BlueGreen

Akaroa Wharf Replacement

Coastal Avifauna Assessment

Prepared for Christchurch City Council
23 July 2025

Document Quality Assurance

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Cover photograph: Akaroa Wharf

Contents

1.0 Introduction

Akaroa wharf, situated on the eastern side of Akaroa Harbour in Banks Peninsula (Map 1), is at the end of its design life (see photos below). As such Christchurch City Council (CCC) is seeking to remove and replace the wharf in the existing location, but shifted north by 1.5-2.5 m (Enviser Ltd, 2025).

At a broader context, Akaroa Harbour is well known for its ecological values, including white flippered penguins (WFP; *Eudyptula minor albosignata*), an *At Risk* endemic subspecies that breeds only on Banks Peninsula. Consequently, BlueGreen Ecology Ltd were engaged to undertake an assessment of effects on coastal avifauna associated with the proposed demolition, construction and operation of the Akaroa Wharf.

Photo 1: North of Akaroa wharf and concrete approach

Photo 2: View east showing an existing pontoon.

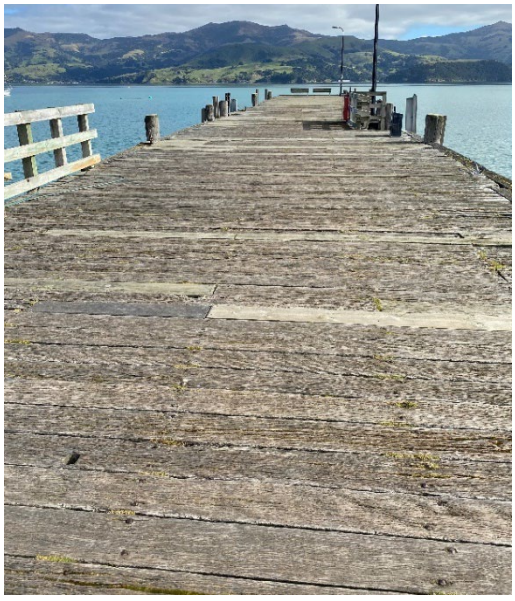

Photo 3: View west looking along the deck of the wharf.

2.0 Methods

2.1 Desktop investigation

A desktop investigation was undertaken to obtain information regarding historical and current coastal avifauna assemblages (including seasonal distribution, abundance and diversity) associated with the Akaroa Harbour and surrounding environments. Data sources included relevant statutory documents, scientific literature (published and unpublished) and relevant websites, including:

- Species[1] records from eBird New Zealand Bird Atlas[2] grid squares DA51 and DB51.
- Species[1] records from eBird hotspot locations[3] for French Farm Bay, Barrys Bay, Duvauchelle Bay mudflats, Robinson's Bay, Takamatua Bay, Akaroa foreshore, Onuku and Akaroa boat trips.
- Forest & Bird Important Bird Areas (IBAs) (Royal Forest and Bird Protection Society of New Zealand, 2015, 2016).
- Information regarding primary and secondary habitat associations[4] was obtained for each species from Heather & Robertson (2005), along with each species' New Zealand threat status according to Robertson *et al*. (2021).
- Christchurch District Plan (CDP) Appendix 9.1.6.1 Schedule of Sites of Ecological Significance (Christchurch City Council, 2017).
- Canterbury Regional Coastal Environment Plan (RCEP) Schedule 1 Areas of Significant Natural Value (ECan, 2020).

2.2 Field investigations

2.2.1 Coastal, shore and wading bird

Due to the location of the proposed activities, field investigations were confined to the inner Akaroa Harbour.

Fixed-point counts of native coastal, shore and wading bird species were conducted at seven locations: Duvauchelle Bay, Robinsons Bay, Takamatua Bay and French Bay, as well as Duvauchelle, Akaroa and Drummonds wharves (refer to Map 2 and representative photos in Appendix 1). Surveys were undertaken on 22-24 August 2023. Two low tide, two mid tide and two high tide surveys were conducted at each of the seven sites.

During each survey, bird species[1], numbers of birds, the locations of birds, their behaviour (foraging, nesting or roosting) and the tidal cycle (low, mid or high) was recorded directly into the ArcGIS online software programme 'FieldMaps' on an iPad. Each survey was approximately 15 minutes long. Observations of Introduced / Exotic species were not recorded.

[1] Excluding species classified as Introduced / Exotic

[2] https://ebird.org/atlasnz/effortmap

[3] https://ebird.org/hotspots

[4] For the purpose of this report, primary habitat refers to the habitat in which the species spends most of its time. Secondary habitats are other habitat types which the species may also utilise.

2.2.2 White-flippered penguin habitat

On 22 August 2023, the Akaroa wharf and land adjacent to the structure was visited to identify the presence of any potential WFP habitat that may be present above mean high water spring. The only potential area identified in proximity to the wharf was a section of recently replaced rip-rap (CRC212107A and CRC212107B) between Drummond and Akaroa wharves (refer to Photo 4 below). While considerable distance from Akaroa wharf, an area of more historical rip-rap revetment (Photo 5 below) by the boat ramp along the eastern coastal margin of Childrens Bay was also searched as it appeared to have crevice sizes that could provide potential WFP habitat.

These areas were searched for any sign of penguin utilising the habitat, including guano, feathers or birds.

Photo 4: Rip-rap adjacent to Akaroa Wharf

Photo 5: Rip-rap adjacent to boat ramp

2.3 Data constraints

The field surveys were undertaken over three consecutive days. While this allowed for the collection of data during different tidal cycles, it could not account for the potential seasonal variability that may occur, including in regard to international and national migrant wader assemblages. Furthermore, the timing of the surveys coincided with the beginning of the breeding season for most species, not the peak.

2.4 Supporting information

In addition to the information collected through the desktop (relevant literature and databases) and field investigations, this assessment has been based on the information provided in the following supporting documents and plans:

- Project description prepared by Enviser Ltd, dated April 2025.
- Isthmus drawing '*Akaroa Wharf Concept*' dated 23 May 2025
- Styles Group (2024). *Underwater noise effects on the marine environment: Akaroa wharf redevelopment*. Report prepared for Christchurch City Council.
- Sneddon & Morrisey (2025). *Replacement of Akaroa wharf: Assessment of effects on benthic ecology*. Report No. 3921 prepared by Cawthron Institute for Christchurch City Council.
- Sneddon (2025). *Addendum to Cawthron Report 3921: Marine ecological effects from the establishment of a temporary barge load-out berth at Akaroa.*
- Clement & Pavanato (2025). *Replacement of Akaroa wharf: Assessment of effects on marine mammals*. Report No. 4105 prepared by Cawthron Institute for Christchurch City Council.
- Marshall Day (2025). A*karoa Wharf Redevelopment: Assessment of Noise Effects (Terrestrial).* Report (Rp 001 R01 20241028) prepared by Marshall Day Acoustics for Christchurch City Council.
- Pedersen Read (2024). A*karoa Wharf Assessment of Environmental Effects: Lighting.* Report prepared by Pedersen Read Ltd for Christchurch City Council.
- Homes drawings:
    - 145457.31 SSK-01 titled '*Akaroa wharf renewal: General arrangement plan*';
    - 145457.31 SSK-02 titled '*Akaroa wharf renewal: Typical sections*'.

2.5 Assessment methodology

The method used to undertake this assessment is consistent with the Environment Institute of Australia and New Zealand (EIANZ) guidelines for undertaking ecological impact assessments (Roper-Lindsay et al., 2018), whereby ecological values are assigned (Table 1) and the magnitude of effects identified (Table 2) in order to determine the overall level of effect of the proposal (Table 3).

The EIANZ guidelines (Roper-Lindsay et al., 2018) use the New Zealand threat classification as a criteria for assigning ecological value to species as outlined in Table 2. Robertson et al. (2021) provides the most recent threat classifications for avifauna and as such has been used to assign values to individual species. We note that threat classifications that are captured under the EIANZ Very High, High or Moderate ecological value criteria, are the same as those identified in the New Zealand Coastal Policy Statement (Department of Conservation, 2010) Policy 11a(i), that is, *Threatened* or *At Risk* species in the New Zealand Threat Classifications System lists.

Table 2 lists the criteria and descriptions for determining the magnitude of effect as described in the EIANZ guidelines (Roper-Lindsay et al., 2018). For the purpose of this assessment, we have determined the magnitude of effect at the local scale, that being the inner Akaroa Harbour (shown in Map 1), based on the similarity in habitats within that area (e.g. intertidal mudflats, coastal structures and water depths). We have also taken a species rather than habitat focus, and as such the population criteria (text italicised and bolded in Table 2) has been applied for the assessment of effects.

Table 1: Criteria for assigning ecological value to species (Roper-Lindsay et al., 2018).

ECOLOGICAL VALUE	SPECIES CLASSIFICATION
Very High	*Nationally Threatened* (Nationally Critical, Nationally Endangered, Nationally Vulnerable, Nationally Increasing[5]) species found in the ZOI[6] either permanently or seasonally
High	Species listed as *At Risk – Declining* found in the ZOI either permanently or seasonally.
Moderate	Recovering or Naturally Uncommon species found in the ZOI either permanently or seasonally; or Locally (ED) uncommon or distinctive species.
Low	Not Threatened
Negligible	Exotic species, including pests, species having recreational value.

Table 2: Criteria for describing magnitude of effect (Roper-Lindsay et al., 2018)

MAGNITUDE	DESCRIPTION
Very High	Total loss of, or very major alteration, to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether; AND/OR ***Loss***[7] ***of a very high proportion of the known population*** or range of the element / feature.
High	Major loss or major alteration to key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR ***Loss***[7] ***of a high proportion of the known population*** or range of the element / feature.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that post-development character, composition and/or attributes will be partially changed; AND/OR ***Loss***[7] ***of a moderate proportion of the known population*** or range of the element / feature.
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances/patterns; AND/OR ***Having a minor effect on the known population*** or range of the element / feature.
Negligible	Very slight change from existing baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR ***Having a negligible effect on the known population*** or range of the element / feature.

Table 3: Criteria for describing the level of effect (Roper-Lindsay et al., 2018)

LEVEL OF EFFECT		ECOLOGICAL AND / OR CONSERVATION VALUE				
		Very High	**High**	**Moderate**	**Low**	**Negligible**
MAGNITUDE	**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
	Positive	Net gain	Net gain	Net gain	Net gain	Net gain

[5] Nationally Increasing is category that was devised by DOC in 2021 (Michel, 2021). Thus, while such a threat category is not identified in Roper-Lindsay et al. (2018), we have included it along with all other *Threatened* classifications in to the Very High ecological value category.

[6] Roper-Lindsay et al. (2018) define the Zone of Influence (ZOI) as "the areas/resources that may be affected by the biophysical changes caused by the proposed project and associated activities."

[7] In the context of mobile fauna, the term "loss" can include displacement from an area.

3.0 Existing environment – Akaroa Harbour

3.1 Akaroa Harbour

Akaroa Harbour enters from the southern coast of the Banks Peninsula, heading in a predominantly northerly direction. The harbour is 4,200 ha, with a total shoreline length of approximately 16.5 km. The outer harbour is approximately 1.8 km wide at is heads (Fenwick, 2004). Although the heads are exposed to the full force of storm waves approaching from southerly quarters, the inner half of the harbour is very sheltered, with wide mudflats between steep rocky headlands (Fenwick, 2004). Shores along the length of the harbour grade from soft, gently sloping muds landward to vertical unbroken bedrock seaward (Fenwick, 2004).

The 512.15 ha Akaroa Marine Reserve lies at the mouth of the harbour, on the south-eastern side, providing protected marine habitat for species such penguins and dolphins.

While the Akaroa Harbour itself is not recognised by Forest & Bird (2016) as an Important Bird Area (IBA), the coastal margin of Banks Peninsula is identified as an IBA (NZ060, Figure 1 below; Forest & Bird (2015)). This IBA (Figure 1 below) is based on the populations of IBA trigger species (yellow-eyed penguin (*Megadyptes antipodensis*) and spotted shag (*Phalacrocorax punctatus*)) that are present on the Peninsula.

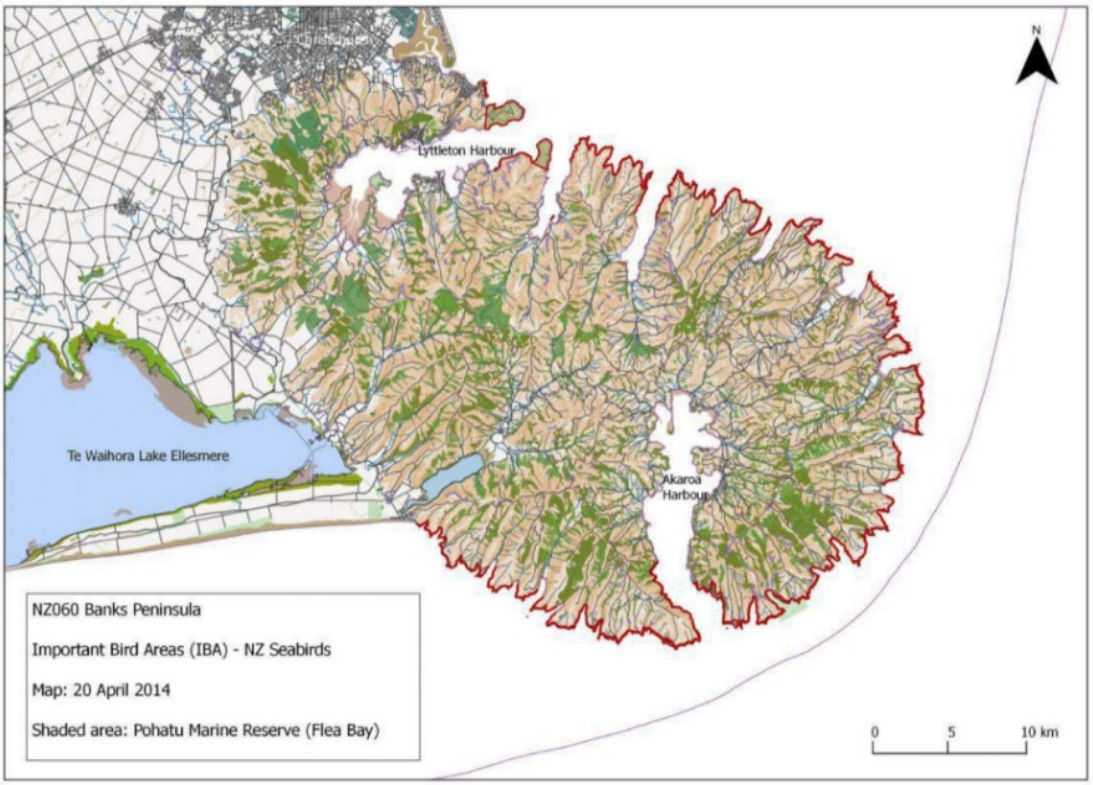

Figure 1: Extent of the proposed Banks Peninsula (NZ060) IBA. (Source: Forest & Bird (2015))

Spotted shag nest on the cliffs of the Banks Peninsula, including within Akaroa Harbour (Doherty & Bräger, 1997). Until recently, this species was classified as *Not Threatened;* however,

Robertson et al. (2021) updated its classification to *Threatened – Nationally Vulnerable (E(1))*[8]. Robertson et al. (2021) reported that this updated classification is in part being driven by "*the significant and ongoing decline in the number of breeding pairs on Banks Peninsula, a site used by c. 30–50% of the entire species (Andrew Crossland, Christchurch City Council, pers. comm.). Breeding habitat was lost during the devastating Canterbury earthquakes of 2010–2011, and the population has failed to recover since then*".

WFP are endemic to Canterbury and breed on Banks Peninsula, Otamahua / Quail Island, Moncks Bay and Motunau Island (approximately 65 km north of Christchurch). Challies & Burleigh (2004) reported 68 WFP colonies on the Banks Peninsula, including three colonies within Akaroa Harbour (colony sizes of 139, 83 and <50). Brägger & Stanley (1999) reported a WFP colony on Onawe Peninsula, at the northern end of Akaroa Harbour.

3.2 Coastal bird species and habitat

A compiled list of the 55 coastal and oceanic species recorded from the desktop sources for Akaroa Harbour is provided in Appendix 2, along with their NZ threat classifications (Robertson et al., 2021). These species will utilise the harbour to varying degrees and for different functions. The harbour as a whole has considerable ecological values and coastal avifauna of the inner and outer harbour differs. For instance, the intertidal mudflats in the inner Akaroa Harbour bays (e.g. French Farm, Barry's, Duvauchelle, Robinsons and Takamatua bays) provide foraging habitat for a variety wading and shorebird species. Whereas species of petrel, shearwater, prion, penguin, gannet and shag forage on fish in the deeper waters of the harbour.

A total of 14 native coastal bird species were recorded during the August 2023 surveys, including two *Threatened* and eight *At Risk* species (Table 4). The highest overall bird abundance (n=452, Figure 2) and species diversity (n=10, Figure 3) was recorded at Duvauchelle Bay.

The distribution of the species recorded at the survey sites are shown in Maps 3-7. The predominant activity recorded at Duvauchelle, Robinsons and Takamatua bays was foraging (refer to Figure 4 below), which is expected given the expansive intertidal mudflats that are at these locations. Whereas the predominant activity recorded at Duvauchelle wharf and French Bay was roosting associated with the wharf structures.

Table 4: Native coastal avifauna species recorded during the August 2023 survey

SPECIES	THREAT CLASSIFICATION	ECOLOGICAL VALUE[9]
Caspian tern	Threatened - Nationally Vulnerable	Very High
Spotted shag	Threatened - Nationally Vulnerable	Very High
Red-billed gull	At Risk - Declining	High
South Island pied oystercatcher	At Risk - Declining	High
White-fronted tern	At Risk - Declining	High
Royal spoonbill	At Risk - Naturally Uncommon	Moderate
Pied shag	At Risk - Recovering	Moderate
Variable oystercatcher	At Risk - Recovering	Moderate
Black shag	At Risk - Relict	Moderate

[8] This classification is assigned to species with large populations and ongoing or predicted decline.
[9] Refer to Table 1 (page 5) for the criteria to assign species' ecological values

SPECIES	THREAT CLASSIFICATION	ECOLOGICAL VALUE[9]
Little shag	At Risk - Relict	Moderate
Australasian gannet	Not Threatened	Low
Paradise shelduck	Not Threatened	Low
Southern black-backed gull	Not Threatened	Low
White-faced heron	Not Threatened	Low

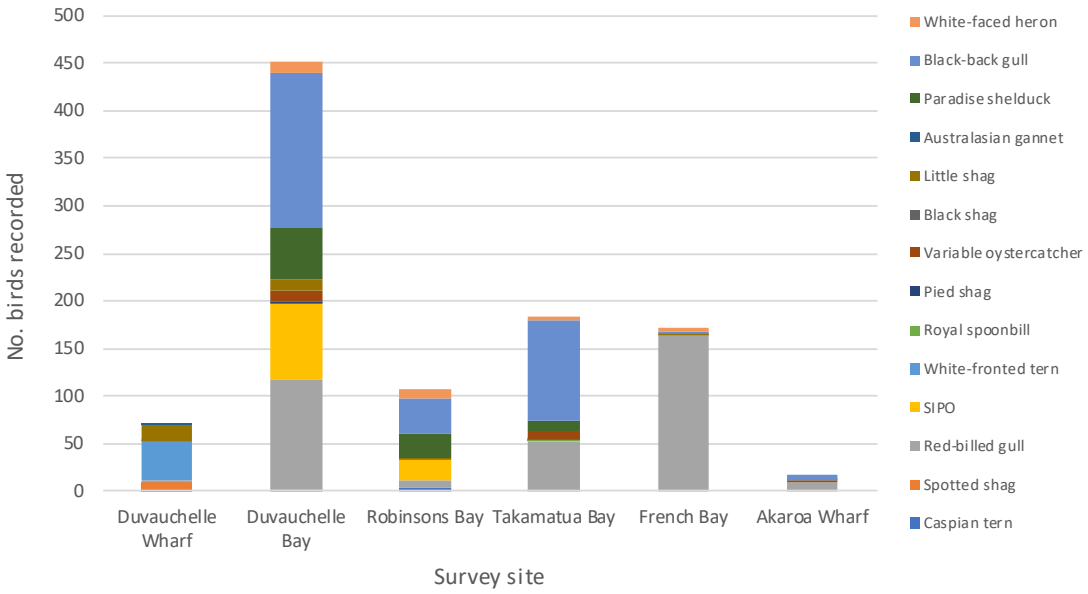

Figure 2: Coastal avifauna species diversity and abundance recorded during the August 2023 survey

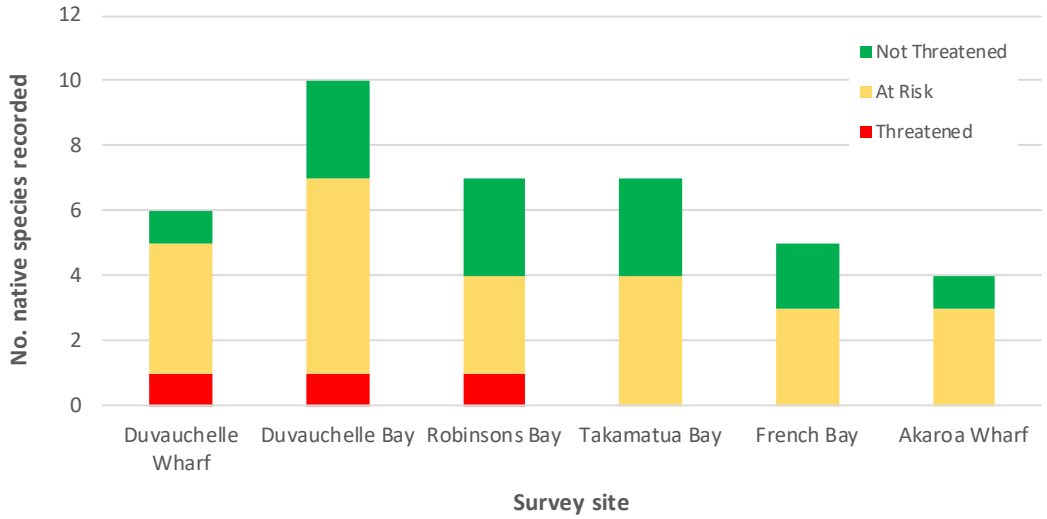

Figure 3: Native coastal avifauna diversity and threat classifications recorded during the August 2023 survey

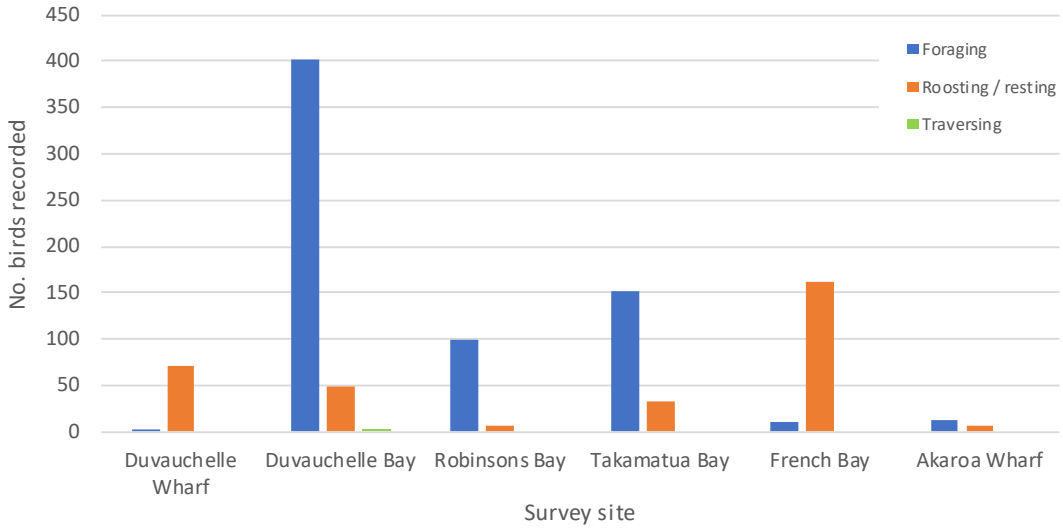

Figure 4: Coastal avifauna behaviours recorded during the August 2023 survey

3.3 Akaroa Inlet

Akaroa wharf is located at the southern end of French Bay, Akaroa Inlet. The intertidal mudflats of Akaroa Inlet are narrower than those of the inner harbour bays, ranging from around 200 m in width in Childrens Bay towards the north of the inlet, to around 50 m in French Bay (Hart et al., 2009).

During the August 2023 surveys, five native species were recorded at the Akaroa wharf and French Bay sites (Map 7): little shag (*At Risk*), red-billed gull (*At Risk*), southern black-backed gull (*Not Threatened*), variable oystercatcher (*At Risk*) and white-faced heron (*Not Threatened*). Notably, no birds were recorded on the Akaroa wharf itself (refer to Map 7); rather birds were recorded foraging in the adjacent intertidal habitat, including in French Bay, or roosting on other wharf structures. Drummond's wharf, included in the French Bay survey site, was regularly used by roosting birds (Figure 4 above), primarily red-billed gulls (Figure 3 above and Photo 6 below).

While only five native species were recorded at the Akaroa wharf and French Bay sites during the August 2023 surveys, it is possible that all the species that were recorded in the wider upper Akaroa Harbour (refer to Table 4 above) may occur there.

The survey of the two areas of potential WFP habitat (refer to Section 2.2.2, Photo 4 and Photo 5, page 3) confirmed that no birds were breeding at those locations, including Akaroa Wharf. Furthermore, the bays either side of the Akaroa wharf, as well as the coastal structures, experience high levels of public use and disturbance, and therefore do not provide opportunities for other coastal birds to breed.

Photo 6: Red-billed gulls roosting on Drummond's wharf[10]

4.0 Significant Sites

Appendix 9.1.6.1 of the Christchurch District Plan (Christchurch City Council, 2017) identifies three Sites of Ecological Significance (SES) within Akaroa Harbour (SES/A/10 Barry's Bay kahikatea, SES/A/20 Wainui / Carews Peak and SES/A/22 Lighthouse Road coastal slopes). The project site is not located within any of these SES's.

Schedule 1 of the Canterbury Regional Coastal Environment Plan (RCEP) identifies Areas of Significant Natural Value (ASNV); three such sites are located within the Akaroa Harbour (refer to Table 5 and Figure 5). The project site is not located within any of these ASNVs.

Table 5: RCEP Schedule 1 Areas of Significant Natural Value within Akaroa Harbour

SITE	NAME	AREA	VALUES IDENTIFIED
S5.5.25 (Site No: 12-017)	Akaroa Harbour tidal flats	365.88 ha	• Maori cultural values • Protected areas • Wetland, estuaries and coastal lagoons • Marine mammals and birds • Ecosystems, flora and fauna habitats • Scenic sites
S5.5.26 (Site No: 12-018)	Onawe Peninsula	82.83 ha	• Maori cultural values • Protected areas • Marine mammals and birds • Ecosystems, flora and fauna habitats • Scenic sites • Historic places • Coastal landforms and associated processes
S5.5.24 (Site No: 12-016)	Nikau Palm Gully to Akaroa Head	321.04 ha	• Protected areas • Marine mammals and birds • Ecosystems, flora and fauna habitats • Scenic sites

[10] **Note**: Photo of Drummond's wharf taken during the August 2023 survey, prior to the refurbishment works to accommodate recreational usage.

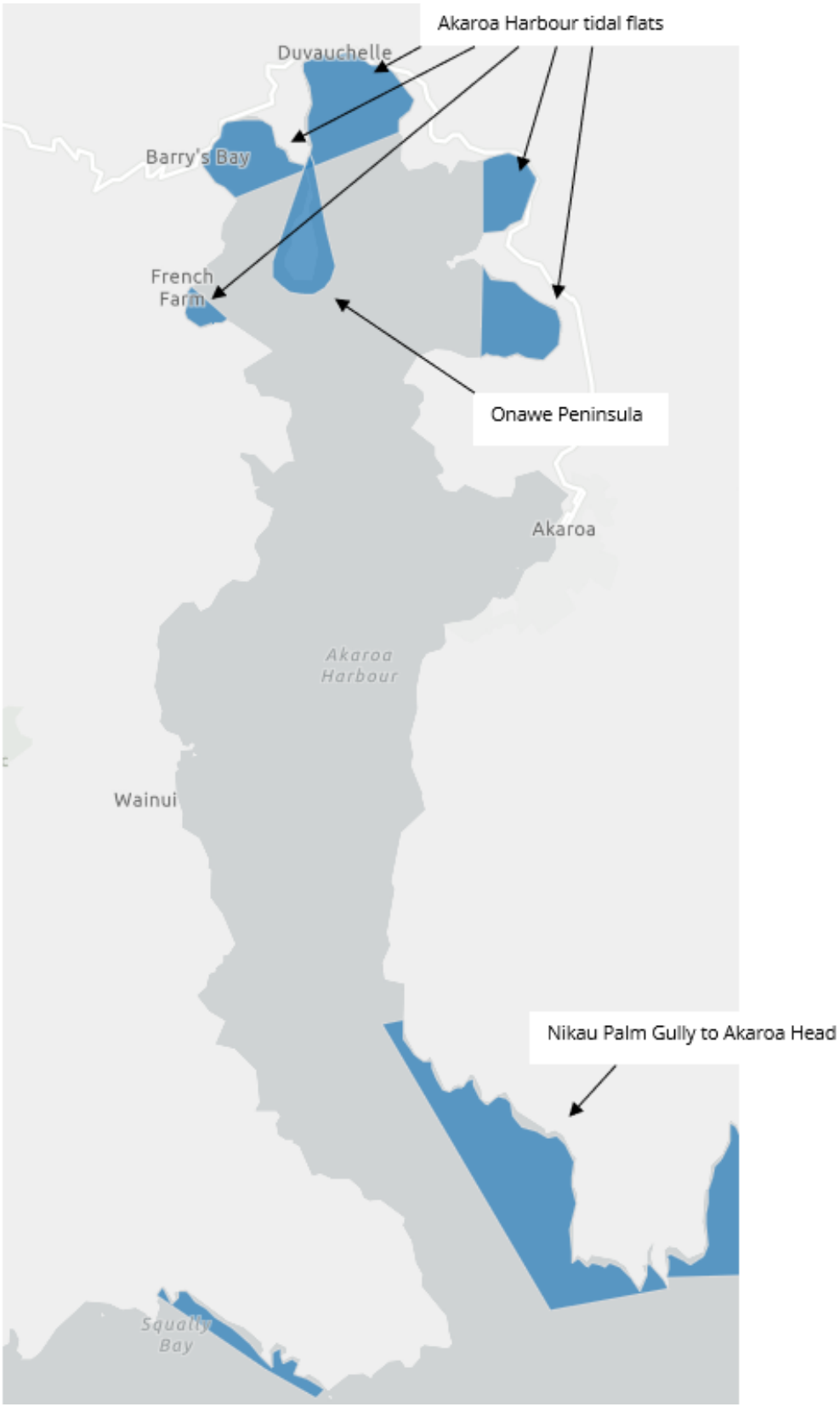

Figure 5: RCEP Schedule 1 Areas of Significant Natural Value within Akaroa Harbour

5.0 Akaroa Wharf Project

The following description of the Akaroa wharf Project and construction details are taken from Enviser (2025).

5.1 Description

Akaroa Wharf will be rebuilt generally in the existing wharf's location. The wharf will be approximately 185 m long and 8 m wide for most of its length. The proposed construction envelope covers the existing alignment of the wharf, an option to move the wharf to the north by 1.5-2.5m. The alignment may also be adjusted to avoid clashes with the existing pile layout. The wharf deck and supporting piles will all be constructed within this envelope. Ancillary features, like ladders, fender piles and other fittings, may extend beyond the envelope. The exact orientation of the wharf will be dependent on the piling layout and will be refined during detailed design.

5.1.1 Marine side elements

- Wharf height will be raised to 3.06 m, which is between 500-600 mm higher than the existing deck to allow for sea-level rise and storm surges.
- The proposed wharf will be approximately in its original location or, potentially, offset from its existing alignment by 1.5-2.5 m to the north.
- New floating pontoons will be arranged on the northern and southern faces of the main wharf. The pontoons will be accessed from the main wharf by gangways and small piled platforms.
- The southern floating pontoon will include infrastructure for diesel refuelling.
- A new crane will be installed on the western end of the wharf to assist commercial vessels with loading/unloading.
- Removal of the original 1887 abutment and associated reclamation back, to accommodate the increase in deck height and lateral shift of the wharf. A small area of reclamation, enclosed by a concrete 'L-wall' seawall, is proposed on the northern side of where the new wharf will meet the shoreline (refer to Figure 6 below).
- Wharf materials will include reinforced concrete decking, steel-encased concrete piles, timber fender piles and timber deck elements along with various wharf fittings (bollards, lighting etc).
- To facilitate construction, a small loading ramp will be constructed on the southern side of the Akaroa boat ramp (refer to Figure 7 below). This will require a temporary reclamation, disturbance of the seabed, placement of geotextile, granular fill and rip rap protection. A concrete surface may be required. 2-4 steel piles (610mm diameter) will be driven along the southern side of the existing boat ramp to form a training wall to facilitate the barge loading/unloading.
- The seaward approach to this ramp will require dredging to facilitate barge access (refer to Figure 8 below). The dredge channel will extend approximately 90m from the shoreline, be approximately 30m wide. In total, approximately 1,500 m^3 of seabed will be dredged with the spoil removed to/placed to the southwest of the dredged channel.

Dredging will be undertaken via mechanical excavator, either based on a barge, or from shore at low tide, or a combination of both.

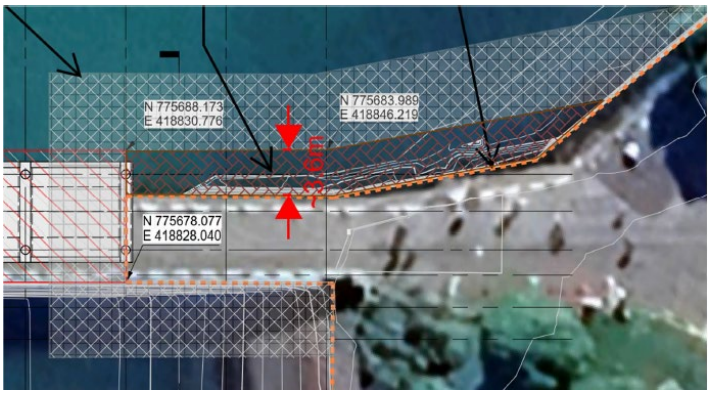

Figure 6: L-wall' seawall, shown between red arrows, against the northern wall of the wharf abutment (taken from Holmes drawing 145457.31 SSK-01).

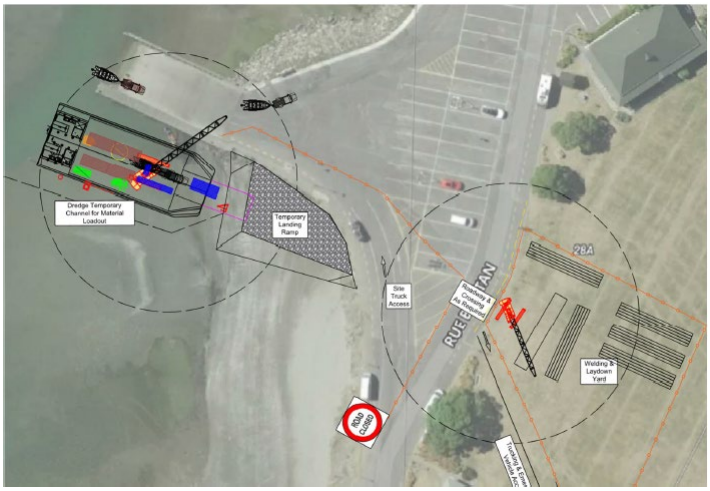

Figure 7: Temporary landing ramp at the entrance to the wharf (HEB, 2025)

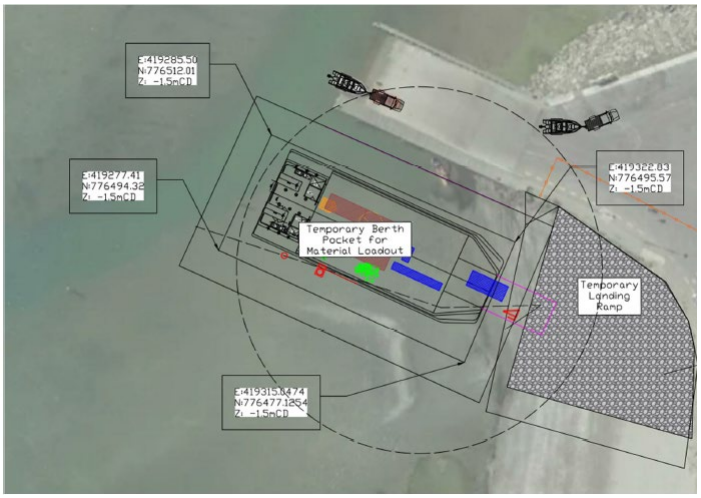

Figure 8: Temporary berth pocket at the entrance to the wharf (HEB, 2025)

5.1.2 Land side elements

- Two construction phase laydown areas (1 and 2).
- A vehicle staging area (located at the Beach Road boat ramp).

- A closed section of the road near the recreation ground boat ramp.
- Construction phase alterations to parking spaces and traffic movements.
- Trenching to connect services.
- Earthworks to remove the abutment and construct the new seawall, abutment and prepare for surface finishes.
- Sealing and concrete works to provide a finished surface.

5.2 Construction

5.2.1 Enabling works

This will comprise the following:

1. Establish a laydown area at the recreation ground boat ramp (Laydown 1), and install security, fencing, containers and traffic management at the main wharf area (Laydown 2)
2. Establish the boat ramp (and undertake dredging) to allow the Patiki to berth alongside to transfer plant and materials.
3. Mobilise the Patiki to Akaroa (from Lyttelton and loaded with plant).
4. Construct the 'L-wall' at the base of the existing wharf.

5.2.2 Wharf demolition, piling and construction methodology

The piling methodology will rely on the existing wharf structure for support of the piling gates, so demolition will follow behind the landside piling front. The general sequence is as follows:

- Enabling works will commence, primarily the construction of the 'L-wall' to provide support and staging space for the piling.
- The piling rig (crawler crane) will track out to the first bent on the wharf.
- A small section of deck will be cut out and removed in the location of one pile in the bent, the other pile will likely sit outside the face of the existing wharf.
- The piling gate (two piles) will be placed on the existing wharf deck and secured in place.
- The piling rig will pitch and place the steel piles (all piles are expected to be pitched and driven in a single length). The piles will have a steel driving tip welded to the end to enable driving into the weathered basalt.
- Vibro piling methods (using a 100-ton crawler crane with an ICE 28RF vibro hammer) will be used to drive the piles as far as possible. This is a variable frequency, resonance free hammer that minimises vibration and reduces noise.
- A percussion piling hammer will then be used to drive the piles until the desired embedment into the basalt is achieved. If the required embedment cannot be achieved with percussive piling, the pile may need to be removed, and a drill used to pre-drill a socket into the basalt before the pile is re-driven.
- Once the piles are installed, they will be filled with concrete and the capping beams will be put in place.
- Temporary platforms/grillage will be installed on the capping beam to allow the piling rig to advance to the next bent. Temporary piles may be required to support this

temporary works, but they will be the same diameter (or smaller) than the permanent piles.

- A second, marine-based piling crew, will undertake a similar operation with a piling rig based on the barge. The marine-based rig will work from the outer end, install piles and then demolish the existing wharf. Once it has met up with the land-based rig, it will assist the land-based operation with the capping beams and placement of concrete in the piles. The marine plant will also be used to remove all the old timber piles that clash with the new, with the remainder cut at seabed level using HEB's hydraulic shears.
- The piling rigs will not undertake piling concurrently, but the work fronts will advance together.
- Any remaining sections of wharf will be demolished, and the wharf deck can be constructed, which will comprise:
    - Placement of precast deck elements on the capping beam
    - Installation of temporary formwork
    - Pouring the topping slab
- Finishing works (surface finishes, furniture installation, and electrical) will following completion of the wharf deck. Buildings may be constructed at this point. This section has been left until last to prevent damaging these items.

The following notes provide additional information on the construction methodology and assumptions:

- It is assumed that dredging is not required for vessel navigation purposes (in the operational phase).
- Material/soil etc from the abutment removal will be disposed of at an authorised land-based facility. If larger rocks are present, they may be re-used as riprap.
- Placement of materials on the seabed will be confined to within the design footprints for the wharf (including L-wall and riprap) and floating pontoons.
- An estimated 44-55 piles (710 mm diameter) will be required for the main wharf and 12-16 (710 mm diameter) for the floating pontoons (north and south).

5.2.3 Noise

The demolition and construction activities have the potential to generate noise at levels that may disrupt residents, businesses and wildlife. To manage these effects, the following constraints and methodologies are anticipated:

- Noise reduction methods for underwater noise (i.e. bubble curtains);
- Noise reduction methods for terrestrial noise (i.e. non-steel dollys, shrouds etc);
- Use of low noise methods where possible.
- Restrictions on the time-of-day piling can occur;
- Minimising the overall piling programme to limit disturbance timeframes.

5.2.4 Hours of work

The standard work hours of Monday to Saturday 07:30-18:00 hrs are likely to apply to the general works, piling may be restricted to weekdays and daylight hours only. No work on Sundays or public holidays. It is also likely a restriction on working over the Christmas- New Year holiday (2-week period).

5.2.5 Duration of works

A full programme is yet to be prepared, but initial estimates are an overall programme over 11-14 months comprising (noting some works are concurrent):

- Site setup 1-2 months;
- Demolition 2-3 months;
- Piling and deck 5-6 months;
- Deck furniture, services and pontoons 3-4 months.

6.0 Assessment of Effects

Based on the project description and construction method provided in Section 5.0 above, the potential construction and operational effects on coastal avifauna associated with the Akaroa wharf project, and which have been assessed below, relate to considerations associated with the following:

- Habitat loss;
- Injuries and /or mortalities;
- Disturbance / displacement;
- Food supply and foraging ability;
- Artificial lighting;
- Pollution / contaminants and litter; and
- Cumulative effects

6.1 Habitat loss

While no birds were recorded roosting or breeding on Akaroa wharf during the August 2023 surveys, it is possible that species such as red-billed gull which use the adjacent wharf structures (refer to Map 7) use Akaroa wharf to roost. We consider it highly unlikely that coastal birds nest on the Akaroa wharf due to the level human activity that occurs there. This potential roosting habitat would be unavailable during the construction phase of the project, however the magnitude of effect on the coastal avifauna species roosting on the Akaroa wharf is considered to be Negligible[11] and of a temporary nature.

[11] As defined in Table 2 on page 5

The proposed reclamation associated with the L-wall seawall (shown in Figure 6 on page 13) will result in the permanent loss of very small area of habitat, however we consider this will be of Negligible magnitude of effect given no birds were recorded utilising this area (refer to Map 7).

The proposed reclamation associated with the loading ramp (shown in Figure 7 on page 13) will result in the temporary loss of a small area of intertidal foraging habitat for a limited number birds that were recorded foraging adjacent to the proposed reclamation site (refer to Map 7). Given the extensive areas of intertidal foraging habitat in close proximity (e.g. French Bay) and the wider inlet, the magnitude of effect on the coastal avifauna species foraging in the area of the proposed reclamation for the loading ramp is considered to be Negligible and of a temporary nature.

Thus, the potential **level of effect** of the loss of roosting or foraging habitat is considered to be **Very Low** based on a Negligible magnitude of effect and the High ecological values of the *At Risk* species recorded in the wider area (refer to Section 3.3 and Map 7) that may utilise Akaroa wharf.

We acknowledge that there may be other species that weren't recorded during the August 2023 survey which may roost on Akaroa wharf. However, we would expect that the magnitude of effect resulting from the temporary loss of habitat (both temporary and permanent) on those species to also be Negligible for the same reasons as outlined above. Therefore, the level of effect on any *Threatened* and *At Risk* species that roost on Akaroa wharf or forage on the adjacent beach would be Low to Very Low.

6.2 Injuries and /or mortalities

The mobile nature of most avifauna species means that the direct injuries and / or mortalities associated with the Akaroa wharf activities would only occur to breeding birds.

The coastal avifauna and WFP surveys confirmed that there is no breeding habitat on or adjacent to the Akaroa wharf. As such, there is no risk of injuries or mortalities as a result of the Akaroa wharf project. Furthermore, given the level of human activity and disturbance that occurs on the Akaroa wharf, it is extremely unlikely that coastal birds (e.g. gulls, terns etc) breed on this structure. This is further supported by the fact that there are no eBird records of coastal birds breeding on Akaroa wharf.

Thus, the potential effects of injuries and / or mortalities are **avoided** through the mobile nature of roosting birds, and the absence of breeding coastal birds on Akaroa wharf.

6.3 Disturbance / displacement

There is the possibility that birds recorded foraging and roosting adjacent to the Akaroa wharf (red-billed gull, variable oystercatcher, little shag and southern black-backed gull; refer to Map 7) may be disturbed / displaced during the demolition and construction phases of the project. However, given these species are already exposed to high levels of activities, and the presence of similar habitats nearby, the magnitude of effects result from displacement / disturbance on these birds during the demolition, construction and operational phases is considered to be Negligible[11].

Another form of disturbance / displacement to birds during the construction phase relates to underwater noise levels from such works as impact and vibro-piling. All seabirds obtain their

food from the marine environment; however, they differ in the methods used to obtain their prey (refer to Figure 9). These various methods differ in the amount of time individuals spend under water, with underwater pursuit species such as penguins, shearwaters, diving petrels and shags spending the greatest amount of time underwater relative to other seabird species.

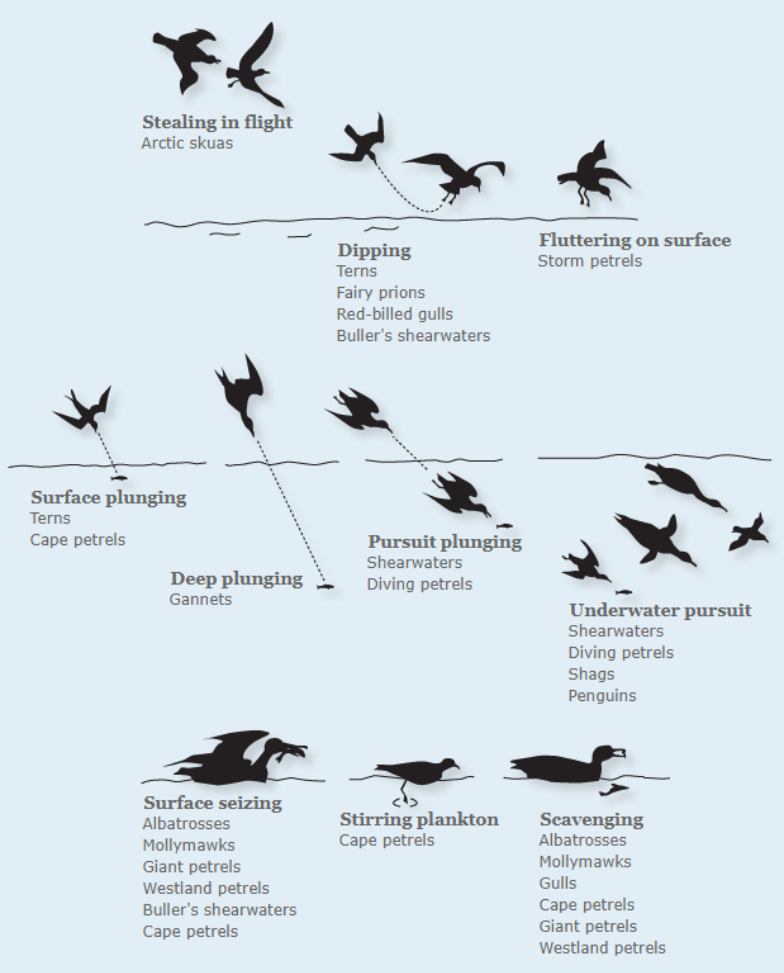

Figure 9: Seabird feeding methods (Source: Te Ara – Encyclopaedia of New Zealand)

Styles Group (2024) determined that the Akaroa wharf piling noise is expected to be audible across the harbour to Anchorage Bay near Wainui Wharf (approximately 5km; refer to Figure 10 below, taken from Styles Group (2024)). While Brägger & Stanley (1999) reported a WFP colony on Onawe Peninsula, north of Akaroa Inlet, their study of the near-shore distribution and seasonal abundance of WFP's reported that birds as almost exclusively used the southern (outer) half of the Akaroa Harbour. Furthermore, WFP generally come to shore at dusk and leave at dawn. As such, it is likely that WFP will be outside the zone of influence when vibro-piling is occurring.

Furthermore, the inner Akaroa Harbour provides an expansive area for shag species to forage in away from the piling works.

Thus, the potential **level of effect** of disturbance / displacement on birds associated with the construction (above and below water) and operation of the Akaroa wharf is considered to be **Low to Very Low** based on a Low and Negligible[11] magnitude of effect for WFP and all other coastal species respectively.

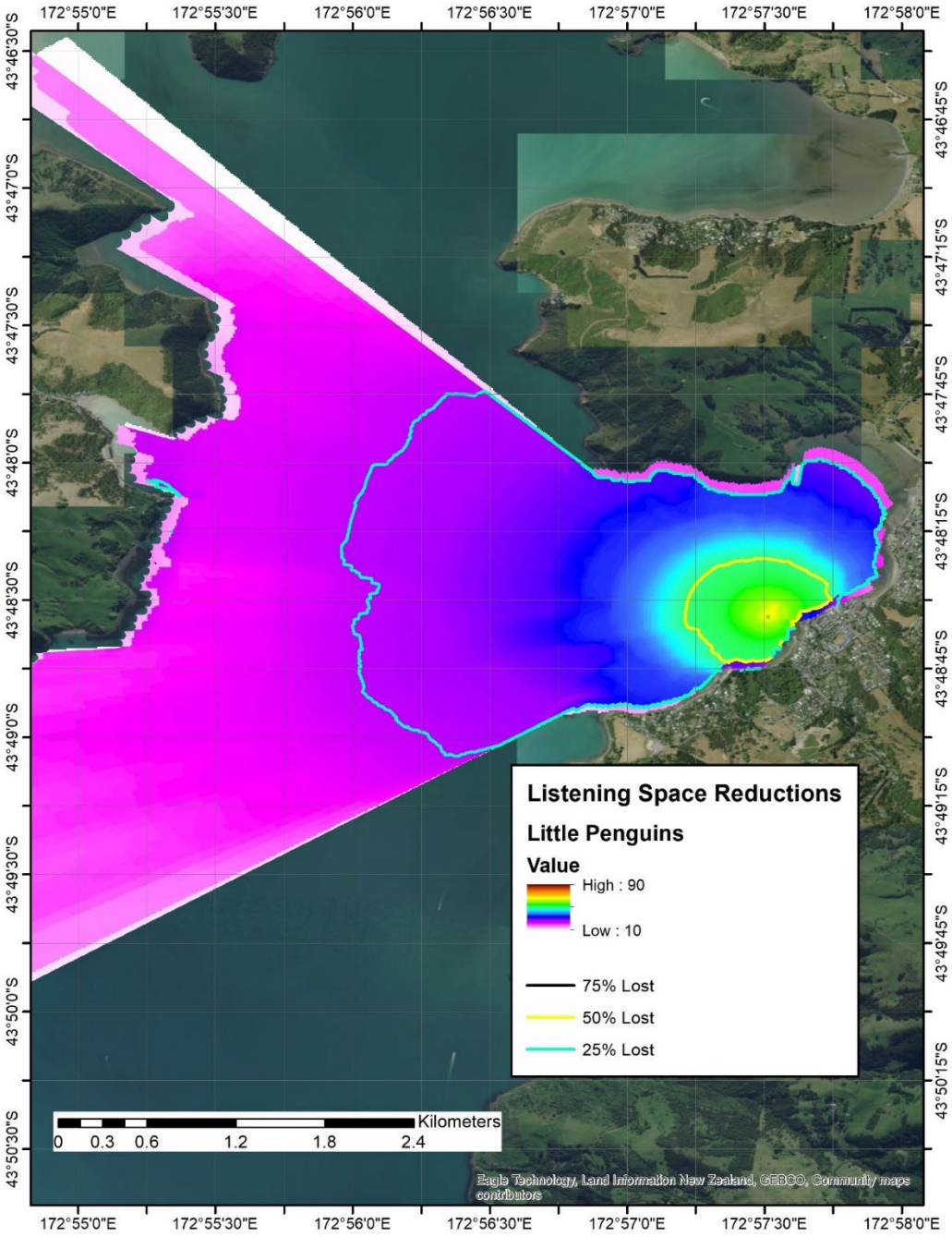

Figure 10: Map showing the extent of listening space reductions (LSR, %) for little penguins during the percussive piling. (Source: Styles Group (2024))

6.4 Food supply & foraging ability

The potential impact of loss of intertidal foraging habitat associated with the temporary reclamation for the loading ramp has been assessed in Section 6.1 above, while underwater noise levels associated with construction works on WFP and shag foraging have been assessed in Section 6.3 above. In this current section we have assessed the following potential indirect effects of the Project on coastal avifauna:

- Food supply – Changes in ability of wading shorebirds to access food or a decrease in food supply due to the deposition of sediment in the intertidal foraging areas; and
- Foraging ability – Changes in the ability of visual predators (divers) to detect prey in the water due to increased suspended sediment (TSS) in the water column.

In terms of existing food supply for wading shorebirds, Sneddon & Morrisey (2025) reported that the intertidal habitat in French Bay supported a typical community, with limited diversity, likely due to the absence of bedrock reef and the relatively mobile nature of the cobble and pebble substrate. With regards to the beach adjacent to the existing wharf (and location of the proposed temporary barge landing), Sneddon (2025) reported that the infauna samples were quite sparse and that overall abundances and taxa richness of infauna were comparable to those of shallow offshore areas of Akaroa Inlet. These descriptions of the quality and quantity of available prey items align with the observation of very few birds foraging in French Bay and Akaroa wharf areas (refer to Section 3.3 above and Figure 4 on page 9).

Species that were observed or likely to forage in the waters around the Akaroa wharf include shags, terns, gulls and WFP. Shag, tern and penguin are all visual foragers and as such increased levels of turbidity can impact the ability of these species to locate prey within the water column. However, with regards to the indirect effects from propagation of turbidity plumes on benthic ecology, Sneddon & Morrisey (2025) concluded that these are likely to extend no more than a few hundred of metres from the site, and except directly adjacent to the source, are expected to be both short-lived and of negligible severity / magnitude relative to naturally occurring nearshore resuspension events.

Thus, based on the localised and temporary nature of any increased turbidity and sedimentation associated with the Akaroa wharf works (including temporary reclamation and dredging activities associated with the loading ramp), and the extensive foraging habitat (including intertidal) available within the inner Akaroa Harbour, the magnitude of effect on the food supply and foraging ability of coastal avifauna is considered to be Negligible. Thus, the potential **level of effect** on foraging ability is considered to be **Low to Very Low** based on a Negligible[11] magnitude of effect and the Very High and High ecological values of the *Threatened* and *At Risk* species recorded or likely foraging there.

6.5 Artificial lighting

Artificial lighting will be required to support the wharf construction whenever works are undertaken outside of daylight hours. Most of the construction works are expected to occur during daylight hours with limited works after dark.

Light-induced mortalities have been recorded for a number of seabirds, particularly petrels, whereby they are attracted to artificial light sources and either collide with structures or are vulnerable to predation when on land (Black, 2005; Deppe et al., 2017; Le Corre et al., 2002,

2003; Montevecchi et al., 2006; Reed et al., 1985; Rodríguez et al., 2012; Rodríguez & Rodríguez, 2009). Another potential effect of attraction to artificial lights is that birds are temporarily diverted towards the light(s) and away from other areas (e.g. breeding colonies).

Conversely, Santos et al. (2010) found that artificial illumination from urban areas and roads had a positive effect on nocturnal foraging of waders whereby visual foragers increased their foraging effort in illuminated areas, and mixed foragers changed to more efficient visual foraging strategies. These behavioural shifts improved prey intake rate by an average of 83% in visual and mixed foragers (Santos et al., 2010).

Coastal avifauna are currently exposed to the existing lighting on Akaroa wharf and the adjacent shoreline[12]. Furthermore, neither the historical fittings, nor the existing LED fittings have any backlight shields or physical shrouding to control spill light (Pedersen Read, 2024).

In the lighting assessment for the Project, Pedersen Read (2024) outline the proposed construction and operational phase lighting. As noted in that assessment, the permanent wharf lighting will be informed by best practice design principles from the *National Light Pollution Guidelines for Wildlife* (Commonwealth of Australia, 2023), and include:

- Lighting kept to the minimum required for safe construction and operation; and
- Lighting should be directed downwards (not upwards) and shielded to reduce light projecting horizontally towards coastal waters and avoid light projecting vertically to passing birds.

As such, provided the above measures are applied, any potential effects of lighting on coastal avifauna from the construction and operational phases of the Akaroa wharf project will be less than is occurring with the existing environment, and will in fact result in a **Positive** effect due to the removal of the existing LED fittings on the pole-mounted luminaires[13] which don't have any backlight shields or physical shrouding to control spill light.

6.6 Pollution / contaminants and litter

Marine pollutants include hydrocarbons, heavy metals, hydrophobic persistent organic pollutants and small plastic debris. The location of seabirds at or near the top of the marine food web makes them particularly sensitive to these pollutants (Burger & Gochfeld, 2002; Furness & Camphuysen, 1997). Some toxins can have a range of effects on seabirds, including affecting development, physiology and behaviour, reproductive performance and survival rates (Burger et al., 1992; Burger & Gochfeld, 1993; Finkelstein et al., 2006; Fry, 1995; Howarth et al., 1982). Pollutants can also affect seabirds indirectly by altering their habitat structure and prey availability.

Ingestion and entanglement of marine litter (including discarded fishing line and hooks), particularly plastics, is common among seabirds and can cause death by dehydration, blockage of the digestive tract, or toxins released in the intestines (Brandão et al., 2011; Colabuono et al., 2009; Furness, 1985; Hutton et al., 2008; Pierce et al., 2004; Verlis et al., 2013).

[12] According to Pedersen Read (2024), the existing wharf general lighting comprises 5 x pole mounted luminaires on the wharf structure and one pole mounted luminaire on the abutment. The existing poles are approximately 5m high. In addition to the pole mounted lighting on the wharf, there are also 4 x wall mounted exterior bulkhead luminaires mounted on the Blue Pearl Gallery building, and some interior lighting in the Black Cat Cruises building, visible though the shopfront glazing.

[13] Lighting associated with the existing buildings on Akaroa wharf is outside the scope of the current project and as such are not included in this assessment.

The current wharf provides a diesel supply facility for commercial vessel operators. The southern floating pontoon will be designed to allow installation of infrastructure for diesel refuelling of vessels in the future.

The risks of accidental spillages of fuel and other materials (e.g. uncured cement during construction) are inherently difficult to predict because they depend on operational practices that are yet to be established (Sneddon & Morrisey, 2025). The handling of potentially harmful substances needs to be governed by appropriate protocols to mitigate spill risk. Mitigation can be achieved by application of best practice procedures to avoid spills of fuel and other materials during demolition, construction and operation, including:

- rigorous control protocols around activities such as refuelling of equipment and cement pours;
- documented contingency plans and associated resources for rapid containment, recovery and clean-up should spills occur.

With regard to marine litter, coastal avifauna are currently exposed to the risk of encountering plastics and discarded fishing line and hooks. The construction and operation of the Akaroa wharf will not have a material effect through any degree of change on this level of risk.

Based on the above measures, we consider the magnitude of effect from pollutants / contaminants and litter associated with the construction and operation of the Akaroa wharf will be Negligible. Thus, the potential **level of effect** is considered to be **Low to Very Low** based on a Negligible[11] magnitude of effect and the Very High and High ecological values of the *Threatened* and *At Risk* species recorded or likely to be present.

6.7 Cumulative effects

The assessment of cumulative effects requires the consideration of appropriate temporal and spatial boundaries for the assessment, and consideration of the interactions of the ecological effects of the Project along with past and future activities. As such, the assessment of cumulative effects on coastal avifauna for the current project has been undertaken at the scale of the entire Akaroa Harbour, and has considered the following:

- The redevelopment of Duvauchelle wharf, located approximately 6 km in the inner Akaroa Harbour. The potential effects of the Duvauchelle wharf project were assessed as being Low to Very Low (BlueGreen Ecology, 2023), and of similar nature to those identified in this current assessment.
- The redevelopment of Drummonds wharf, approximately 120 m from Akaroa wharf. This project will be completed before the Akaroa project can start, and therefore there will be no temporal overlap in construction stressors from the two projects.
- Caged (floating circular pens) salmon farming at Titoki and Lucas Bays in the outer harbour, approximately 7 km from the Akaroa wharf site. Effects associated with finfish farming are nutrient and organic matter inputs, some localised seabed depositional effects, and potential entanglements.
- Sedimentation into the marine environment (including intertidal zones) from existing land uses. Fenwick (2004) noted that the large, steep catchment area surrounding the

harbour is farmed, with run off from this activity contributing to the pressures in terms of sediment and nutrient inputs.

- Coastal avifauna in Akaroa Harbour are already exposed to recreational and commercial marine vessel traffic and activities.

When considered in the context of the above factors, and at the scale of the wider Akaroa Harbour, the cumulative effects of the Akaroa wharf project will be Negligible on coastal avifauna due to the limited spatial scale and duration of the potential effects. Thus, the potential **level of cumulative effect** is considered to be **Low to Very Low** based on a Negligible[11] magnitude of effect and the Very High and High ecological values of the *Threatened* and *At Risk* species recorded or likely to be present.

6.8 Summary of effects

A summary of the level of effects on coastal avifauna associated with the Akaroa wharf works, as outlined in Sections 6.1 -6.7 above, is provided in Table 12. As noted above, while there may be other species that weren't recorded during the August 2023 survey which utilise the Akaroa wharf, the above effects assessment has been undertaken on the basis of the presence of *Threatened* and *At Risk* species. As such we consider the Low to Very Low levels of effect that we have determined would be the same for other species with the same threat classifications.

According to Roper-Lindsay et al. (2018), the overall level of effect (Table 3) can then be used to guide the extent and nature of the ecological management response required (including the need for biodiversity offsetting):

- Very High adverse effects require a net biodiversity gain.[14]
- High and Moderate adverse effects require no net loss of biodiversity values.
- Low and Very Low effects should not normally be a concern. If effects are assessed taking impact management developed during project shaping into consideration, then it is essential that prescribed impact management is carried out to ensure Low or Very Low effects.

Thus, based on the Low to Very Low levels of effects that have been determined, the effects management required to ensure these levels are outlined in Section 7.0 below.

7.0 Effects Management Requirements

In order to achieve a **Positive** effect associated with the project lighting, the permanent wharf lighting[13] must be informed by best practice design principles from the *National Light Pollution Guidelines for Wildlife* (Commonwealth of Australia, 2023), and include:

- Lighting kept to the minimum required; and
- Lighting directed downwards (not upwards) and shielded to reduce light projecting horizontally towards coastal waters and avoid light projecting vertically to passing birds.

[14] Though when ecological compensation is required because biodiversity offsetting is not possible, the principles of no-net-loss or net-gain do not apply (Maseyk et al., 2018).

Table 6: Summary of potential effects associated with the Akaroa wharf works (Denotes species that were recorded at the site during the August 2023 surveys)*

SPECIES	ECOLOGICAL VALUE[15]	POTETNTIAL LEVEL OF EFFECT[16]						
		Temporary habitat loss	Injuries / mortalities	Disturbance / displacement	Food supply & foraging ability	Lighting	Pollution / contaminants and litter	Cumulative effects
Caspian tern	Very High	Low	Avoid	Low	Low	Positive[17]	Low	Low
Spotted shag	Very High	Low	Avoid	Low	Low	Positive[17]	Low	Low
Red-billed gull*	High	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
South Island pied oystercatcher	High	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
White-fronted tern	High	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
White-flippered penguin	High	-	Avoid	Low	Very Low	Positive[17]	Very Low	Low
Black shag	Moderate	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
Little shag*	Moderate	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
Pied shag	Moderate	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
Royal spoonbill	Moderate	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
Variable oystercatcher*	Moderate	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
Australasian gannet	Low	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
Black-backed gull*	Low	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
Paradise shelduck	Low	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low
White-faced heron*	Low	Very Low	Avoid	Very Low	Very Low	Positive[17]	Very Low	Very Low

[15] Refer to Table 1 (page 5) for criteria for assigning ecological values
[16] Determined based on the matrix provided in Table 3 (page 5)
[17] On the basis that the effects management recommendations outlined in Section 7.0 are implemented

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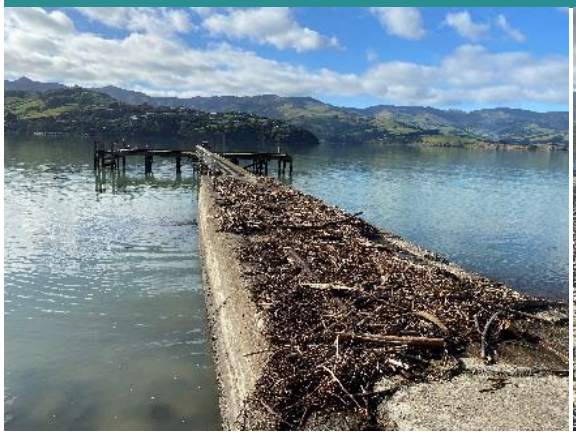
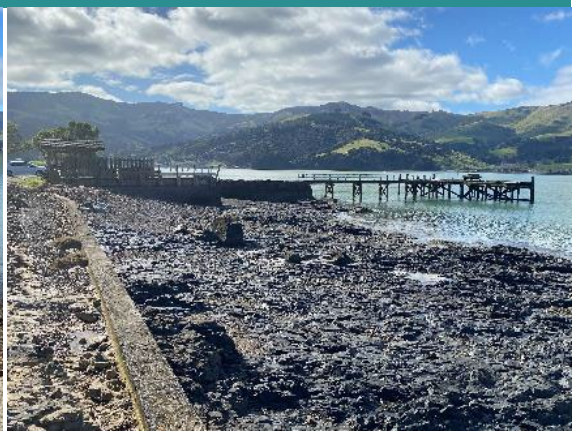
Appendix 1: Representative site photos

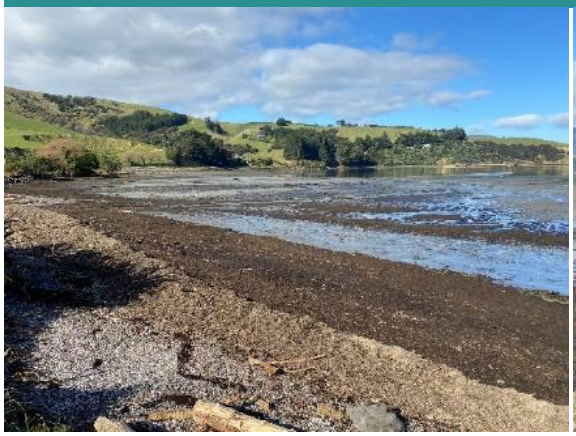
Duvauchelle wharf





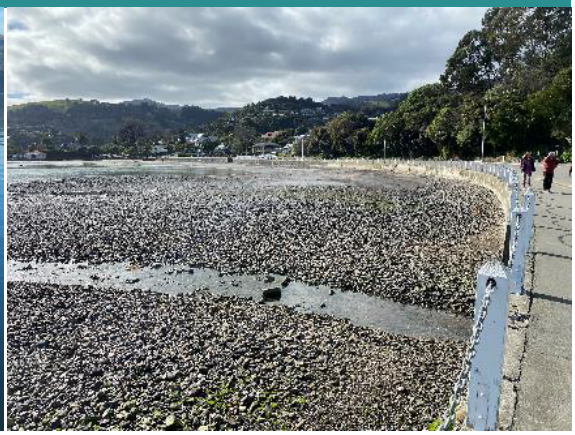
Duvauchelle Bay

Robinsons Bay

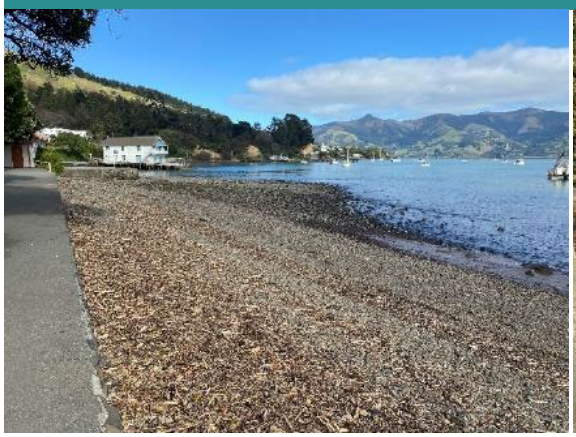


Takamatua Bay

French Bay



Akaroa wharf



Appendix 2: Coastal avifauna species list compiled from desktop data sources

SPECIES		CONSERVATION STATUS (Robertson et al. 2021)	HABITAT PREFERENCE								DESKTOP DATA SOURCE									
			Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential	DA51	DB51 (outer)	French Farm Bay	Barrys Bay	Duvauchelle Bay mudflats	Robinson's Bay	Takamatua Bay	Akaroa town & foreshore	Onuku	Akaroa Hbr boat trips
Black shag	*Phalacrocorax carbo novaehollandiae*	At Risk Relict[CR DPS DPT SO Sp]									x	x		x	x	x	x	x		x
Black stilt	*Himantopus novaezelandiae*	Threatened - Nationally Critical[CD CR RR]																x		
Black swan	*Cygnus atratus*	Not Threatened[SO]									x			x	x	x	x	x		x
Black-billed gull	*Larus bulleri*	At Risk - Declining[CI CR RF]									x	x		x	x	x	x	x	x	x
Black-fronted tern	*Chlidonias albostriatus*	Threatened - Nationally Endangered[CI CD, PD, RF, Sp]									x	x			x		x	x	x	x
Grey duck x mallard hybrid	*Anas superciliosa x platyrhynchos*	Not Threatened									x	x	x		x	x	x	x		x
Grey teal	*Anas gracilis*	Not Threatened[Inc SO]									x			x	x	x		x		
Little black shag	*Phalacrocorax sulcirostris*	At Risk - Naturally Uncommon[RR SO]									x		x	x	x	x		x		x
Little shag	*Phalacrocorax melanoleucos brevirostris*	At Risk - Relict[CR DPT]									x	x		x	x	x	x	x	x	x
NZ pied oystercatcher	*Haematopus finschi*	At Risk - Declining[CI]									x	x		x	x	x	x	x	x	x
NZ scaup	*Aythya novaeseelandiae*	Not Threatened[Inc]											x			x		x		x
Australian shoveler	*Anas rhynchotis*	Not Threatened[SO]												x	x			x		
Paradise shelduck	*Tadorna variegata*	Not Threatened									x	x	x	x	x	x	x	x	x	x
Pied shag	*Phalacrocorax varius varius*	At Risk - Recovering[CD]									x	x	x	x	x	x	x	x	x	x
Pied stilt	*Himantopus h. leucocephalus*	Not Threatened[SO]									x			x	x	x	x	x		x
Pukeko	*Porphyrio m. melanotus*	Not Threatened[Inc SO]									x	x	x	x	x	x	x	x	x	x
White heron	*Ardea modesta*	Threatened - Nationally Critical[CR OL SO St]												x						
Banded dotterel	*Charadrius bicinctus bicinctus*	At Risk - Declining[CD CI CR DPS PD]									x									
Black-backed gull	*Larus d. dominicanus*	Not Threatened[SO]									x	x	x	x	x	x	x	x	x	x
Caspian tern	*Hydroprogne caspia*	Threatened - Nationally Vulnerable[CI SO Sp]									x	x	x	x	x	x	x	x		x

SPECIES		CONSERVATION STATUS (Robertson et al. 2021)	HABITAT PREFERENCE								DESKTOP DATA SOURCE									
			Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential	DA51	DB51 (outer)	French Farm Bay	Barrys Bay	Duvauchelle Bay mudflats	Robinson's Bay	Takamatua Bay	Akaroa town & foreshore	Onuku	Akaroa Hbr boat trips
Eastern bar-tailed godwit	*Limosa lapponica baueri*	At Risk - Declining[CI TO]									x				x		x			
Foveaux shag	*Leucocarbo stewarti*	Threatened - Nationally Vulnerable[CD CR DPS DPT PD]										x								
Red-billed gull	*Larus novaehollandiae scopulinus*	At Risk - Declining[CI]									x	x	x	x	x	x	x	x	x	x
Reef heron	*Egretta sacra sacra*	Threatened - Nationally Endangered[CI CR DPT SO Sp]									x									
Royal spoonbill	*Platalea regia*	At Risk - Naturally Uncommon[Inc RR SO Sp]									x			x	x	x	x	x		x
Spotted shag	*Stictocarbo punctatus*	Threatened - Nationally Vulnerable[CI CR]									x	x		x	x	x	x	x	x	x
Variable oystercatcher	*Haematopus unicolor*	At Risk - Recovering[CI Inc]									x	x	x	x	x	x	x	x	x	x
White-faced heron	*Egretta novaehollandiae*	Not Threatened[SO]									x	x	x	x	x	x	x	x		x
White-fronted tern	*Sterna s. striata*	At Risk - Declining[CI CR DPT]									x	x		x	x	x	x	x	x	x
Arctic skua	*Stercorarius parasiticus*	Migrant[SO]									x	x						x		x
Australasian gannet	*Morus serrator*	Not Threatened[CI De* Inc SO]									x	x			x		x	x		x
Black-browed albatross	*Thalassarche melanophris*	Coloniser[SO]																		x
Buller's shearwater	*Puffinus bulleri*	At Risk - Declining[CD CR DPT OL St]										x								x
Erect-crested penguin	*Eudyptes sclateri*	At Risk - Declining[CDB CI CR PD RR]										x								
Fairy prion	*Pachyptila turtur*	At Risk - Relict[CDB RR SO]										x								
Fluttering shearwater	*Puffinus gavia*	At Risk - Relict[CDB RR]										x						x		x
Grey-faced petrel	*Pterodroma macroptera gouldi*	Not Threatened[De* Inc RR]																		x
Grey petrel	*Procellaria cinerea*	At Risk - Relict[CD CR DPT RR SO]										x								
Hutton's shearwater	*Puffinus huttoni*	Threatened - Nationally Vulnerable[CD CI OL]									x	x				x				x
Northern diving petrel	*Pelecanoides urinatrix urinatrix*	At Risk - Relict[CBD Inc RR SO]																		x

SPECIES		CONSERVATION STATUS (Robertson et al. 2021)	HABITAT PREFERENCE								DESKTOP DATA SOURCE									
			Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential	DA51	DB51 (outer)	French Farm Bay	Barrys Bay	Duvauchelle Bay mudflats	Robinson's Bay	Takamatua Bay	Akaroa town & foreshore	Onuku	Akaroa Hbr boat trips
Northern giant petrel	*Macronectes halli*	At Risk - Recovering[RR Inc SO]									x	x				x		x	x	x
Northern royal albatross	*Diomedea sanfordi*	Threatened - Nationally Vulnerable[CD Cl CR DPT RF RR]									x	x								
NZ white-capped mollymawk	*Thalassarche cauta steadi*	At Risk - Declining[CD Cl CR EF RR]										x								x
Pomarine skua	*Coprotheres pomarinus*	Migrant[SO]																		x
Salvin's mollymawk	*Thalassaarche salvini*	Threatened -Nationally Critical[CD CO CR RR]										x								x
Snares Cape petrel	*Daption capense australe*	At Risk - Naturally Uncommon[CD Cl CR DPT RR]										x								x
Sooty shearwater	*Puffinus griseus*	At Risk - Declining[CD Cl SO]									x	x								x
Southern Buller's mollymawk	*Thalassarche b. bulleri*	At Risk -Declining[CD CR RR]									x	x								x
Southern giant petrel	*Macronectes giganteus*	Migrant[SO]										x						x		x
Southern royal albatross	*Diomedea e. epomophora*	Threatened - Nationally Vulnerable[CD Cl CR DPT RR]									x	x			x			x		x
Yellow-eyed penguin	*Megadyptes antipodes*	Threatened - Nationally Endangered[CD Cl CR DPS DPT EF PD RF]										x						x		x
Wandering albatross	*Diomedea exulans*	Migrant[TO]																		x
Westland petrel	*Procellaria westlandica*	At Risk - Naturally Uncommon[CD CR OL St]																		x
White-chinned petrel	*Procellaria aequinoctialis*	Not Threatened[CD De* RR TO]										x								
White flippered blue penguin	*Eudyptula minor albosignata*	At Risk - Declining[CD Cl CR PD RR]									x	x		x		x	x	x	x	x

BlueGreen

About BlueGreen

Over the last 20 years we have gathered a high level of knowledge and expertise working on a number of large scale projects of national significance, right from pre-consenting investigations through to Environment Court and Board of Inquiry Hearings. As such we are able to offer our clients proven expertise to assist with a range of ecological challenges, both simple and complex, across various ecosystems.

E: Leigh@BlueGreenEcology.nz
BlueGreenEcology.nz
BlueGreen Ecology Ltd

Boffa Miskell

www.boffamiskell.co.nz

0 4 Km

1:150,000 @ A3

Data Sources: Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors, Eagle Technology, LINZ

Projection: NZGD 2000 New Zealand Transverse Mercator

AKAROA WHARF WORKS

Site Context

Date: 29 September 2023 | Revision: 0

Plan prepared by Boffa Miskell Limited

Project Manager: Karin.Sievwright@boffamiskell.co.nz | Drawn: HCo | Checked: HHu

Map 1

Boffa Miskell

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AKAROA WHARF WORKS

Coastal Avifauna Survey Sites

Date: 18 September 2023 | Revision: 0

Plan prepared by Boffa Miskell Limited

Project Manager: Karin.Sievwright@boffamiskell.co.nz | Drawn: HCo | Checked: HHu

Map 2

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1:1,200 @ A3

Data Sources: Bluegreen Ecology, Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Observed avifauna species
- Little shag
- Pied shag
- Spotted shag
- White-fronted tern
- Red-billed gull
- Australasian gannet

AKAROA WHARF WORKS

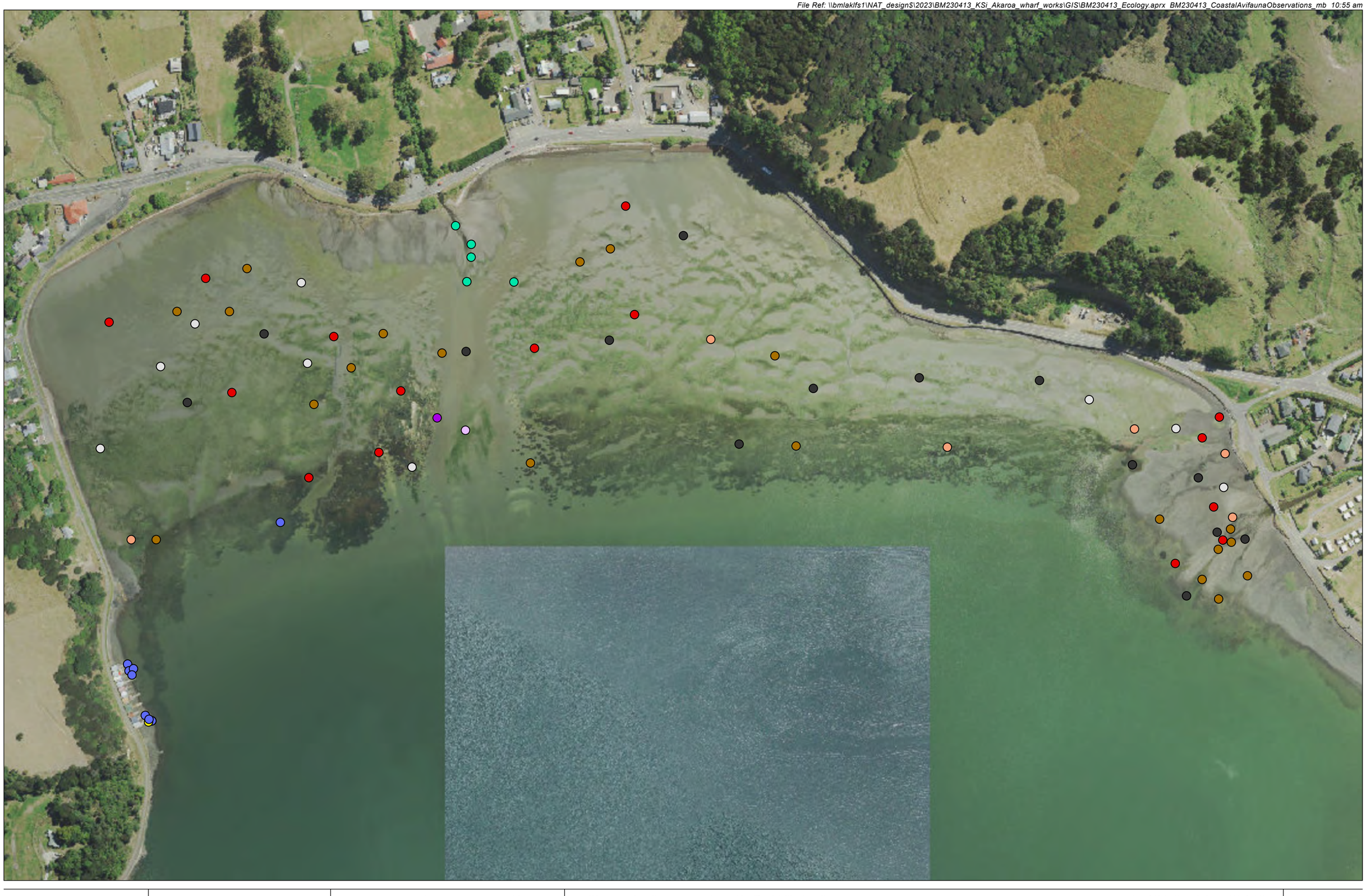
Duvauchelle Wharf Coastal Avifauna

Date: 18 September 2023 | Revision: 0

Plan prepared for BlueGreen Ecology by Boffa Miskell Limited

Project Manager: Karin.Sievwright@boffamiskell.co.nz | Drawn: HCo | Checked: HHu

Map 3



Boffa Miskell

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Data Sources: Bluegreen Ecology, Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Observed avifauna species

- Little shag
- Pied shag
- Caspian tern
- White-fronted tern
- Paradise shelduck
- Red-billed gull
- Southern black-backed gull
- South Island pied oystercatcher
- Variable oystercatcher
- White faced heron

AKAROA WHARF WORKS

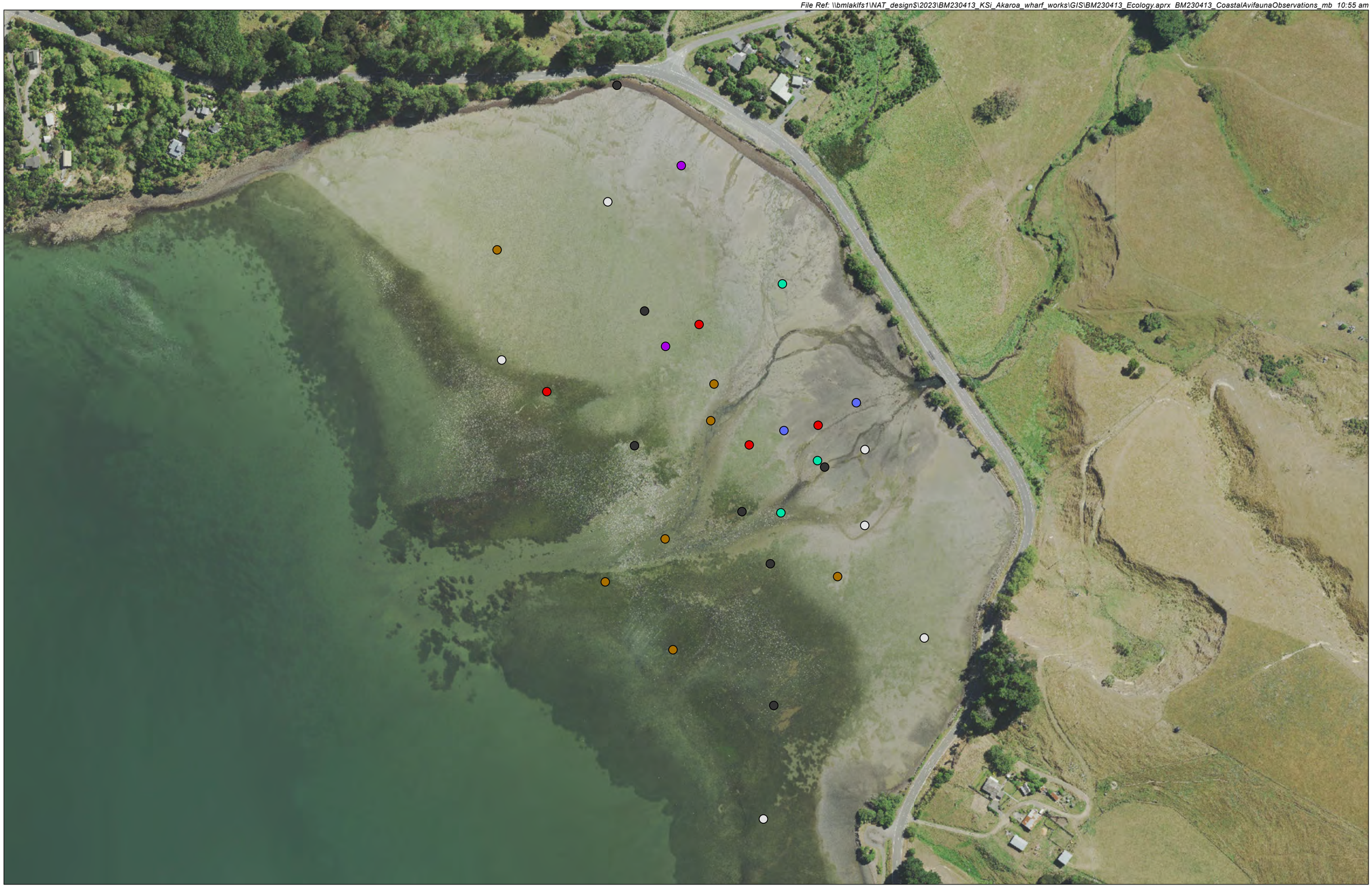
Duvauchelle Bay Coastal Avifauna

Date: 18 September 2023 | Revision: 0

Plan prepared for BlueGreen Ecology by Boffa Miskell Limited

Project Manager: Karin.Sievwright@boffamiskell.co.nz | Drawn: HCo | Checked: HHu

Map 4



Boffa Miskell

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Data Sources: Bluegreen Ecology, Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Observed avifauna species

- Little shag
- Caspian tern
- Paradise shelduck
- Red-billed gull
- Southern black-backed gull
- South Island pied oystercatcher
- White faced heron

AKAROA WHARF WORKS

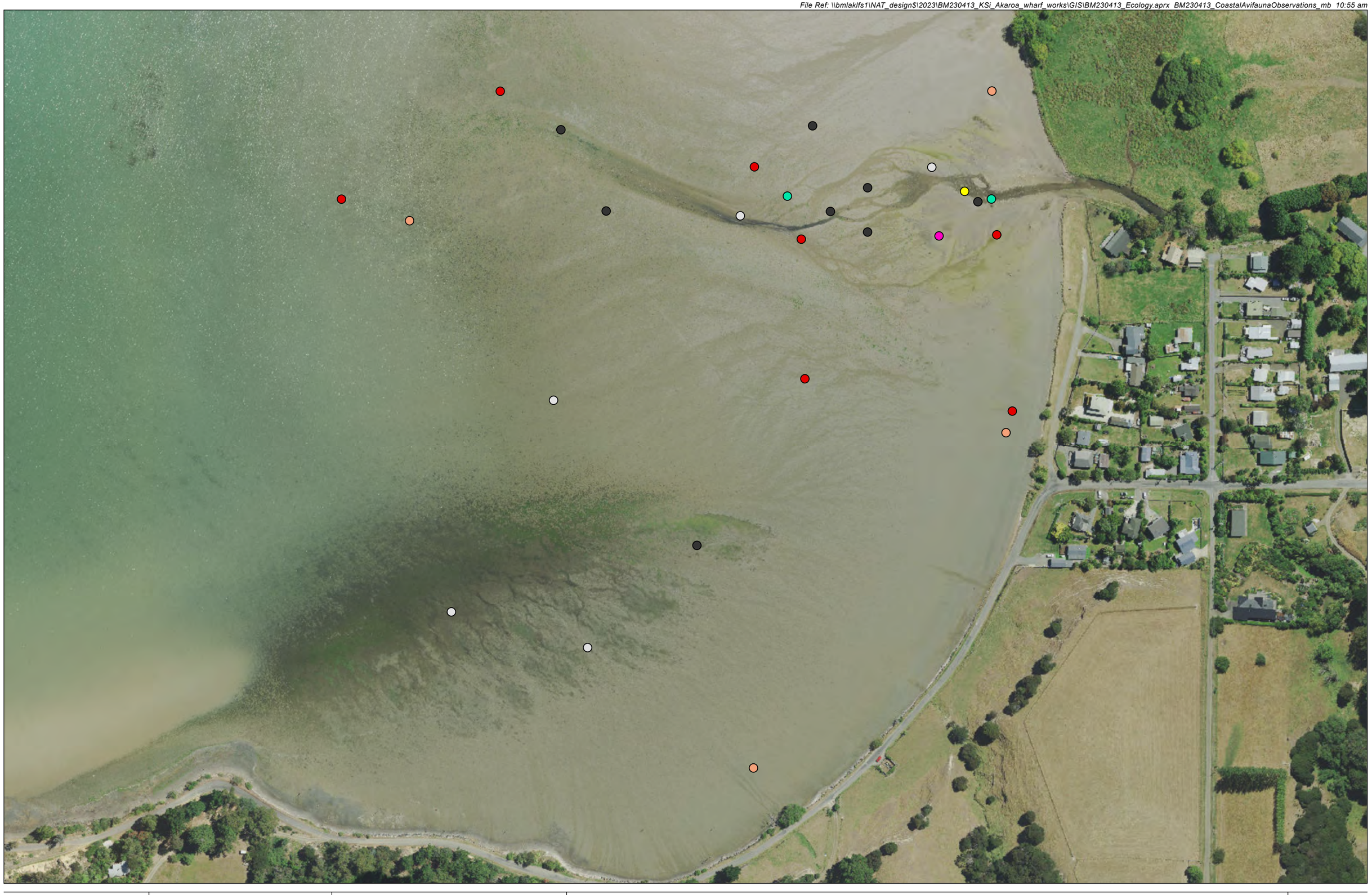
Robinsons Bay Coastal Avifauna

Date: 18 September 2023 | Revision: 0

Plan prepared for BlueGreen Ecology by Boffa Miskell Limited

Project Manager: Karin.Sievwright@boffamiskell.co.nz | Drawn: HCo | Checked: HHu

Map 5



Boffa Miskell

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Data Sources: Bluegreen Ecology, Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Observed avifauna species

- Pied shag
- Paradise shelduck
- Red-billed gull
- Royal spoonbill
- Southern black-backed gull
- Variable oystercatcher
- White faced heron

AKAROA WHARF WORKS

Takamatua Bay Coastal Avifauna

Date: 18 September 2023 | Revision: 0

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Project Manager: Karin.Sievwright@boffamiskell.co.nz | Drawn: HCo | Checked: HHu

Map 6

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0 60 m

1:2,400 @ A3

Data Sources: Bluegreen Ecology, Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Observed avifauna species
- Little shag
- Red-billed gull
- Southern black-backed gull
- Variable oystercatcher
- White faced heron

AKAROA WHARF WORKS

French Bay and Akaroa Wharf Coastal Avifauna

Date: 18 September 2023 | Revision: 0

Plan prepared for BlueGreen Ecology by Boffa Miskell Limited

Project Manager: Karin.Sievwright@boffamiskell.co.nz | Drawn: HCo | Checked: HHu

Map 7