

# Assessment of Effects on Avifauna Ecology

## Alternative to the Brynderwyn Hills – Brynderwyn Hills section

2 April 2026

Revision A

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# Glossary of Acronyms and Abbreviations

The glossary of acronyms and abbreviation tables in Volumes A and B of the Substantive Application apply to this report and should be referred to in addition to the acronyms and abbreviations below.

Abbreviation / Acronym	Term
AU SEA	Auckland Unitary Plan Significant Ecological Areas
DOC	Department of Conservation
IBA	Important Bird Area
LCDB	New Zealand Land Cover Database
SIPO	South Island pied oystercatcher
SNA	Significant Natural Area
ZOI	Zone of Influence

# Glossary of Defined Terms

The glossary of defined terms tables in Volumes A and B of the Substantive Application apply to this report and should be referred to in addition to the defined terms below.

Term	Description / Definition
5 km buffer	The area within a 5 km of the boundary of the Proposed Designation
Zone of Influence	Defined by Roper-Lindsay et al. (2018) as “the areas/resources that may be affected by the biophysical changes caused by the proposed project and associated activities.”

# 1. Introduction

## 1.1. Purpose and scope of this report

This report provides an assessment of the actual and potential effects on avifauna ecology associated with the construction and operation of the Brynderwyn Hills section of the Alternative to the Brynderwyn Hills project (the Project).

This assessment forms part of a suite of technical assessments prepared for NZTA to inform the Substantive Application for the Project under the Fast-track Approvals Act 2024 (FTAA). This report is more specifically in support of the Resource Management Act 1991 (RMA) application (Notice of Requirements and resource consents), and the application for Wildlife Act approvals. This report should be read in conjunction with Volume A of the Substantive Application.

The scope of this assessment includes a description of the methodology applied in preparing the assessment, determination of the actual and potential effects generated by the Project, and details of the recommended measures to manage and mitigate adverse effects.

## 1.2. Qualifications and Experience

My name is Leigh Bull. I am a Director and Avifauna Ecologist with BlueGreen Ecology Limited. I hold the qualifications of Bachelor of Science (Zoology), Masters of Science with Honours (Ecology) and PhD (Ecology) from Victoria University of Wellington. My area of specialisation is ornithology. I have worked as a professional ecologist for 20 years (not including 11 years of tertiary study).

My experience relevant to this application is as follows:

- Transmission Gully motorway - Prepared the avifauna assessment for the Transmission Gully project and developed methods and measures to avoid, minimise and mitigate potential effects. Provided expert evidence on behalf of Waka Kotahi for the Transmission Gully Environment Court Hearing.
- Mackays to Peka Peka - Prepared the avifauna assessment and developed methods and measures to avoid, minimise and mitigate potential effects. Provided expert evidence on behalf of Waka Kotahi for the Mackays to Peka Peka Board of Inquiry Court Hearing.
- East West Link Road - Undertook field investigations, prepared the avifauna assessment and developed methods and measures to avoid, minimise and mitigate potential effects. Provided expert evidence on behalf of Waka Kotahi for the East-West Link Board of Inquiry Hearing.
- Ara Tūhono – Pūhoi to Warkworth motorway - Provided expert evidence on behalf of Waka Kotahi for the Board of Inquiry hearing.
- Ara Tūhono – Warkworth to Wellsford motorway - Prepared the avifauna assessment and developed methods and measures to avoid, minimise and mitigate potential effects. Provided expert evidence on behalf of Waka Kotahi for the Council hearing.
- NorthPort Expansion - Prepared an assessment of effects on coastal avifauna in relation to Northport's Eastern expansion (13 ha reclamation) and developed methods and measures to avoid, minimise and mitigate potential effects. Appeared as an expert witness during Council and Environment Court Hearings process.

## 1.3. Code of Conduct

Although this Project is not being considered before the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses as contained in Section 9 of the Environment Court Practice Note 2023. I agree to comply with that Code. I am satisfied that the matters which I address in this assessment are within my area of expertise, except where I state that I am relying on information provided by another person or expert. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

## 2. Assessment Methodology

### 2.1. Assessment Framework

The Indicative Alignment within the Proposed Designation represents a possible alignment which has been developed for assessment purposes, illustrating what the Project's final design might look like, and the effects generated by its construction and operation. The alignment that gets built, including the design and placement of bridges, culverts, stormwater systems, soil disposal areas and landscaping, will be refined and confirmed during the detailed design stage.

The methodology I have 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 effects of the proposal (Table 3).

The EIANZ guidelines use the New Zealand threat classification system as the criteria for assigning ecological value to species as outlined in Table 1. Robertson et al. (2021) provides the most recent threat classifications for avifauna and as such has been used to assign values to individual species. Terrestrial and wetland vegetation values are identified in the respective reports for the Project, and these have been used to assist with determining avifauna habitat values. I note that the ecological values as defined here do not include cultural values (e.g. taonga species).

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, I have determined the magnitude of effect at the scale of the Ecological District based on the habitat features and species / populations that are present (Table 2).

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

VALUE	DESCRIPTION
NEGLIGIBLE	Exotic species, including pests, species having recreational value.
LOW	Nationally and locally common indigenous species.
MODERATE	Species listed as any other category of At Risk ( <i>Recovering, Relict, Naturally Uncommon</i> ) found in the Zone of Influence <sup>1</sup> (ZOI) either permanently or seasonally; or Locally (Ecological District) uncommon or distinctive species.
HIGH	Species listed as <i>At Risk – Declining</i> found in the ZOI either permanently or seasonally.
VERY HIGH	<i>Nationally Threatened - (Nationally Critical, Nationally Endangered, Nationally Vulnerable, Nationally Increasing<sup>2</sup>)</i> species found in the ZOI either permanently or seasonally.

<sup>1</sup> 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.”

<sup>2</sup> “Nationally Increasing” is a category that was devised by DOC (Michel, 2021) in 2021 and is assigned to a species where they have a “Small population that have experienced a previous decline (or for which it is uncertain whether it has experienced a previous decline) and that is forecast to increase >10% over the next 10 years or 3 generations, whichever is longer” (Rolfe et al. 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.

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

MAGNITUDE	DESCRIPTION
<b>Very High</b>	Total loss of, or very major alteration, to key elements / features of the baseline conditions such that the post development character, composition and / or attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss <sup>3</sup> of a very high proportion of the known population or range of the element / feature.
<b>High</b>	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 <sup>3</sup> of a high proportion of the known population or range of the element / feature.
<b>Moderate</b>	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 <sup>3</sup> of a moderate proportion of the known population or range of the element / feature.
<b>Low</b>	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.
<b>Negligible</b>	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	
<b>MAGNITUDE</b>	<b>Very High</b>	Very High	Very High	High	Moderate	Low
	<b>High</b>	Very High	Very High	Moderate	Low	Very Low
	<b>Moderate</b>	High	High	Moderate	Low	Very Low
	<b>Low</b>	Moderate	Low	Low	Very Low	Very Low
	<b>Negligible</b>	Low	Very Low	Very Low	Very Low	Very Low
	<b>Positive</b>	Net gain	Net gain	Net gain	Net gain	Net gain

## 2.2. Desktop Assessment

I undertook a desktop assessment to obtain all readily available information regarding avifauna distribution within the construction footprint and elsewhere within the Proposed Designation, and a 5 km buffer<sup>4</sup> around the boundary of the Proposed Designation. The desktop data sources that I accessed in December 2025 and included:

- Avifauna species records from eBird, iNaturalist and Wilderlab environmental DNA (eDNA) data were downloaded from the respective websites.
- New Zealand Land Cover Database (LCDB) v6.0 (which is a multi-temporal, thematic classification of New Zealand's land cover, identifying 33 mainland land cover classes).
- Auckland Unitary Plan Significant Ecological Areas (AU SEAs) (Auckland Council, 2025).
- Regional Plan for Northland 2026 (RPN), Significant Ecological Areas, Significant Marine Mammal and Seabird Areas (NRC, 2026).

<sup>3</sup> In the context of mobile fauna, the term “loss” can include permanent displacement from an area.

<sup>4</sup> Given the mobile nature of avifauna species and the use of a habitat network by most species, a 5 km was considered an appropriate buffer to capture records of species that may interact with the construction or operational phase of the Project.

- Protected Natural Areas Programme (PNAP) reports for the relevant Ecological Districts and the Department of Conservation's (DOC) Significant Natural Areas (SNAs) / Recommended Areas for Protection (RAP) (Goldwater et al., 2012; Lux et al., 2007; Lux & Beadel, 2006; Manning, 2001).
- Information regarding DOC public conservation land.
- Forest & Bird Important Bird Areas (IBAs (Forest & Bird, 2014, 2015, 2016)) and Birdlife International Data Zone species extents were downloaded for the Project site and surrounding landscape.
- Queen Elizabeth the Second National Trust (QEII) covenants.
- NZTA GIS data hub for the Project (e.g. GIS shapefiles the Project Designation and Indicative Alignment).
- Primary and secondary habitat associations<sup>5</sup> for each of the species recorded was obtained from Heather & Robertson (2005a);
- Avifauna species' threat status according to the New Zealand Threat Classification System (Robertson, Baird, Elliott, Hitchmough, McArthur, Makan, Miskelly, O'Donnell, et al., 2021).
- Literature (published and unpublished) searches were undertaken to obtain additional information regarding avifauna species recorded within and surrounding the Northland Corridor Study Area (refer to Section 7 for a list of references).

## 2.3. Field Assessment

With regard to field assessment for avifauna, five-minute bird counts were conducted opportunistically at 12 locations (refer to Map 2 in **Appendix A**) in conjunction with the terrestrial field investigations. Incidental observations of native species were also recorded by suitably qualified and experienced ecologists while on site.

I conducted a site visit on 29 October 2025 to view potential key avifauna habitats along the Proposed Designation and to gain an understanding of the wider landscape.

## 2.4. Relevant Standards and Guidelines

I applied the following relevant standards and guidelines in the desktop assessment, monitoring and evaluative stages of this assessment, where applicable:

- Commonwealth of Australia (2023). *National Light Pollution Guidelines for Wildlife*. Prepared by Australian Government's Department of Climate Change, Energy, the Environment and Water.
- NZTA (2025). *NZTA Standardised design solutions for use on State Highway Roads of National Significance*. Prepared by the New Zealand Transport Agency Waka Kotahi.
- Roper-Lindsay et al. (2018). Ecological impact assessment (EclA). EIANZ guidelines for use in New Zealand: Terrestrial and freshwater ecosystems (2nd ed.). Environment Institute of Australia and New Zealand.

## 2.5. Construction Assumptions

This assessment has been prepared on the basis of the following construction-related<sup>6</sup> assumptions:

- Overall construction duration of approximately six years with four earthworks seasons.
- The Project will be built as a single stage.
- Each of the four Earthworks Zones will be constructed concurrently and will be completed within a few months of each other over the construction period.
- Best practice erosion and sediment controls will be implemented prior to bulk earthworks and will be maintained throughout the duration of construction.

<sup>5</sup> 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.

<sup>6</sup> Includes both enabling and main construction works

- Blasting is expected in areas of competent rock, particularly within Earthworks Zone 2 and parts of Earthworks Zones 3 and 4.
- Blasting for road construction will follow a top-down approach, involving sequential blasting and excavation, rather than benching methods used in quarry operations.
- Night works may be required for specific activities such as bridge installations, utility relocations, or pavement works.
- Maximum depth<sup>7</sup> (m) of individual spoil sites range from ~5-29 m.

## 2.6. Alignment changes within the Proposed Designation

As outlined at Section 2.1 above, the final alignment, design and construction methodology for the Project will be refined and confirmed during the detailed design stage. Nevertheless, this assessment has been conducted on the Indicative Alignment as it is considered indicative with regards to the extent of potential impacts, and because the habitat within the Indicative Alignment is representative of that which is present in the rest of the Proposed Designation.

As such, the recommended mitigation methods in Section 5 establish outcome-based criteria that will ensure effects on the environment are adequately avoided, remedied or mitigated, regardless of the final design and construction methodology for the Project. Therefore, should the final alignment within the Proposed Designation change, I consider the effects assessment, proposed mitigation and recommendations outlined in this report would remain appropriate.

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<sup>7</sup> Maximum depth of spoil centre line to terrain

## 3. Existing Environment

### 3.1. Avifauna Habitats and Species

The majority of the Proposed Designation is located within the Eastern Northland Ecological Region and the Waipu Ecological District. However, the area south of the Brynderwyn Hills is located within the Kaipara Ecological Region and the Otamatea Ecological District as well as the Eastern Northland Ecological Region and Rodney Ecological District (refer to Map 1 in **Appendix A**).

Based on LCDB data, the predominant land cover type within the Indicative Alignment (71.36%; Figure 1), Proposed Designation (66.14%; Figure 2) and 5 km buffer (58.41%) is high producing exotic grassland (refer to Table 4, and Map 3 in **Appendix A**). The Indicative Alignment and Proposed Designation comprise approximately 34.96 ha (~9.5%) and 163.18 ha (~14%) of LCDB terrestrial indigenous landcover classes (broadleaved indigenous hardwoods, indigenous forest, manuka / kanuka) respectively.

Table 4: Area of LCDB (v6) land cover classes within the Indicative Alignment, Proposed Designation and 5 km buffer

LAND COVER CLASS	INDICATIVE ALIGNMENT (ha)	PROPOSED DESIGNATION (ha)	5KM BUFFER (ha)
Broadleaved Indigenous Hardwoods	1.01	13.32	595.83
Built-up Area (settlement)	0.18	1.63	175.83
Deciduous Hardwoods	5.05	6.36	37.54
Estuarine Open Water			300.57
Exotic Forest	62.68	213.55	1838.36
Forest - Harvested			427.04
Gorse and/or Broom			143.71
Herbaceous Freshwater Vegetation			3.75
Herbaceous Saline Vegetation			4.59
High Producing Exotic Grassland	264.28	765.26	14874.23
Indigenous Forest	20.15	121.32	5501.50
Lake or Pond		1.60	50.86
Low Producing Grassland	3.18	3.01	179.86
Mangrove			186.77
Manuka and/or Kanuka	13.80	28.55	852.62
Orchard, Vineyard or Other Perennial Crop		0.01	28.68
River		0.02	63.27
Sand and Gravel			57.02
Short-rotation Cropland			11.06
Surface Mine or Dump			51.31
Transport Infrastructure		2.34	15.66
Urban Parkland/Open Space		13.32	65.00
<b>TOTAL</b>	<b>370.33</b>	<b>1,156.96</b>	<b>25,465.05</b>

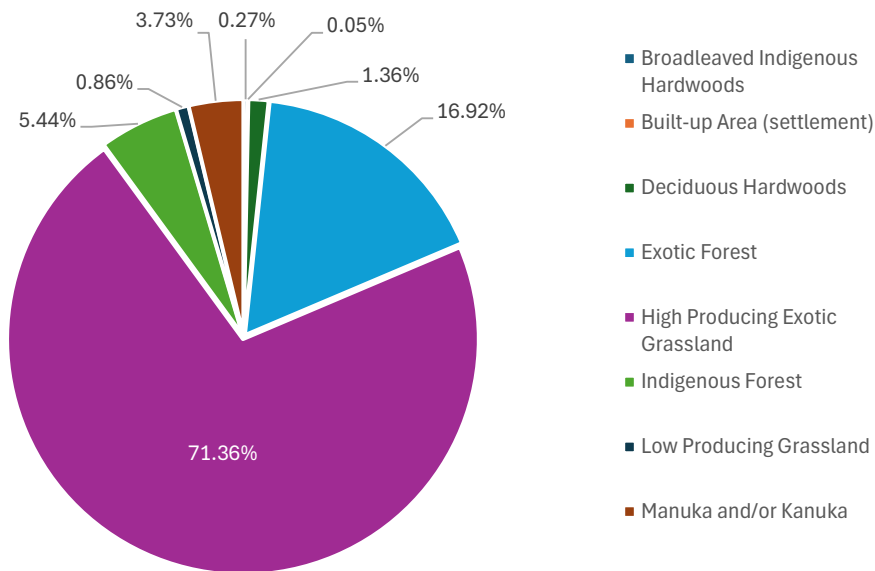


Figure 1: Proportion of LCDB (v6) land cover classes within the Indicative Alignment

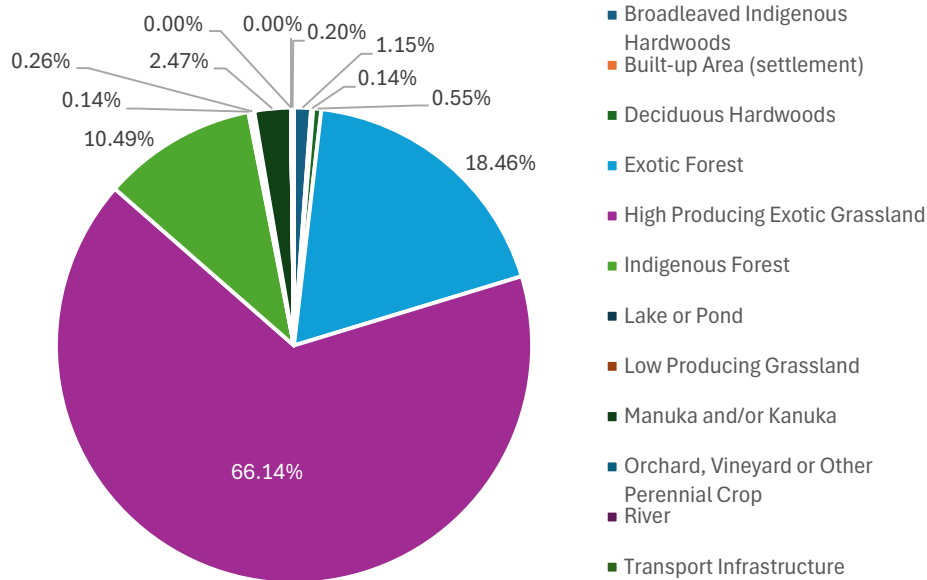


Figure 2: Proportion of LCDB (v6) land cover classes within the Proposed Designation

A finer scale mapping and description of terrestrial and wetland vegetation communities within the Indicative Alignment and Proposed Designation is provided in the Assessment of Effects on Terrestrial Ecology (Appendix D6 of Volume B of the Substantive Application) and Assessment of Effects on Freshwater Ecology (Appendix D7 of Volume B of the Substantive Application) reports respectively and have also been used to inform this assessment. A breakdown of the 34 terrestrial vegetation communities (exotic, native and mixed) identified within the Indicative Alignment and Proposed Designation is provided in **Appendix B**.

Based on the desktop and field data sources, a total of 87 species have been recorded within the Proposed Designation and 5 km buffer area, of which 41 were within the Proposed Designation (outside of the Construction footprint) and 25 within the Indicative Alignment (Figure 2). A list of the recorded species, their New Zealand threat classifications, as well as their primary and secondary habitat associations<sup>8</sup> is provided in **Appendix C**.

<sup>8</sup> 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.

Maps 4-19 (**Appendix A**) show the locations where different avifauna species were recorded within the Indicative Alignment, Proposed Designation and 5 km buffer. For ease of access, Table 5 provides a list of these avifauna species maps which are references throughout the remainder of this assessment.

Table 5: Overview list of avifauna species maps (provided in Appendix A of this assessment).

MAP NUMBER	SPECIES
4	Bittern, heron, egret and spoonbill
5	Fernbird and grebe
6	Rails & crake
7	New Zealand waders
8	Shags
9	Gulls, terns and gannet
10	Waterfowl
11	Native forest birds
12	NZ pipit, swallow & spur-wing plover
13	Dove and pigeon (includes kereru)
14	Parrots, kingfisher & kookaburra
15	Quail, turkey, peafowl & pheasants
16	Raptors, owls & magpie
17	Introduced finch and passerines
18	Non-resident migrants
19	Threatened and At Risk species

Of the 25 species recorded within the Indicative Alignment, the majority were either native *Not Threatened* or *Introduced* species; including no *Threatened* and two *At Risk* species (refer to Figure 3 and Table 6 below). Furthermore, the majority of species recorded within the Indicative Alignment are primarily associated with farmland / open country habitat, rather than indigenous land cover classes (refer to **Appendix C**).

A slightly greater number of species was recorded within the Proposed Designation (41 in total) compared to under the Indicative Alignment, including three *Threatened* and three *At Risk* species (refer to Figure 5 and Table 6).

Of the 87 species recorded within the 5 km buffer area, 18 are classified as *At Risk* and 11 as *Threatened* (refer to Figure 3, Table 6 and Map 19). A greater diversity of species primarily associated with freshwater / wetland and coastal / estuary habitats was recorded within the 5 km buffer (Figure 6) compared to the Proposed Designation (Figure 5) and Indicative Alignment (Figure 4).

An overview of the habitat types found within the Proposed Designation, along with the avifauna species that may be associated with those, is provided in the following sections of this report.

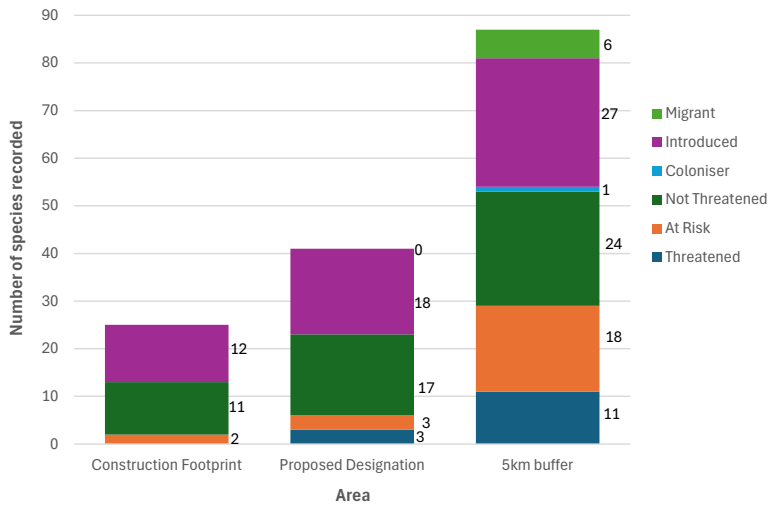


Figure 3: Breakdown of the NZ threat classifications of the avifauna species recorded within the 5km buffer area, Proposed Designation and Indicative Alignment

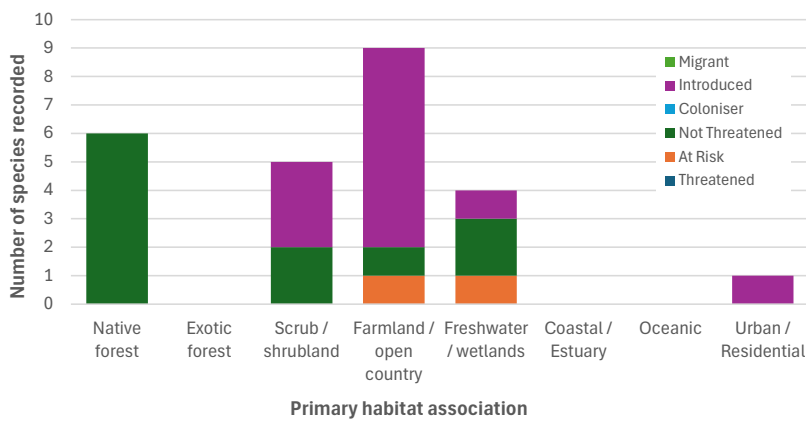


Figure 4: Primary habitat of the avifauna species recorded within the Indicative Alignment

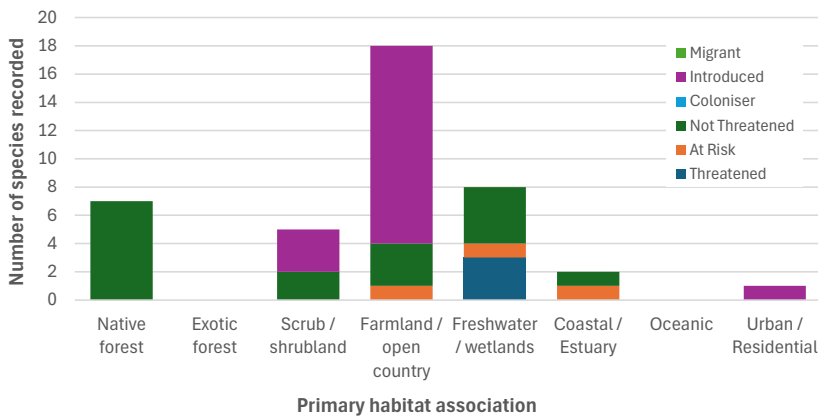


Figure 5: Primary habitat of the avifauna species recorded within the Proposed Designation

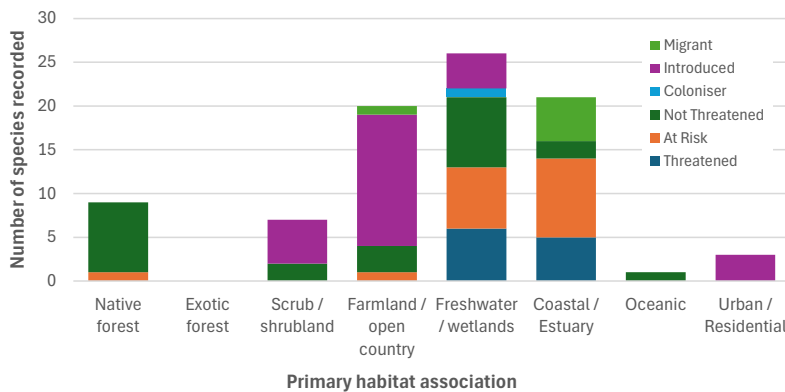


Figure 6: Primary habitat of the avifauna species recorded within the 5km buffer

Table 6: List of Threatened and At Risk species and their habitat preferences (refer to Appendix A Map 19 for species records)

SPECIES	NZ THREAT STATUS	ECOLOGICAL VALUE	PRIMARY HABITAT	INDICATIVE ALIGNMENT	PROPOSED DESIGNATION	5 KM BUFFER	HABITAT DETAILS <sup>9</sup>
North Island Kākā	At Risk - Recovering	Moderate	Native forest			✓	Forest-dwelling, with nests generally in tree cavities over 5 m above the ground.
NZ pipit / Pīhoihoi	At Risk - Declining	High	Farmland / open country	✓	✓	✓	Birds of open country, including the tideline of sandy beaches, rough pasture, riverbeds and above the tree-line. Present within felled compartments of pine forests. Nest under tussocks and grass clumps within fern, and partly or fully covered with vegetation.
Australasian bittern / Matuku-hūrepo	Threatened – Nationally Critical	Very High	Freshwater / wetlands			✓	Utilise a network of wetlands. Sites regularly visited include raupō-fringed lakes, spring-fed creeks with cover and areas of rank-grass along paddock/drain edges. Nest among dense wetland vegetation. Often forage along wetland or water edges, including in farm drains.
Black shag / Māpunga	At Risk - Relict	Moderate	Freshwater / wetlands			✓	Found in a variety of habitats, including coastal waters, estuaries, harbours, rivers, streams, lakes and ponds. Colonies occur on trees or shrubs, on the ground in swamps, coastal cliffs and headlands, and on artificial structures.
Black-billed gull / Tarāpuka	At Risk - Declining	High	Freshwater / wetlands			✓	Predominantly breeds on South Island braided rivers but breed as far north as the Kaipara Harbour. In the North Island they nest at a range of sites including inland rivers, coastal shell banks and sandspits.
Black-fronted tern / Tarapirohe	Threatened – Nationally Endangered	Very High	Freshwater / wetlands			✓	Breed on the South Island braided rivers. After breeding, birds disperse to coastal areas roosting in sheltered harbours, estuaries and lagoons, foraging mostly offshore but also on near-coastal farmland. Small numbers of black-fronted tern visit the North Island in winter.
Brown teal / Pāteke	Threatened – Nationally Increasing	Very High	Freshwater / wetlands			✓	Habitat mostly in agricultural environments, with breeding and feeding in stock ponds, and also margins of small streams that retain overhanging marginal vegetation. Typically, nests are buried in dry locations deep within bases of rush, grass or fern clumps near water.
Grey duck / Pārerā	Threatened – Nationally Vulnerable	Very High	Freshwater / wetlands		✓	✓	Threatened status attributed to the ongoing hybridisation with mallard ducks, with hybrid and pure grey ducks being difficult to differentiate by observation alone and generally requiring genetic analysis. Typically associated with undisturbed waters rather than those in close proximity to human activity. Remote lakes and headwater rivers with forested or scrub fringes are preferred. Mostly occur in “wild” rather than pastoral landscapes.
Little black shag / Kawau tūī	At Risk – Naturally Uncommon	Moderate	Freshwater / wetlands			✓	Occur in harbours, lakes, estuaries and coastal inlets. Nest is an open platform of sticks and twigs, lined with leaves and grass, in trees overhanging fresh water.
Little shag / Kawaupaka	At Risk - Relict	Moderate	Freshwater / wetlands		✓	✓	Most widely distributed shag species in New Zealand, found in both marine and freshwater habitats, on the coast as well as on inland lakes, ponds, rivers and streams. Little shag nest in trees over-hanging water and also on ledges or sea cliffs
North Island fernbird / Mātātā	At Risk - Declining	High	Freshwater / wetlands	✓		✓	Found mainly in dense, low wetland vegetation, occupying drier shrubland and tussock habitat. Poor fliers, typically scramble through dense vegetation.

<sup>9</sup> Sourced from <https://www.nzbirdsonline.org.nz/>.

SPECIES	NZ THREAT STATUS	ECOLOGICAL VALUE	PRIMARY HABITAT	INDICATIVE ALIGNMENT	PROPOSED DESIGNATION	5 KM BUFFER	HABITAT DETAILS <sup>9</sup>
NZ dabchick / Weweia	Threatened – Nationally Increasing	Very High	Freshwater / wetlands		✓	✓	Requires open water bodies, inhabiting freshwater lakes and ponds to nest and forage.
South Island pied oystercatcher / Tōrea	At Risk - Declining	High	Freshwater / wetlands			✓	Occur throughout New Zealand in most estuaries and harbours. They usually breed inland in the South Island, mainly east of the Southern Alps on riverbeds and farmland. However, are also known to breed on high country grasslands, and in coastal areas adjacent to estuaries and lagoons. Migrate to coastal areas of both the North and South Islands after breeding.
Spotless crane / Pūweto	At Risk - Declining	High	Freshwater / wetlands			✓	Predominantly found in freshwater wetlands dominated by dense emergent vegetation, particularly raupō.
White heron / Kōtuku	Threatened – Nationally Critical	Very High	Freshwater / wetlands		✓	✓	Sole New Zealand breeding site near Okarito Lagoon in Westland. Most often seen in harbours and estuaries but also visit freshwater wetlands.
Banded dotterel / Pohowera	At Risk - Declining	High	Coastal / estuary			✓	Breeding locations widespread on mainland New Zealand. Typical breeding habitat includes lightly vegetated riverbeds, outwash fans, herbfields, beaches and farmland.
Banded rail / Moho pererū	At Risk - Declining	High	Coastal / estuary			✓	In the North Island, banded rail is restricted to mangroves and saltmarshes in estuaries.
Caspian tern / Taranui	Threatened – Nationally Vulnerable	Very High	Coastal / estuary			✓	Breed mainly on open coastal shellbanks and sandspits, and occasionally on braided river beds and at inland lakes.
Eastern bar-tailed godwit / Kuaka	At Risk - Declining	High	Coastal / estuary			✓	The most common Arctic migrant in New Zealand. Predominantly forages on soft intertidal substrates but may also be found probing in wet pasture.
Lesser knot / Huahou	At Risk- Declining	High	Coastal / estuary			✓	Arctic migrant. Mainly at sites with extensive sandflats or mudflats, and roost on shellbanks and sandspits.
Northern NZ dotterel / Tūturiwhatu	Threatened – Nationally Increasing	Very High	Coastal / estuary			✓	Found on or near the coast around much of the North Island. Northern birds mainly breed on sandy beaches and sandspits, some on shell banks in harbours, and a few on gravel beaches. On beaches, usually clustered around stream-mouths. In urban areas (particularly Auckland) they often breed a short distance inland on short grass (golf courses, road verges or beside airport runways that are near coastal waters) or on bare ground (building sites, quarries).
NZ fairy tern / Tara iti	Threatened – Nationally Critical	Very High	Coastal / estuary			✓	Breeding confined to Waipu sandspit, Mangawhai sandspit, Pakiri River mouth, Papakanui sandspit, and occasionally Te Arai stream mouth. Generally forage in estuaries and coastal waters.
Pied shag / Kāruhiruhi	At Risk - Recovering	Moderate	Freshwater / wetlands			✓	Mainly nest in trees along coastal cliffs, with a few colonies in trees in or about freshwater lakes near the coast. Pied shags mainly forage in coastal marine waters, harbours and estuaries, but occasionally also in freshwater lakes and ponds close to the coast.
Red-billed gull / Tarāpunga	At Risk - Declining	High	Coastal / estuary		✓	✓	Found in most coastal locations throughout New Zealand; except for a colony at Lake Rotorua, it rarely is found inland.

SPECIES	NZ THREAT STATUS	ECOLOGICAL VALUE	PRIMARY HABITAT	INDICATIVE ALIGNMENT	PROPOSED DESIGNATION	5 KM BUFFER	HABITAT DETAILS <sup>9</sup>
Reef heron / Matuku moana	Threatened – Nationally Endangered	Very High	Coastal / estuary			✓	A bird of the rocky shore, but can also be seen on estuary mudflats feeding at low tide and may occasionally be seen wading in the shallow waves on sandy beaches. Rarely seen inland.
Royal spoonbill / Kōtuku ngutupapa	At Risk – Naturally Uncommon	Moderate	Coastal / estuary			✓	Breeds in the exposed canopy of tall kahikatea trees, on the ground near estuaries, rivers and harbours, in reeds, in low shrubs, and on steep rocky headlands. Feeds while wading in water.
Variable oystercatcher / Tōrea pango	At Risk - Recovering	Moderate	Coastal / estuary			✓	Most commonly breed on sandy beaches, sand spits, and in dunes, but will use a wide variety of coastal habitat types, including shell banks, rocky shorelines, and less often gravel beaches. Forage in all these areas and also on inter-tidal mud-flats in estuaries, and on rock platforms. Not usually seen far from the coast, but will forage in paddocks, and occasionally nest a short distance inland, usually on mown or grazed grassy areas or bare ground.
White-fronted tern / Tara	At Risk - Declining	High	Coastal / estuary			✓	Mainly a marine species that is seldom found far from the coast. Breeding usually occurs in large dense colonies on shingle river beds, sand dunes, stacks and cliffs.
Wrybill / Ngutu pare	Threatened – Nationally Increasing	Very High	Coastal / estuary			✓	Completely dependent on braided rivers for breeding, after which they migrate north to winter in the estuaries and harbours of the northern North Island.

**TOTAL**                    2                    6                    29

### 3.1.1. Farmland / open pasture

The predominant land cover within the Proposed Designation is farmland comprising exotic pasture grassland (refer to Table 4 above). A total of 18 species that were recorded within the Proposed Designation have a primary habitat association with farmland / open country, the majority of which are *Introduced* flocking species that are common and widespread (refer Figure 5 and **Appendix C**). Native species associated with farmland that have been recorded within the Proposed Designation include NZ pipit / Pīhoihoi, spur-winged plover, swamp harrier / Kāhu and welcome swallow / Warou. Of these, NZ pipit / Pīhoihoi is the only *At Risk* species which is primarily associated with farmland / open country habitat (Table 6) and was also recorded within the Indicative Alignment. NZ pipit / Pīhoihoi is a widespread species found in rough open habitats and their nests are generally a cup of woven grass under tussocks and grass clumps within fern, either partly or fully covered with vegetation.

Farmland / open pasture does however provide secondary habitat for a number of *At Risk* species that may utilise open pasture to roost or forage on if the conditions are suitable (e.g. roosting gulls, foraging SIPO / Tōrea, pied stilt / Poaka, dotterel etc; refer to **Appendix C** Appendix C for species list and habitat associations). The use of such habitat by these species is generally temporary and transient depending on climatic and seasonal factors.

While not recorded within the Proposed Designation or 5 km buffer (refer to Map 11), North Island brown kiwi / Kiwi-nui (*Apteryx mantelli*, classified as *Not Threatened*) are known to traverse farmland / open country between forest (native and exotic) stands across the broader landscape (Potter, 1990; Taborsky & Taborsky, 1995). A map of North Island brown kiwi / Kiwi-nui distribution (2020) is provided in **Appendix D**.

### 3.1.2. Native forests and scrub/shrublands

The Proposed Designation intersects with several large areas of native forest habitat, which have been identified as SNAs (refer to Map 2 and Table 7 below). Table 8 below provides details regarding the vegetation communities that have been recorded within the SNAs that occur within the Indicative Alignment and the remainder of the Proposed Designation, and identifies avifauna species that are known to, or could occur within that feature. While the larger tracts of forest will provide habitat for a number of forest-dwelling native species (e.g. Tūī, bellbird / Korimako, kererū, silvereye / Tauhou, shining cuckoo / Pīpīwharau, grey warbler / Rirorio, tomtit / Miromiro, ruru), the smaller patches of native forest which are dotted across the landscape, may also serve the ecological function of stepping stones to facilitate passage across the wider landscape (refer to Map 11).

Table 7: Extent of SNAs within the Indicative Alignment and remainder of the Proposed Designation (refer to Map 2 for locations)




SNA		WITHIN INDICATIVE ALIGNMENT (ha)	REMAINDER OF PROPOSED DESIGNATION (ha)	TOTAL SNA SIZE (ha)
Q08/233	SH1 Forest Remnants	2.45	4.96	7.4
Q08/235	Ahuroa River Forest Remnants	0.48	11.99	53.8
Q08/227	Northern Brynderwyn Hills Remnants	0.53	1.24	3.1
Q08/222	Waipu Gorge Forest Remnants	2.52	10.17	543.7
Q08/225b	Brynderwyn Hills Forest Complex B	1.96	24.45	189.1
Q08/225a	Brynderwyn Hills Forest Complex A	11.37	33.73	236
Q08/066	Brynderwyn Farm Pond		1.18	1.18
Q08/067	Brynderwyn Road Forest Remnants	1.08	22.80	26.4
Q08/173	Wairau River Riparian Forest Remnants	0.0004	0.44	21.3
ROD001	Pukeareinga Scenic Reserve and Surrounds	16.26	42.02	473.7
ROD002	Pretty Bush		0.13	17.3
ROD003	Pukepohatu, Cattlemount and Surrounds		0.34	2138.9
	<b>TOTAL AREA (ha)</b>	<b>36.65</b>	<b>153.45</b>	




The stand of planted manuka located between SH1 and the Waihoihoi River is likely to provide habitat for North Island fernbird / Mātātā, which were recorded approximately 1 km south of this location (refer to Map 5).



While not recorded within the Proposed Designation or 5 km buffer (refer to Map 4 and **Appendix C**), North Island brown kiwi / Kiwi-nui (classified as *Not Threatened*) are known to inhabit forest (native and exotic) stands across the landscape (Potter, 1990; Taborsky & Taborsky, 1995). A map of North Island brown kiwi / Kiwi-nui distribution (2020) is provided in **Appendix D**. A 1997 survey of Pukeareinga Scenic Reserve and Surrounds (ROD001) recorded kiwi probe holes and scat (Goldwater et al., 2012). Thus, given the historic records of kiwi in the wider area, the presence of potential habitat, and their known home ranges (McLennan et al., 1987; Potter, 1990; Taborsky & Taborsky, 1992, 1995; Ziesemann, 2011), it is likely that a low number of kiwi / Kiwi-nui are present or will occur within the Proposed Designation, and potentially the Indicative Alignment.


North Island kākā was the only native forest dwelling species with an *At Risk* classification that was recorded within the 5 km buffer, but it was not recorded within the Indicative Alignment or Proposed Designation (Table 6). During the recent field investigations, a single North Island kākā was recorded in the Pukepohatu, Cattlemount and Surrounds SNA (ROD003) near the intersection of SH12 and SH1 (refer to Map 19). Historically, Lux et al. (2007) recorded kākā in the Brynderwyn Hills Complex (Q08/225 (a-j)), and this species has also been recorded in the wider landscape associated with Wahiwaka Creek Forest Remnants (Q08146) and approximately 1 km to the south of Pukenui Forest (Q07022). As such, it is likely kākā are present in low numbers in these larger stands of native forest and will be traversing the landscape.

Table 8: Vegetation and avifauna communities associated with SNAs within the Indicative Alignment (north to south)

SNA	VEGETATION COMMUNITIES	REPRESENTATIVE SITE PHOTO	POTENTIAL NATIVE AVIFAUNA HABITAT
SH1 Forest Remnants (Q08/233)	<ul style="list-style-type: none"> <li>• Kahikatea treeland, forest and swampland</li> <li>• Kahikatea-pukatea forest/native scrub/tradescantia</li> <li>• Tōtara forest/native broadleaf scrub</li> </ul>		<p>Tall stature trees likely to provide habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Fantail / Pīwakawaka</li> <li>▪ Tūī</li> <li>▪ Silvereye / Tauhou</li> <li>▪ Grey warbler / Rirorio</li> <li>▪ Kererū</li> <li>▪ Ruru</li> <li>▪ Bellbird / Korimako</li> </ul> <p>Welcome swallow / Warou may utilise the vegetation edge interface.</p>
Ahuroa River Forest Remnants (Q08/235)	<ul style="list-style-type: none"> <li>• Totara forest</li> <li>• Remnant Riparian podocarp-hardwood-kanuka treeland</li> </ul>		<p>Tall stature trees likely to provide habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Fantail / Pīwakawaka</li> <li>▪ Tūī</li> <li>▪ Silvereye / Tauhou</li> <li>▪ Grey warbler / Rirorio</li> <li>▪ Kererū</li> <li>▪ Ruru</li> <li>▪ Bellbird / Korimako</li> </ul> <p>While not directly under the Indicative Alignment, the riparian vegetation and stream may provide habitat for kingfisher / Kōtare, shag species and welcome swallow / Warou.</p>
Northern Brynderwyn Hills Remnants (Q08/227)	<ul style="list-style-type: none"> <li>• Kauri-kahikatea-totara treeland</li> </ul>		<p>Tall stature trees likely to provide habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Fantail / Pīwakawaka</li> <li>▪ Tūī</li> <li>▪ Silvereye / Tauhou</li> <li>▪ Grey warbler / Rirorio</li> <li>▪ Kererū</li> <li>▪ Ruru</li> <li>▪ Bellbird / Korimako</li> </ul> <p>Welcome swallow / Warou may utilise the vegetation edge interface.</p>

SNA	VEGETATION COMMUNITIES	REPRESENTATIVE SITE PHOTO	POTENTIAL NATIVE AVIFAUNA HABITAT
Waipu Gorge Forest Remnants (Q08/222)	<ul style="list-style-type: none"> <li>• Kanuka forest</li> <li>• Broadleaved species scrub forest</li> </ul>		<p>Large forest complex likely to provide habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Fantail / Pīwakawaka</li> <li>▪ Tūtī</li> <li>▪ Silvereeye / Tauhou</li> <li>▪ Grey warbler / Rirorio</li> <li>▪ Kererū</li> <li>▪ Tomtit / Miromiro</li> <li>▪ Shining cuckoo / Pīpīwharauora</li> <li>▪ Ruru</li> <li>▪ Bellbird / Korimako</li> </ul> <p>Possible that low numbers of North Island Kākā (At Risk) may visit this forest on occasion.</p>
Brynderwyn Hills Forest Complex B (Q08/225b)	<ul style="list-style-type: none"> <li>• Kohekohe-taraire-tawa-podocarp/broadleaf</li> <li>• Kānuka forest</li> <li>• Kauri-podocarp forest</li> </ul>		<p>Large forest complex likely to provide habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Fantail / Pīwakawaka</li> <li>▪ Tūtī</li> <li>▪ Silvereeye / Tauhou</li> <li>▪ Grey warbler / Rirorio</li> <li>▪ Kererū</li> <li>▪ Tomtit / Miromiro</li> <li>▪ Shining cuckoo / Pīpīwharauora</li> <li>▪ Ruru</li> <li>▪ Bellbird / Korimako</li> </ul> <p>Possible that low numbers of North Island Kākā (At Risk) may visit this forest on occasion.</p>
Brynderwyn Hills Forest Complex A (Q08/225a)	<ul style="list-style-type: none"> <li>• Kauri-podocarp forest</li> <li>• Kohekohe-taraire-tawa-podocarp/broadleaf</li> </ul>		<p>Large forest complex likely to provide habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Fantail / Pīwakawaka</li> <li>▪ Tūtī</li> <li>▪ Silvereeye / Tauhou</li> <li>▪ Grey warbler / Rirorio</li> <li>▪ Kererū</li> <li>▪ Tomtit / Miromiro</li> <li>▪ Shining cuckoo / Pīpīwharauora</li> <li>▪ Ruru</li> <li>▪ Bellbird / Korimako</li> </ul>

SNA	VEGETATION COMMUNITIES	REPRESENTATIVE SITE PHOTO	POTENTIAL NATIVE AVIFAUNA HABITAT
Brynderwyn Road Forest Remnants (Q08/067)	<ul style="list-style-type: none"> <li>• Kauri-podocarp-broadleaf forest</li> <li>• Totara-kauri broadleaf scrub</li> </ul>		<p>Possible that low numbers of North Island Kākā (At Risk) may visit this forest on occasion.</p> <p>Likely to provide habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Fantail / Pīwakawaka</li> <li>▪ Tūī</li> <li>▪ Silvereye / Tauhou</li> <li>▪ Grey warbler / Rirorio</li> <li>▪ Kererū</li> <li>▪ Tomtit / Miromiro</li> <li>▪ Shining cuckoo / Pīpīwharauoa</li> <li>▪ Ruru</li> <li>▪ Bellbird / Korimako</li> </ul>
Wairau River Riparian Forest Remnants (Q08/173)	<ul style="list-style-type: none"> <li>• Kahikatea with occasional matai, ti kouka and totara.</li> </ul>		<p>Likely to provide habitat for a number of native Not Threatened species:</p> <ul style="list-style-type: none"> <li>▪ Fantail / Pīwakawaka</li> <li>▪ Tūī</li> <li>▪ Silvereye / Tauhou</li> <li>▪ Grey warbler / Rirorio</li> <li>▪ Kererū</li> <li>▪ Tomtit / Miromiro</li> <li>▪ Shining cuckoo / Pīpīwharauoa</li> <li>▪ Ruru</li> <li>▪ Bellbird / Korimako</li> </ul>

SNA	VEGETATION COMMUNITIES	REPRESENTATIVE SITE PHOTO	POTENTIAL NATIVE AVIFAUNA HABITAT
Pukeareinga Scenic Reserve and Surrounds (ROD001)	<ul style="list-style-type: none"> <li>• Kanuka forest</li> <li>• Scattered podocarp-broadleaf-kanuka treeland/mixed native and exotic scrub/ranked grassland.</li> <li>• Tōtara-kauri/broadleaf scrub.</li> <li>• Kauri podocarp forest</li> </ul>		<p>Likely to provide habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Fantail / Pīwakawaka</li> <li>▪ Tūt</li> <li>▪ Silvereye / Tauhou</li> <li>▪ Grey warbler / Rirorio</li> <li>▪ Kererū</li> <li>▪ Tomtit / Miromiro</li> <li>▪ Shining cuckoo / Pīpīwharauora</li> <li>▪ Ruru</li> <li>▪ Bellbird / Korimako</li> </ul> <p>Kiwi / Kiwi-nui probe holes and scat recorded in the Pukeareinga Scenic Reserve in 1997 (Goldwater et al., 2012).</p>

### 3.1.3. Freshwater / wetlands

Four species that primarily associate with freshwater / wetland habitats were recorded within the Indicative Alignment (Figure 4); comprising one *At Risk* (North Island fernbird / Mātātā), two native *Not Threatened* (paradise shelduck and pukeko) and one *Introduced* (mallard) species. Species recorded within the Proposed Designation, but not within the Indicative Alignment, include species that are *Threatened* (NZ dabchick/ Weweia, grey duck<sup>10</sup> and white heron / Kotuku) and *At Risk* (little shag / Kawaupaka) (refer to Figure 5, Table 6 and respective species maps listed in Table 5).

Maps provided in Appendix 2 of the Assessment of Effects on Freshwater Ecology (Appendix D7 of Volume B of the Substantive Application) identify the wetlands occurring within the Proposed Designation, including Indicative Alignment, and these are listed in Table 9 below. Table 9 also identifies the anticipated extent of area to be impacted by the Project and the avifauna species for which they may provide habitat. The majority of these wetlands are scattered, low stature exotic-dominated features in pasture, which are of limited value to *Threatened* or *At Risk* freshwater / wetland avifauna species (refer to Table 6 for the details of habitat preferences for these species). However, during recent field investigations, North Island fernbird / Mātātā were recorded at Wetland 13<sup>11</sup>, which forms part of a wider complex of wetlands and riparian margin associated with the Waihoihoi River. As such, it is likely North Island fernbird / Mātātā are not just confined to this single wetland but utilise the wider wetland-riparian-scrubland ecosystem.

Wetland 24<sup>12</sup> has a relatively large area of raupō (refer to photo in Table 9 below, and Maps 10 and 11 in Appendix 2 of the Assessment of Effects on Freshwater Ecology - Appendix D7 of Volume B of the Substantive Application, which may provide habitat for cryptic marshbird species such as Australasian bittern / Matuku-hūrepo and spotless crane / Kotoreke; both species were recorded within 5 km of the Proposed Designation (refer to Map 4 and 6 in **Appendix A** respectively). Australasian bittern / Matuku-hūrepo are known to use a network of wetlands across the landscape (Williams, 2024), as well as forage in farm drains; as such these drains are also likely to provide habitat for this species across the Proposed Designation.

Other wetlands / riparian margins identified in the Assessment of Effects on Freshwater Ecology report (Appendix D7 of Volume B) as being within the Proposed Designation but currently outside of the Indicative Alignment, and which may provide habitat for cryptic marshbirds include Wetland 8<sup>13</sup> (raupō wetland adjacent to the Waihoihoi River) and the Brynderwyn Farm Pond SNA (Q08/066). The larger streams (e.g. Waihoihoi and Piroa) and associated riparian vegetation, may provide habitat for a variety of native species (refer Table 10 below) including shags, kingfisher / Kōtare and welcome swallow / Warou.

Several ponds / open water bodies are located within the Proposed Designation (listed in Table 10 below). With regard to the ponds, Lux & Beadel (2006) reported a Black shag / Māpunga present in the 1.2 ha constructed Brynderwyn Farm Pond SNA (Q08/066; refer Table 10), while recent field investigations recorded NZ dabchick / Weweia on the Mayflower pond and grey duck / Pārera on the Waipu nursery pond. Additionally, brown teal / Pāteke (*Threatened*) and Australasian little grebe / Tokitokipio (*Coloniser*) have been recorded in the wider area (refer to Table 6, and Maps 10 and 5 respectively), so may also visit these ponds occasionally.

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<sup>10</sup> The Threatened – Nationally Vulnerable status applied to grey duck is attributed to the ongoing hybridisation with mallard ducks, with hybrid and pure grey ducks being difficult to differentiate by observation alone and generally requiring genetic analysis (Robertson, Baird, Elliott, Hitchmough, McArthur, Makan, Miskelly, O'Donnell, et al., 2021).

<sup>11</sup> Shown in Map 5 in Appendix 2 of the Freshwater and Wetlands Assessment



<sup>12</sup> Shown in Maps 10 and 11 in Appendix 2 of the Freshwater and Wetlands Assessment




<sup>13</sup> Shown in Map 3 in Appendix 2 of the Freshwater and Wetlands Assessment




Table 9: Wetland habitats within Indicative Alignment (north to south) and associated native avifauna values




WETLAND FEATURE REF# <sup>14</sup>	DESCRIPTION	AREA WITHIN INDICATIVE ALIGNMENT (ha)	TOTAL WETLAND FEATURE AREA (ha)	POTENTIAL NATIVE AVIFAUNA HABITAT VALUES	
1	Largely an exotic wetland formed around the discharge channel adjacent to Ahuroa River riparian margin	-	0.02		<p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul> <p>Treeland edge may provide habitat for widespread <i>Not Threatened</i> native forest species such as silvereye / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka.</p>
2	Exotic dominated, purslane, water pepper and rushes	0.25	0.25		<p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul>
3	Manuka edge. Juncus, creeping bent, buttercup	0.06	0.16		<p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul> <p>The manuka edge may provide habitat for scrub/shrubland species, including fernbird / Mātātā (At Risk)</p>




<sup>14</sup> As identified and described in Appendices 1 and 2 of the Freshwater & Wetlands Assessment respectively




WETLAND FEATURE REF# <sup>14</sup>	DESCRIPTION	AREA WITHIN INDICATIVE ALIGNMENT (ha)	TOTAL WETLAND FEATURE AREA (ha)	POTENTIAL NATIVE AVIFAUNA HABITAT VALUES
4	Juncus, buttercup, creeping bent	0.27	0.64	 <p>Potential habitat for a number of native <i>Not Threatened</i> species</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul>
5	Juncus, buttercup, creeping bent	-	0.03	<p>Potential habitat for a number of native <i>Not Threatened</i> species</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul>
6	Juncus, buttercup, creeping bent	-	0.04	 <p>Potential habitat for a number of native <i>Not Threatened</i> species</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul>

WETLAND FEATURE REF# <sup>14</sup>	DESCRIPTION	AREA WITHIN INDICATIVE ALIGNMENT (ha)	TOTAL WETLAND FEATURE AREA (ha)	POTENTIAL NATIVE AVIFAUNA HABITAT VALUES
7	Juncus, buttercup, creeping bent	-	0.43	 <p>Potential habitat for a number of native <i>Not Threatened</i> species</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul>
8	Central area of raupō with dense rush edges. Feature connected to the Waihoihoi River.	-	1.25	 <p>Potential habitat for a number of native <i>Not Threatened</i> species</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul> <p>Potential habitat for Australasian bittern / Matuku-hūrepo (<i>Threatened</i>) and Fernbird / Mātātā (<i>At Risk</i>)</p>
9	Juncus, buttercup, creeping bent	-	0.05	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul>
10		-	0.07	

WETLAND FEATURE REF# <sup>14</sup>	DESCRIPTION	AREA WITHIN INDICATIVE ALIGNMENT (ha)	TOTAL WETLAND FEATURE AREA (ha)	POTENTIAL NATIVE AVIFAUNA HABITAT VALUES
11	Upper gully. Juncus, creeping buttercup, creeping bent	0.20	1.96	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul> <p>Fernbird / Mātātā (At Risk) recorded present.</p>
12	Upper gully and forest. Kahikatea with creeping bent, Glyceria, water pepper, creeping buttercup	0.36	0.40	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul> <p>Also potential habitat for Fernbird / Mātātā (At Risk) Treeland edge may provide habitat for widespread <i>Not Threatened</i> native forest species such as silvereye / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka.</p>
13	Upper forested gully. Juncus, creeping butter cup, creeping bent	0.27	1.73	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul> <p>Fernbird / Mātātā (At Risk) recorded present. Treeland edge may provide habitat for widespread <i>Not Threatened</i> native forest species such as silvereye / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka.</p>

WETLAND FEATURE REF# <sup>14</sup>	DESCRIPTION	AREA WITHIN INDICATIVE ALIGNMENT (ha)	TOTAL WETLAND FEATURE AREA (ha)	POTENTIAL NATIVE AVIFAUNA HABITAT VALUES
14	Upper gully head. Wet pasture with Juncus and creeping bent	0.50	0.53	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul> <p>Potential habitat Fernbird / Mātātā (At Risk)</p>
15	Kikuyu with juncus scattered throughout	-	0.09	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Welcome swallow / Warou</li> </ul>
16	A small section of more intact forest gully wetland. The lower portion of the forest contain beds of raupō, Carex, lemna, and an area of gully floor kiekie. Upstream, the flood plain remains mostly exotic wetland species and pasture grasses	-	0.43	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul> <p>Forested section may provide habitat for widespread <i>Not Threatened</i> native forest species such as silvereve / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka.</p>

WETLAND FEATURE REF# <sup>14</sup>	DESCRIPTION	AREA WITHIN INDICATIVE ALIGNMENT (ha)	TOTAL WETLAND FEATURE AREA (ha)	POTENTIAL NATIVE AVIFAUNA HABITAT VALUES
17	General Gully heads	-	0.01	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Welcome swallow / Warou</li> </ul> <p>Treeland edge may provide habitat for widespread <i>Not Threatened</i> native forest species such as silvereeye / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka.</p>
18	General Gully heads	-	0.00	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Welcome swallow / Warou</li> </ul> <p>Treeland edge may provide habitat for widespread <i>Not Threatened</i> native forest species such as silvereeye / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka.</p>
19	Largely creeping butter cup, a few wheki, tall fescue and other exotic wetland common species	-	0.35	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> </ul>

WETLAND FEATURE REF# <sup>14</sup>	DESCRIPTION	AREA WITHIN INDICATIVE ALIGNMENT (ha)	TOTAL WETLAND FEATURE AREA (ha)	POTENTIAL NATIVE AVIFAUNA HABITAT VALUES
20	Largely creeping buttercup, soft rush, creeping bent, Edgar's rush, <i>Isolepis</i> and water forget-me-not	0.01	0.01	 <p>Limited potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> <li>▪ White-faced heron / Matuku moana</li> </ul>
21	At the head of the gully, the depression forms two arms and a general central basin which contains a mix of wet pasture and natural inland wetland of exotic common pastoral wetland species.	0.01	0.07	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> </ul>
22	Juncus, creeping bent and buttercup	-	0.01	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> </ul> <p>Treeland edge may provide habitat for widespread <i>Not Threatened</i> native forest species such as silvereve / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka.</p>








WETLAND FEATURE REF# <sup>14</sup>	DESCRIPTION	AREA WITHIN INDICATIVE ALIGNMENT (ha)	TOTAL WETLAND FEATURE AREA (ha)	POTENTIAL NATIVE AVIFAUNA HABITAT VALUES
23	Juncus, creeping bent and buttercup	0.03	0.03	 <p>Potential habitat for a number of native <i>Not Threatened</i> species:</p> <ul style="list-style-type: none"> <li>▪ Pūkeko</li> <li>▪ Paradise shelduck / Pūtangitangi</li> <li>▪ Kingfisher / Kōtare</li> <li>▪ Welcome swallow / Warou</li> </ul> <p>Treeland edge may provide habitat for widespread <i>Not Threatened</i> native forest species such as silverye / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka.</p>
24	Raupo gully with edge willow	1.05	3.16	 <p>Potential habitat for:</p> <ul style="list-style-type: none"> <li>▪ Australasian bittern / Matuku-hūrepo (<i>Threatened</i>)</li> <li>▪ Spotless crane / Pūweto (<i>At Risk</i>)</li> <li>▪ Fernbird / Mātātā (<i>At Risk</i>)</li> <li>▪ Pūkeko (Not Threatened)</li> <li>▪ Paradise shelduck / Pūtangitangi (<i>Not Threatened</i>)</li> <li>▪ Kingfisher / Kōtare (<i>Not Threatened</i>)</li> <li>▪ Welcome swallow / Warou (<i>Not Threatened</i>)</li> <li>▪ White-faced heron / Matuku moana (<i>Not Threatened</i>)</li> </ul>

Table 10: Pond / open water body habitats within Proposed Designation (north to south) and associated native avifauna values

POND / OPEN WATER BODY FEATURE		POTENTIAL NATIVE AVIFAUNA HABITAT
Waipu nursery pond		<ul style="list-style-type: none"> <li>▪ Grey duck / Pāpera (<i>Threatened</i>) and NZ dabchick / Weweia (<i>Threatened</i>) may forage in the open water.</li> <li>▪ Planted rush edge may provide habitat for fernbird / Mātātā (<i>At Risk</i>).</li> <li>▪ Welcome swallow / Warou (<i>Not Threatened</i>) likely to forage over open water and along riparian margin.</li> <li>▪ Brown teal / Pāteke (<i>Threatened</i>) and Australasian little grebe / Tokitokipio (<i>Coloniser</i>) have been recorded in the wider landscape and may utilise this open water body occasionally.</li> </ul>
Waihoihoi river		<ul style="list-style-type: none"> <li>▪ Taller trees along the riparian edge may provide roosting habitat for shag species and kingfisher / Kōtare, which may also forage in the open water.</li> <li>▪ Welcome swallow / Warou likely to forage over open water and along riparian margin.</li> <li>▪ Fernbird / Mātātā (<i>At Risk</i>) may use riparian margin to traverse across the wider complex of scrub and wetlands in this area.</li> </ul>
Piroa stream		<ul style="list-style-type: none"> <li>▪ Taller trees along the riparian edge may provide roosting habitat for shag species and kingfisher / Kōtare, which may also forage in the open water.</li> <li>▪ Welcome swallow / Warou likely to forage over open water and along riparian margin.</li> <li>▪ Forested edge will also provide habitat for native forest-dwelling species such as silvereye / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka, Tūi etc.</li> </ul>

POND / OPEN WATER BODY FEATURE		POTENTIAL NATIVE AVIFAUNA HABITAT
Mayflower pond		<ul style="list-style-type: none"> <li>▪ Taller trees along the riparian edge may provide roosting habitat for shag species and kingfisher / Kōtare, which may also forage in the open water.</li> <li>▪ Open water provides foraging habitat for NZ dabchick / Weweia (<i>Threatened</i>), and edge vegetation may provide breeding habitat.</li> <li>▪ Welcome swallow / Warou likely to forage over open water and along riparian margin.</li> <li>▪ Forested edge will also provide habitat for native forest-dwelling species such as silvereve / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka, Tūi etc.</li> <li>▪ Brown teal / Pāteke (<i>Threatened</i>) and Australasian little grebe / Tokitokipio (<i>Coloniser</i>) have been recorded in the wider landscape and may utilise this open water body occasionally.</li> </ul>
Brynderwyn farm pond (Q08/066)		<ul style="list-style-type: none"> <li>▪ Black shag / Māpunga reported here, so may also be used by other shag species.</li> <li>▪ Open water may provide foraging habitat for NZ dabchick / Weweia.</li> <li>▪ Vegetated pond edge may provide foraging habitat for Australasian bittern / Matuku-hūrepo and crake.</li> <li>▪ Potential habitat for fernbird / Mātātā.</li> <li>▪ Welcome swallow / Warou and kingfisher / Kōtare likely to forage over open water and along riparian margin.</li> <li>▪ Brown teal / Pāteke, coot and Australasian little grebe / Tokitokipio have been recorded in the wider landscape and may utilise this open water body occasionally.</li> </ul>

### 3.1.4. Exotic forest / shelterbelts / ornamental plantings

Exotic pine forest is known to provide habitat for a number of native *Not Threatened* species including whitehead / Pōpokotea (*Mohoua albicilla*), tomtit / Miromiro, rifleman / Tītipounamu (*Acanthisitta chloris*), silvereve / Tauhou, grey warbler / Rirorio, fantail / Pīwakawaka, Northland brown kiwi / Kiwi-nui, as well as the *Threatened* New Zealand falcon / Kārearea and *At Risk* pipit / Pīhoihoi and robin / Toutouwai (*Petroica longipes*) (Acres, 1956; Borkin et al., 2007; Caughley & Challies, 1960; Seaton et al., 2010a, 2010b, 2013). Seaton et al. (2010b) investigated variation in bird species abundance in the Kaingaroa Plantation Forest (Bay of Plenty), and reported 31 species, with the introduced chaffinch (*Fringilla coelebs*) being the most abundant (32%) species recorded.

While tomtit / Miromiro is the only species recorded within the exotic pine forest that is part of the Indicative Alignment (refer to Map 11 and **Appendix C**). Based on the species recorded outside of the Indicative Alignment, it is expected that other native species such as silvereve / Tauhou, ruru, grey warbler / Rirorio, shining cuckoo / Pīpīwharauoa and fantail / Pīwakawaka will also occur there. It is also possible that North Island brown kiwi / Kiwi-nui may be present within exotic pine forest habitat. With regard to *Threatened* or *At Risk* species, while New Zealand falcon / Kārearea have been recorded breeding elsewhere in exotic pine forests, there are only sparse records of this species in Northland, and none within the Proposed Designation. There are also no records of NZ pipit / Pīhoihoi within the pine forest (refer to Map 12 and **Appendix C**).

The scattered exotic shelterbelts and ornamental planting across the landscape surrounding the Project are likely to provide habitat for a variety of small native *Not Threatened* (e.g. silvereve / Tauhou, fantail / Pīwakawaka, grey warbler / Rirorio, Tūi) and introduced birds (e.g. myna, starling, sparrow, chaffinch, gold finch).

## 4. Assessment of Effects

### 4.1. Assessment of actual and potential effects

Rather than undertaking an assessment of potential effects on all 41 avifauna species that have been recorded within the Indicative Alignment and / or Proposed Designation, I have focused on native species for which their primary habitat may be impacted by the Project. As such, the following species are not included the assessment:

- Introduced / exotic species which are not native to New Zealand; and
- Species whose primary habitat are coastal / estuarine and oceanic environments due neither of these habitat types occur within the Proposed Designation;

Conversely, several species that have not been recorded in the Proposed Designation were included in this assessment, specifically where the species:

- were recorded within the 5 km buffer; and / or
- have primary habitat that may be impacted; and / or
- are known to traverse the wider landscape.

These species include the Australasian bittern / Matuku-hūrepo, Australasian little grebe / Tokitokipio, North Island kākā, North Island brown kiwi / Kiwi-nui and a variety of petrel species.

Taking the above into consideration, Table 11 lists the avifauna species for which the following anticipated construction and operational phase effects (both direct and indirect) have been assessed:<sup>15</sup>

- Direct habitat loss (Section 4.1.1);
- Injuries and / or mortalities (Section 4.1.2);
- Disturbance and / or displacement (Section 4.1.3);
- Artificial lighting (Section 4.1.4).

Table 11: Native species for which the construction and operational impacts of the Project were assessed

SPECIES	NZ THREAT STATUS	ECOLOGICAL VALUE <sup>16</sup>	PRIMARY HABITAT						LOCATION RECORDED		
			Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Oceanic	Indicative Alignment	Proposed Designation	5km buffer
Bellbird / Korimako	Not Threatened	Low	█						✓		✓
Kererū	Not Threatened	Low	█							✓	✓
Kingfisher / Kōtare	Not Threatened	Low	█				█		✓	✓	✓
Morepork	Not Threatened	Low	█							✓	✓
North Island fantail / Pīwakawaka	Not Threatened	Low	█						✓	✓	✓
North Island Kākā	At Risk - Recovering	Moderate	█								✓
North Island kiwi / Kiwi-nui	Not Threatened	Low	█								
North Island tomtit / Miromiro	Not Threatened	Low	█						✓	✓	✓
Shining cuckoo / Pīpīwharau	Not Threatened	Low	█						✓	✓	✓
Tūī	Not Threatened	Low	█						✓	✓	✓
Grey warbler / Rirorio	Not Threatened	Low		█	█				✓	✓	✓
Silvereye / Tauhou	Not Threatened	Low		█	█				✓	✓	✓

<sup>15</sup> Refer to Section 2.5 for project and construction related assumptions on which this assessment has been based.

<sup>16</sup> Following the EIANZ criteria provided in Table 1 (page 11).

SPECIES	NZ THREAT STATUS	ECOLOGICAL VALUE <sup>16</sup>	PRIMARY HABITAT						LOCATION RECORDED		
			Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Oceanic	Indicative Alignment	Proposed Designation	5km buffer
NZ pipit / Pīhoihoi	At Risk - Declining	High							✓	✓	✓
Spur-winged plover	Not Threatened	Low							✓	✓	✓
Swamp harrier / Kāhu	Not Threatened	Low							✓	✓	✓
Welcome swallow / Warou	Not Threatened	Low							✓	✓	✓
Australasian bittern / Matuku-hūrepo	Threatened - Nationally Critical	Very High									✓
Australasian little grebe / Tokitokipio	Coloniser	Low									✓
Black shag / Māpunga	At Risk - Relict	Moderate									✓
Black swan	Not Threatened	Low							✓	✓	
Black-billed gull / Tarāpuka	At Risk - Declining	High									✓
Black-fronted tern / Tarapirohe	Threatened - Nationally Endangered	Very High									✓
Brown teal / Pāteke	Threatened - Nationally Increasing	Very High									✓
Grey duck / Pārera	Threatened – Nationally Vulnerable	Very High							✓	✓	
Grey teal / Tētē-moroiti	Not Threatened	Low									✓
Little black shag / Kawau tūi	At Risk - Naturally Uncommon	Moderate									✓
Little shag / Kawaupaka	At Risk - Relict	Moderate							✓	✓	
North Island fernbird / Mātātā	At Risk - Declining	High							✓		✓
NZ dabchick / Weweia	Threatened - Nationally Increasing	Very High							✓	✓	
SIPO / Tōrea	At Risk - Declining	High							✓	✓	
NZ scaup / Pāpango	Not Threatened	Low									✓
Australian shoveler	Not Threatened	Low									✓
Paradise shelduck / Pūtangitangi	Not Threatened	Low							✓	✓	✓
Pied stilt / Poaka	Not Threatened	Low							✓	✓	
Pūkeko	Not Threatened	Low							✓	✓	✓
Spotless crane / Pūweto	At Risk - Declining	High									✓
White heron / Kōtuku	Threatened - Nationally Critical	Very High							✓	✓	
Black petrel / Tāiko	Threatened – Nationally Vulnerable	Very High									
Buller's shearwater / Rako	At Risk - Declining	High									
Common diving petrel / Kuaka	At Risk – Relict	Moderate									
Cook's petrel / Tītī	At Risk – Relict	Moderate									
Grey-faced petrel / Ōi	Not Threatened	Low									
Fluttering shearwater / Pakahā	At Risk – Relict	Moderate									
Sooty shearwater / Tītī	At Risk - Declining	High									
White-faced storm petrel / Takahikare	At Risk – Relict	Moderate									

#### 4.1.1. Direct habitat loss

##### Construction phase

Based on the current Indicative Alignment, approximately 370 ha of landcover will be lost under the Indicative Alignment during the construction phase, the majority of which comprises farmland and exotic pine forest (refer to Table 4 on page 6). The native species potentially affected by the loss of habitats within the Indicative Alignment are listed in Table 12, along with the approximate area of each habitat.

Table 12: Habitat located under the Indicative Alignment and species that may be associated with that habitat. (Underlined species indicate a primary habitat association)

	FARMLAND	EXOTIC PINE FOREST	NATIVE FOREST & SCRUB / SHRUBLAND	FRESHWATER WETLANDS / RIPARIAN MARGINS
<b>POTENTIAL SPECIES IMPACTED</b>	<ul style="list-style-type: none"> <li>• <u>NZ pipit / Pīhoihoi</u></li> <li>• <u>Harrier / Kāhu</u></li> <li>• <u>Pūkeko</u></li> <li>• <u>Spur-wing plover</u></li> <li>• Paradise shelduck / Pūtangitangi</li> <li>• Pied stilt / Poaka</li> <li>• SIPO / Tōrea</li> </ul>	<ul style="list-style-type: none"> <li>• Silvereeye / Tauhou</li> <li>• Tomtit / Miromiro</li> <li>• Grey warbler / Rirorio</li> <li>• Shining cuckoo / Pīpīwharauoa</li> <li>• Fantail / Pīwakawaka</li> <li>• North Island brown kiwi / Kiwi-nui</li> <li>• Ruru</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Tūī</u></li> <li>• <u>Bellbird / Korimako</u></li> <li>• <u>Silvereeye / Tauhou</u></li> <li>• <u>Tomtit / Miromiro</u></li> <li>• <u>Grey warbler / Rirorio</u></li> <li>• <u>Kererū</u></li> <li>• <u>Shining cuckoo / Pīpīwharauoa</u></li> <li>• <u>Fantail / Pīwakawaka</u></li> <li>• <u>North Island brown kiwi / Kiwi-nui</u></li> <li>• <u>North Island Kākā</u></li> <li>• <u>Ruru</u></li> <li>• Fernbird / Mātātā</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Australasian bittern / Matuku-hūrepo</u> (potentially wetland 24<sup>17</sup>)</li> <li>• <u>Fernbird / Mātātā</u> (potentially wetlands 3, 11, 12, 13, 14, 24)</li> <li>• <u>Spotless crane / Pūweto</u> (potentially wetland 24)</li> <li>• <u>Pūkeko</u></li> <li>• <u>Paradise shelduck / Pūtangitangi</u></li> <li>• Silvereeye / Tauhou</li> <li>• Fantail / Pīwakawaka</li> <li>• <u>Kingfisher / Kōtare</u></li> <li>• Welcome swallow / Warou</li> <li>• <u>Little shag / Kawaupaka</u></li> <li>• <u>Little black shag / Kawau tūī</u></li> <li>• <u>Black shag / Māpunga</u></li> </ul>
<b>AREA UNDER INDICATIVE ALIGNMENT<sup>18</sup></b>	~265 ha (Table 4)	~63 ha (Table 4)	~37 ha (Table 7)	~3.0 ha in total (includes 2.44 ha of potential wetland habitat for Threatened or At Risk species) (Table 9)

#### 4.1.2. Injuries and / or mortalities

##### Construction phase

The mobile nature of most avifauna species means that the potential for direct injuries and / or mortalities associated with construction activities are likely to be confined to birds that may be breeding, are flightless (e.g. North Island kiwi / Kiwi-nui) or are reluctant flyers. Species that could potentially be breeding within the Indicative Alignment are listed in Table 13, and have been considered, along with flightless or reluctant fliers, when assessing the potential for construction related injuries and / or mortalities.

<sup>17</sup> Shown in Maps 10 and 11 in Appendix 2 of the Freshwater and Wetlands Assessment

<sup>18</sup> Note that a number of the wetlands identified are likely to also be included in the LCDB calculation of pasture farmland.

Table 13: Species potentially breeding under the Indicative Alignment and their primary habitat association. (Underlined species indicate a primary habitat association)

	FARMLAND	EXOTIC PINE FOREST	NATIVE FOREST & SCRUB / SHRUBLAND	FRESHWATER WETLANDS / RIPARIAN MARGINS
<b>POTENTIAL SPECIES IMPACTED</b>	<ul style="list-style-type: none"> <li>NZ pipit / <u>Pīhoihoi</u></li> <li><u>Pūkeko</u></li> <li><u>Spur-wing plover</u></li> <li><u>Harrier / Kāhu</u></li> </ul>	<ul style="list-style-type: none"> <li>Silvereye / Tauhou</li> <li>Tomtit / Miromiro</li> <li>Grey warbler / Rirorio</li> <li>Shining cuckoo / Pīpīwharauoa</li> <li>Fantail / Pīwakawaka</li> <li>North Island brown kiwi / Kiwi-nui</li> <li>Ruru</li> </ul>	<ul style="list-style-type: none"> <li><u>Tūi</u></li> <li><u>Bellbird / Korimako</u></li> <li><u>Silvereye / Tauhou</u></li> <li><u>Tomtit / Miromiro</u></li> <li><u>Grey warbler / Rirorio</u></li> <li><u>Kererū</u></li> <li><u>Shining cuckoo / Pīpīwharauoa</u></li> <li><u>Fantail / Pīwakawaka</u></li> <li><u>North Island brown kiwi / Kiwi-nui</u></li> <li><u>North Island Kākā</u></li> <li><u>Ruru</u></li> <li><u>Fernbird / Mātātā</u></li> </ul>	<ul style="list-style-type: none"> <li><u>Australasian bittern / Matuku-hūrepo (Wetland 24<sup>17</sup>)</u></li> <li><u>Fernbird / Mātātā</u></li> <li><u>Spotless crane / Pūweto (Wetland 24<sup>17</sup>)</u></li> <li><u>Pūkeko</u></li> <li><u>Paradise shelduck / Pūtangitangi</u></li> <li><u>Kingfisher / Kōtare</u></li> </ul>

### Operation phase

Operational injuries and / or mortalities may occur if birds:

- traverse the new road at heights that result in collisions with vehicles; or
- are scavenging on roadkill and get struck by a vehicle; or
- are foraging on the roadside verge.

Habitat fragmentation can result in increased road kills (Spellerberg & Morrison, 1998). A list of species reported as road kill and which have been recorded within the Proposed Designation are listed in Table 14 (Beauchamp, 2009, p. 200; Brockie et al., 2009; Cousins, 2010; Flux et al., 2022; Sadleir & Linklater, 2016; Simcock et al., 2022). Other species that may be vulnerable to vehicle collisions and which have been recorded within the 5 km buffer include:

- Brown teal / Pāteke due to their habits of foraging in road ditches, being nocturnal and not particularly strong fliers (often flying low);
- NZ dabchick / Weweia due to their nocturnal flights; and
- Australasian bittern / Matuku-hūrepo, which forage close to roadsides (in drains) and have a characteristic slow lopping flight.

Table 14: Species recorded within the 5 km buffer that may potentially be impacted by vehicle collisions and their primary habitat association

	FARMLAND	EXOTIC PINE FOREST	NATIVE FOREST & SCRUB / SHRUBLAND	FRESHWATER WETLANDS / RIPARIAN MARGINS
<b>POTENTIAL SPECIES IMPACTED</b>	<ul style="list-style-type: none"> <li>NZ pipit / Pīhoihoi</li> <li>Pūkeko</li> <li>Harrier / Kāhu</li> <li>Spur-wing plover</li> </ul>	<ul style="list-style-type: none"> <li>Silvereye / Tauhou</li> <li>Grey warbler / Rirorio</li> <li>Fantail / Pīwakawaka</li> <li>North Island brown kiwi / Kiwi-nui</li> <li>Ruru</li> </ul>	<ul style="list-style-type: none"> <li>Silvereye / Tauhou</li> <li>Tūi</li> <li>Kererū</li> <li>Kiwi / Kiwi-nui</li> <li>Ruru</li> <li>Grey warbler / Rirorio</li> <li>Fantail / Pīwakawaka</li> </ul>	<ul style="list-style-type: none"> <li>Welcome swallow / Warou</li> <li>Kingfisher / Kōtare</li> <li>NZ dabchick / Weweia</li> <li>Australasian bittern / Matuku-hūrepo</li> <li>Brown teal / Pāteke</li> </ul>

### 4.1.3. Disturbance and / or displacement

Disturbance activities could occur during both the construction (e.g. noise, vibration and plant movement) and operational phases of the Project. Road construction noise can be of high intensity but is usually of limited duration. In contrast, road-traffic noise is persistent over time.

Disturbance to avifauna may result in short- or long-term displacement, decreased feeding rates, unattended nests (leading to incubation failure and increased opportunities for predators), and energy and time costs (Borgmann, 2010; Bowles, 1995; Kaldor, 2019; Lord et al., 2001; Price, 2008; Walls, 1999). Disturbance can result in an effective loss of habitat (Hockin et al., 1992), whereby an area adjacent to the disturbance source is not, or to a lesser extent, utilised. Studies have shown that the effects of road disturbance on birds can extend for approximately 1 km (Benítez-López et al., 2010; Cooke et al., 2020).

Given the presence of an existing State Highway (within and adjacent to the Proposed Designation), and the observation of birds within 1 km of that highway (refer to Maps 4-19 in **Appendix A**), we consider the effects of disturbance associated with the Project will not extend beyond a distance of 1 km from the Indicative Alignment or operational carriageway. Species that have potential habitat within 1 km of the Indicative Alignment and / or have been recorded within the Proposed Designation, are listed in Table 15 and have been considered when assessing the potential for construction and operational disturbance and / or displacement.

Table 15: Species that may be disturbed and / or displaced as a result of construction and operational activities (Underlined species indicate a primary habitat association)

	FARMLAND	EXOTIC PINE FOREST	NATIVE FOREST & SCRUB / SHRUBLAND	FRESHWATER WETLANDS / RIPARIAN MARGINS
POTENTIAL SPECIES IMPACTED	<ul style="list-style-type: none"> <li>• <u>NZ pipit / Pīhoihoi</u></li> <li>• <u>Pūkeko</u></li> <li>• <u>Spur-wing plover</u></li> <li>• Paradise shelduck / Pūtangitangi</li> <li>• <u>Harrier / Kāhu</u></li> <li>• Pied stilt / Poaka</li> <li>• SIPO / Tōrea</li> </ul>	<ul style="list-style-type: none"> <li>• Silvereeye / Tauhou</li> <li>• Tomtit / Miromiro</li> <li>• Grey warbler / Rirorio</li> <li>• Shining cuckoo / Pīpīwharuroa</li> <li>• Fantail / Pīwakawaka</li> <li>• North Island brown kiwi / Kiwi-nui</li> <li>• Ruru</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Tūī</u></li> <li>• <u>Bellbird / Korimako</u></li> <li>• <u>Silvereeye / Tauhou</u></li> <li>• <u>Tomtit / Miromiro</u></li> <li>• <u>Grey warbler / Rirorio</u></li> <li>• <u>Kererū</u></li> <li>• <u>Shining cuckoo / Pīpīwharuroa</u></li> <li>• <u>Fantail / Pīwakawaka</u></li> <li>• <u>North Island brown kiwi / Kiwi-nui</u></li> <li>• <u>North Island Kākā</u></li> <li>• <u>Ruru</u></li> <li>• Fernbird / Mātātā</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Australasian bittern / Matuku-hūrepe</u></li> <li>• <u>Fernbird / Mātātā</u></li> <li>• <u>Spotless crane / Pūweto</u></li> <li>• <u>Coot</u></li> <li>• <u>Australasian little grebe / Tokitokipio</u></li> <li>• <u>Brown teal / Pāteke</u></li> <li>• <u>Pūkeko</u></li> <li>• <u>Paradise shelduck / Pūtangitangi</u></li> <li>• <u>Grey duck / Pārera</u></li> <li>• <u>NZ dabchick / Weweia</u></li> <li>• Pied stilt / Poaka</li> <li>• Silvereeye / Tauhou</li> <li>• Fantail / Pīwakawaka</li> <li>• <u>Kingfisher / Kōtare</u></li> <li>• Welcome swallow / Warou</li> <li>• White-faced heron / Matuku moana</li> <li>• <u>Little shag / Kawaupaka</u></li> <li>• <u>Little black shag / Kawau tūī</u></li> <li>• <u>Black shag / Māpunga</u></li> </ul>

#### 4.1.4. Artificial lighting

##### Operational phase

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., 2017a, 2017b; Le Corre et al., 2002, 2003; Montevecchi, 2006; Poot et al., 2008; Reed et al., 1985; Rodríguez et al., 2012; Rodríguez & Rodríguez, 2009). Over a period of 3.5 years, Heswall (2024) reported 356 seabirds from eight different species (Cook’s petrel, grey-faced petrel, black petrel, Buller’s shearwater, fluttering shearwater, common diving petrel, white-faced storm petrel and sooty shearwater) being found in Auckland following their grounding as a result of artificial lighting. Groundings were more common in the Central Business District and industrial areas, coinciding with a higher light pollution intensity and lower natural night sky brightness (Figure 7; Heswall (2024)).

Notably, the Project is located outside the North Auckland Seabird Flyway (NZ016; refer to Figure 8), which has been identified as an IBA due to the movement of coastal and seabirds across the North

Auckland Peninsula (Forest & Bird, 2015). Furthermore, none of the seabird groundings reported by Heswall (2024) (refer to (Figure 7) were within the Proposed Designation.

Ruru are attracted to the insects, such as moths and weta, that swarm around artificial light sources at night (Haw et al., 2001; Haw & Clout, 1999; Lindsay & Ordish, 1964). The lights therefore can provide a reliable place to find food, but this in turn can put ruru at risk of vehicle collisions (refer to Section 4.1.2 above).

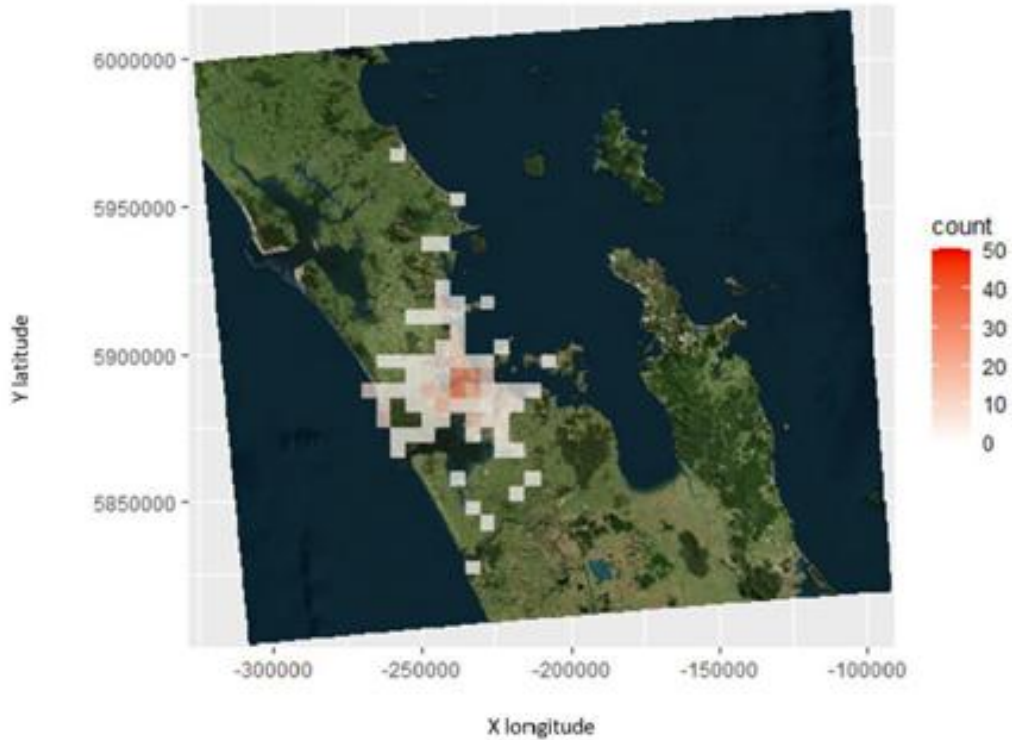


Figure 7: The number and location of seabird groundings across Auckland in 5km<sup>2</sup> for all species from 2018-2023 (Source: Figure 2.2 in Heswall (2024))

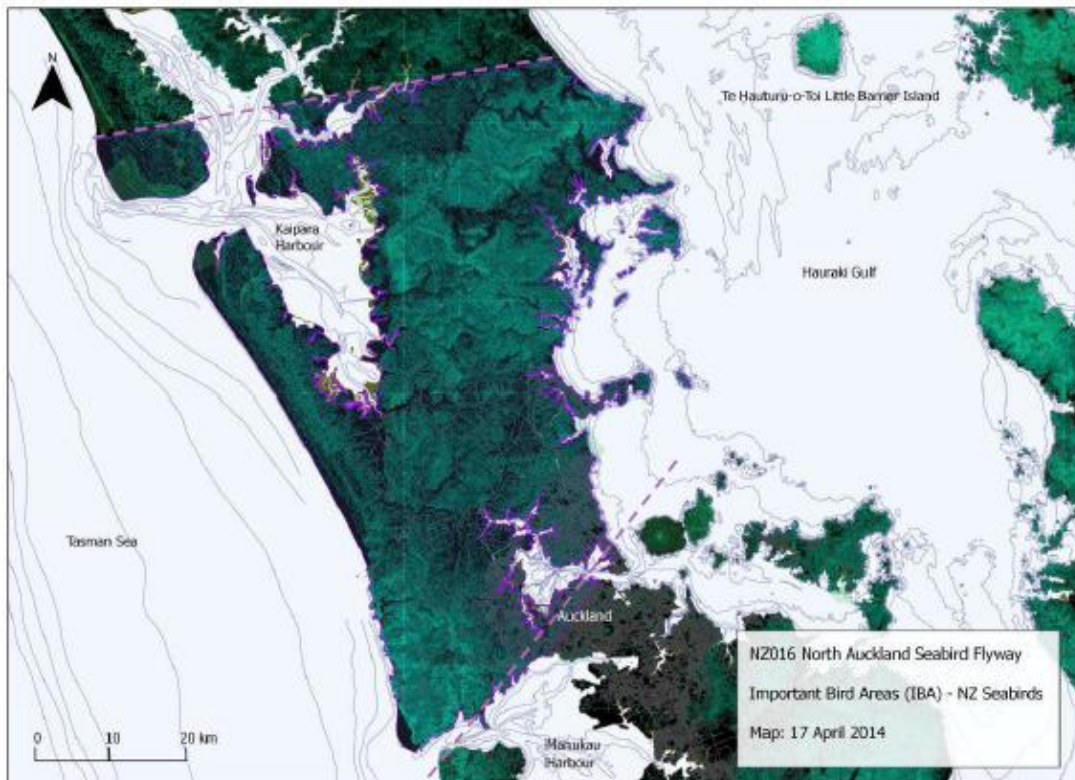


Figure 8: North Auckland Seabird Flyway (NZ016) (Source: Forst & Bird (2015))

#### 4.1.5. Effects Assessment Summary

Table 16 below presents the results of an assessment of potential effects of the Project on the species listed in Table 11. A holistic approach has been taken, whereby an assessment of potential effects of the Project's potential construction and operational activities are considered for each species to give an overall level of effect, **without any effects management measures**.

Overall, at the scale of the Ecological District, I consider the level of potential effects to be Low to Very Low on the majority of species, with the exceptions being:

- Potential High levels of effects for Australasian bittern / Matuku-hūrepo, North Island fernbird / Mātātā, New Zealand pipit / Pīhoihoi and spotless crane / Pūweto (Table 16 outlines the rationale for the level of effect identified for each of these species).
- Potential Moderate levels of effect for North Island kākā (Table 16 outlines the rationale for the level of effect identified for each of these species).

These levels of effects are due to the *Threatened* or *At Risk* status of the species, and the potential for injury and / or mortalities of breeding birds, as well as the loss of habitat types that are limited in the Ecological District. I consider high levels of effect (determined through use of the EIANZ Guidelines) represent significant adverse effects. Potential measures to reduce these levels of effect are discussed in Section 5 below.

Table 16: Native species for which the construction and operational impacts of the Project were assessed (ordered by descending NZ Threat status)

SPECIES	NZ THREAT STATUS	LOCATION RECORDED			ECOLOGICAL VALUE <sup>19</sup>	MAGNITUDE OF EFFECT <sup>20</sup> WITHOUT EFFECTS MANAGEMENT	LEVEL OF EFFECT <sup>21</sup> WITHOUT EFFECTS MANAGEMENT	RATIONALE FOR DETERMINING THE MAGNITUDE OF EFFECT IDENTIFIED
		Indicative Alignment	Proposed Designation	5km buffer				
Australasian bittern / Matuku-hūrepo	Threatened - Nationally Critical			✓	Very High	Moderate	High	<ul style="list-style-type: none"> <li>Potential direct habitat loss (portion of Wetland 2417; Table 12), with limited available habitat in the Ecological District.</li> <li>Potential construction injury / mortality if breeding within Indicative Alignment (Wetland 24; Table 13) and collision with vehicles during operational phase.</li> <li>Potential construction and operation disturbance and / or displacement due to proximity to habitat (wetlands and farm drains; Table 15 and Map 4).</li> </ul>
White heron / Kōtuku	Threatened - Nationally Critical		✓	✓	Very High	-	-	<ul style="list-style-type: none"> <li>No breeding habitat within the Project Area (breeding confined to Okarito Lagoon, Westland).</li> <li>Only a single record of one bird alongside SH1 in 2018, most likely foraging on pasture (Map 4).</li> <li>As such, we do not consider there will be any effects on white heron associated with the construction and operation of the Project as they are unlikely to occur there.</li> </ul>
Black-fronted tern / Tarapirohe	Threatened - Nationally Endangered			✓	Very High	-	-	<ul style="list-style-type: none"> <li>Records were of birds along the coast only, none inland (Map 9).</li> <li>As such, we do not consider there will be any effects on black-fronted tern associated with the construction and operation of the Project as they are unlikely to occur there.</li> </ul>
Black petrel / Tāiko	Threatened – Nationally Vulnerable				Very High	Negligible	Low	<ul style="list-style-type: none"> <li>Artificial lighting the only potential effect considered as this species breeds on offshore islands.</li> <li>Proposed Designation located outside of the North Auckland Seabird Flyway (Figure 8).</li> <li>All the reported groundings of black petrel by Heswall (2024) were to the south of the Proposed Designation.</li> </ul>
Grey duck / Pāpera	Threatened – Nationally Vulnerable		✓	✓	Very High	Negligible	Low	<ul style="list-style-type: none"> <li>Potential construction and operation disturbance and / or displacement due to proximity to habitat (pasture and wetlands; Table 15)</li> </ul>
Brown teal / Pāteke	Threatened - Nationally Increasing			✓	Very High	Negligible	Low	<ul style="list-style-type: none"> <li>Potential for vehicle collisions (Table 14) and disturbance / displacement (Table 15).</li> </ul>
NZ dabchick / Weweia	Threatened - Nationally Increasing		✓	✓	Very High	Negligible	Low	<ul style="list-style-type: none"> <li>Potential for vehicle collisions (Table 14) and disturbance / displacement (Table 15).</li> </ul>
Black-billed gull / Tarāpuka	At Risk - Declining			✓	High	Negligible	Very Low	<ul style="list-style-type: none"> <li>No breeding habitat within the Proposed Designation.</li> <li>Majority of birds have been recorded associated with coastal environment (Map 9)</li> <li>Only potential habitat use relates to foraging and roosting on pasture.</li> <li>Presence of extensive similar available habitat outside the Proposed Designation.</li> </ul>
Buller's shearwater / Rako	At Risk - Declining				High	Negligible	Very Low	<ul style="list-style-type: none"> <li>Artificial lighting the only potential effect considered as this species breeds on offshore islands.</li> <li>Proposed Designation located outside of the North Auckland Seabird Flyway (Figure 8).</li> <li>All the reported groundings of Buller's shearwater by Heswall (2024) were to the south of the Proposed Designation.</li> </ul>

<sup>19</sup> According to EIANZ criteria as outlined in Table 1 (page 11)

<sup>20</sup> According to EIANZ criteria as outlined in Table 2 (page 12)

<sup>21</sup> As per the EIANZ matrix provided in Table 3 (page 12)

SPECIES	NZ THREAT STATUS	LOCATION RECORDED			ECOLOGICAL VALUE <sup>19</sup>	MAGNITUDE OF EFFECT <sup>20</sup> WITHOUT EFFECTS MANAGEMENT	LEVEL OF EFFECT <sup>21</sup> WITHOUT EFFECTS MANAGEMENT	RATIONALE FOR DETERMINING THE MAGNITUDE OF EFFECT IDENTIFIED
		Indicative Alignment	Proposed Designation	5km buffer				
North Island fernbird / Mātātā	At Risk - Declining	✓		✓	High	Moderate	High	<ul style="list-style-type: none"> <li>• Potential direct loss of foraging and breeding habitat (wetland / scrubland / riparian margin; Table 12), with limited available habitat in the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (wetland / scrubland / riparian margin; Table 13).</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (wetland / scrubland / riparian margin; Table 15)</li> </ul>
SIPO / Tōrea	At Risk - Declining			✓	High	Negligible	Very Low	<ul style="list-style-type: none"> <li>• Only potential habitat use relates to foraging and roosting on pasture.</li> <li>• Direct loss of potential foraging and roosting habitat (pasture; Table 12)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (pasture; Table 15).</li> <li>• Presence of extensive similar available habitat outside the Proposed Designation.</li> </ul>
NZ pipit / Pīhoihoi	At Risk - Declining	✓	✓	✓	High	Moderate	High	<ul style="list-style-type: none"> <li>• Direct loss of foraging and potentially breeding habitat (pasture; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (pasture; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (pasture; Table 15)</li> </ul>
Sooty shearwater / Tītī	At Risk - Declining				High	Negligible	Very Low	<ul style="list-style-type: none"> <li>• Artificial lighting the only potential effect considered as this species breeds on offshore islands.</li> <li>• Proposed Designation located outside of the North Auckland Seabird Flyway (Figure 8).</li> <li>• All the reported groundings of sooty shearwater by Heswall (2024) were to the south of the Proposed Designation.</li> </ul>
Spotless crane / Pūweto	At Risk - Declining			✓	High	Moderate	High	<ul style="list-style-type: none"> <li>• Potential direct habitat loss (portion of Wetland 2417; Table 12), with limited available habitat in the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (Wetland 2417; Table 13).</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (wetlands and farm drains; Table 15).</li> </ul>
North Island kākā	At Risk - Recovering			✓	Moderate	Moderate	Moderate	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and breeding habitat (native forest; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native forest; Table 13)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (native forest; Table 15)</li> </ul>
Little black shag / Kawau tūī	At Risk - Naturally Uncommon			✓	Moderate	Low	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential roosting habitat (riparian vegetation; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (riparian vegetation; Table 15)</li> </ul>
Black shag / Māpunga	At Risk - Relict			✓	Moderate	Low	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential roosting habitat (riparian vegetation; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (riparian vegetation; Table 15)</li> </ul>

SPECIES	NZ THREAT STATUS	LOCATION RECORDED			ECOLOGICAL VALUE <sup>19</sup>	MAGNITUDE OF EFFECT <sup>20</sup> WITHOUT EFFECTS MANAGEMENT	LEVEL OF EFFECT <sup>21</sup> WITHOUT EFFECTS MANAGEMENT	RATIONALE FOR DETERMINING THE MAGNITUDE OF EFFECT IDENTIFIED
		Indicative Alignment	Proposed Designation	5km buffer				
Common diving petrel / Kuaka	At Risk – Relict				Moderate	Negligible	Very Low	<ul style="list-style-type: none"> <li>Artificial lighting the only potential effect considered as this species breeds on offshore islands.</li> <li>Proposed Designation located outside of the North Auckland Seabird Flyway (Figure 8).</li> <li>All the reported groundings of common diving petrel by Heswall (2024) were to the south of the Proposed Designation.</li> </ul>
Cook's petrel / Titi	At Risk – Relict				Moderate	Negligible	Very Low	<ul style="list-style-type: none"> <li>Artificial lighting the only potential effect considered as this species breeds on offshore islands.</li> <li>Proposed Designation located outside of the North Auckland Seabird Flyway (Figure 8).</li> <li>All the reported groundings of Cook's petrel by Heswall (2024) were to the south of the Proposed Designation.</li> </ul>
Fluttering shearwater / Pakahā	At Risk – Relict				Moderate	Negligible	Very Low	<ul style="list-style-type: none"> <li>Artificial lighting the only potential effect considered as this species breeds on offshore islands.</li> <li>Proposed Designation located outside of the North Auckland Seabird Flyway (Figure 8).</li> <li>All the reported groundings of fluttering shearwater by Heswall (2024) were to the south of the Proposed Designation.</li> </ul>
Little shag / Kawaupaka	At Risk - Relict		✓	✓	Moderate	Low	Low	<ul style="list-style-type: none"> <li>Direct loss of potential roosting habitat (riparian vegetation; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>Potential construction and operation disturbance and / or displacement due to proximity to habitat (riparian vegetation; Table 15)</li> </ul>
White-faced storm petrel / Takahikare	At Risk – Relict				Moderate	Negligible	Very Low	<ul style="list-style-type: none"> <li>Artificial lighting the only potential effect considered as this species breeds on offshore islands.</li> <li>Proposed Designation located outside of the North Auckland Seabird Flyway (Figure 8).</li> <li>All the reported groundings of white-faced storm petrel by Heswall (2024) were to the south of the Proposed Designation.</li> </ul>
Australasian little grebe / Tokitokipio	Coloniser			✓	Moderate	Negligible	Very Low	<ul style="list-style-type: none"> <li>Potential for disturbance / displacement (Table 15).</li> </ul>
Australasian shoveler / Kuruhengi	Not Threatened			✓	Low	Negligible	Very Low	<ul style="list-style-type: none"> <li>May experience some disturbance associated with construction and operation, but widespread and highly mobile species that utilises open waterbodies.</li> </ul>
Bellbird / Korimako	Not Threatened	✓		✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>Direct loss of potential foraging and breeding habitat (native forest; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>Potential construction injury / mortality if breeding within Indicative Alignment (native forest; Table 13)</li> <li>Potential construction and operation disturbance and / or displacement due to proximity to habitat (native forest; Table 15)</li> </ul>
Black swan	Not Threatened		✓	✓	Low	Negligible	Very Low	<ul style="list-style-type: none"> <li>May experience some disturbance associated with construction and operation, but widespread and highly mobile species that utilises open waterbodies.</li> </ul>
Grey-faced petrel / Ōi	Not Threatened				Low	Negligible	Very Low	<ul style="list-style-type: none"> <li>Artificial lighting the only potential effect considered as this species breeds on scattered coastal cliffs of mainland New Zealand and offshore islands.</li> <li>Proposed Designation located outside of the North Auckland Seabird Flyway (Figure 8).</li> <li>All the reported groundings of grey-faced petrel by Heswall (2024) were to the south of the Proposed Designation.</li> </ul>
Grey teal / Tētē-moroiti	Not Threatened			✓	Low	Negligible	Very Low	<ul style="list-style-type: none"> <li>May experience some disturbance associated with construction and operation, but widespread and highly mobile species that utilises open waterbodies.</li> </ul>

SPECIES	NZ THREAT STATUS	LOCATION RECORDED			ECOLOGICAL VALUE <sup>19</sup>	MAGNITUDE OF EFFECT WITHOUT EFFECTS MANAGEMENT <sup>20</sup>	LEVEL OF EFFECT WITHOUT EFFECTS MANAGEMENT <sup>21</sup>	RATIONALE FOR DETERMINING THE MAGNITUDE OF EFFECT IDENTIFIED
		Indicative Alignment	Proposed Designation	5km buffer				
Grey warbler / Rirorio	Not Threatened	✓	✓	✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and breeding habitat (native and exotic forest; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native and exotic forest; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (native and exotic forest; Table 15)</li> </ul>
Kererū	Not Threatened	✓	✓	✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and breeding habitat (native forest; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native forest; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (native forest; Table 15)</li> </ul>
Kingfisher / Kōtare	Not Threatened	✓	✓	✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of foraging and potentially breeding habitat (riparian vegetation and wetlands; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (riparian vegetation; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (wetlands and riparian vegetation; Table 15)</li> </ul>
Ruru	Not Threatened		✓	✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and breeding habitat (native and exotic forest; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native and exotic forest; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (Table 15)</li> <li>• Potential benefit to food supply due to prey attracted to artificial lighting (Section 4.1.4)</li> </ul>
North Island brown kiwi / Kiwi-nui	Not Threatened				Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging, roosting and breeding habitat (native and exotic forest; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native and exotic forest; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (native and exotic forest; Table 15)</li> </ul>

SPECIES	NZ THREAT STATUS	LOCATION RECORDED			ECOLOGICAL VALUE <sup>19</sup>	MAGNITUDE OF EFFECT <sup>20</sup> WITHOUT EFFECTS MANAGEMENT	LEVEL OF EFFECT <sup>21</sup> WITHOUT EFFECTS MANAGEMENT	RATIONALE FOR DETERMINING THE MAGNITUDE OF EFFECT IDENTIFIED
		Indicative Alignment	Proposed Designation	5km buffer				
North Island fantail / Pīwakawaka	Not Threatened	✓	✓	✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and breeding habitat (native and exotic forest, riparian vegetation; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native and exotic forest; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (native and exotic forest; Table 15)</li> </ul>
North Island tomtit / Miromiro	Not Threatened	✓	✓	✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and breeding habitat (native and exotic forest; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native and exotic forest; Table 13)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (native and exotic forest; Table 15)</li> </ul>
NZ scaup / Pāpango	Not Threatened			✓	Low	Negligible	Very Low	<ul style="list-style-type: none"> <li>• May experience some disturbance associated with construction and operation, but widespread and highly mobile species that utilises open waterbodies.</li> </ul>
Paradise shelduck / Pūtangitangi	Not Threatened	✓	✓	✓	Low	Low	Very Low	<ul style="list-style-type: none"> <li>• Direct loss of foraging and potentially breeding habitat (wetland and pasture; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (wetlands; Table 13)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (pasture and wetlands; Table 15)</li> </ul>
Pied stilt / Poaka	Not Threatened		✓	✓	Low	Low	Very Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and roosting habitat (pasture and wetlands; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (pasture and wetlands; Table 15)</li> </ul>
Pūkeko	Not Threatened	✓	✓	✓	Low	Low	Very Low	<ul style="list-style-type: none"> <li>• Direct loss of foraging and potentially breeding habitat (pasture and wetlands; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (pasture and wetlands; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (pasture and wetlands; Table 15)</li> </ul>
Shining cuckoo / Pīpīwharau	Not Threatened	✓	✓	✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and breeding habitat (native and exotic forest; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native and exotic forest; Table 13)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (native and exotic forest; Table 15)</li> </ul>

SPECIES	NZ THREAT STATUS	LOCATION RECORDED			ECOLOGICAL VALUE <sup>19</sup>	MAGNITUDE OF EFFECT <sup>20</sup> WITHOUT EFFECTS MANAGEMENT	LEVEL OF EFFECT <sup>21</sup> WITHOUT EFFECTS MANAGEMENT	RATIONALE FOR DETERMINING THE MAGNITUDE OF EFFECT IDENTIFIED
		Indicative Alignment	Proposed Designation	5km buffer				
Silvereye / Tauhou	Not Threatened	✓	✓	✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and breeding habitat (native and exotic forest, riparian vegetation; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native and exotic forest; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (native and exotic forest; Table 15)</li> </ul>
Spur-winged plover	Not Threatened	✓	✓	✓	Low	Low	Very Low	<ul style="list-style-type: none"> <li>• Direct loss of foraging and potentially breeding habitat (pasture; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (pasture; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (pasture and wetland; Table 15)</li> </ul>
Swamp harrier / Kāhu	Not Threatened	✓	✓	✓	Low	Low	Very Low	<ul style="list-style-type: none"> <li>• Direct loss of foraging and potentially breeding habitat (pasture; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (pasture / wetlands / scrub; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (pasture and wetland; Table 15)</li> </ul>
Tūī	Not Threatened	✓	✓	✓	Low	Moderate	Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging and breeding habitat (native forest; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential construction injury / mortality if breeding within Indicative Alignment (native forest; Table 13)</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (native forest; Table 15)</li> </ul>
Welcome swallow / Warou	Not Threatened	✓	✓	✓	Low	Low	Very Low	<ul style="list-style-type: none"> <li>• Direct loss of potential foraging habitat (wetlands and riparian vegetation; Table 12), but extensive similar habitat available within the Ecological District.</li> <li>• Potential operational injury / mortality due to vehicle collisions (Table 14)</li> <li>• Potential construction and operation disturbance and / or displacement due to proximity to habitat (wetlands and riparian vegetation; Table 15)</li> </ul>

## 5. Recommended Mitigation

The species for which potential High or Moderate levels of effect were identified are listed in Table 17 below. These levels of effects are driven by the potential for injury and / or mortalities of breeding birds, as well as the loss of habitat types that are limited in the Ecological District. However, it is possible to reduce these levels of effects (to those outlined in Table 17 below) through the following:

- Minimising habitat loss as much as possible;
- Preparation of an Avifauna Management Plan, which outlines measures to avoid direct and indirect impacts and to manage nesting avifauna, and implementation of those measures during both the enabling and main construction works;
- Replace<sup>22</sup> at a ratio of 1:1 areas of wetland and terrestrial habitat that may be utilised by *Threatened* or *At Risk* cryptic marshbirds (e.g. Wetlands 11, 12, 13, 14 and 24) and North Island kaka (*At Risk*);
- Operational lighting associated with the Project should be kept to a minimum necessary to ensure the safe functioning of the road, be hooded and orientated downwards to reduce light spill in order to avoid attracting seabirds (Commonwealth of Australia, 2023).

Overall, through implementation of these effects management measures, I consider the overall level of effects from the Project will be Low to Very Low, as outlined in Table 17 below.

Table 17: Levels of potential effects with the implementation of effects management measures

SPECIES	ECOLOGICAL VALUE	WITHOUT EFFECTS MANAGEMENT		WITH EFFECTS MANAGEMENT		EFFECTS MANAGEMENT MEASURE
		Magnitude	Level of Effect	Magnitude	Level of Effect	
Australasian bittern / Matukuhūrepo	Very High	Moderate	High	Negligible	Low	AMP to include measures to: <ul style="list-style-type: none"> <li>▪ Confirm no birds present immediately prior to habitat clearance works.</li> <li>▪ Implement exclusion zones around breeding birds.</li> </ul> Replace habitat feature(s) impacted by the project that may provide habitat for Australasian bittern (refer to Table 9).
North Island fernbird / Mātātā	High	Moderate	High	Negligible	Very Low	AMP to include measures to: <ul style="list-style-type: none"> <li>▪ Confirm no birds present immediately prior to habitat clearance works.</li> <li>▪ Implement exclusion zones around breeding birds.</li> </ul> Replace habitat feature(s) impacted by the project that may provide habitat for North Island fernbird (refer to Table 9 and Table 10).
NZ pipit / Pīhoihoi	High	Moderate	High	Negligible	Very Low	AMP to include measures to: <ul style="list-style-type: none"> <li>▪ Confirm no birds present immediately prior to habitat clearance works.</li> <li>▪ Implement exclusion zones around breeding birds.</li> </ul>
Spotless crane / Pūweto	High	Moderate	High	Negligible	Very Low	AMP to include measures to: <ul style="list-style-type: none"> <li>▪ Confirm no birds present immediately prior to habitat clearance works.</li> <li>▪ Implement exclusion zones around breeding birds.</li> </ul> Replace habitat feature(s) impacted by the project that may provide habitat for spotless crane (refer to Table 9).

<sup>22</sup> Could include enhancement of existing wetlands which are outside of the Indicative Alignment.

SPECIES	ECOLOGICAL VALUE	WITHOUT EFFECTS MANAGEMENT		WITH EFFECTS MANAGEMENT		EFFECTS MANAGEMENT MEASURE
		Magnitude	Level of Effect	Magnitude	Level of Effect	
North Island Kākā	Moderate	Moderate	Moderate	Negligible	Very Low	AMP to include measures to: <ul style="list-style-type: none"> <li>Confirm no birds present immediately prior to habitat clearance works.</li> <li>Implement exclusion zones around breeding birds.</li> </ul>

## 5.1. Avifauna Management Plan

Potential injuries, mortalities or disturbance / displacement of nesting avifauna during the construction phase can be **avoided** through measures in the Avifauna Management Plan, such as:

- Undertaking vegetation clearance during the non-breeding season (generally February to August); and/ or
- If vegetation clearance / construction is to occur in or adjacent to (i.e. within 100 m) areas identified as potential habitat for *Threatened* or *At Risk* species during the breeding season, surveys of those areas for nesting birds ahead of works.
- Implementation of appropriate work exclusion zones around any nests that are found within and adjacent (i.e. within 100 m) to the proposed work area.

Given the cryptic nature of a number of the species listed in Table 17 above, a survey and monitoring methodology for the AMP should be designed and undertaken by a suitably qualified and experienced ornithologist.

## 5.2. Habitat Replacement

A total of 2.44 ha<sup>23</sup> of wetland vegetation and ~39 ha of indigenous terrestrial vegetation which may provide habitat for Threatened or At Risk species will be lost under the current proposed Indicative Alignment.

To address the loss of wetland vegetation, I recommend that replacement habitat be created away from the proposed road alignment. Two potential locations have been identified. One potential site is located at the corner of existing SH1 and SH12 (shown by yellow polygon in Figure 9 below), which is approximately 4 ha in a lower bowl, into which a 2.44 ha wetland could be created. Alternatively, the Brynderwyn Farm Pond SNA (Q08/066) could be enhanced / extended through the planting of 2.44 ha wetland vegetation at that location.

With regards to the loss of indigenous terrestrial vegetation, three areas (shown in Figure 10, Figure 11 and Figure 12 below) have been recommended as mitigation sites in the Assessment of Effects on Terrestrial Ecology (Appendix D6 of Volume B of the Substantive Application) for revegetation. In addition, 5-year planting and maintenance plans are proposed for the mitigation sites, which will including weed and pest control. This quantum of revegetation, in conjunction of weed and pest control over a period of 5 years will address the loss of ~39 ha of indigenous terrestrial vegetation under the Indicative Alignment.

<sup>23</sup> Based on areas of Wetlands 11, 12, 13, 14 and 24 (which provide potential habitat for Threatened and / or At Risk cryptic marshbirds) lost under the Construction Footprint as listed in Table 9

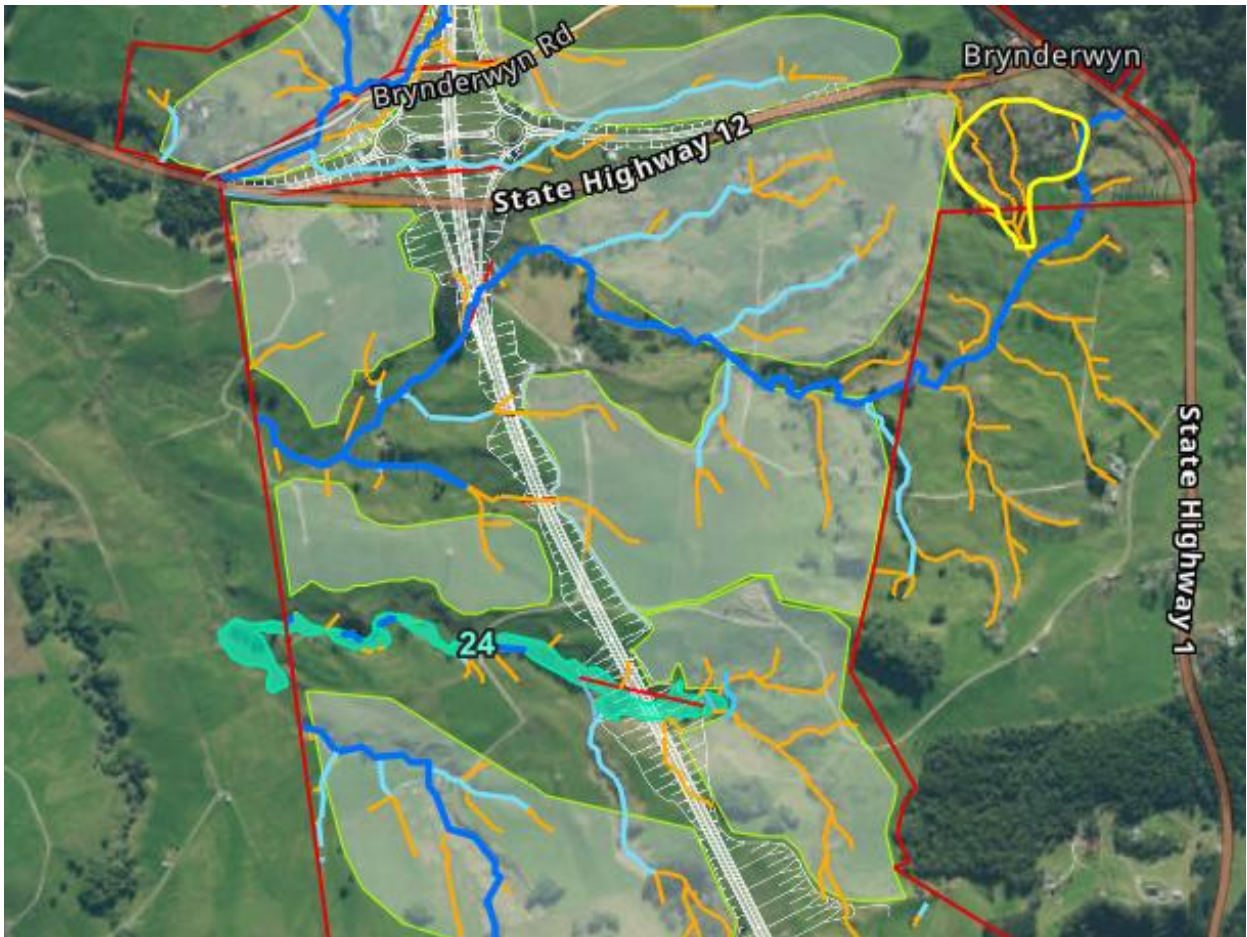


Figure 9: Potential location (yellow polygon) to create replacement wetland and open waterbody habitat

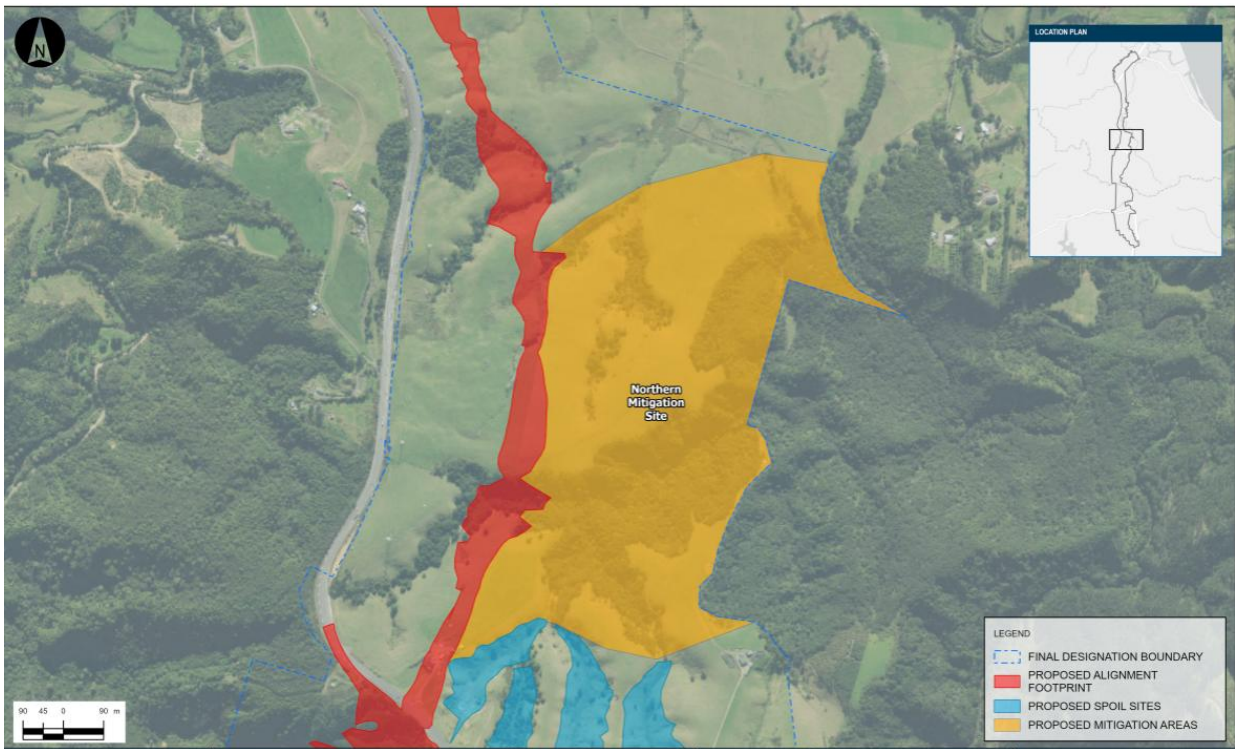


Figure 10:: Proposed northern mitigation site (orange shading)

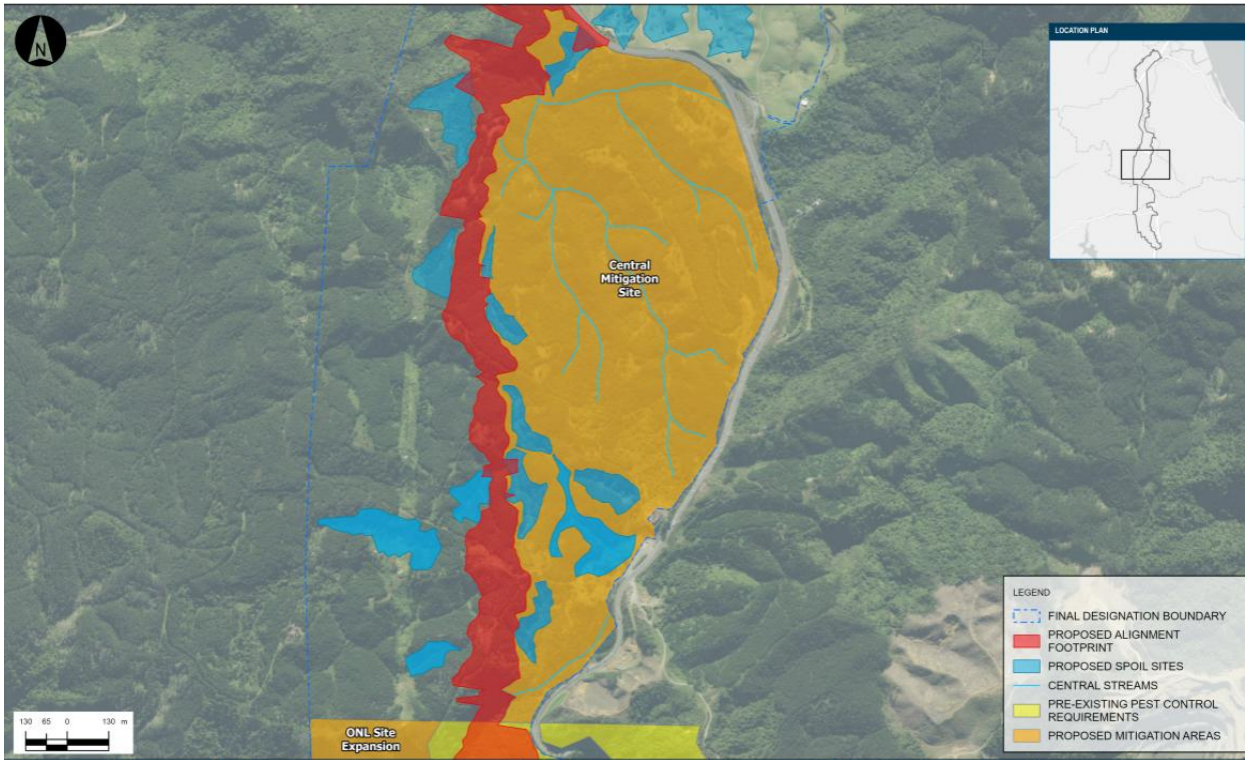


Figure 11: Proposed central mitigation site (orange shading)

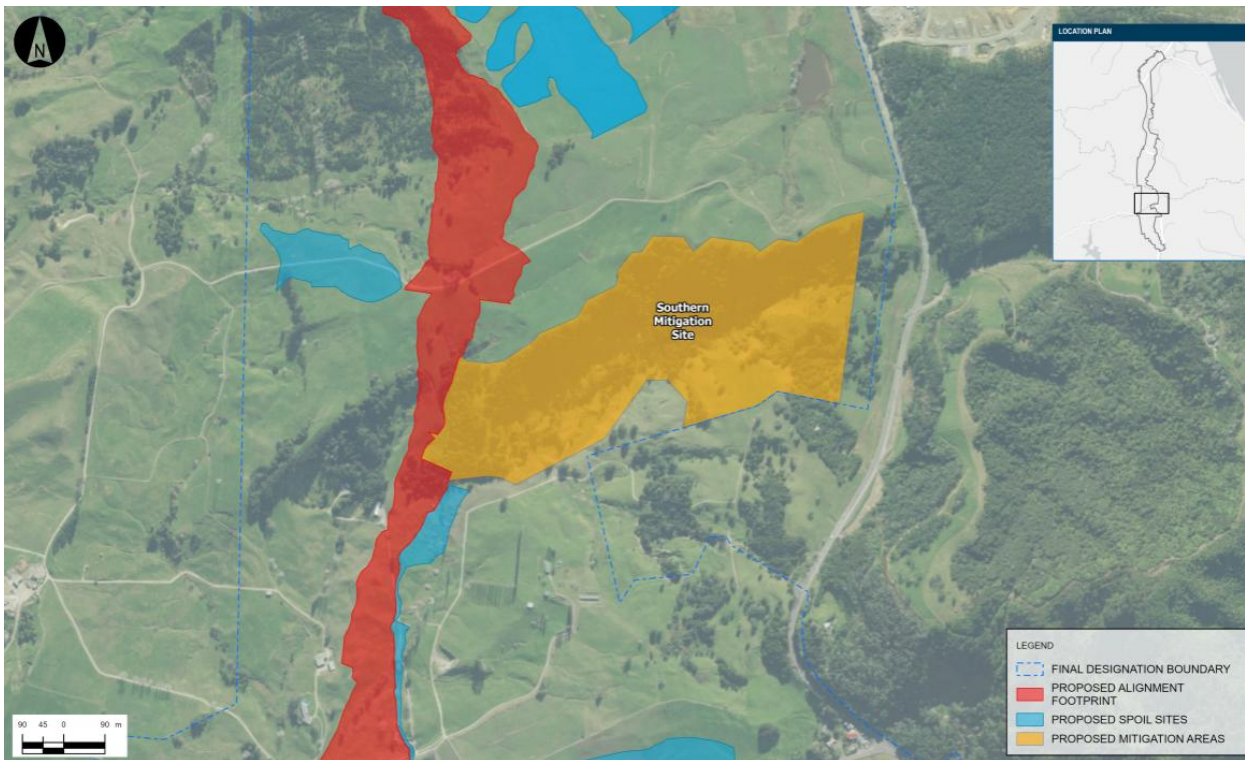


Figure 12: Proposed southern mitigation site (orange shading)

## 6. Conclusion

The predominant land cover type within the Indicative Alignment and Proposed Designation is high producing exotic grassland but also includes Significant Natural Areas and wetlands. The freshwater / wetland habitats were found to have the greatest proportion of Threatened and At Risk species associated with them, relative to other habitat types (e.g. pasture farmland, native forest and scrub).

As outlined at Section 2.1 above, the final alignment, design and construction methodology for the Project will be refined and confirmed during the detailed design stage. Nevertheless, this assessment has been conducted on the proposed Indicative Alignment as it is considered indicative with regards to the extent of potential impacts, and because the habitat within the Indicative Alignment is representative of that which is present in the rest of the Proposed Designation.

I undertook an assessment of potential effects of the Project on 45 native species following the EIANZ Guidelines, and determined that **without any effects management measures**, and at the scale of the Ecological District (refer to Table 16), the level of potential effects to be Low to Very Low on the majority of species, with the exceptions being:

- **Potential High levels of effects** for Australasian bittern / Matuku-hūrepo, North Island fernbird / Mātātā, New Zealand pipit / Pīhoihoi and spotless crane / Pūweto (Table 16 outlines the rationale for the level of effect identified for each of these species).
- **Potential Moderate levels** of effect for North Island kākā (Table 16 outlines the rationale for the level of effect identified).

These levels of effects are due to the *Threatened* or *At Risk* status of the species, and the potential for injury and / or mortalities of breeding birds, as well as the loss of habitat types that are limited in the Ecological District. I consider high levels of effect (determined through use of the EIANZ Guidelines) represent significant adverse effects. However, it is possible to reduce these levels of effects through the following:

- Minimising habitat loss as much as possible;
- Preparation of an Avifauna Management Plan, which outlines measures to avoid direct and indirect impacts and to manage nesting avifauna, and implementation of those measures during both the enabling and main construction works; and
- Replace<sup>24</sup> at a ratio of 1:1 the areas of wetland and terrestrial habitat that may be utilised by *Threatened* or *At Risk* cryptic marshbirds (e.g. Wetlands 11, 12, 13, 14 and 24) and North Island kaka (*At Risk*), and which are directly impacted by the Project.

Overall, through implementation of the above effects management measures, I consider the overall level of effects from the Project will be Low to Very Low, as outlined in Table 17 above.

The recommended mitigation methods establish outcome-based criteria that will ensure effects on the environment are adequately avoided, remedied or mitigated, regardless of the final design and construction methodology for the Project. Therefore, should the final alignment within the Proposed Designation change, I consider the effects assessment, proposed mitigation and recommendations outlined in this report would remain appropriate.

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<sup>24</sup> Could include enhancement of existing wetlands which are outside of the Indicative Alignment.

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# APPENDICES



# Appendix A: Avifauna Assessment Maps

Projection: NZGD 2000 New Zealand Transverse Mercator

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- Section 2B
- Section 2B 5km buffer
- Ecological regions and districts (DOC)
- Existing state highway

### Northern Corridor Project Site Context

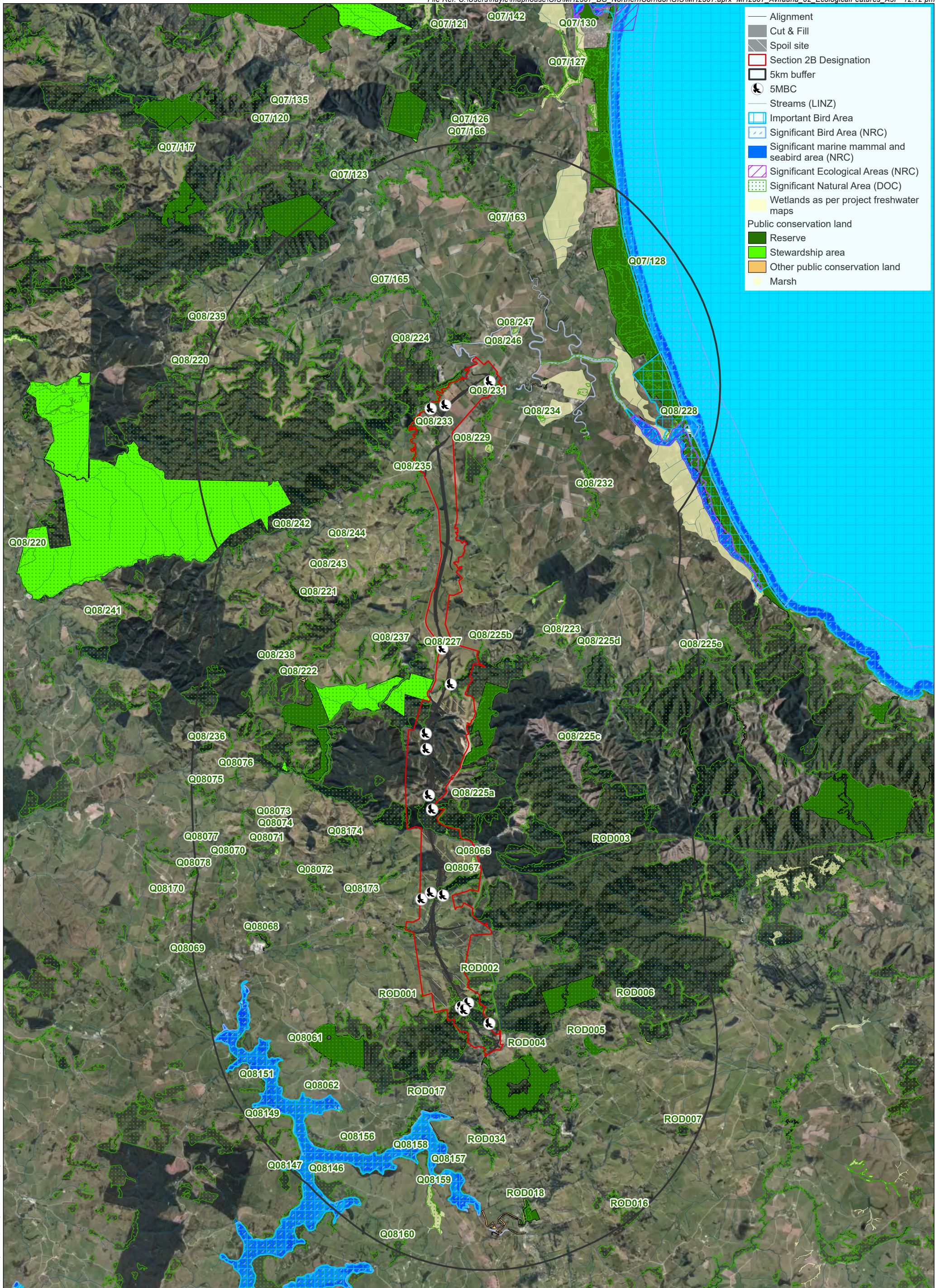
**AVIFAUNA ASSESSMENT  
NORTHLAND CORRIDOR SECTION 2B**  
Plan prepared for Waka Kotahi NZ Transport Agency | 1 April 2026



Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Department of Conservation, Eagle Technology, LINZ, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community



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**Ecological Features**

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NORTHLAND CORRIDOR SECTION 2B**  
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**BlueGreen MapHouse** | ©

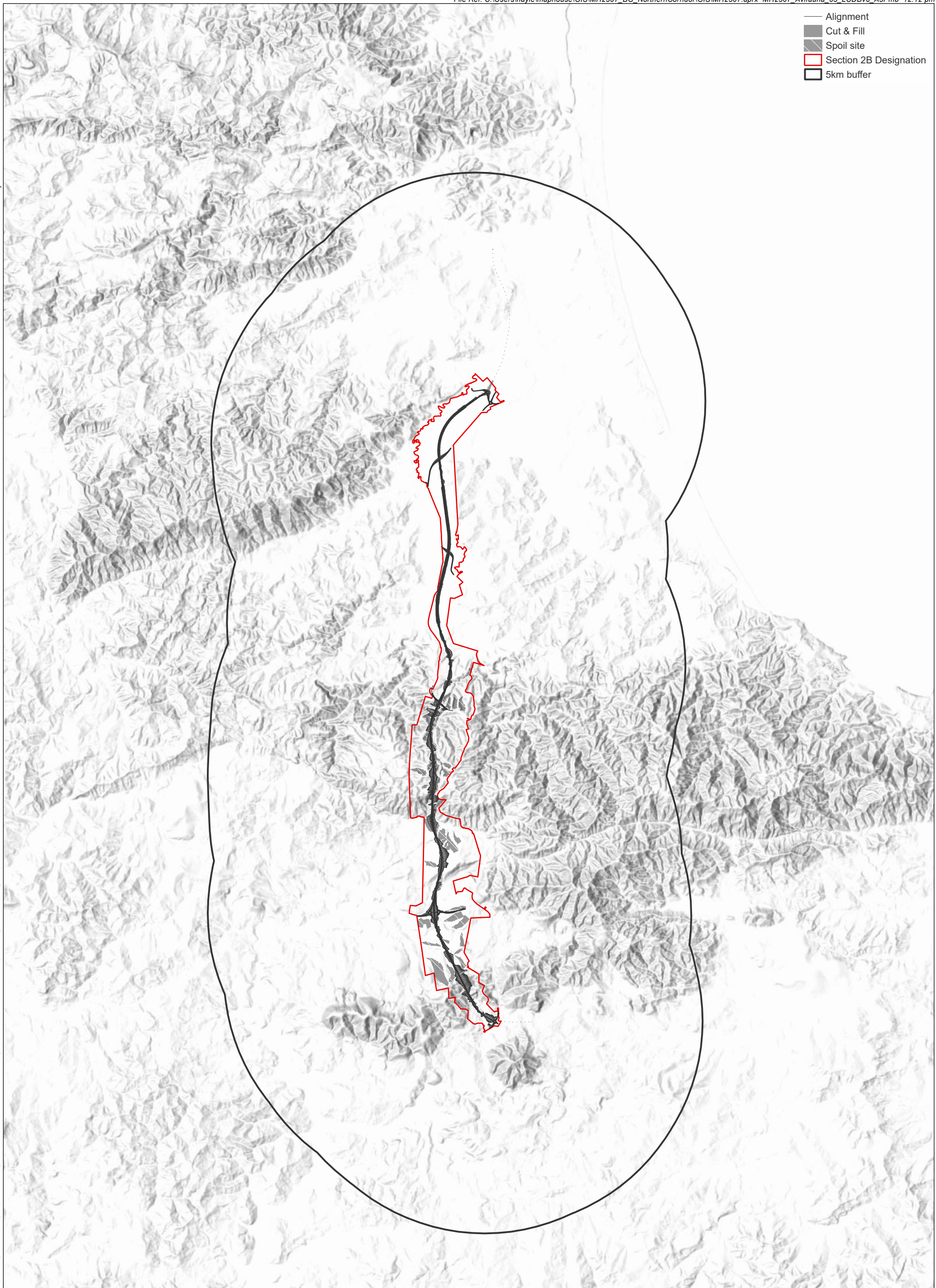
Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust



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- Alignment
- Cut & Fill
- Spoil site
- Section 2B Designation
- 5km buffer



Landcover Database (v6)

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NORTHLAND CORRIDOR SECTION 2B  
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BlueGreen MapHouse | ©

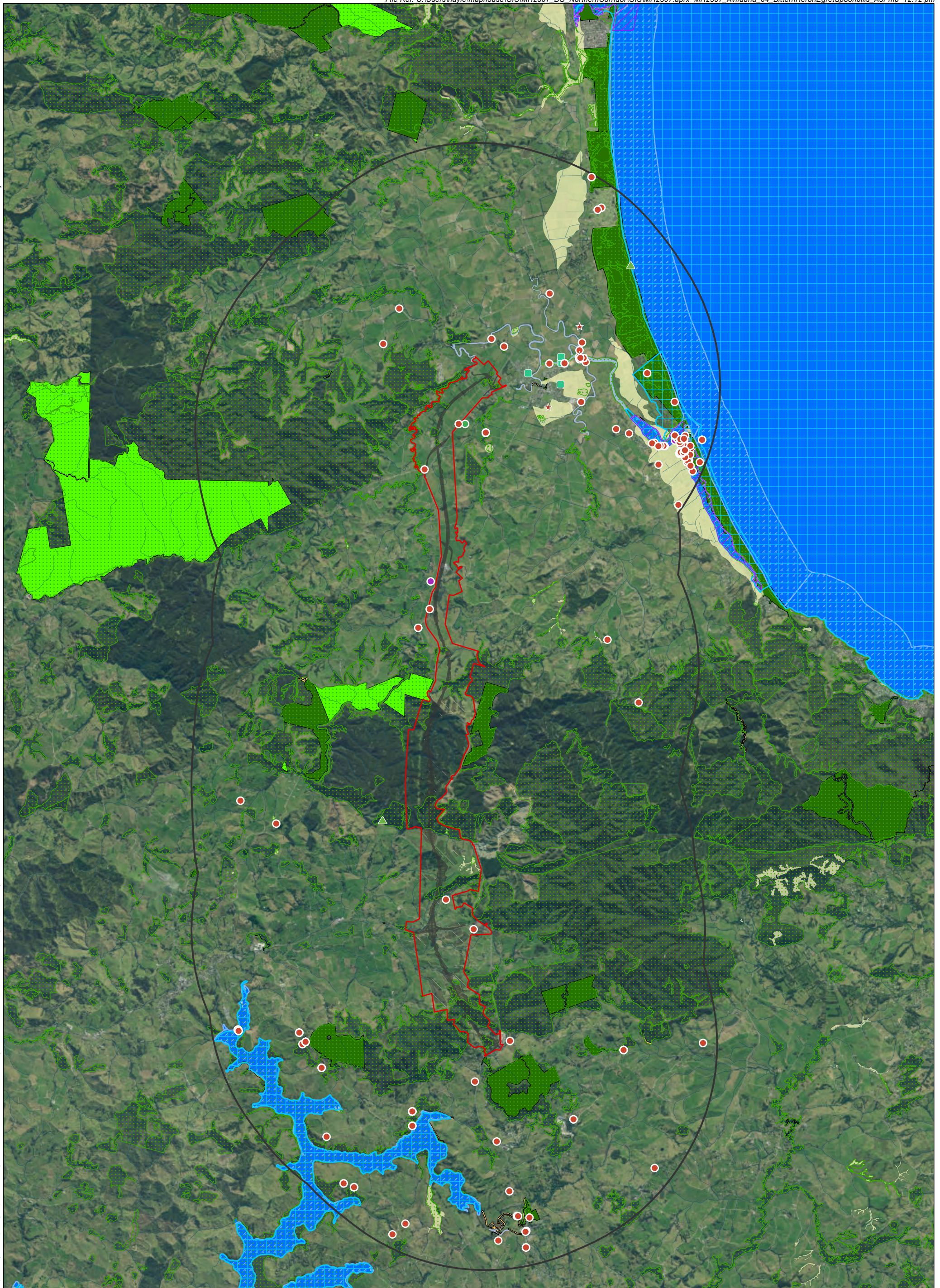
Data Sources: Waka Kotahi NZTA, Landcare Research NZ Ltd, Eagle Technology, LINZ



Map 3

Projection: NZGD 2000 New Zealand Transverse Mercator

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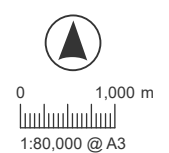


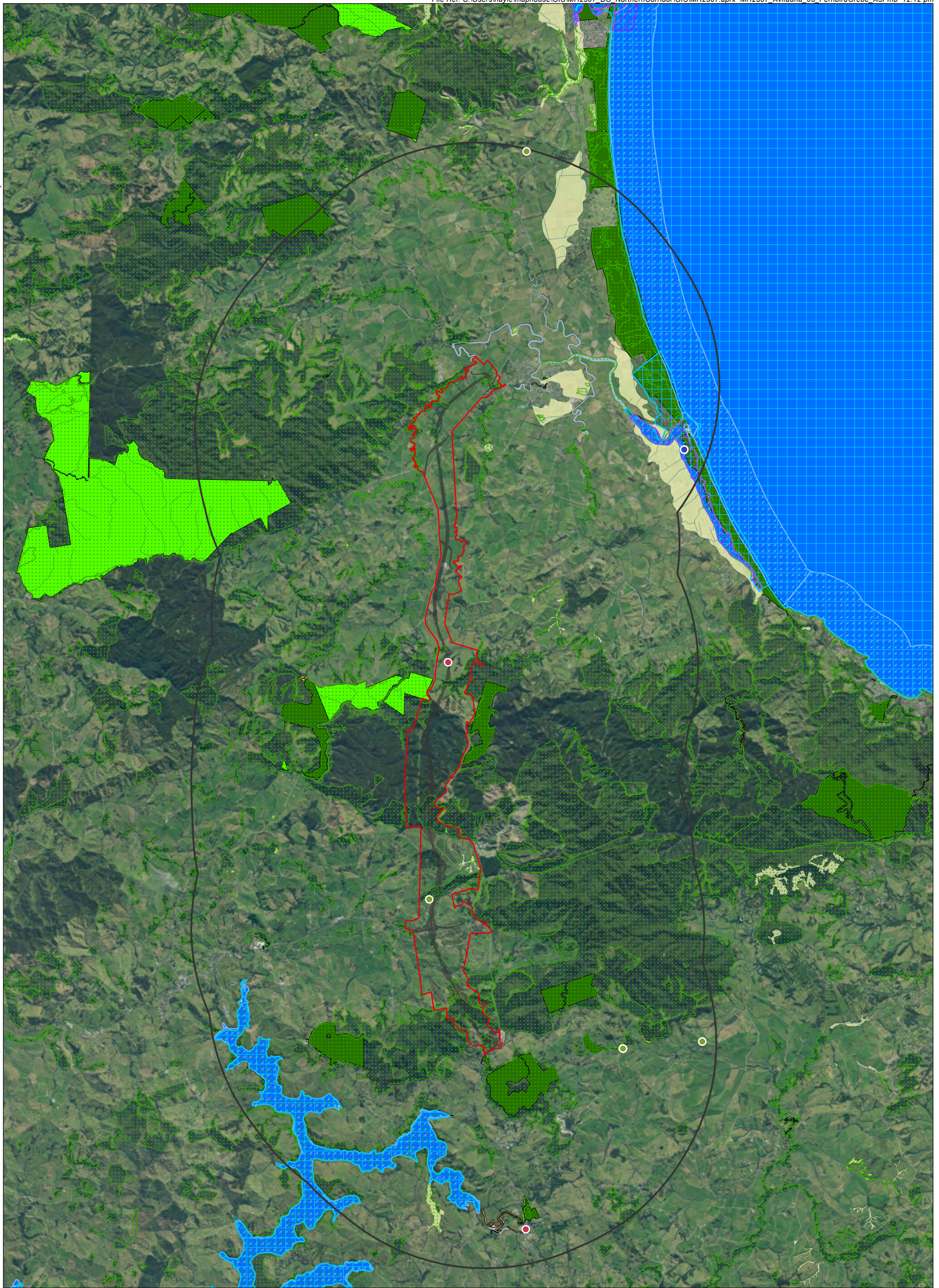
Bittern, heron, egret & spoonbill

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- ▲ Australasian bittern
- Kotuku / white heron
- Reef heron
- White-faced heron
- Eastern cattle egret
- ★ Royal spoonbill





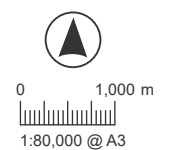
### Fernbird & grebe

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NORTHLAND CORRIDOR SECTION 2B  
Plan prepared for Waka Kotahi NZ Transport Agency | 1 April 2026



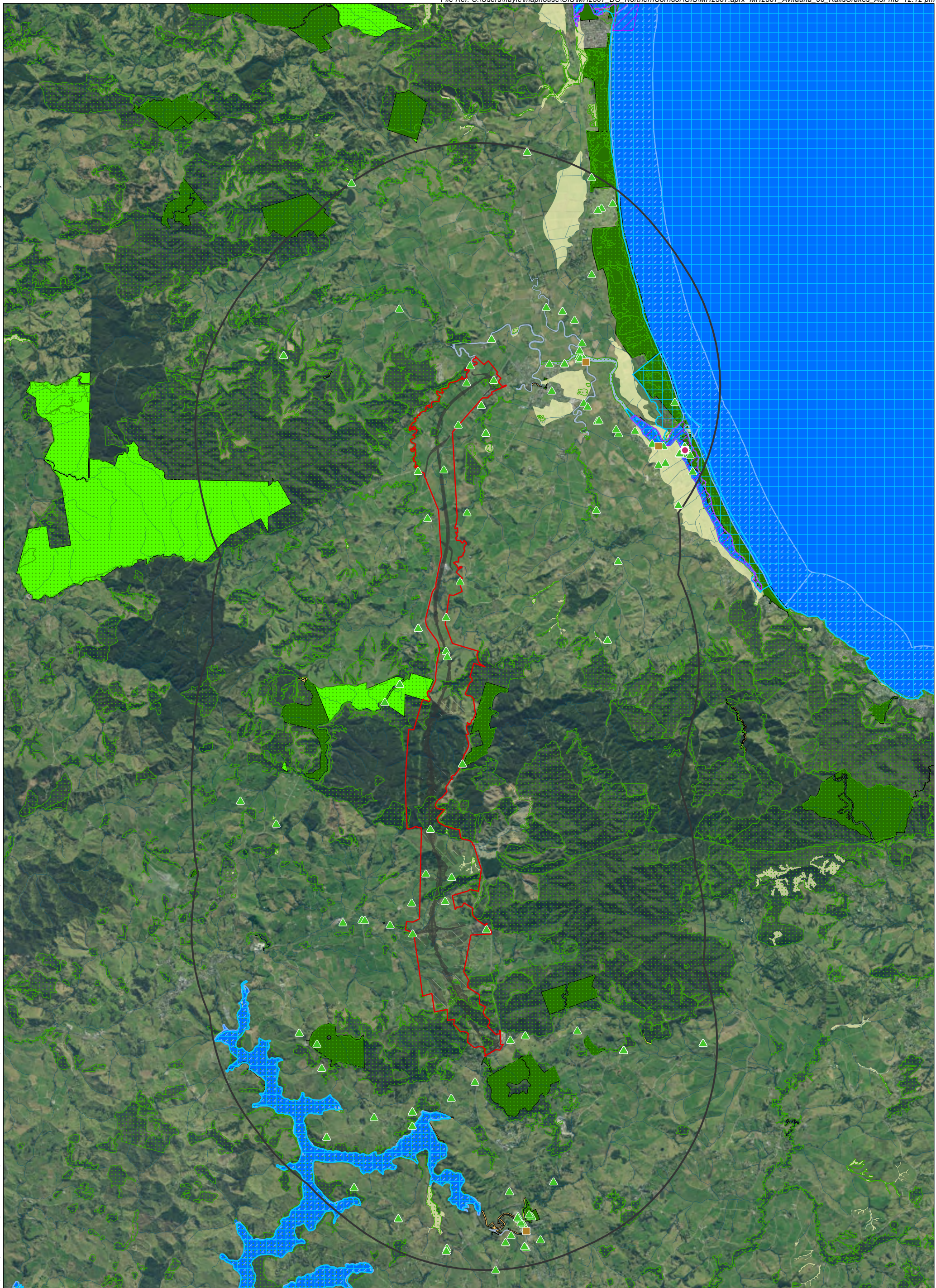
- Australasian little grebe
- NZ dabchick
- New Zealand fernbird

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP



Projection: NZGD 2000 New Zealand Transverse Mercator

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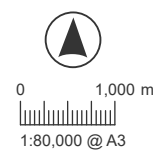
### Rails & crakes

- Banded rail
- Spotless crane
- ▲ Pukeko

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NORTHLAND CORRIDOR SECTION 2B**  
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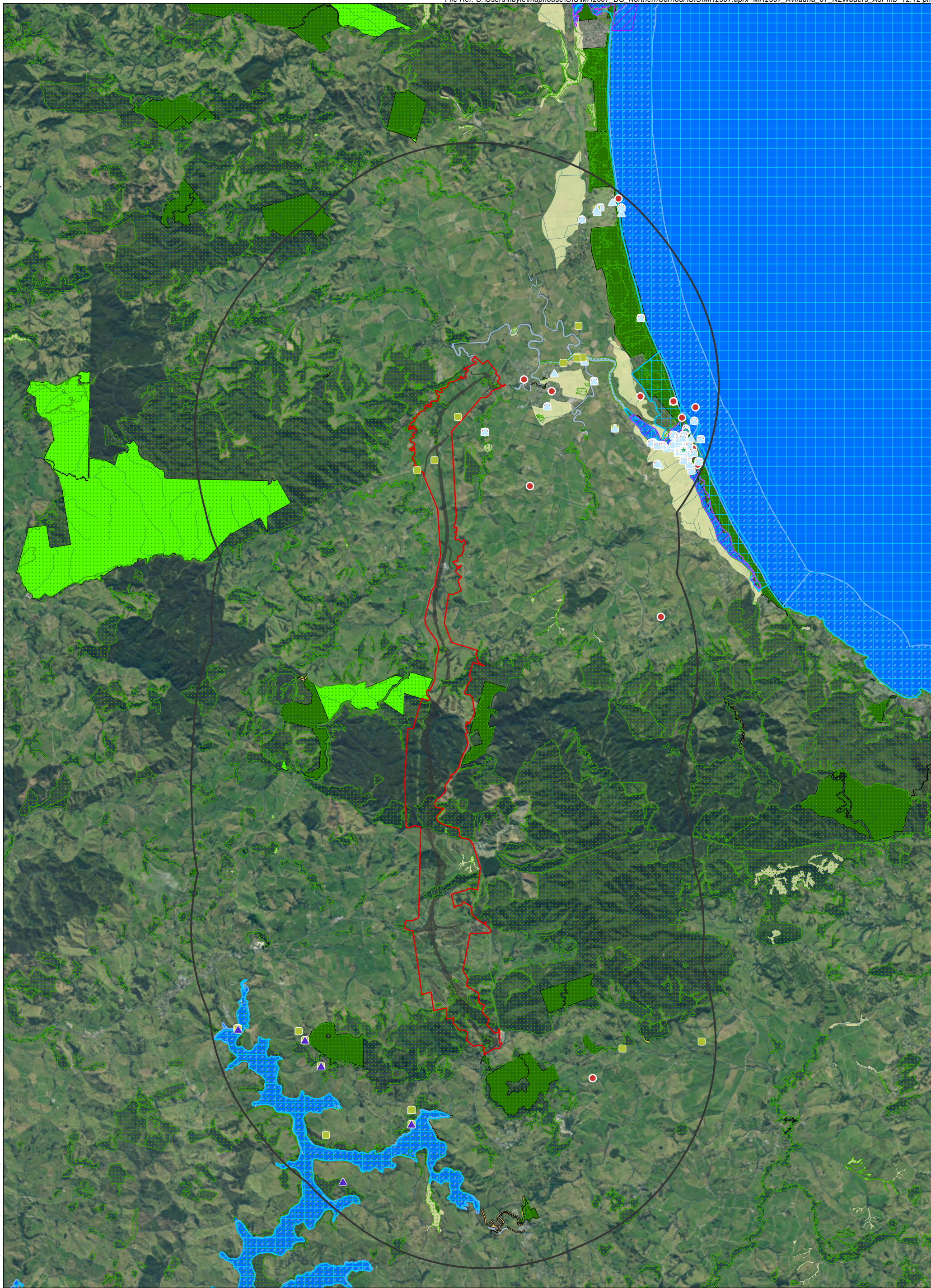
**BlueGreen** MapHouse | ©

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP



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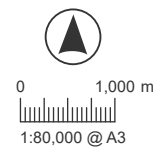
NZ waders

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 NORTHLAND CORRIDOR SECTION 2B  
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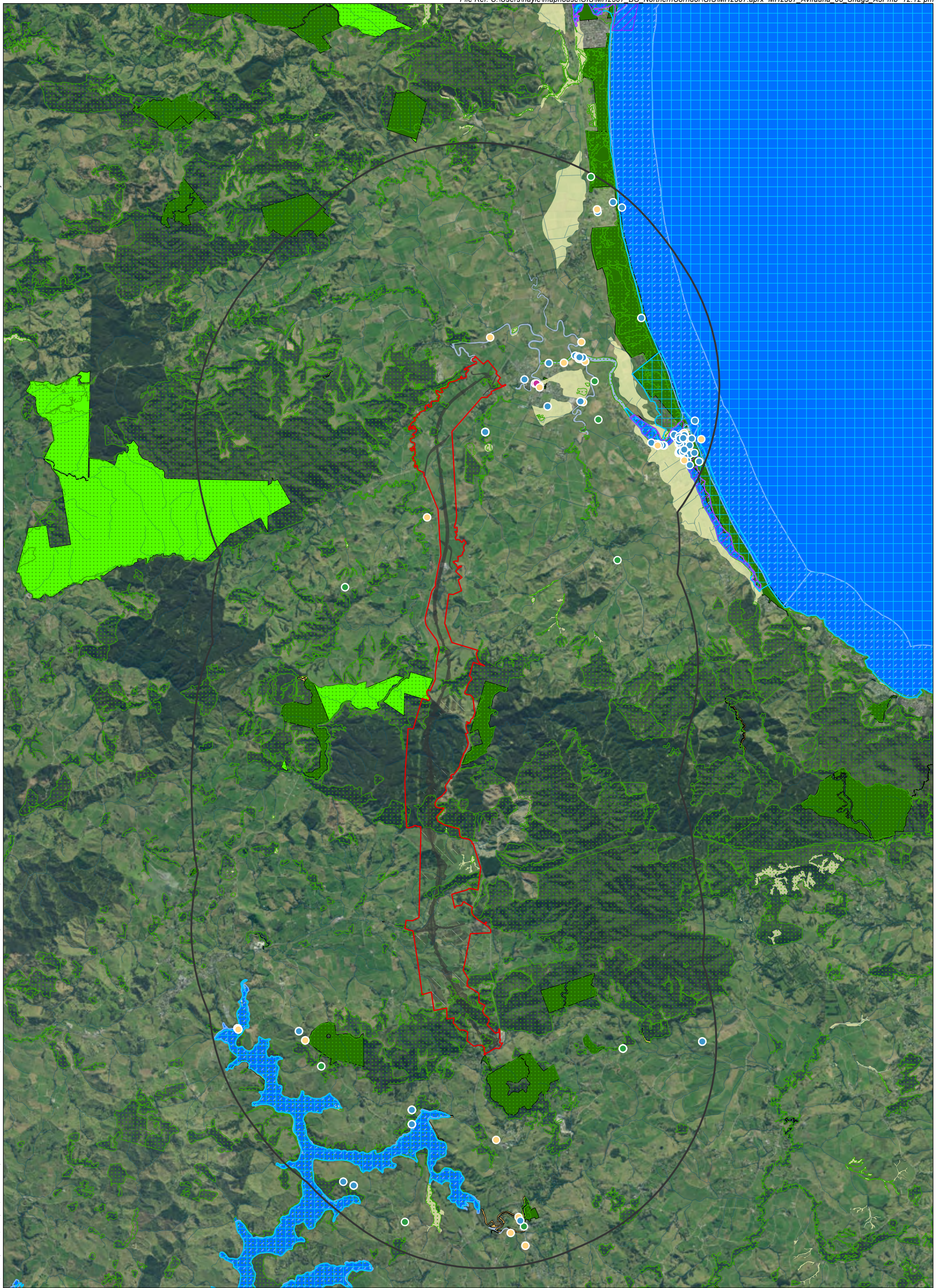
- Banded dotterel
- Northern NZ dotterel
- ▲ NZ pied oystercatcher
- ▲ Variable oystercatcher
- Pied stilt
- Pied x black stilt (hybrid)
- ★ Wrybill

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP



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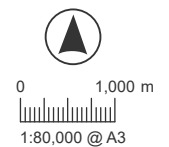
### Shags

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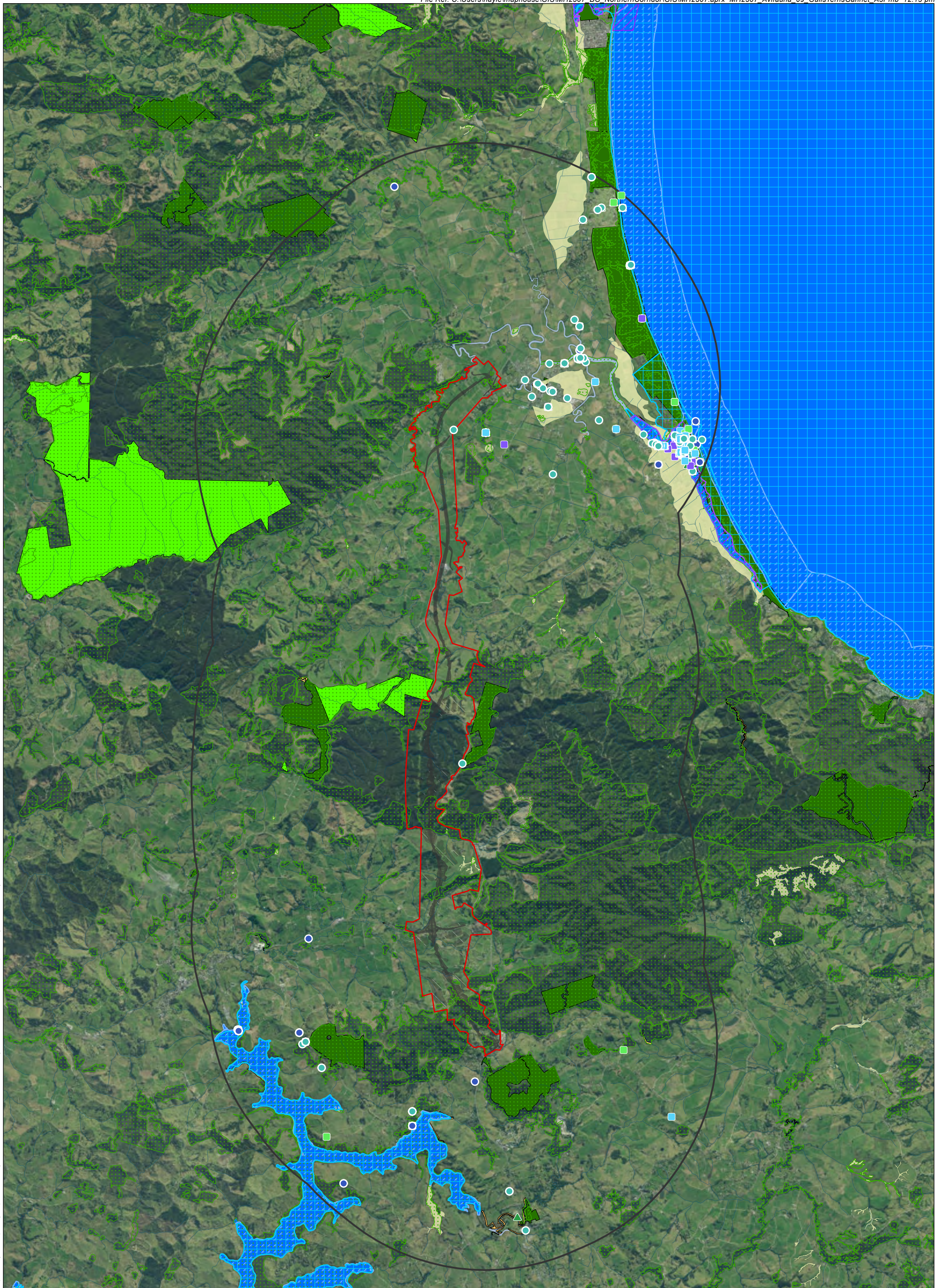
- Black shag
- Little shag
- Little black shag
- Pied shag

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP



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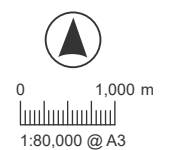
Gulls, terns & gannet

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 NORTHLAND CORRIDOR SECTION 2B  
 Plan prepared for Waka Kotahi NZ Transport Agency | 1 April 2026



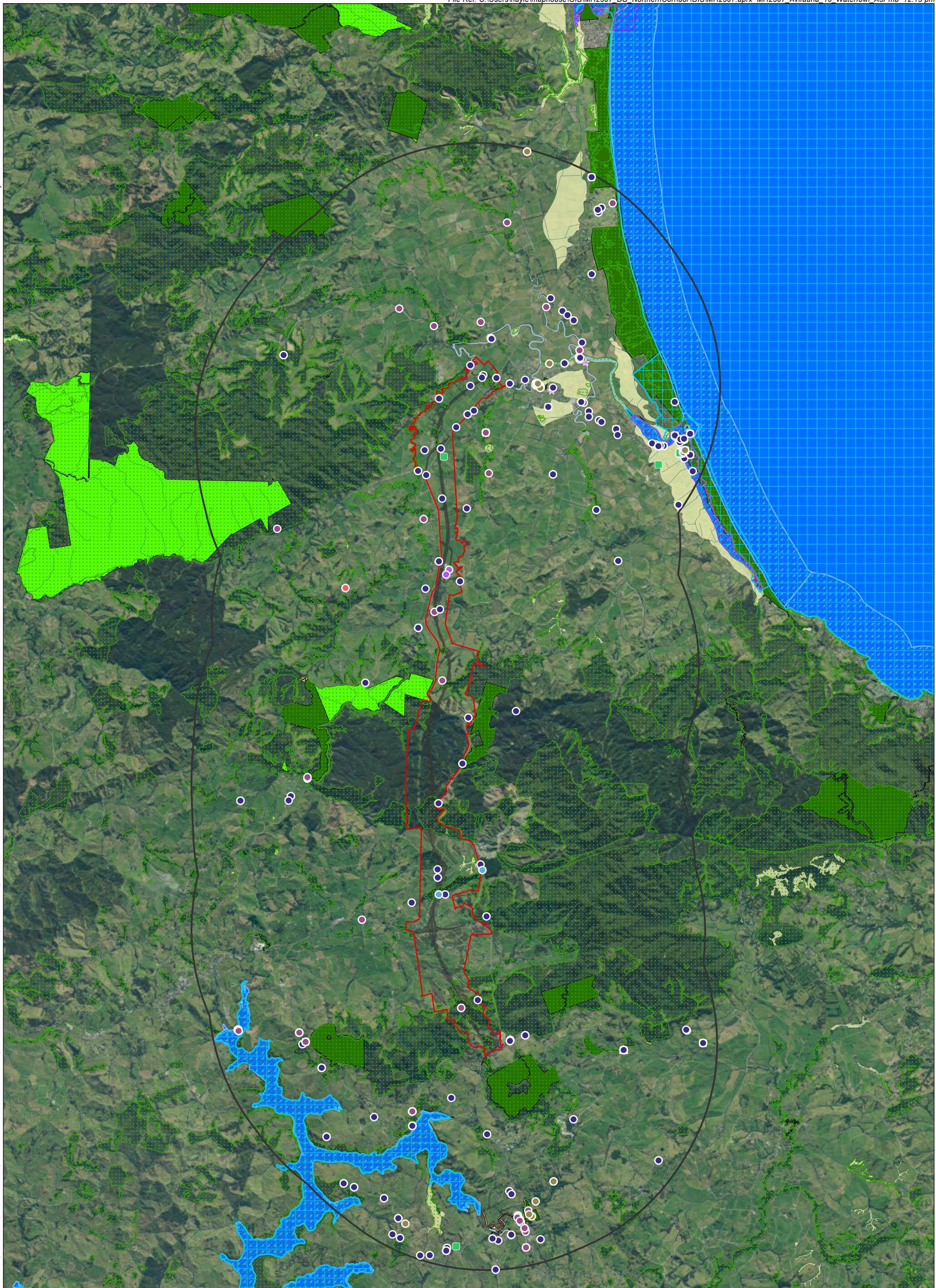
- Black-billed gull
- Red-billed gull
- Southern black-backed gull
- Black-fronted tern
- Caspian tern
- Fairy tern
- White-fronted tern
- ▲ Australasian gannet

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP



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## Waterfowl

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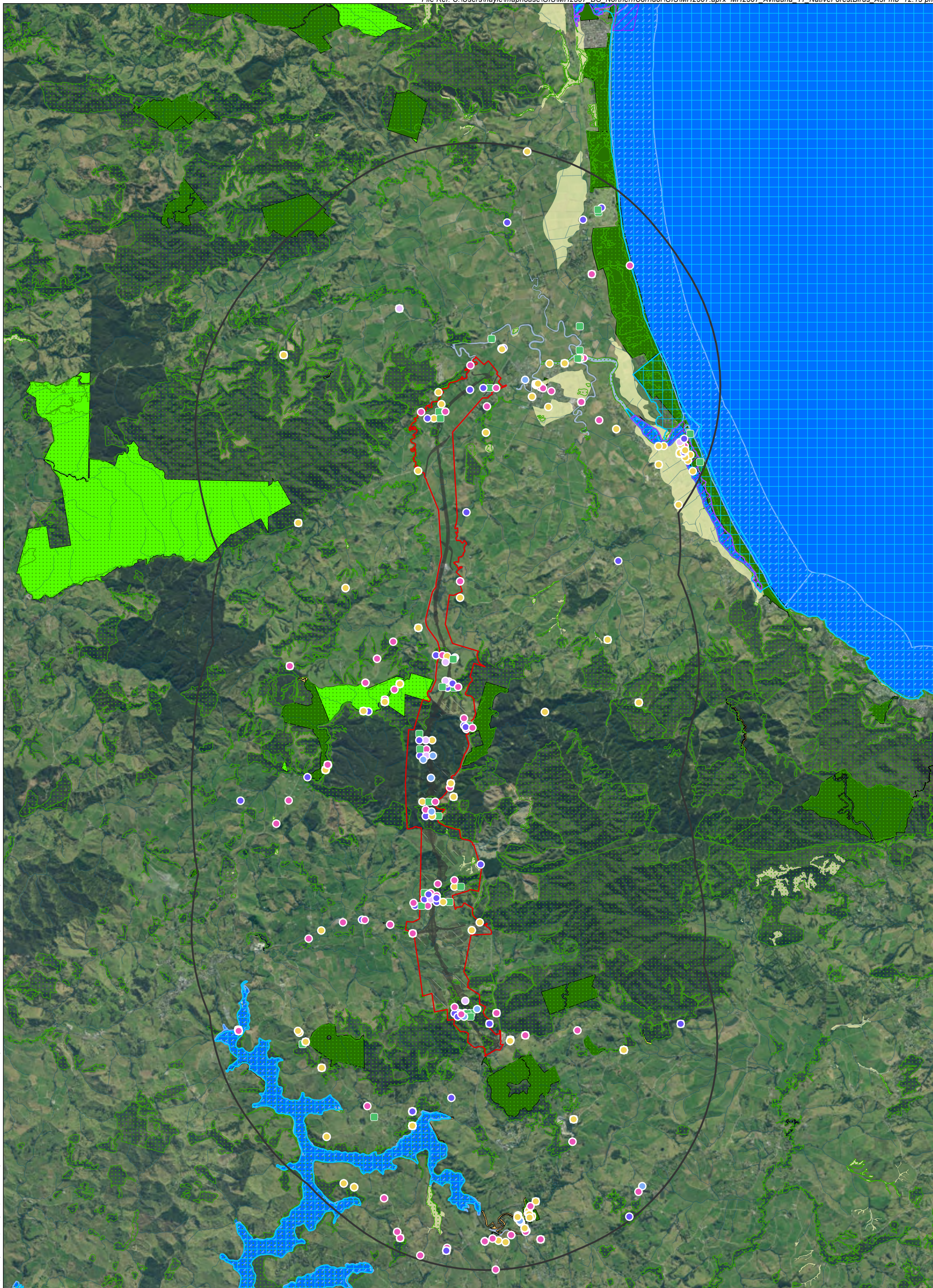
**BlueGreen** MapHouse | ©

- |                         |                |                              |                     |
|-------------------------|----------------|------------------------------|---------------------|
| ▲ Australasian shoveler | ★ Grey teal    | ● Grey duck x mallard hybrid | ● NZ scaup          |
| ■ Black swan            | ● Canada goose | ● Mallard                    | ● Paradise shelduck |
| ■ Mute swan             | ● Feral goose  | ● Muscovy duck               |                     |
| ★ Brown teal            | ● Grey duck    |                              |                     |

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP

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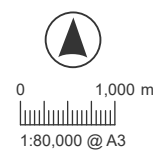


**Native forest birds**

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NORTHLAND CORRIDOR SECTION 2B**  
Plan prepared for Waka Kotahi NZ Transport Agency | 1 April 2026

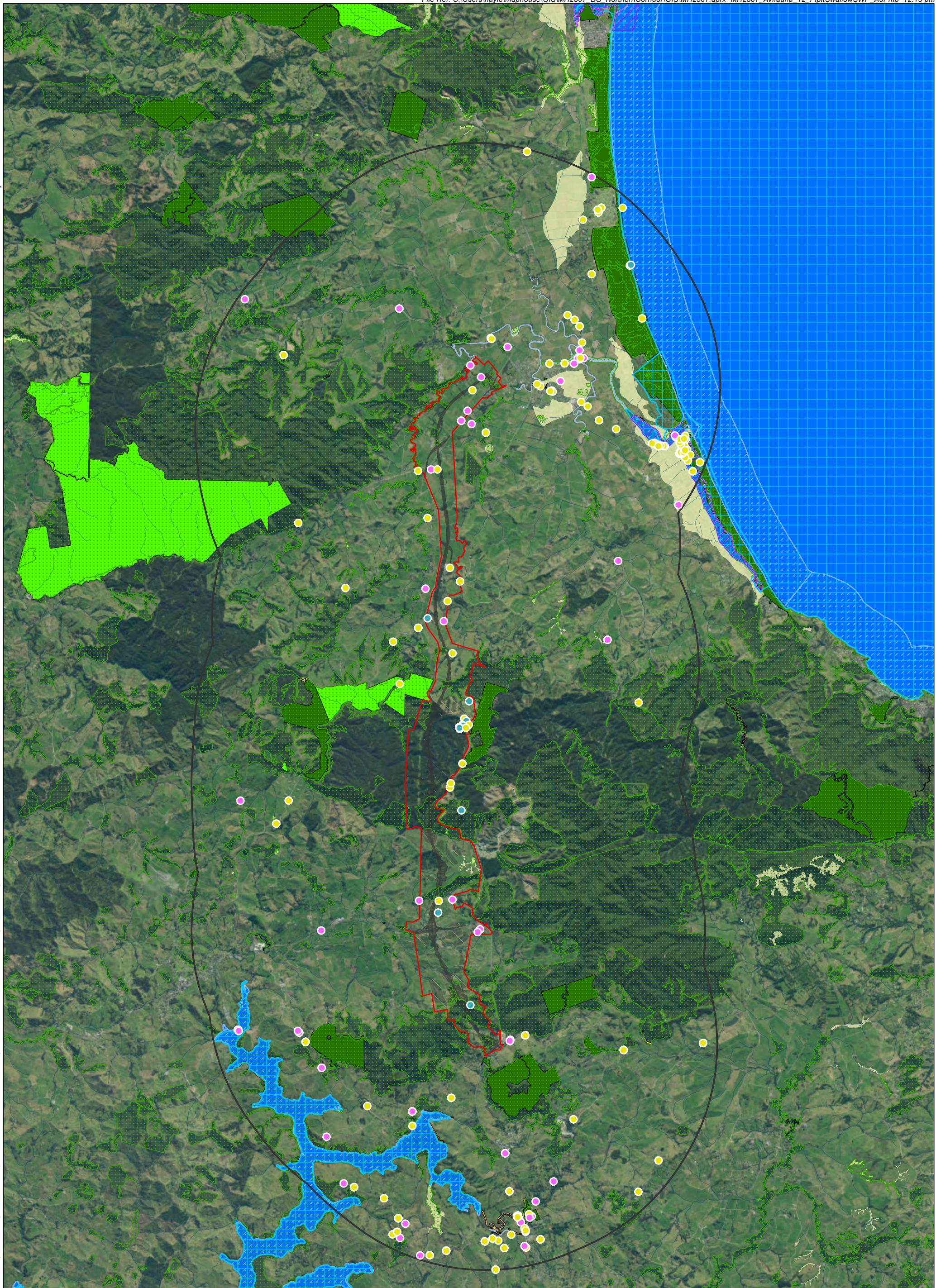


- Grey warbler
- NZ fantail
- Silvereye
- Tui
- NZ bellbird
- Shining cuckoo
- Tomtit



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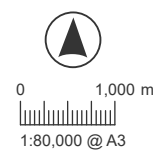
### NZ pipit, swallow & spur-wing plover

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NORTHLAND CORRIDOR SECTION 2B  
Plan prepared for Waka Kotahi NZ Transport Agency | 1 April 2026



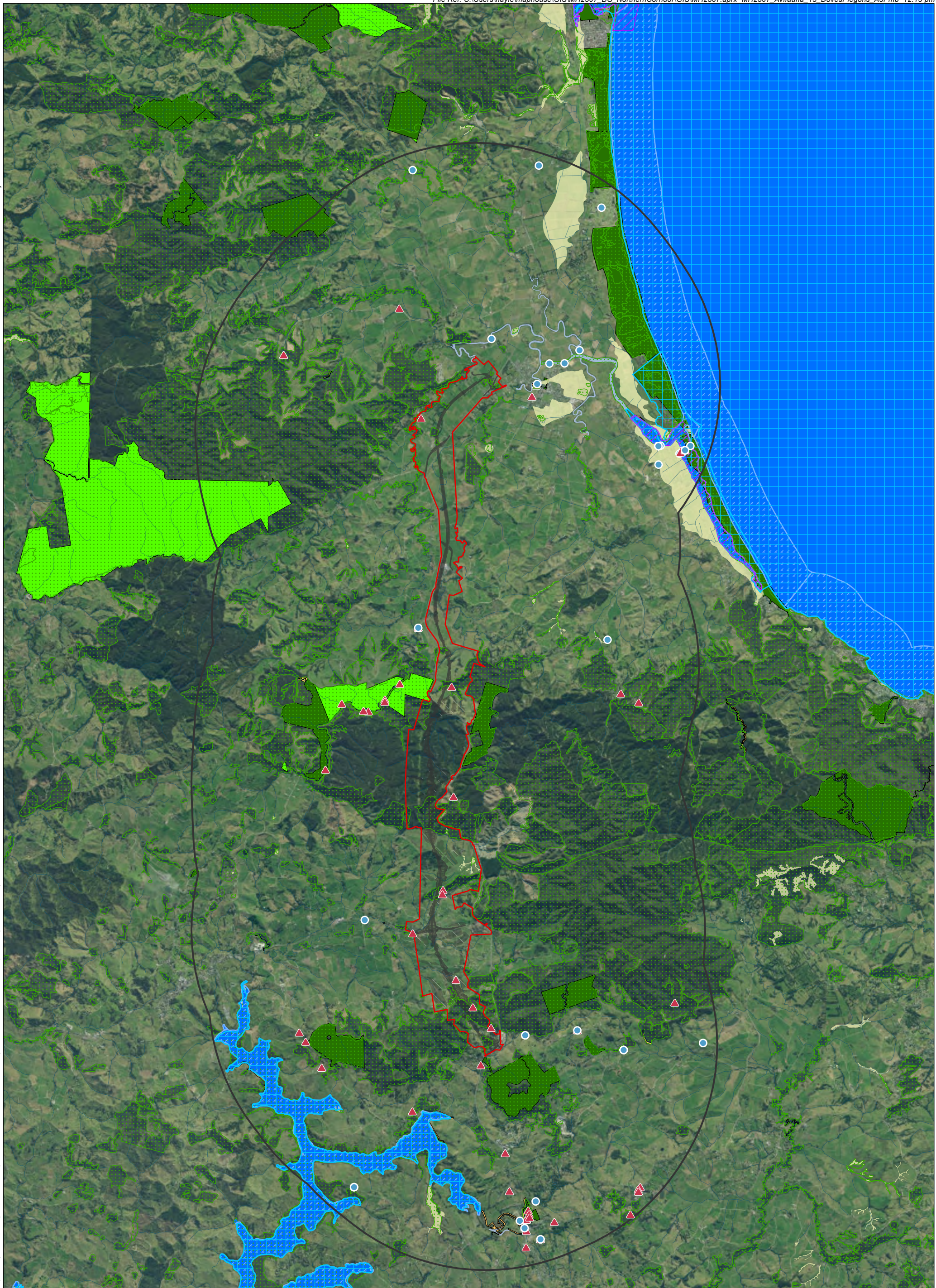
- NZ pipit
- Welcome swallow
- Spur-winged plover

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP



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### Dove & pigeons

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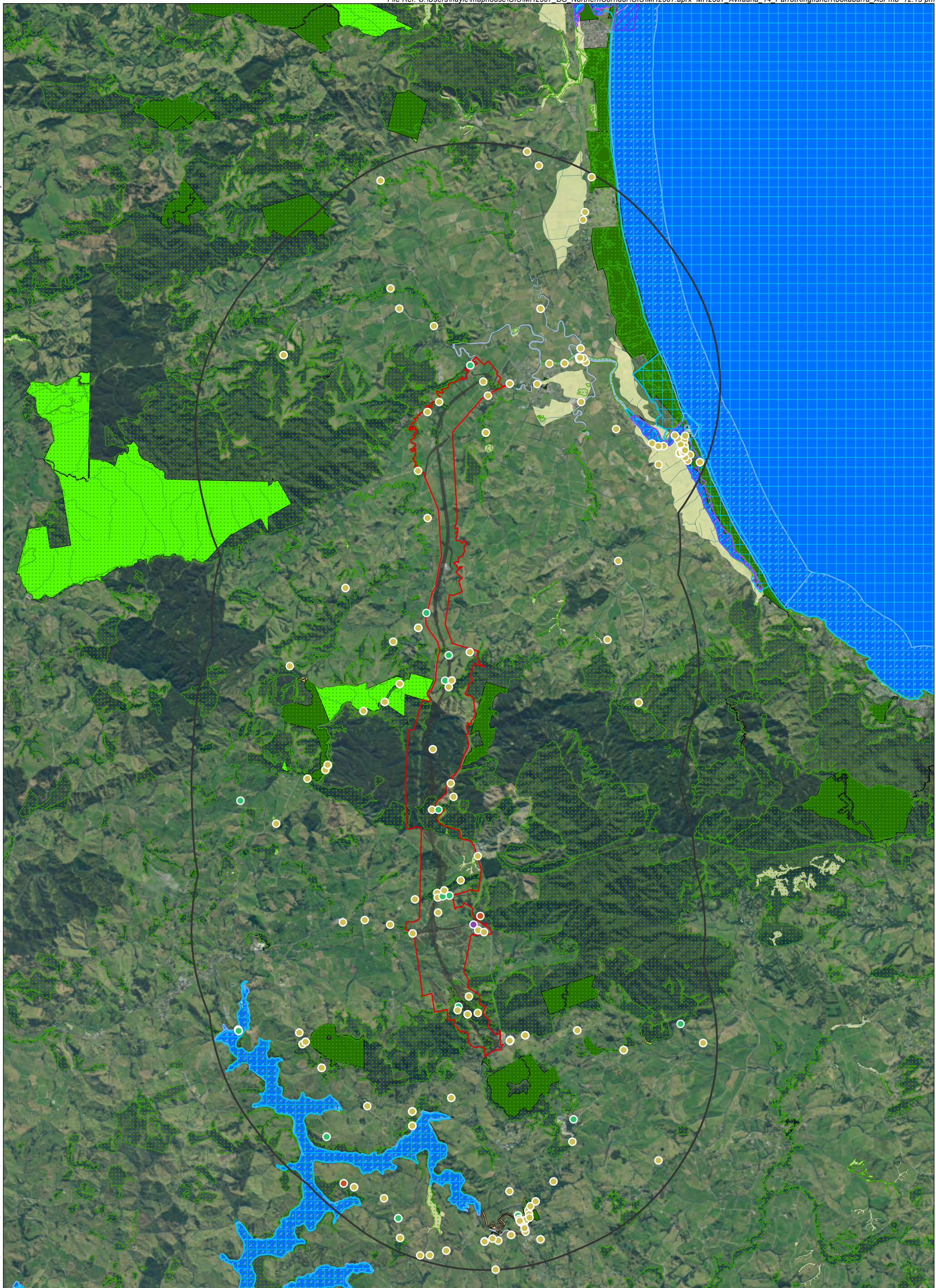
- Spotted dove
- ▲ Feral pigeon
- ▲ Kereru / NZ pigeon



Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP

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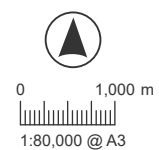


### Parrots, kingfisher & kookaburra

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- Eastern rosella
- NZ kaka
- Kookaburra
- Sacred kingfisher

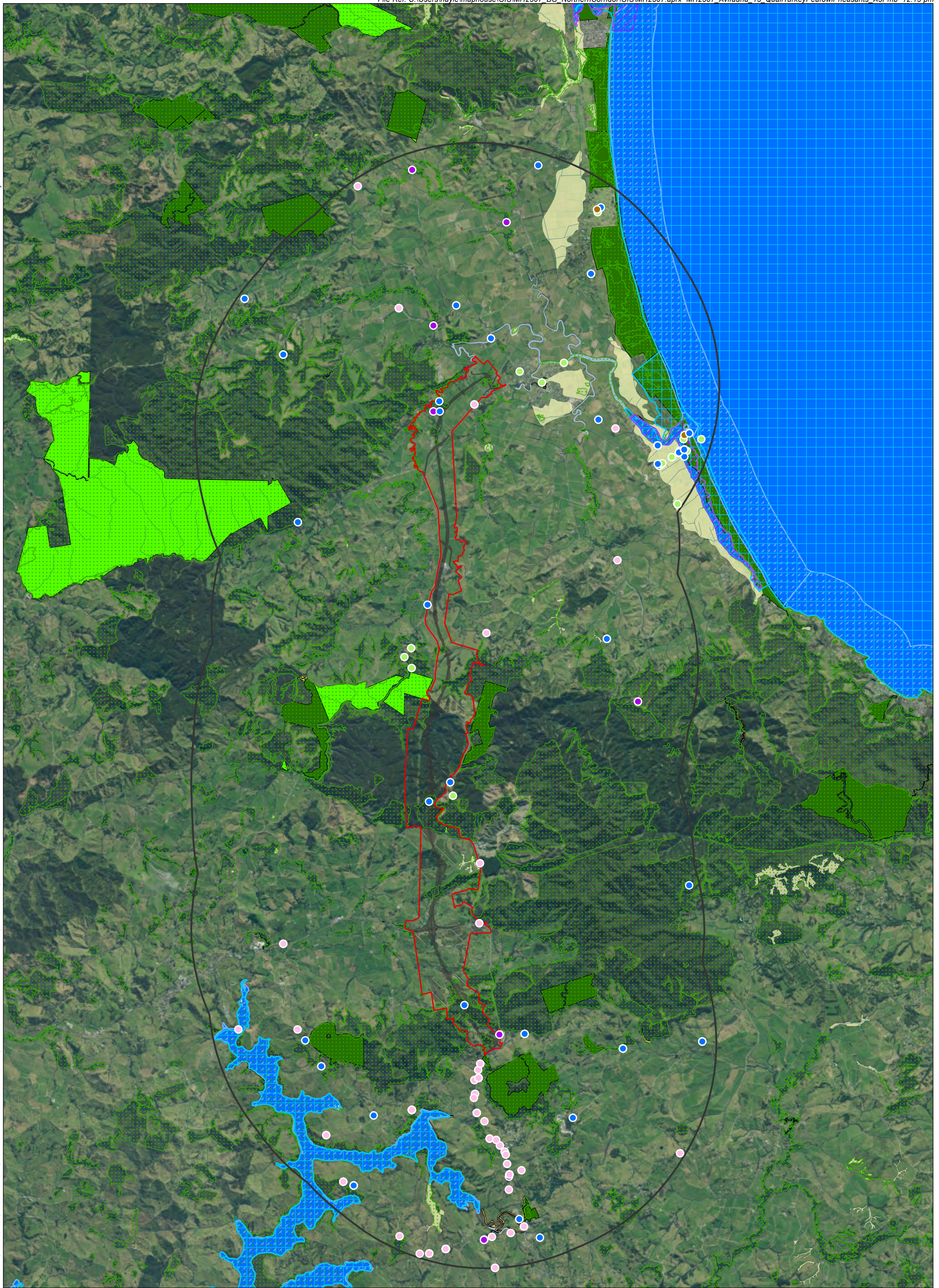


Map 14

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP

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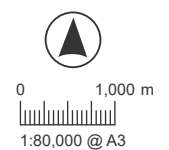
### Quail, turkey, peafowl & pheasants

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NORTHLAND CORRIDOR SECTION 2B  
Plan prepared for Waka Kotahi NZ Transport Agency | 1 April 2026



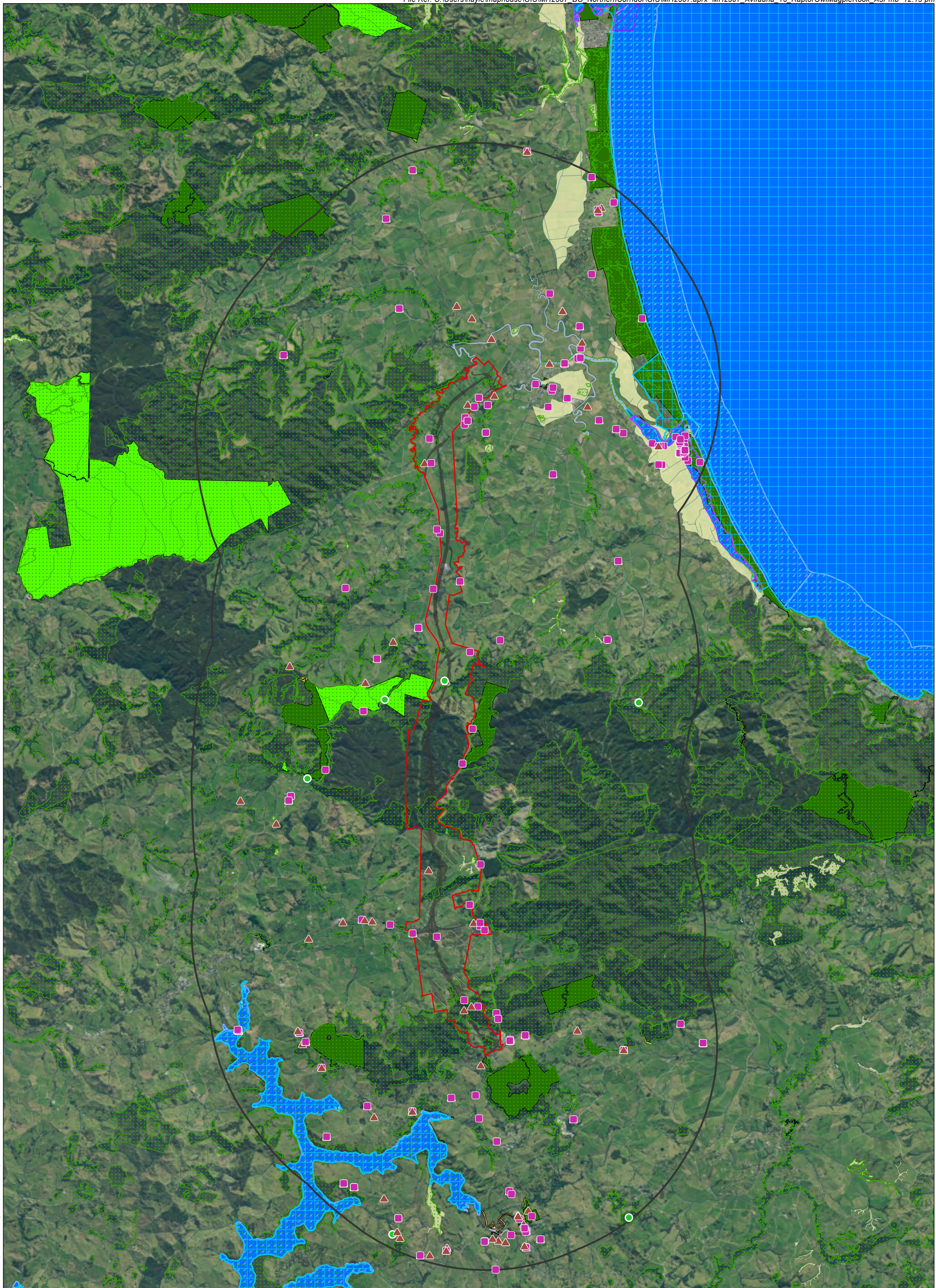
- Brown quail
- California quail
- Indian peafowl
- Ring-necked pheasant
- Wild turkey

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP



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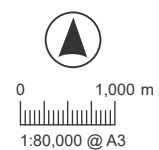


### Raptors, owls & magpie

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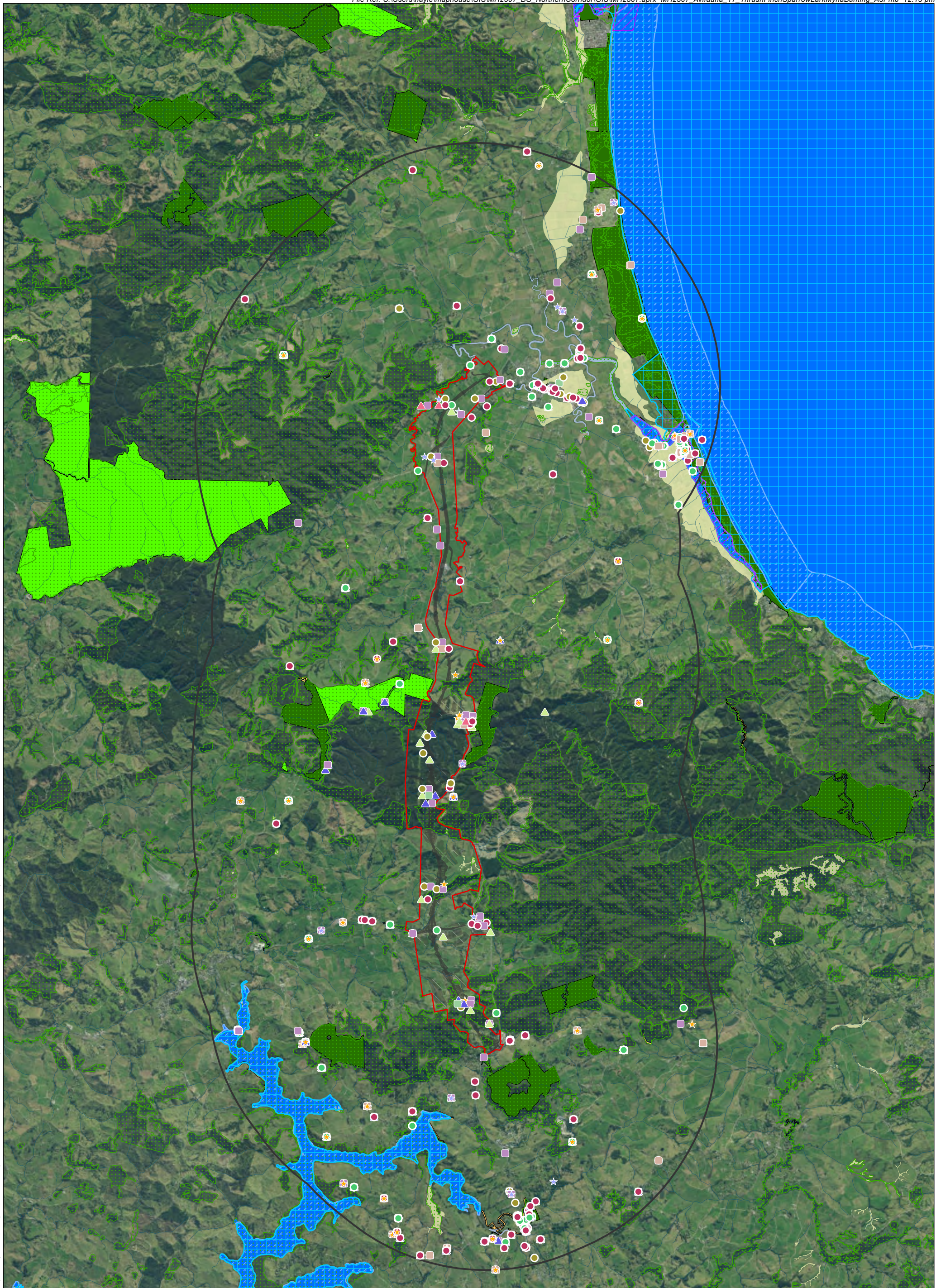


- ▲ Australian magpie
- Morepork
- Swamp harrier



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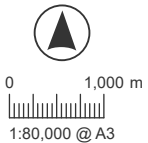


Introduced finch and passerines

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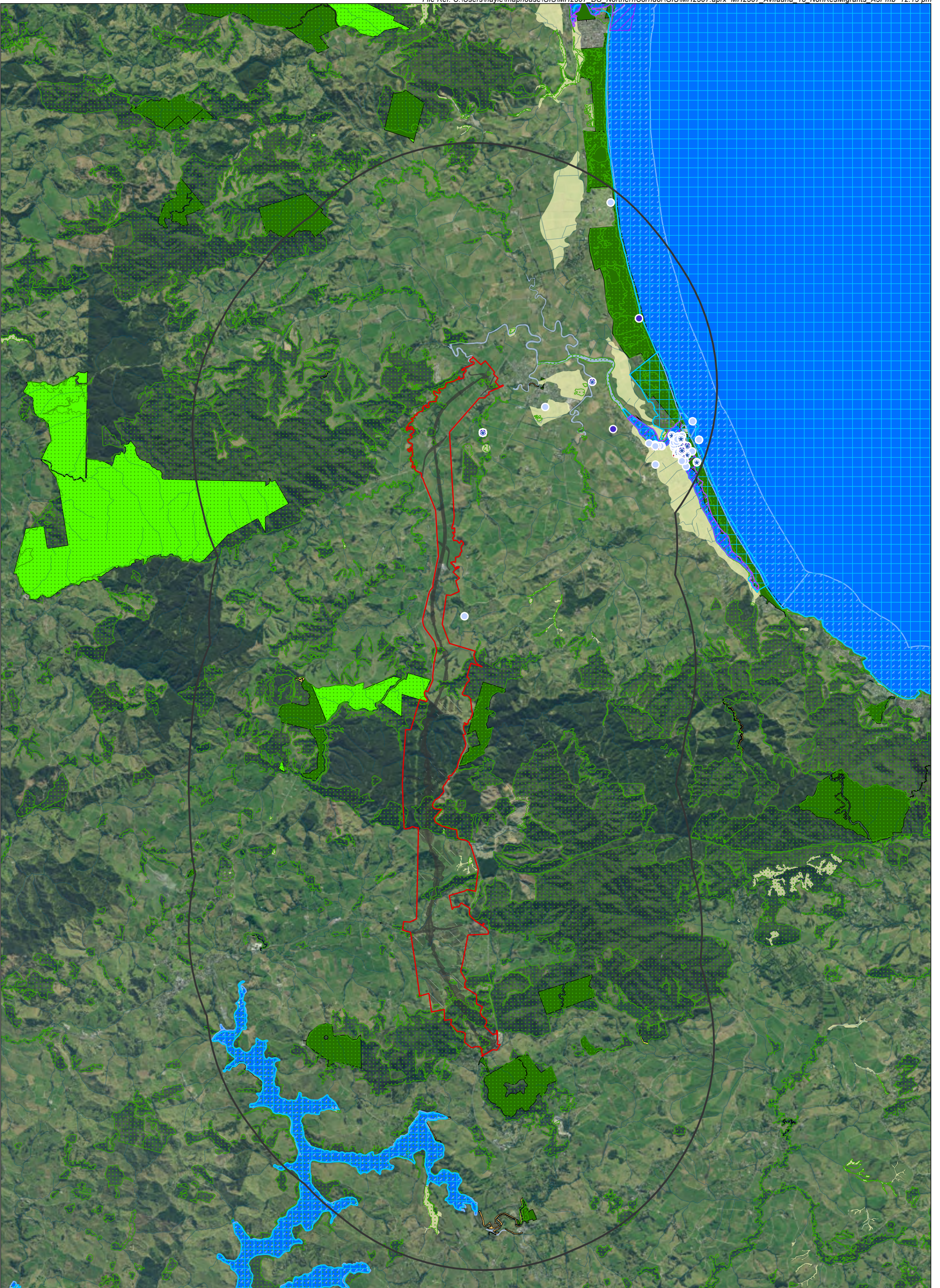


- Blackbird
- ▲ Greenfinch
- Eurasian skylark
- Song thrush
- ▲ Common chaffinch
- Common myna
- House sparrow
- ★ Starling
- ▲ Goldfinch
- Dunnock
- Redpoll
- ★ Yellowhammer



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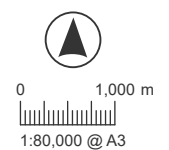
**Non-resident migrants**

**AVIFAUNA ASSESSMENT  
NORTHLAND CORRIDOR SECTION 2B**  
Plan prepared for Waka Kotahi NZ Transport Agency | 1 April 2026



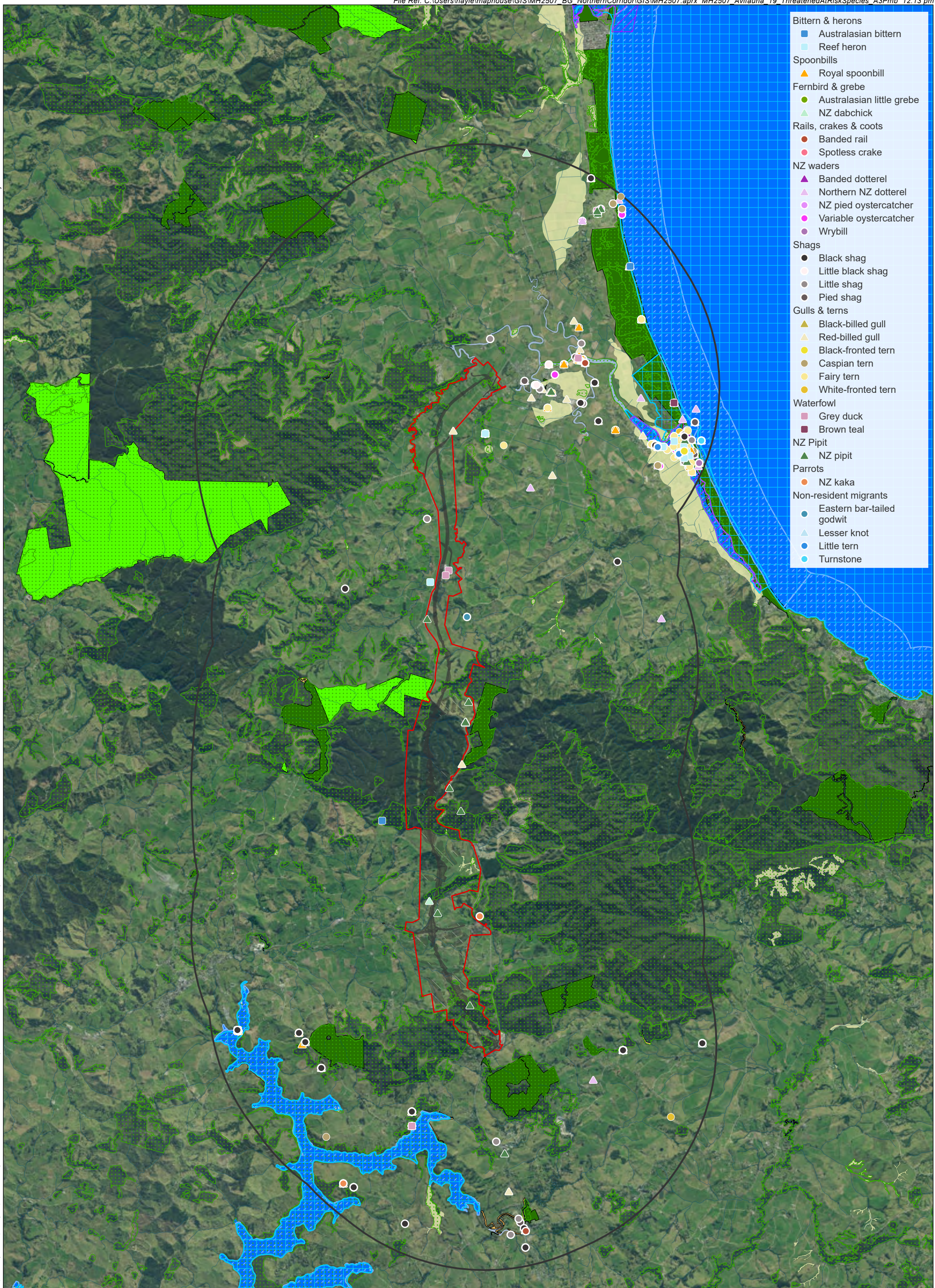
- Eastern bar-tailed godwit
- Lesser knot
- ▲ Little tern
- ▲ Pacific golden plover
- Red-necked stint
- Sharp-tailed sandpiper
- ★ Turnstone

Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP



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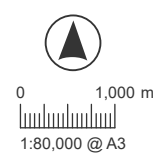
- Bittern & herons**
  - Australasian bittern
  - Reef heron
- Spoonbills**
  - ▲ Royal spoonbill
- Fernbird & grebe**
  - Australasian little grebe
  - ▲ NZ dabchick
- Rails, crakes & coots**
  - Banded rail
  - Spotless crake
- NZ waders**
  - ▲ Banded dotterel
  - ▲ Northern NZ dotterel
  - NZ pied oystercatcher
  - Variable oystercatcher
  - Wrybill
- Shags**
  - Black shag
  - Little black shag
  - Little shag
  - Pied shag
- Gulls & terns**
  - ▲ Black-billed gull
  - ▲ Red-billed gull
  - Black-fronted tern
  - Caspian tern
  - Fairy tern
  - White-fronted tern
- Waterfowl**
  - Grey duck
  - Brown teal
- NZ Pipit**
  - ▲ NZ pipit
- Parrots**
  - NZ kaka
- Non-resident migrants**
  - Eastern bar-tailed godwit
  - ▲ Lesser knot
  - Little tern
  - Turnstone

Threatened and At Risk species

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 NORTHLAND CORRIDOR SECTION 2B  
 Plan prepared for Waka Kotahi NZ Transport Agency | 1 April 2026



Data Sources: Waka Kotahi NZTA, Department of Conservation (DOC), Northland Regional Council (NRC), Auckland Council (AC), BirdLife International, QEII National Trust, Cornell Lab of Ornithology (Ebird), iNaturalist, Wilderlab, WSP



## Appendix B: Terrestrial (native and exotic) Vegetation Communities

TERRESTRIAL VEGETATION COMMUNITIES	CONSTRUCTION FOOTPRINT (ha)	PROPOSED DESIGNATION (ha)	TOTAL (ha)
Anthropic tōtara forest	2.93	15.35	18.27
Bamboo forest		0.10	0.10
Broadleaved species scrub forest	4.06	22.73	26.79
Crack willow/mixed exotic and native shrub/exotic groundcover	8.25	12.08	20.32
Crack willow-exotic trees-remnant native trees/mixed exotic and native shrub	0.11	2.39	2.49
Eucalyptus treeland/ranked grassland	0.46	0.76	1.22
Exotic pine forest/mixed native and exotic scrub/ranked grassland	55.04	201.79	256.82
Exotic pine forest/native broadleaf scrub		0.39	0.39
Gorse shrubland	0.02	0.25	0.27
Japanese cedar hedgerow	0.40	0.32	0.72
Kahikatea forest	0.45	0.55	1.00
Kahikatea treeland	1.14	3.06	4.20
Kahikatea-kauri-totara treeland	0.42	1.19	1.61
Kahikatea-pukatea forest/native scrub/tradescantia	0.77	1.77	2.54
Kānuka forest	12.10	46.51	58.61
Kānuka treeland/native and exotic scrub/ranked grassland	3.62	2.53	6.15
Kauri-podocarp forest	1.67	23.34	25.01
Kohekohe-taraire-tawa-podocarp/broadleaf	10.29	39.35	49.64
Lawson's cypress-exotic pine treeland	0.39	0.56	0.95
Macrocarpa/mixed native and exotic scrub/ranked grassland	0.23	0.87	1.10
Mixed exotic-native scrub and hedgerow scrub	0.08	1.00	1.08
Nīkau treeland	0.07		0.07
Ornamental plantings and gardens	1.52	3.68	5.20
Planted native vegetation	4.97	6.18	11.15
Poplar treeland/exotic scrub/ranked grassland	0.66	4.61	5.28
Pūriri forest/ranked grassland	0.36	1.33	1.69
Redwood treeland/ranked grassland		0.04	0.04
Remnant Riparian podocarp-hardwood-kanuka treeland		13.13	13.13
River she-oak hedgerow	0.36	0.75	1.10
Scattered podocarp-broadleaf-kanuka treeland/mixed native and exotic scrub/ranked grassland	0.28	2.85	3.13
Tōtara forest/native broadleaf scrub	1.45	2.69	4.14
Tōtara-kauri/broadleaf scrub	1.09	2.88	3.97
Tōtara-kānuka forest/mixed native and exotic scrub/ranked grassland	1.29	3.55	4.85
Mixed tall exotic shelterbelt treeland	0.42	1.33	1.75
<b>TOTAL (ha)</b>	<b>114.90</b>	<b>419.91</b>	<b>534.80</b>

## Appendix C:

# Compiled avifauna species list

The data presented in the following table comprises:

- A compiled list of all avifauna species recorded from the desktop and field data (refer to Sections 2.2 and 2.3 for details regarding data sources).
- The Threat Status has been taken from Robertson et al. (2021) with qualifiers: CD=Conservation Dependent (CDB indicates the need for only good biosecurity); CI=Climate Impact; CR=Conservation Research Needed; De=Designated; DPR=Data Poor Recognition; DPS=Data Poor Size; DPT=Data Poor Trend; EF=Extreme Fluctuations; IE=Island Endemic; Inc=Increasing; OL=One Location; PD=Partial Decline; PF=Population Fragmentation; RF=Recruitment Failure; RR=Range Restricted; SO=Secure Overseas; Sp=Sparse; TO=Threatened Overseas.
- Information regarding primary (dark green) and secondary (light green) habitats presented in the following table was obtained for each species from Heather & Robertson (2005b). 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.
- Species are grouped according to primary habitat association and then ordered alphabetically according to their common name.

SPECIES		NZ THREAT CLASSIFICATION		HABTIAT ASSOCIATION								RECORDED WITHIN			
				Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential	Indicative Alignment	Proposed Designation	5km buffer	
Bellbird / Korimako	<i>Anthornis m. melanura</i>	Not Threatened	Not Threatened										✓		✓
Kererū	<i>Hemiphaga novaeseelandiae</i>	Not Threatened	Not Threatened <sup>CD Inc</sup>											✓	✓
Kingfisher / Kotare	<i>Todiramphus sanctus vagans</i>	Not Threatened	Not Threatened										✓	✓	✓
Morepork / Ruru	<i>Ninox n. novaeseelandiae</i>	Not Threatened	Not Threatened											✓	✓
North Island fantail / Pīwakawaka	<i>Rhipidura fuliginosa placabilis</i>	Not Threatened	Not Threatened <sup>EF</sup>										✓	✓	✓
North Island Kākā	<i>Nestor meridionalis septentrionalis</i>	At Risk	Recovering <sup>CD Inc PD PF</sup>												✓
North Island tomtit / Miromiro	<i>Petroica macrocephala toitoi</i>	Not Threatened	Not Threatened										✓	✓	✓
Shining cuckoo / Pīpīwharau	<i>Chrysococcyx l. lucidus</i>	Not Threatened	Not Threatened										✓	✓	✓
Tūī	<i>Prothemadera n. novaeseelandiae</i>	Not Threatened	Not Threatened <sup>Inc</sup>										✓	✓	✓
Blackbird	<i>Turdus merula</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Brown quail	<i>Coturnix ypsilophora australis</i>	Introduced	Introduced & Naturalised <sup>SO</sup>												✓
California quail	<i>Callipepla californica</i>	Introduced	Introduced & Naturalised <sup>SO</sup>												✓
Eastern rosella	<i>Platycercus eximius</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Grey warbler / Rirorio	<i>Gerygone igata</i>	Not Threatened	Not Threatened										✓	✓	✓
Pheasant	<i>Phasianus colchicus</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Silvereye / Tauhou	<i>Zosterops lateralis lateralis</i>	Not Threatened	Not Threatened <sup>SO</sup>											✓	✓
Canada goose	<i>Branta canadensis</i>	Introduced	Introduced & Naturalised <sup>SO</sup>											✓	✓
Cattle egret	<i>Ardea ibis coromanda</i>	Migrant	Migrant <sup>SO</sup>												✓
Chaffinch	<i>Fringilla coelebs</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Dunnoek	<i>Prunella modularis</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Goldfinch	<i>Carduelis carduelis</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Greenfinch	<i>Carduelis chloris</i>	Introduced	Introduced & Naturalised <sup>SO</sup>											✓	✓
House sparrow	<i>Passer domesticus</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Kookaburra	<i>Dacelo novaeguineae</i>	Introduced	Introduced and Naturalised <sup>SO RR</sup>											✓	✓

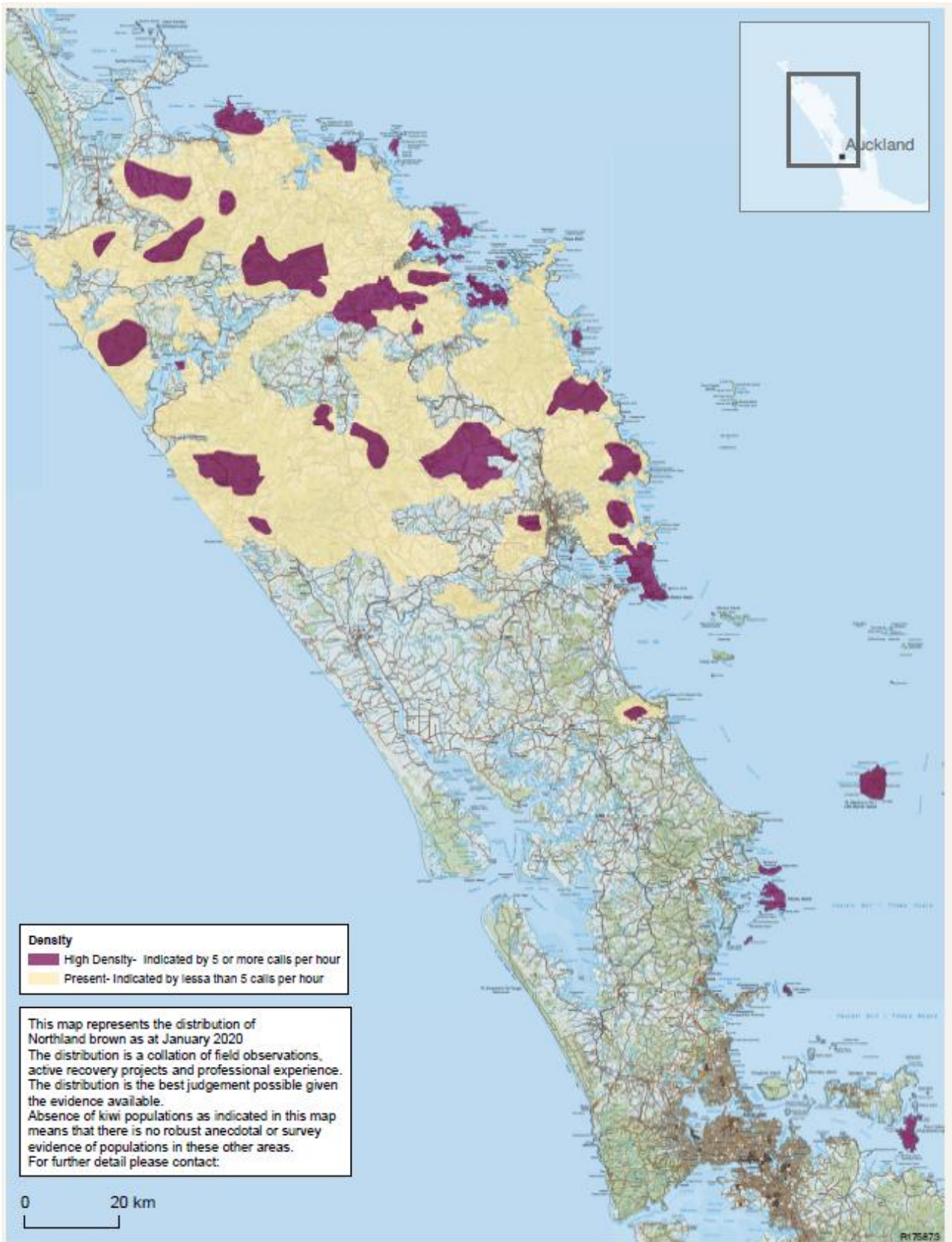
SPECIES		NZ THREAT CLASSIFICATION		HABITAT ASSOCIATION								RECORDED WITHIN			
				Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential	Indicative Alignment	Proposed Designation	5km buffer	
Magpie	<i>Gymnorhina tibicen</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
NZ pipit / Pīhoihoi	<i>Anthus n. novaeseelandiae</i>	At Risk	Declining <sup>CI CR</sup>										✓	✓	✓
Peafowl	<i>Pavo cristatus</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Redpoll	<i>Carduelis flammea</i>	Introduced	Introduced & Naturalised <sup>SO</sup>												✓
Skylark	<i>Alauda arvensis</i>	Introduced	Introduced & Naturalised <sup>SO</sup>											✓	✓
Song thrush	<i>Turdus philomelos</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Spur-winged plover	<i>Vanellus miles novaehollandiae</i>	Not Threatened	Not Threatened <sup>SO</sup>											✓	✓
Starling	<i>Sturnus vulgaris</i>	Introduced	Introduced & Naturalised <sup>SO</sup>											✓	✓
Swamp harrier / Kāhu	<i>Circus approximans</i>	Not Threatened	Not Threatened <sup>SO</sup>										✓	✓	✓
Welcome swallow / Warou	<i>Hirundo n. neoxena</i>	Not Threatened	Not Threatened <sup>SO ST</sup>											✓	✓
Wild turkey	<i>Meleagris gallopavo</i>	Introduced	Introduced & Naturalised <sup>SO</sup>											✓	✓
Yellowhammer	<i>Emberiza citrinella</i>	Introduced	Introduced & Naturalised <sup>SO</sup>										✓	✓	✓
Australasian bittern / Matuku-hūrepo	<i>Botaurus poiciloptilus</i>	Threatened	Nationally Critical <sup>CR DPT RF Sp TO</sup>												✓
Australasian little grebe / Tokitokipio	<i>Tachybaptus n. novaehollandiae</i>	Coloniser	Coloniser <sup>SO</sup>												✓
Black shag / Māpunga	<i>Phalacrocorax carbo novaehollandiae</i>	At Risk	Relict <sup>CR DPS DPT SO Sp</sup>												✓
Black swan	<i>Cygnus atratus</i>	Not Threatened	Not Threatened <sup>SO</sup>											✓	✓
Black-billed gull / Tarāpuka	<i>Larus bulleri</i>	At Risk	Declining <sup>CI CR RF</sup>												✓
Black-fronted tern / Tarapirohe	<i>Chlidonias albostratus</i>	Threatened	Nationally Endangered <sup>CI CD, PD, RF, Sp</sup>												✓
Brown teal / Pāteke	<i>Anas chlorotis</i>	Threatened	Nationally Increasing <sup>CD Inc RR</sup>												✓
Feral goose	<i>Anser anser</i>	Introduced	Introduced & Naturalised <sup>SO</sup>												✓
Grey duck / Pāpera	<i>Anas superciliosa</i>	Threatened	Nationally Vulnerable <sup>CR DPR DPS DPT SO</sup>											✓	✓
Grey duck x mallard hybrid	<i>Anas superciliosa x platyrhynchos</i>	Not Threatened	Not Threatened												✓

SPECIES		NZ THREAT CLASSIFICATION		HABITAT ASSOCIATION								RECORDED WITHIN			
				Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential	Indicative Alignment	Proposed Designation	5km buffer	
Grey teal / Tētē-moroiti	<i>Anas gracilis</i>	Not Threatened	Not Threatened <sup>Inc SO</sup>												✓
Little black shag / Kawau tūi	<i>Phalacrocorax sulcirostris</i>	At Risk	Naturally Uncommon <sup>RR SO</sup>												✓
Little shag / Kawaupaka	<i>Phalacrocorax melanoleucos brevisrostris</i>	At Risk	Relict <sup>CR DPT</sup>										✓		✓
Mallard	<i>Anas platyrhynchos</i>	Introduced	Introduced & Naturalised <sup>SO</sup>									✓			✓
Mute swan	<i>Cygnus olor</i>	Introduced	Introduced & Naturalised <sup>SO Sp</sup>												✓
North Island fernbird / Mātātā	<i>Bowdleria punctata vealeae</i>	At Risk	Declining <sup>CI CR DPS DPT</sup>									✓			✓
NZ dabchick / Weweia	<i>Poliocephalus rufopectus</i>	Threatened	Nationally Increasing <sup>Inc</sup>										✓		✓
South Island (NZ) oystercatcher / Tōrea	<i>Haematopus finschi</i>	At Risk	Declining <sup>CI</sup>												✓
NZ scaup / Pāpango	<i>Aythya novaeseelandiae</i>	Not Threatened	Not Threatened <sup>Inc</sup>												✓
Australasian shoveler / Kuruwhengi	<i>Anas rhynchotis</i>	Not Threatened	Not Threatened <sup>SO</sup>												✓
Muscovy duck	<i>Cairina moschata</i>	Introduced	Introduced & Naturalised <sup>SO</sup>												✓
Paradise shelduck / Pūtangitangi	<i>Tadorna variegata</i>	Not Threatened	Not Threatened									✓	✓	✓	✓
Pied stilt / Poaka	<i>Himantopus h. leucocephalus</i>	Not Threatened	Not Threatened <sup>SO</sup>										✓		✓
Pūkeko	<i>Porphyrio m. melanotus</i>	Not Threatened	Not Threatened <sup>Inc SO</sup>									✓	✓	✓	✓
Spotless crane / Pūweto	<i>Porzana t. tabuensis</i>	At Risk	Declining <sup>DPS DPT PF SO</sup>												✓
White heron / Kōtuku	<i>Ardea modesta</i>	Threatened	Nationally Critical <sup>CR OL SO St</sup>										✓		✓
Banded dotterel / Pohowera	<i>Charadrius bicinctus bicinctus</i>	At Risk	Declining <sup>CD CI CR DPS PD</sup>												✓
Banded rail / Moho pererū	<i>Gallirallus philippensis assimilis</i>	At Risk	Declining <sup>CI CR DPS DPT RR</sup>												✓
Black-backed gull / Karoro	<i>Larus d. dominicanus</i>	Not Threatened	Not Threatened <sup>SO</sup>												✓
Caspian tern / Taranui	<i>Hydroprogne caspia</i>	Threatened	Nationally Vulnerable <sup>CI SO Sp</sup>												✓
Eastern bar-tailed godwit / Kuaka	<i>Limosa lapponica baueri</i>	At Risk	Declining <sup>CI TO</sup>												✓
Eastern little tern / Tara teo	<i>Sternula albifrons sinensis</i>	Migrant	Migrant <sup>SO</sup>												✓
Lesser knot / Huahou	<i>Calidris canutus rogersi</i>	At Risk	Declining <sup>CI TO</sup>												✓

SPECIES	NZ THREAT CLASSIFICATION	HABITAT ASSOCIATION								RECORDED WITHIN		
		Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential	Indicative Alignment	Proposed Designation	5km buffer
Northern NZ dotterel / Tūturiwhatu	<i>Charadrius obscurus aquilonius</i>	Threatened	Nationally Increasing <sup>CD CI Inc RR</sup>									✓
NZ fairy tern / Tara iti	<i>Sternula nereis davisae</i>	Threatened	Nationally Critical <sup>CD CI CR RF RR</sup>									✓
Pacific golden plover	<i>Pluvialis fulva</i>	Migrant	Migrant <sup>SO</sup>									✓
Pied shag / Kāruhiruhi	<i>Phalacrocorax varius varius</i>	At Risk	Recovering <sup>CD</sup>									✓
Red-billed gull / Tarāpunga	<i>Larus novaehollandiae scopulinus</i>	At Risk	Declining <sup>CI</sup>							✓		✓
Red-necked stint	<i>Calidris ruficollis</i>	Migrant	Migrant <sup>SO</sup>									✓
Reef heron / Matuku moana	<i>Egretta sacra sacra</i>	Threatened	Nationally Endangered <sup>CI CR DPT SO Sp</sup>									✓
Royal spoonbill / Kōtuku ngutupapa	<i>Platalea regia</i>	At Risk	Naturally Uncommon <sup>Inc RR SO Sp</sup>									✓
Sharp-tailed sandpiper	<i>Calidris acuminata</i>	Migrant	Migrant <sup>SO</sup>									✓
Turnstone	<i>Arenaria interpres</i>	Migrant	Migrant <sup>SO</sup>									✓
Variable oystercatcher / Tōrea pango	<i>Haematopus unicolor</i>	At Risk	Recovering <sup>CI Inc</sup>									✓
White-faced heron / Matuku moana	<i>Egretta novaehollandiae</i>	Not Threatened	Not Threatened <sup>SO</sup>							✓		✓
White-fronted tern / Tara	<i>Sterna s. striata</i>	At Risk	Declining <sup>CI CR DPT</sup>									✓
Wrybill / Ngutu pare	<i>Anarhynchus frontalis</i>	Threatened	Nationally Increasing <sup>RR CD CR</sup>									✓
Australasian gannet / Tākapu	<i>Morus serrator</i>	Not Threatened	Not Threatened <sup>CI De* Inc SO</sup>									✓
Feral pigeon	<i>Columba livia</i>	Introduced	Introduced & Naturalised <sup>SO</sup>									✓
Spotted dove	<i>Streptopelia chinensis tigrina</i>	Introduced	Introduced & Naturalised <sup>SO</sup>									✓
Myna	<i>Acridotheres tristis</i>	Introduced	Introduced & Naturalised <sup>SO</sup>							✓	✓	✓

# Appendix D:

## North Island Brown Kiwi Estimated Distribution 2020



**Density**

- High Density- Indicated by 5 or more calls per hour
- Present- Indicated by less than 5 calls per hour

This map represents the distribution of Northland brown as at January 2020. The distribution is a collation of field observations, active recovery projects and professional experience. The distribution is the best judgement possible given the evidence available. Absence of kiwi populations as indicated in this map means that there is no robust anecdotal or survey evidence of populations in these other areas. For further detail please contact:

0 20 km



## North Island Brown Kiwi Estimated distribution 2020



NZGD 2000 New Zealand Transverse Mercator  
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