# Appendix 7: Technical Report:

# Assessment of Ecological Values and Effects, Boffa Miskell

# New Local Road to Waiinu Beach

Assessment of Ecological Values and Effects
Prepared for South Taranaki District Council

20 March 2017

# Document Quality Assurance

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*Cover photograph:* Lake Waikato, north of the concept alignment © Boffa Miskell, 2017

# EXECUTIVE SUMMARY

South Taranaki District Council are preparing to lodge a Notice of Requirement (NoR) to designate an area of land for the provision of a new local road that involves realigning, widening, and extending the existing Nukumaru Station Road from State Highway 3 to Wai-inu Beach. To understand and evaluate the ecological values present along the proposed road alignment, Boffa Miskell have undertaken an ecological assessment of the values and potential effects associated with the project.

The designation footprint used for this assessment includes route options as well as the area for construction. It is understood that the detailed design and alignment of the road is yet to be determined, and shall need to satisfy any conditions imposed on the final designation.

Desktop, data base, and field survey identified 10 habitat types along the designation footprint. The majority of these habitat types are exotic and of low or limited ecological value. The areas identified with higher values (and significant as per either the Taranaki Regional Policy statement or the Horizons One Plan) includes one of two small depression wetlands (a carex wetland east of the current road) and Waikato lake (and margin). The lake is not directly affected, although the Carex wetland may lose some 20m$^2$ as a result of widening the road.

There are no rivers or lakes directly affected by the proposed new road alignment.

No rare plant species or vegetation communities were recorded along the proposed designation footprint.

The habitats directly affected (except the Waikato wetland) are common and of low value ecologically.

The magnitude of the potential effects, on an Ecological District or catchment scale, are very low or negligible and the resultant significance of the potential adverse effect is generally very low.

In regard to native fauna, there is one potential direct adverse effect to be managed – the potential for loss of the southern north island speckled skink. The potential effect to NZ pipit (if present) is both unlikely but also simply managed.

In both cases, adverse effects to these species can be avoided through a standard salvage process.

The avoidance through salvage and pre-clearance management processes are recommended, as are avoidance of weed issues from disturbance.

Generally, the proposal is relatively benign in terms of ecological impacts based on the alignment and the existing values and with the recommended avoidance and remedies.

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# 1 INTRODUCTION

Boffa Miskell Limited (BML) have been engaged by South Taranaki District Council (STDC) to prepare a Notice of Requirement to designate a new local road which realigns, widens and extends the existing Nukumaru Station Road from State Highway 3 to Wai-inu Beach. The location of the road traverses both STDC and Whanganui District Council (WDC) jurisdictional areas, which also corresponds to the Taranaki Regional Council (TRC) and Manawatu-Wanganui Regional Council (Horizons) jurisdictional areas.

The application for the Notice of Requirement to designate the route as a new local road requires an assessment of effects, including ecological effects. The following report is an ecological impact assessment of the proposed designation footprint with a resulting constraints map to help avoid, mitigate, and remedy adverse effects on areas (vegetation and habitats) and waterbodies of ecological value.

## 1.1 Ecological Assessment Scope

The scope of the ecological assessment is to:

- describe the ecological values of the area along the proposed designation footprint
- assess the ecological values against relevant statutory regulations and schedules;
- understand the actual and potential adverse effects on the ecological values from the new local road; and
- provide an ecological constraints map and corresponding recommendations to avoid, minimise, remedy and mitigate ecological effects.

## 1.2 Limitations of Ecological Assessment

As with all one off field ecological assessments, seasonal or temporal variation in the presence of mobile fauna means that the presence or absence of such fauna cannot be ascertained with great accuracy. The condition of habitat becomes the surrogate for the presence or absence of fauna rather than observed condition on the day of the survey. In such situations the ecological values do not represent potential presence but in considering

This assessment has been carried out on the concept alignment given to BML by BTW on the 6th of December 2016. This is assumed in this assessment to be designation being sought by this application.

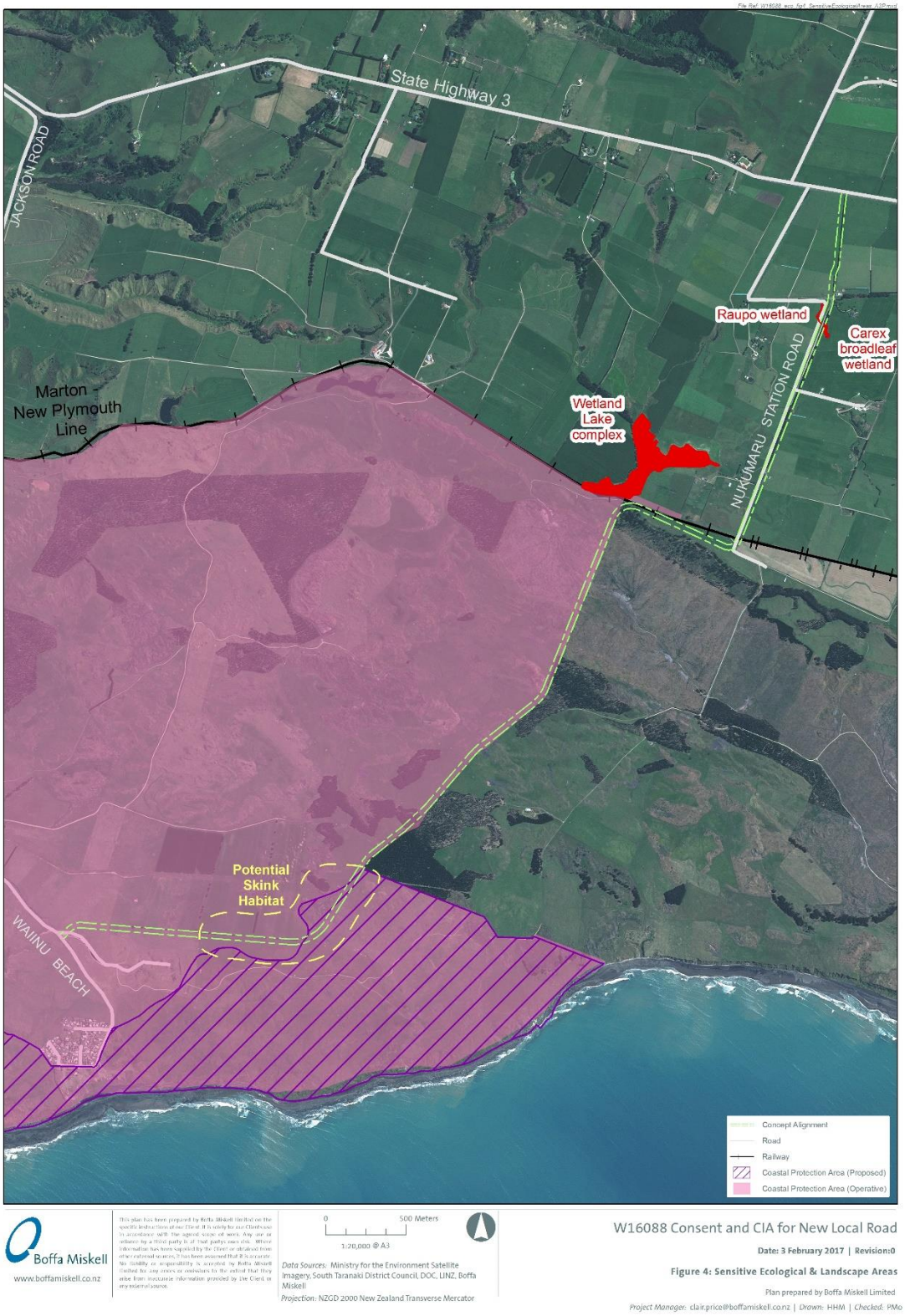


*Figure 1:Map of the site area, detailing the designation footprint (20/12/2016) operative (and proposed_ coastal protection area and "valued" native habitat*

# 2 METHODOLOGY

The ecological assessment of the site has been undertaken using a combination of desktop analysis and field survey work outlined below.

## 2.1 Desktop Analysis

Existing biological databases and all published information on biological values within the study area were researched.

This phase also included preparation of site maps and plans to direct the field survey. The extent and differences in vegetation within the site were delineated on geographic information systems (GIS) using topographical maps and high resolution aerial photography prior to site visit.

Information was derived from known datasets on landforms, soils, climate, and topography of the site. Preliminary vegetation communities were identified and described through a combination of New Zealand Land Cover Database version four (LCDBv4), and the use of aerial photographs.

Land Environments New Zealand (LENZ), and Potential Vegetation of New Zealand (PVNZ – Leathwick *et al.* (2004)) data were also used in the analysis.

The national threat classification of species was derived from the appropriate threat classification list for each taxa (de Lange et al., 2013; Goodman et al., 2014; H. A. Robertson et al., 2013) and their regional status was derived from the Draft Conservation Management Strategy for the Wellington Conservancy (Department of Conservation, 2010).

### 2.1.1 Birds

Data from the Ornithological Society of New Zealand's (OSNZ) atlas (C. J. R. Robertson, Hyvonen, Fraser, & Pickard, 2007) was collated from a 10 km x 10 km grid squares (266, 614 and 266, 615) which encompass the site and surrounding area. The species list obtained from the OSNZ atlas data served as a baseline of species previously recorded in the wider area and therefore potentially present at or near the site.

### 2.1.2 Lizards

A list of lizard species in the area, as noted in Hitchmough et al (2016), was collated.

### 2.1.3 Bats

Existing native bat records in the Taranaki Region was sought and reviewed.

### 2.1.4 Fish

A review of fish records from the area encompassing SH3 – coast from Wai-inu to Nukumaru Road (Catchment No. 339.000 Waitotara R) on the NIWA freshwater fish database (NZFFD[1]) was conducted.

### 2.1.5 Vegetation and Rare Plants

Local plant species lists obtained from the New Zealand Plant Conservation Network website (http://www.nzpcn.org.nz/observation_site_search.aspx) were examined to identify any rare or uncommon plants in which to focus field surveys.

## 2.2 Field Survey

The field survey consisted of an ecologist slow driving within the grazed pasture areas of the alignment, stopping and leaving the vehicle at points of interest, and walking the route within the exotic pine plantations. The survey was undertaken between the hours of 11am and 3pm on the 13th December. The weather conditions on that day were sunny, warm and calm.

### 2.2.1 Vegetation

The desktop delineated vegetation communities were ground-truthed in the field, where each identified community type was described on site. Any variations found in the field which differed from the desktop map were noted and the desktop map changed accordingly. Each community visited was assessed with photographs and descriptions including, species lists and basic structural measurements such as diameter at breast height (DBH) and height of canopy.

Vegetation plots or transects were not considered necessary to be part of the process of describing this vegetation as the communities along the alignment were small, simple, and well defined.

Note, vegetation includes wetland habitats but not open water or aquatic habitats.

### 2.2.1 Freshwater

Field surveys for freshwater fauna was were not deemed necessary in this assessment as there are no waterways within the designation footprint. Equally, no waterways outside the designation footprint will be directly affected by the road construction or operation.

### 2.2.2 Birds

All incidental bird observations were recorded while on site and observations of birds within or adjacent to the site, including unusually large numbers of common or exotic bird species, or an unusual or noteworthy behaviour.

[1] http://www.niwa.co.nz/freshwater-and-estuaries/nzffd

### 2.2.3 Lizards

Field surveys for terrestrial lizards were not conducted. Rather, we rely on the vegetation community descriptions obtained from the field investigations (refer to Section 2.2.1) to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of lizards present within nearby habitats.

### 2.2.4 Bats

Like the lizards, field surveys for bats were not conducted. Rather, we have relied on the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of bats present within nearby areas.

## 2.3 Assessment of Significance

The location of the road is largely on or near the jurisdictional boundary between STDC and WDC, which also corresponds to the TRC and Horizons boundary. A section of the proposed designation footprint also falls within the STDC's Proposed District Plan (with decisions) coastal environment, named the Coastal Protection Area. The STDC's Operative District Plan also includes a Coastal Protection Area, although the inland extent is greater and overlays the proposed designation footprint south of the railway corridor.

Therefore, all statutory planning documents of the four local authorities relevant to the consenting and ecological assessment of the road, and the New Zealand Coastal Policy Statement were considered in the assessment of significance.

## 2.4 Limitations of Field Survey

Assessment of the site vegetation and watercourses on the site was based on the proposed designation footprint. We note that this design may not be final. Depending on the scope of any future designation and detailed design changes, further ecological assessments, including quantitative assessments may be required.

We also note that potential seasonal variability is not assessed through one site visit. The composition of the avifauna community utilising the area could not be fully established as the survey was only conducted once in the summer season. Furthermore, some plant species, such as orchids, are likely to be missed during a single site visit outside of the flowering season when they are most easily identified.

Fauna present, in addition to birds, is reliant solely on the project ecologist's assessment of the habitat type and condition as noted during the field survey.

# 3 ECOLOGICAL DESCRIPTION

## 3.1 Site description

The proposed designation footprint runs from State Highway 3, within flat dairy pasture following a property boundary and fence line/shelter belt south. The new road, then connects to and follows the existing Nukumaru Station Road which is relatively flat, with some headwater depressions nearby and bordered by shelter belts. The land immediately south of the Marton-New Plymouth railway corridor is relatively flat, and beyond this the topography changes to duneland. This duneland consists patches of forestry on the steep dunes and low production pasture on the gentler slopes and basins. The patches of (pine) forestry are in several stages of young growth, from just harvested to approximately 5-10 years of age. The remaining topography is coastal dune in nature, increasingly so as the road moves further south and south-west towards the active coastline.

## 3.2 Ecological Context

Based on an initial desktop review of available information we have identified the following ecological habitats within both the proposed designation footprint and potential receiving environments of the road alignment (the study area).

## 3.3 Coastal Environment

The extent of the 'coastal environment' along the South Taranaki district coastline is depicted in the Operative District Plan and the Proposed District Plan (as amended with Decisions, November 2016) (see Figure 1 above). The notation shown in both these statutory documents is called the Coastal Protection Area (CPA). As part of the recent district plan review, the CPA was reassessed to give effect to the NZCPS, using the criteria in Policy 1 to determine the landward extent. There are appeals to the Environment Court on the Proposed District Plan CPA, and while not specific to the Wai-inu Beach and Nukumaru Domain area, the resolution of the appeals could have implications on the wider application of the CPA along the South Taranaki coastline. To that end, the different CPA areas shown in the Operative and Proposed District Plan (as amended by Decisions) are relevant to this assessment.

**The CPA.**

The southern end of the proposed designation footprint extends 530m into the Proposed District Plan (with decisions) CPA This means that 1.06 ha (10580m$^2$) of coastal environment will be directly affected. The point where the designation footprint crosses the Proposed CPA is at the inland most extent, in the context of the Wai-inu coastal section. The proposed designation footprint area within the Proposed CPA is predominantly pine plantation on a gently sloping stable dune, with the edges of this topography being flat to gentle and covered in rough pasture (see Figure 2). The ecology is not that of the more southern areas, which do retain some native and duneland processes and systems. It is predominantly exotic and pastural in use, condition, and value. The

area is at the very northern edge of the potential speckled skink habitat (shown in Figure 1). We note that in regard to the proposed CPA, the majority of the effects will fall outside that “Zone”.

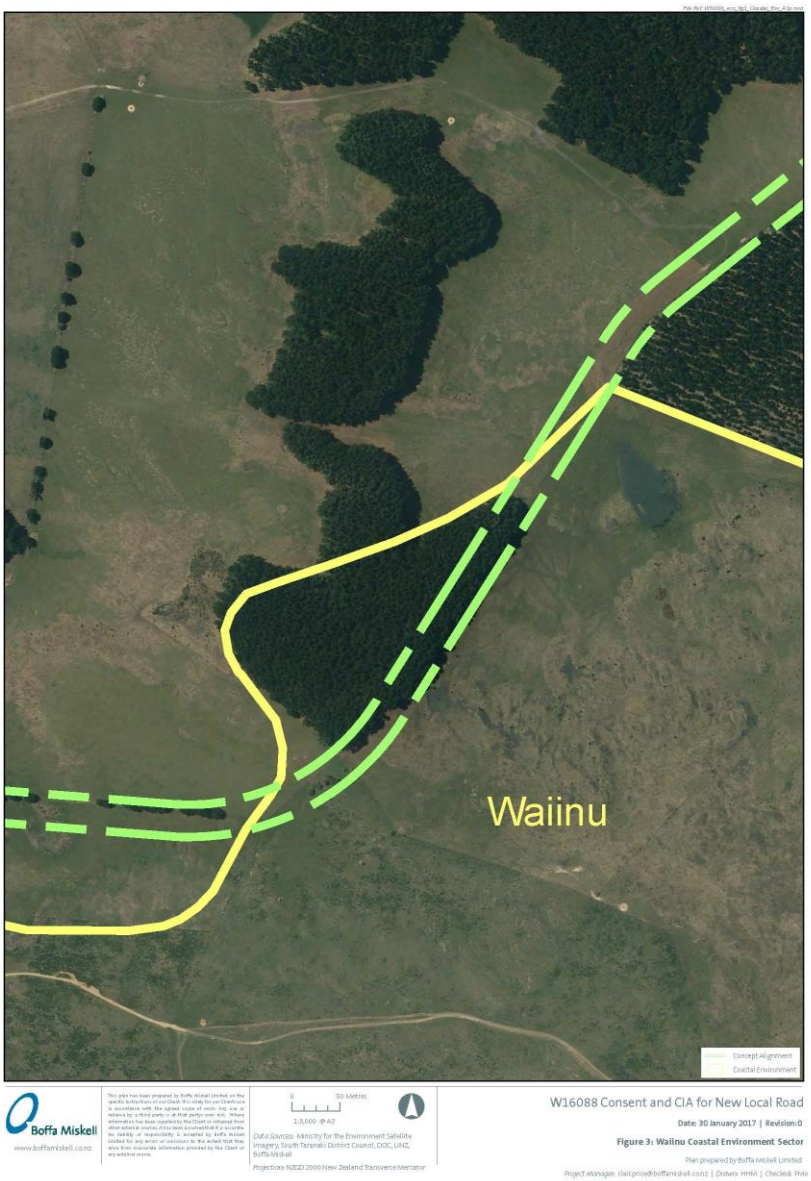


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*Figure 2: The section of the concept alignment that crosses the proposed CPA (below the solid yellow line), the entire area shown in the figure is within the current (operative) CPA. .*

## 3.4 Waterbodies:

Three types of waterbodies can be found in the wider study area and may be exposed to indirect impacts of the new road, these waterbodies are:

- **Wetland:** There is one wetland in the proposed designation footprint, already crossed by a section of the existing Nukumaru Station Road which is to be widened. This wetland is

found in a depression and consists of two wetland types, these being a Raupo wetland to the west of the road and a carex wetland to the east (Figure 1). These wetlands are defined by their vegetation types, and as a result are assessed with the vegetation communities.

- **Headwater depressions:** while no waterways are present directly within the road footprint, there are some headwater depressions in the study area that drain the area of flat land in the southern end of Nukumaru station road. These headwater depressions sit within improved pasture and form part of a drainage network into both Lake Waikato to the west and Lake Marahau to the east.
- **Dune Lakes:** Lake Waikato is a large dune lake of approximately 12.3 ha in area draining from a series of headwater depressions within dairy farms to the north (Figure 1). Margin vegetation includes large willow and indigenous broadleaves, as well as extensive areas of rush and reedland.

  Lake Waikato lies just north of the proposed designation footprint and is not considered to be directly affected from the construction and the operation of the new local road as it is separated from the alignment by an existing railway track and is downstream of the drainage flow path. However, there are potential indirect impacts on birdlife associated with this habitat.

## 3.5 Ecological District

New Zealand has been divided up into ecological districts, each of which corresponds to an identifiable landscape and associated ecological community (McEwen, 1987). This site is found in the Manawatu Ecological Region and crosses the border between the Foxton ecological district to the south and the Manawatu Plains ecological district, where the land flattens from Lake Waikato, in the north (See Figure 1). The identifying landscape characteristics for each district is defined below:

**The Foxton ecological district** is defined by landforms resulting from sand movements. It is a highly modified environment for the most part consisting of farmland, exotic pine plantations, and urban areas with few native areas remaining.

**The Manawatu Plains ecological district** is distinguished by the flat topography of flood-plains and river terraces. Again this district is highly modified and little remains of the original wetlands and podocarp forests.

## 3.6 Current Terrestrial Vegetation

Ten vegetation communities (including wetland vegetation) have been identified within the study area of the proposed designation footprint (approximately 16.2 ha in total). These communities are predominantly exotic, with only 1.5 ha (0.93%) of the total footprint area encompassing indigenous vegetation.

Table 1 below, details the plant communities sorted by structural form, from grassland to wetlands to seral forest and mature forest/trees. Only the three most intact and native habitats (i.e. the

raupo wetland, the Carex wetland and the wetland complex of lake Waikato ) have been mapped (Figure 1).

Appendix 2 shows photographs of each community within the area of the concept alignment.

*Table 1: Vegetation communities and their features within the assessment site, the area of which falls within the 20m impact zone and the 100m potential impact zone.*

| | | |
|---|---|---|
| **EXOTIC GRASSLAND** | | |
| **1** | **Rough pasture** | • 6.6 hectares of this community type is found beneath the proposed designation footprint. This is 41% of the total footprint and a fraction of the total area that this community covers locally.<br>• Found primarily in the southern section of the road in the coastal dune area of the South Taranaki District, Taranaki Region.<br>• This environment also falls within the costal environment zone.<br>• Predominantly seeding pasture grass and associated agricultural weeds, grazed by sheep and beef and not irrigated.<br>• Potential habitat of the threatened speckled skink and pipit bird |
| **2** | **Improved pasture** | • 6.1 hectares of this community type is found beneath the proposed designation footprint. This is 37% of the total footprint and a fraction of the extensive area that this community covers locally.<br>• Found primarily in the northern section of the road, on the flat land behind the dunes in the Wanganui district, horizons Region.<br>• Irrigated, dense pasture grass species for the production of dairy.<br>• Some headwater depressions are found at the southern section of this habitat type, these eventually drain into dune lakes on both the west and east of the alignment.<br>• No threatened species are believed to occupy this habitat type. |
| **3** | **Wet pasture** | • This community will not be directly affected by the proposed designation footprint, but is a potential receiving environment of indirect impacts from works.<br>• Found as headwater depressions within improved pasture area either side of Nukumaru Road, these drain into dune lakes on both the west and east of the proposed designation footprint.<br>• Potentially used by two at risk species, the pied stilt and variable oyster catcher in times of bad weather and flooding. |
| **INDIGENOUS WETLAND** | | |
| **4** | **Carex wetland** | • Only one pocket of this vegetation type was recorded. This was an area of ~0.1 ha found on the eastern side of Nukumaru road in a slight depression within the Wanganui District, Horizons Region. A small culvert provided some water connection with upper Raupo wetland on the other side of the road.<br>• 0.002 hectares (20m²) of this community type is found beneath the proposed designation footprint.<br>• The vegetation consists of a canopy (thinner in the wetter centre) of *Melicytus ramiflorus and Myrsine australis, these trees were approximately 4m in height with multi-stemmed trunks approximately 5-20 DBH in size. The shrub canopy was sparse, with some Piper excelsum on the dryer edges and Carex secta in the wetter centre. Two ferns were also noted on the dryer banks, Microsorum pustulatum, Polystichum oculatum.* This is a limited representation of the natural biodiversity expected in such a wetland.<br>• Exotic species recorded within the site were arum lily *Zantedeschia aethiopica,* Gorse, *Ulex europaeus, and* convolvulus *Calystegia sylvatica.*<br>• This wetland is considered to be in moderate to poor health, due to fragmentation, invasive species presence and modified hydrology. |

| | | |
|---|---|---|
| | | • Whilst the wetland was not found to contain any threatened or at risk species, this ecosystem as a whole is a rare community as listed in Table F.2a in Schedule F, One Plan |
| 5 | **Raupo wetland** | • The vegetation consists of Raupo *Typha orientalis* amongst improved pasture grass. It is in a depression on the western side of Nukumaru Road adjacent to the carex wetland.<br>• It is a wetland some 0.15 hectares in size of which 0.007 hectares(70m2) o is beneath the proposed designation footprint.<br>• The raupo is sufficiently dense that it may be seasonal habitat, or occasional resource for threatened bittern and spotted crake. |
| 6 | **Lake Waikato margin wetlands** | • This community will not be directly affected by the designation footprint, but is a potential receiving environment of non-direct impacts from works.<br>• Margins consist of willow, with native rushland and reedland where the willow is not present.<br>• There are historic records of two threatened species in this environment, the Australasian bittern and water buttercup.<br>• There is the potential for other threatened bird species to occupy this habitat, the little black shag, black shag, spotless crake, white heron, grey duck and NZ dabchick. |
| **SERAL FOREST** | | |
| 7 | **Coastal broadleaf scrub** | • 0.14 hectares of this community type is found beneath the proposed designation footprint. With current design, most of this vegetation (totalling approximately 1760m²) will be lost in the widening of the existing Nukumaru Station Road, with the remaining vegetation likely too small to viably persist.<br>• This community is a small roadside remnant seral scrub community, consisting of the native species, Korokio *Corokia cotoneaster*, Matipo *Myrsine australis* Mahoe *Melicytus ramiflorus*, Kawakawa *Piper excelsum,* hounds tongue fern *Microsorum pustulatum*. It also contains an exotic species boxthorn *Lycium ferocissimum* and pohutakawa *Metrosideros excelsa* a native species which is not naturally present in this area.<br>• Given its linear shape, there is no core to this vegetation. There is low structural and compositional diversity, with undergrowth rare. Boxthorn is also present. Given these facts, the condition of this community is considered to be poor.<br>• Found on the roadside edge of the lower Nukumaru Station Road.<br>• No rare or threatened species are thought to occupy this habitat. |
| 8 | **Native plantings** | • 0.005 (50m²) hectares of this community type is found beneath the proposed designation footprint. With current design, most of this vegetation will be lost<br>• Found planted at the gate entrance to a private property on Nukumaru station road.<br>• Noted species consist of flax *Phormium tenax*, cabbage tree *Cordyline australis, Matipo Myrsine australis Mahoe Melicytus ramiflorus,* Kohuhu *pittosporum tenuifolium.*<br>• A fantail was observed within this habitat during site visit. No rare or threatened species are thought to occupy this habitat. |
| **EXOTIC FOREST/TREES** | | |
| 9 | **Plantation pine** | • 2.5 hectares of this community type is found beneath the proposed designation footprint (% of total footprint)<br>• Stands of *Pinus Radiata* have been planted on the steeper duneland where grazing is not suitable.<br>• Most of these areas have been harvested and replanted since the 2000's and are in varying stages of young growth.<br>• No rare or threatened species are thought to occupy this habitat. |
| **EXOTIC FOREST/TREES** | | |

| | | |
|---|---|---|
| 10 | **Shelter belts and shade trees.** | • hectares of this community type is found beneath the proposed designation footprint (% of total footprint)<br>• Exotic shelterbelts or a single tree of either Pine, Macrocarpa or silver birch<br>• In rows of single trees, generally bordering a paddock, road or driveway.<br>• Mature trees, may provide roosting sites for little black and black shags. |

## 3.7 Rare Plants

The desktop exercise identified seven rare plant species in the wider landscape which could potentially be present. The site survey investigated any potential habitats of these species within the concept alignment. None of the seven threatened or at risk plant species were found during this survey. The only habitat likely to support threatened species found was the stabilised sand dunes to the south, in which Puha (*Sonchus kirkii*) has been known to occur but was not found in survey. Its presence along the proposed designation footprint is unlikely.

## 3.8 Birds

A roaming inventory of birds sighted or heard was taken during the site walkover. See Table 2 for details. None of the five native species seen or heard are classified as *Threatened* or *At Risk* (H. A. Robertson et al., 2013).

*Table 2 Bird species either sighted or heard within the site during the site visit and their primary habitat*

| Common name | Species | Endemic or Native | Threat Status | Primary Habitat |
|---|---|---|---|---|
| Black swan | *Cygnus atratus* | Native | Not Threatened | Freshwater/Wetlands |
| Blackbird | *Turdus merula* | Introduced | Introduced & Naturalised | Scrub/shrubland |
| Chaffinch | *Fringilla coelebs* | Introduced | Introduced & Naturalised | Farmland / open country |
| Goldfinch | *Carduelis carduelis* | Introduced | Introduced & Naturalised | Farmland / open country |
| House sparrow | *Passer domesticus* | Introduced | Introduced & Naturalised | Farmland / open country |
| Dunnock | *Prunella modularis* | Introduced | Introduced & Naturalised | Scrub/shrubland |
| Mallard | *Anas platyrhynchos* | Introduced | Introduced & Naturalised | Freshwater/Wetlands |
| North Island fantail | *Rhipidura fuliginosa placabilis* | Native | Not Threatened | Native forest |
| Pheasant | *Phasianus colchicus* | Introduced | Introduced & Naturalised | Scrub/shrubland |

| | | | | |
|---|---|---|---|---|
| Pukeko | *Porphyrio m. melanotus* | Native | Not Threatened | Freshwater/Wetlands |
| Silvereye | *Zosterops lateralis lateralis* | Native | Not Threatened | Scrub/shrubland |
| Skylark | *Alauda arvensis* | Introduced | Introduced & Naturalised | Farmland / open country |
| Song thrush | *Turdus philomelos* | Introduced | Introduced & Naturalised | Farmland / open country |
| Swamp harrier | *Circus approximans* | Native | Not Threatened | Farmland / open country |
| Yellowhammer | *Emberiza citrinella* | Introduced | Introduced & Naturalised | Farmland / open country |

This list is not exhaustive due to the limited time on site and does not account for seasonal variation that may occur. As such, these observations have been supplemented with data obtained from the OSNZ atlas data (C. J. R. Robertson et al., 2007). Based on that, Appendix 5 lists other native species not observed within the site but which are recorded to be present locally.

Of the locally recorded species (Appendix 5), 12 species have a conservation status, of these, given their habitat preference, seven potentially occur, at least periodically, in the study area (Table 4).

*Table 3: Threatened or at risk avian species recorded the area of the road designation footprint, their habitat preference and likelihood of being found in the Study area.*

| SPECIES - Robertson et al. 2012 | CONSERVATION STATUS - Robertson et al. 2013 | Habitat preference (C. J. R. Robertson et al., 2007) | Potential Presence in Study Area |
|---|---|---|---|
| NZ pipit *Anthus n. novaeseelandiae* | At Risk- Declining | Open habitat (avoids intensively farmed areas) | Potentially found in the rough pasture at the southern end of the alignment |
| Pied stilt *Himantopus h. leucocephalus* | At Risk- Declining | Breeds on riverbeds, lake Margins and damp pasture. Outside of breeding, can be seen in flocks in estuaries and lakes. | Potentially present in wet pasture, especially in times of bad weather. |
| Little black shag *Phalacrocorax sulcirostris* | At Risk- Naturally Uncommon | Lakes, estuaries and harbours | Potentially present in the alignment in the large pines around Lake Waikato |
| Black shag *Phalacrocorax carbo novaehollandiae* | At Risk- Naturally Uncommon | Rivers, Streams and lakes, also estuaries harbours and sheltered coastal waters. | Potentially present in the alignment in the large pines around Lake Waikato |
| Spotless crake *Porzana t. tabuensis* | At Risk-Relict | Freshwater wetlands with Raupo or sedge | Potentially present in lake Waikato |
| Australasian bittern *Botaurus poiciloptilus* | Threatened-Nationally Endangered | Freshwater wetlands, especially with a dense cover of Raupo or reeds. Some movement to coastal wetlands in autumn and winter. | Potentially present in lake Waikato |
| NZ dabchick *Poliocephalus rufopectus* | Threatened-Nationally Vulnerable | Large open lakes inland, only occasionally in North Island | Potentially present in lake Waikato |

There is a potential direct effect of removing NZ pipit habitat or, more specifically, of disturbing breeding pipit. Other than this, indirect impacts from both the construction and operation of the road have the potential (albeit limited) to effect six other species: Pied Silt, Little black shag, Black shag, spotless crake, Australasian bittern, and NZ dabchick.

## 3.9 Lizards

There are eleven species of lizards within the wider area of the proposed designation footprint (Hitchmough et al., 2016). This is based on the habitat preference and recorded distributions of lizard species (refer to Appendix 4 for details). Of these eleven species, the speckled skink has the greatest potential to be present. There is a known population of speckled skink within the coastal dune area of the proposed designation footprint in the south (DoC Wanganui, pers comms). The speckled skink is listed as Threatened- nationally vulnerable.

Six other species have a very limited potential to be present, listed as At Risk– Declining these are: Ornate skink, Brown skink, Ngahere gecko, Forest gecko, Barking gecko, and Elegant *gecko* (Hitchmough et al., 2013).

## 3.10 Long-tailed Bats

New Zealand's native bat species typically live in areas of mature forest, selecting the oldest and largest trees for roosting and breeding (Alexander, 2001). Populations of long-tailed bats (*Chalinolobus tuberculatus*) have been monitored in the Taranaki Region since 2012 (Bell, 2016). No surveys of bats have been carried out on site, but there is very limited to no habitat present for bats and it is concluded that they will not be present in the proposed designation footprint.

## 3.11 Terrestrial invertebrates

A targeted survey of terrestrial invertebrates on the site was not conducted given the prominence of exotic vegetation along the Proposed designation footprint. There are records of the Red Katipo spider (*Latrodectus katipo*) along the foredune habitat within Taranaki. However, the proposed designation footprint is inland from this habitat and is not likely to affect any katipo population present.

# 4 ASSESSMENT OF SIGNIFICANCE

This section considers the presence of significant indigenous vegetation and significant habitats of indigenous fauna within the study area as identified by statutory plans. The relevant statutory plans in assessing ecological significances include:

- The New Zealand Coastal Policy Statement, 2010

- Horizons One Plan: Schedule F
- Taranaki Regional Policy Statement BIO Policy 4
- Taranaki Freshwater Plan (2001): Appendices 1B, 2A, 2B, 3
- Proposed South Taranaki District Plan (as amended by decisions) Schedules 6:
- Operative South Taranaki District Plan

Note that Tangata whenua significance is not assessed within this report, these are assessed in a separate report: Nukumaru Station Road Extension: Cultural Impact Assessment, 2017 by Nga Rauru.

## 4.1 The New Zealand Coastal Policy Statement 2010

While the alignment briefly traverses the demarcated coastal environment, as described by the Coastal Protection Areas defined in the Operative and Proposed District Plans, both the presence of pine and the flatter topography suggest that this inland area does not possess the attributes that define the extent of the area dune area as set out in the NZCPS.

Three key policies under Policy 1(2) of the NZCPS relevant to ecology in defining the extent of the coastal environment:

*(c) Areas where coastal processes, influences or qualities are significant (SEC).*

Coastal "processes" refers to an active influence of the coastal marine environment on the land. This influence diminishes as you move inland until a point is reached where coastal influences cease to dominate and are overridden by other inland environmental factors. While there will still be a coastal influence at the proposed designation footprint, coastal processes are in no longer dominant and most are absent or have been replaced through the planting of pine and the levelling of the gentler back dunes for improved pastoral use. Of the five environments listed by this criterion, none occur within the proposed designation footprint.

*(e) Coastal vegetation and the habitat of indigenous coastal species including migratory birds*

None of the area within the proposed designation footprint were dominated by plant species which are obligate to coastal environments such as to saline or brackish water, exposure to salt spray or coastal dune slacks. The footprint sits within exotic species of pine and pasture grass.

*(h) Inter-related coastal marine and terrestrial systems, including the intertidal zone*

Within the coastal environment sector the proposed designation footprint sits 1 km – 1.5 km inland from the coast. The terrestrial systems present at this point are exotic in nature and are not inter-related to the coastal marine area. The avifauna is predominantly pastoral, none of the coastal species potentially traversing the proposed designation footprint (gulls, shags) are reliant on habitat within the footprint.

## 4.2 Taranaki Regional Policy Statement (RPS) Assessment of Ecological Significance

### 9.1 Maintaining and enhancing indigenous biodiversity.

*BIO POLICY 4 : When identifying ecosystems, habitats and areas with significant indigenous biodiversity values, matters to be considered will include:*

*a) the presence of rare or distinctive indigenous flora and fauna species; or*

*b) The representativeness of an area; or*

*c) the ecological context of an area.*

*Once identified as significant, consideration should be given to the sustainability of the area to continue to be significant in future when deciding on what action (if any) should reasonably and practicably be taken to protect the values of the area.*

Each matter of policy 4 is considered against the habitats present within the study area (Appendix 7). The outcome of the analysis is present below (Table 4).

## 4.3 Manawatu-Whanganui (Horizons) Regional Policy Statement and Regional Plan – the One Plan Assessment of Ecological Significance

For habitats east of Nukumaru Road which is the Mahoe/Carex wetland:

**Policy 6-2: Regulation of activities affecting indigenous *biological diversity*^**

For the purpose of managing indigenous *biological diversity* in the Region:

a. *Habitats determined to be* **rare habitats*** *and* **threatened habitats*** *under Schedule F must be recognised as areas of significant indigenous vegetation or significant habitats of indigenous fauna.*

The test of this is in Schedule F:

A rare habitat, threatened habitat or at-risk habitat is an area of vegetation or physical substrate which:

*(a) is a habitat type identified in Table F.1 as being "Rare", "Threatened" or "At-risk" respectively,*

*(b) meets at least one of the criteria described in Table F.2(a) for the relevant habitat type, and*

*(c) is not excluded by any of the criteria in Table F.2(b).*

Table F1 recognises wetlands. In the table the relevant type is “swamp and marsh”. The mahoe/carex area depression in farmland is best potentially described as a swamp. However, within the definition in the table a swamp contains: indigenous sedges, rushes, reeds, flaxland, tall herbs, herbfield*, shrubs, scrub and forest. Here the “swamp” is a simple mahoe over Carex secta feature missing crucial diversity and species representativeness.

Table 2(a) has the following criteria:

> *Wetland Habitat Types Classified as Threatened are:*
>
> *viii. Areas of naturally occurring indigenous wetland habitat covering at least 0.1 ha.*
>
> *Or*
>
> *ix. Areas of indigenous vegetation that have been established in the course of wetland habitat restoration.*
>
> *Or*
>
> *x. Areas of artificially created indigenous wetland habitat covering at least 0.5 ha.*

The carex area may just meet the 0.1 ha minimum. We think it unlikely that either feature has been planted and may be a feature regenerated naturally following disturbances (historical). Therefore, despite their simplicity and lack of representation of a more natural diversity, both wetlands may be found (as a precautionary approach) to fit viii of Table F2(b) of the One Plan, and as a result could be considered as “Threatened” and also significant.

*Table 4 Summary of application of significance criteria for each indigenous ecosystem component directly or indirectly affected by the proposed designation footprint*

| Habitat | Significant | Reason for Significance |
|---|---|---|
| **Improved Pasture** | N | - |
| **Wet Pasture** | N | - |
| **Rough Pasture** | N | However, we note the potential for transient NZ pipit. |
| **Raupo wetland** | N | This is identified as an ephemeral monoculture of raupo not identified in Schedule 6 of the South Taranaki Proposed District Plan and while of potential value to certain species in particular seasons cannot be found to be ecologically significant. |
| **Carex wetland** | Y | Identified as ephemeral wetland, regionally significant as a rare habitat under Schedule F, Table 2(a) Horizons One Plan |
| **Lake Waikato Margin wetland** | Y | Significant habitat for threatened species, is identified as regionally significant in Schedule 6 of the Taranaki Regional Freshwater Plan. |
| **Indigenous coastal forest** | N | - |
| **Indigenous planted forest** | N | - |
| **Pine Plantation** | N | - |
| **Exotic shelterbelt** | N | - |

# 5 ASSESSMENT OF ECOLOGICAL VALUE

Having identified the significant vegetation and habitat of fauna (in terms of the regional policy statements and relevant district plans and section 6c (of the RMA)) we next assess their ecological value.

## 5.1 Ecological Value: Habitat

Table 5 & Table 5Table 6 (below), from the EIANZ guidelines for ecological impact assessments (EcIA), (EIANZ, 2015) is used to guide determinations of ecological value for each habitat type within the study area.

*Table 5* EIANZ criteria for assigning value to vegetation or habitat for assessment purposes, as repeated from page 64 of the Ecological Impact Assessment (EIANZ, 2015).

| Determining factors | Value |
|---|---|
| Supporting more than one national priority type[27] | Very high |
| Supporting one national priority type or naturally uncommon ecosystem (Holdaway, Wiser, & Williams, 2012) | High |
| Locally rare or threatened, supporting no threatened or at risk species | Moderate |
| Nationally and locally common, supporting no threatened or at risk species | Low |

## 5.2 Outcome of analysis

*Table 6: Habitat within the study area associated value and reason for that value*

| Habitat | Value | Reason |
|---|---|---|
| Improved Pasture | Low | This community is a monoculture of exotic grassland which does not support any threatened or at risk species. |
| Wet Pasture | Low | This community is a monoculture of exotic grassland, there is the potential at risk species, pied silt to occur occasionally within this environment, however, this habitat, being prominent locally, would not be considered as crucially supportive to these species. |
| Rough Pasture | Low | This habitat, primarily exotic, may have the nationally threatened speckled skink and the at risk NZ pipit. However, there is an abundance of both species habitats in the wider area, and in regard to the speckled skink, the primary habitat is the coastal dune with rough scrub and pasture further |

| | | |
|---|---|---|
| | | south and south-west. The rough pastures in the proposed designation footprint may have threatened species present but the habitat areas themselves are very small areas of the immediate surrounding for these species and therefore are not the “supporting” habitat. |
| Raupo | Low | Wetlands while a national priority type (Holdaway, et al 2012), and rare in the Taranaki/Horizons Regions still need to have representative assemblages. The indigenous species richness and diversity of the site is very low for a typical Raupo wetland. This area is not considered to act as a buffer or connect significant ecosystems. It potentially is utilised on occasion by Australasian bitten, a Threatened- Nationally Endangered species. Given the wider landscape and small size, the chance of high frequency use is low. |
| Carex Wetland | Low | Wetlands are a national priority type (Holdaway, et al 2012), and rare in the Taranaki/Horizons Regions. While this wetland is indigenous in nature, its condition is poor, it is small and isolated and the hydrology has been altered meaning the terrestrial vegetation on the margins and exotic weeds are encroaching into the dryer centre. |
| Lake Margin wetland | High | The indigenous reed and rushland found on the margins of Lake Waikato form extensive swards likely supporting the Australasian bitten a Threatened- Nationally Endangered species. |
| Indigenous coastal shrub | Low | This habitat consists of a low diversity of species and is simple in structure. It is not likely to support any threatened or at risk species. This area is not considered to act as a buffer or connect significant ecosystems, it is too small to provide no core habitat for protected or threatened indigenous species. |
| Indigenous planting | Low | This habitat consists of a low diversity of species and is simple in structure. It is not likely to support any threatened or at risk species. This area is not considered to act as a buffer or connect significant ecosystems, it is too small to provide no core habitat for protected or threatened indigenous species. |
| Pine Plantation | Low | Plantation of exotic trees with little wider functional value. |
| Exotic Shelterbelts | Low | Black and little black shag are classified as being *At Risk*. Both species associate with freshwater and may use nearby large exotic trees for roosting. Given the proximity of the site to Lake Waikato and the presence of large pines on the southern side of this waterbody, both shag species may utilise these trees as roosts, although they were not observed during the site visit. |

## 5.3 Summary of Ecological Value: Fauna

Table 7 (below), from the EIANZ guidelines for ecological impact assessments (EcIA), (EIANZ, 2015) is used to guide determinations of ecological value of fauna within the study area, as listed in Table 8.

*Table 7 EIANZ criteria for assigning value to Fauna within the zone of impact (ZOI) (EIANZ, 2015).*

| Determining factors | Value |
|---|---|
| Nationally Threatened species found in the ZOI or likely to occur there, either permanently or occasionally | Very High |
| Species listed as At Risk – Declining found in the ZOI or likely to occur there, either permanently or occasionally | High |
| Species listed as any other category of At Risk found in the ZOI or likely to occur there, either permanently or occasionally | Moderate-high |
| Locally rare or distinctive species or ecosystems | High |

## 5.4 Out come of analysis

*Table 8: At risk and Threatened species, suspected or with some potential to be within the study area, the associated value of that species and reason for that value*

| Species | Value | Reason for Value |
|---|---|---|
| Birds | | |
| NZ pipit *Anthus n. novaeseelandiae* | High | At Risk- Declining |
| Pied stilt *Himantopus h. leucocephalus* | High | At Risk- Declining |
| Little black shag *Phalacrocorax sulcirostris* | Moderate - High | At Risk- Naturally Uncommon |
| Black shag *Phalacrocorax carbo novaehollandiae* | Moderate - High | At Risk- Naturally Uncommon |
| Spotless crake *Porzana t. tabuensis* | Moderate - High | At Risk-Relict |
| Australasian bittern *Botaurus poiciloptilus* | Very High | Threatened- Nationally Endangered |
| NZ dabchick *Poliocephalus rufopectus* | Very High | Threatened-Nationally Vulnerable |
| Lizards | | |
| *Oligosoma aff. infrapunctatum* "southern North Island" Speckled skink | Very High | Nationally vulnerable |

# 6 MAGNITUDE OF EFFECTS

Having identified the ecological value of the habitat (and fauna) following the EIANZ guidelines, we next determine the magnitude, or level, of adverse effect using Table 9 and conclude with an assessment of the overall Level of Effect (Table 10 which takes into account both magnitude and value.

*Table 9* EIANZ criteria for describing magnitude of effect, as repeated from page 63 of the Ecological Impact Assessment (EIANZ, 2015)

| Magnitude | Description |
|---|---|
| Very high/severe | Total loss of, or very major alteration to, key elements/features/ of the existing baseline conditions, such that the post-development character, composition and/or attributes will be fundamentally change and may be lost from the site altogether; AND/OR<br>Loss of a very high proportion of the known population or range of the element/feature |
| High | Major loss or major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR<br>Loss of a high proportion of the known population or range of the element/feature |
| Moderate/medium | Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR<br>Loss of a moderate proportion of the known population or range of the element/feature |
| Low/minor | Minor shift away from existing 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 or patterns; AND/OR<br>Having a minor effect on the known population or range of the element/feature |
| Negligible | Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation; AND/OR<br>Having negligible effect on the known population or range of the element/feature |

## 6.1 Outcome of analysis

*Table 10 Magnitude of effect on habitat potentially impacted*

| Habitat | Magnitude | Reason |
|---|---|---|
| Improved Pasture | Negligible | Given the low value of this system, the removal of this exotic monoculture community is seen as ecologically neutral. This habitat occurs extensively throughout the Taranaki Region, while a small part will be removed in the construction of the proposed road, this is not seen to impact on the ecology of the area. |
| Wet Pasture | Negligible | Given the low value of this system, the removal of this exotic monoculture community is seen as ecologically neutral. This habitat occurs extensively throughout the Taranaki Region, while a small part will be removed in the construction of the proposed road, this is not seen to have any disenable impact on the ecology of the area. |
| Rough Pasture | Negligible | The removal of this exotic community, predominantly occurs on the inland extent, where stable duneland tapers into levelled and irrigated improved pasture. There is the potential for speckled skink occur in this area and therefore removal of some of this habitat will impact on a very low (and poorest quality) proportion of the local habitat area. |
| Raupo | Low | The impact on this community will be the removal of 70$m^2$ of the existing wetland. This is a minor change which does not affect the existing function or integrity. |
| Carex Wetland | Low | Small area (20$m^2$) of a feature already with exotic edges and high level of tolerance from past disturbances. |
| Lake Margin wetland | Negligible | No direct impacts, but perhaps some indirect ones related to potential discharges and noise / activity disturbance (temporary) of fauna. |
| Indigenous coastal shrub | Low | A non-viable, low functional collection of thin linear nature (a hedge) much of which is a product of human intervention. |
| Indigenous planting | Negligible | Planted common species area without any ecological integrity (linear hedge row). |
| Pine Plantation | Negligible | A system to be cleared in any event. |
| Exotic Shelterbelts | Negligible | No indigenous species, and very limited ecological resource. |

## 6.2 Magnitude of Effect on Fauna

*Table 11: Magnitude of effect on fauna potentially impacted*

| Fauna | Magnitude | Reason |
|---|---|---|
| Birds | | |
| NZ pipit *Anthus n. novaeseelandiae* | Low | May be present depending on current and recent pasture management activities, but unlikely and not year round. |
| North Island fernbird *Bowdleria punctata vealeae* | Low | Highly unlikely present based on size and kind of habitat present in directly affected wetlands and lake margins. |
| Pied stilt *Himantopus h. leucocephalus* | Low | Highly unlikely present based on size and kind of habitat present. |
| Little black shag *Phalacrocorax sulcirostris* | Low | Highly unlikely present based on size and kind of habitat present in directly affected wetlands and lake margins. |
| Black shag *Phalacrocorax carbo novaehollandiae* | Low | Highly unlikely present based on size and kind of habitat present in directly affected wetlands and lake margins. |
| Variable oystercatcher *Haematopus unicolor* | Low | Highly unlikely present based on size and kind of habitat present. |
| Spotless crake *Porzana t. tabuensis* | Low | Highly unlikely present based on size and kind of habitat present. |
| White heron *Ardea modesta* | Low | Highly unlikely present based on size and kind of habitat present. |
| Grey duck *Anas s. superciliosa* | Low | Highly unlikely present based on size and kind of habitat present. |
| Australasian bittern *Botaurus poiciloptilus* | Low | Highly unlikely present based on size and kind of habitat present. |
| NZ dabchick *Poliocephalus rufopectus* | Low | Highly unlikely present based on size and kind of habitat present. |
| Lizards | | |
| *Oligosoma aff. infrapunctatum* "southern North Island" speckled skink | Low | *An unlikely but unconfirmed potential to be in scrub and weed/ rough pasture in the "dunelands" to the south and west of the area.* |

# 7 LEVEL OF EFFECT

The Level of effect is calculated for each habitat based on a combination of ecological value and magnitude and uses the guide in Table 12, with the resultant level of potential effects shown in Table 13 and Table 14.

*Table 12 EIANZ criteria for describing level of effect (EIANZ, 2015)*

| Ecological Value → Magnitude ↓ | Very high | High | Moderate | Low |
|---|---|---|---|---|
| Very high | Very high | Very high | High | Moderate |
| High | Very high | Very high | Moderate | Low |
| Moderate | Very high | High | Low | Very low |
| Low | Moderate | Low | Low | Very low |
| Negligible | Low | Very low | Very low | Very low |

## 7.1 Level of effect on Habitats

*Table 13: Summary of Level of Effect for each indigenous ecosystem component directly or indirectly affected*

| Ecosystem Component | Value | Magnitude | Level |
|---|---|---|---|
| Improved Pasture | Low | Negligible | Very Low |
| Wet Pasture | Low | Low | Very Low |
| Rough Pasture | Low | Low | Very Low |
| Raupo | Low | Low | Very Low |
| Carex Wetland | Low | Low | Very Low |
| Lake Margin wetland | High | Negligible | Very Low |
| Indigenous coastal shrub | Low | Low | Very Low |
| Indigenous planting | Low | Negligible | Very Low |
| Pine Plantation | Low | Negligible | Very Low |
| Exotic Shelterbelts | Low | Negligible | Very low |

## 7.2 Level of effect: Fauna

*Table 14 The potential level of effect for each faunal species (if present).*

| Fauna | Value | Magnitude | Level |
|---|---|---|---|
| Birds | | | |
| NZ pipit *Anthus n. novaeseelandiae* | High | Low | Very Low |
| Pied stilt *Himantopus h. leucocephalus* | High | Negligible | Very Low |
| Little black shag *Phalacrocorax sulcirostris* | Moderate - High | Low | Very Low |
| Black shag *Phalacrocorax carbo novaehollandiae* | Moderate - High | Low | Very Low |
| Spotless crake *Porzana t. tabuensis* | Moderate - High | Negligible | Very Low |
| Australasian bittern *Botaurus poiciloptilus* | Very High | Negligible | Low |
| NZ dabchick *Poliocephalus rufopectus* | Very High | Negligible | Low |
| Lizards | | | |
| *Oligosoma aff. infrapunctatum* "southern North Island" speckled skink | Very High | Low | Moderate |

The potential adverse effects on the shag species include the loss of roost sites predominantly in the Pine forest; forest that was always going to be cleared in the future. The potential adverse effects on pipit and speckled skink are dependent on being present, and if so in what numerical abundance. There are standard measures to avoid direct impact to both these faunal species.

# 8 ECOLOGICAL CONSTRAINTS AND PROJECT SHAPING

Based on the desktop inventory, site visit, an assumed area of effect, and assessment of habitat values, the following sites are identified for which best endeavours should be required to avoid/minimise, remedy or mitigate any impacts to the ecology of the surrounding site:

- Lake Waikato – all efforts to avoid direct efforts on this lake and minimise indirect effects on birdlife by providing the greatest possible distance between the lake and the margin are recommended to be taken.
- Small western raupo wetland - - seek to minimise effects (area affected) and remedy where possible to the section of Raupo on Nukumaru Station Road.
- Small (significant) eastern carex wetland – - seek to minimise effects and remedy where possible disturbances. If area of effect (loss) is very low (<20m2), given the current value, no mitigation need to applied, but if greater steps to attain and improve the wetland should be possible.
- Any lighting installed on the road be downward pointing to ensure no up-spill. This is to ensure no seabirds are attracted to the inland lights to the road at night.
- Works need to maintain the hydrology of the area, especially near Lake Waikato and the wetland habitat. This means potentially avoiding deep or water table intercepting earthworks near the lake margins. Monitored piezometers could be installed, both within the impact zone and as a control outside the impact zone to ensure this occurs.
- Before pine are felled, confirm shags are not nesting in the mature pine trees nearby Lake Waikato.
- In the areas identified as potential skink habitat a salvage operation should be carried out immediately prior to construction in that area so as to rescue any skink potentially affected.
- Prior to the Pipit breeding season (which is August to February) ensure all affected rough pasture is mown or otherwise kept short to discourage pipit in the area of works. Sometimes Pipit occupy an area year round but adults will disperse without issue.

## 8.1 Avoid / Minimise

- Minimise the effects the wetland edges by minimising the width of the road and construction foot print,
- Avoid direct effects to Lake Waikato,
- Undertake pre-works survey (permitted ecologist) and rescue of speckled lizard in the southern “sand dune” area,
- Pre-clearance checks by ecologist to minimise any effects on NZ pipit (and / or mow potential rough pasture pipit habitats between March and August to remove pipit nesting potential),
- Pre forest felling check for shag species prior to work (note shag typically only roost in the evening).
- Appropriate levels of erosion and sediment management will be required.

## 8.2 Remedy

- Ensure edges of work in wetland area are not exposed and available for weed establishment, revegetate with carex or raupo as befitting the area affected.

## 8.3 Mitigation

- The levels of effect, where fauna specifically identified above are avoided (by salvage or other mechanism), do not warrant ecological mitigation. Assuming that the width of the road corridor does not expand further into the raupo or carex wetlands. Therefore no ecological mitigation is proffered other than the species salvages noted above.

## 8.4 Monitoring

- Post works the wetland road side edge should be monitored quarterly to ensure that removing vegetation does not open the wetland up to increase weed invasion. This monitoring should persist until the edge vegetation is sufficiently developed (this is usually the period of the maintenance contract).

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# Appendix 1: Vegetation Site Photos

*Photo 1: Low production exotic pasture on duneland in the southern section of the proposed designation footprint.*

*Photo 2: Improved exotic pasture on the flatter plains in the northern section of the proposed designation footprint.*

*Photo 3: Raupo wetland in pasture on the western side of Nukumaru Station Road.*

*Photo 4: Carex wetland under broadleaf fenced off from pasture on the eastern side of Nukumaru Station Road.*

*Photo 5: Lake Waikato, with extensive wetland margins just north of the railway and proposed designation footprint.*

*Figure 3: Wet pasture seepage running from the eastern side of Nukumaru Station road, draining through improved pasture into Lake Marahau*

*Photo 6: Indigenous coastal broadleaf seral plantings bordering the southern section of Nukumaru Station Road.*

*Photo 7: Indigenous planting.*

*Photo 8: Exotic pine plantation, the fence line is approximately the position of the proposed designation footprint.*

*Photo 9: Example of an exotic tree shelterbelt, in this case a row of pines bordering a paddock and Nukumaru Station road.*

# Appendix 2: Vegetation Species List

The following table provides a list of species recorded in the area of the road designation. The structural class assigned to each species is derived from the NZ Plant Conservation Network website, while the threat classifications are from De Lange *et al.* (2013).

| Species | Common Name | Structural Class | Threat Status | Date | Status | Observation Type | Site |
|---|---|---|---|---|---|---|---|
| Acaena novae-zelandiae | red bidibid | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Acaena novae-zelandiae | red bidibid | Dicotyledonous Herbs other than Composites | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Acaena novae-zelandiae | red bidibid | Dicotyledonous Herbs other than Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Adiantum cunninghamii | Common maidenhair, Cunninghams maidenhair | Ferns | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Agrostis stolonifera* | creeping bent | Grasses | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Agrostis stolonifera* | creeping bent | Grasses | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Alectryon excelsus subsp. excelsus | New Zealand ash, titoki | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Amaranthus lividus* | purple amaranth | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Amaranthus lividus* | purple amaranth | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Ammophila arenaria* | marram grass | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Anagallis arvensis subsp. arvensis var arvensis* | pimpernel | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Anthoxanthum odoratum* | sweet vernal | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Anthoxanthum odoratum* | sweet vernal | Grasses | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Anthoxanthum odoratum* | sweet vernal | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Apodasmia similis | jointed wire rush, oioi | Rushes and Allied Plants | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Arctotheca calendula* | Cape weed | Dicotyledonous Herbs - Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Arenaria serpyllifolia* | sandwort | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Asplenium bulbiferum | Hen and chicken fern, pikopiko, mother spleenwort | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Asplenium flabellifolium | butterfly fern, walking fern, necklace fern | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Asplenium flaccidum | Drooping spleenwort, hanging spleenwort | Ferns | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Asplenium gracillimum | hen & chicken fern | Ferns | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Asplenium oblongifolium | Shining Spleenwort | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Asplenium polyodon | sickle spleenwort | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Astelia hastata | tank lily | Monocotyledonous Herbs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Austroderia fulvida | Toetoe | Grasses | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Austroderia fulvida | Toetoe | Grasses | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Austroderia toetoe | Toetoe | Grasses | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Austroderia toetoe | Toetoe | Grasses | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Austroderia toetoe | Toetoe | Grasses | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Azolla rubra | Pacific azolla, azolla, red azolla | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Azolla rubra | Pacific azolla, azolla, red azolla | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Beilschmiedia tawa | Tawa | Dicotyledonous Trees & Shrubs | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Bidens frondosa* | beggars' ticks | Dicotyledonous Herbs - Composites | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Bidens frondosa* | beggars' ticks | Dicotyledonous Herbs - Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Blechnum chambersii | Lance fern, nini, rereti | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |

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|---|---|---|---|---|---|---|---|
| Blechnum discolor | crown fern, petipeti, piupiu | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Blechnum filiforme | thread fern, climbing hard fern | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Blechnum novae-zelandiae | kiokio, horokio, palm leaf fern | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Blechnum novae-zelandiae | kiokio, horokio, palm leaf fern | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Bolboschoenus fluviatilis | marsh clubrush, kukuraho, purua grass | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Brachyglottis repanda | rangiora, bushman's toilet paper, bushman's friend | Dicotyledonous Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Bromus diandrus* | ripgut brome | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Bromus willdenowii* | prairie grass | Grasses | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Callitriche stagnalis* | water starwort | Dicotyledonous Herbs other than Composites | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Callitriche stagnalis* | water starwort | Dicotyledonous Herbs other than Composites | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Callitriche stagnalis* | water starwort | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Calystegia sepium subsp. roseata | pink bindweed | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Calystegia sepium subsp. roseata | pink bindweed | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Calystegia soldanella | shore bindweed, shore Convolvulus, rauparaha | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Carex forsteri | Forsters Sedge | Sedges | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Carex geminata | Cutty grass, Rautahi | Sedges | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Carex healyi | Harsh-leaved Bastard Grass, Hook Sedge | Sedges | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Carex lessoniana | Rautahi, Cutty Grass | Sedges | Not Threatened | 27/05/1993 | Wild | Plant list data | |
| Carex lessoniana | Rautahi, Cutty Grass | Sedges | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Carex maorica | Maori Sedge | Sedges | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Carex megalepis | Bastard grass, Cavers beard | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |

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|---|---|---|---|---|---|---|---|
| Carex pumila | sand sedge | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Carex secta | Purei, Pukio, Niggerhead | Sedges | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Carex secta | Purei, Pukio, Niggerhead | Sedges | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Carex secta | Purei, Pukio, Niggerhead | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Carex sinclairii | Sinclair's sedge | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Carex solandri | Forest Sedge, Solander's Sedge | Sedges | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Carex uncinata | bastard grass, hook sedge, kamu, matau-a-maui | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Carex virgata | swamp sedge, pukio, toitoi, toetoe | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Carex virgata | swamp sedge, pukio, toitoi, toetoe | Sedges | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Carmichaelia australis | common broom | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Catapodium rigidum* | hard grass | Grasses | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Cenchrus clandestinus * | kikuyu grass | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Centaurium erythraea* | centuary | Dicotyledonous Herbs other than Composites | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Centella uniflora | Centella | Dicotyledonous Herbs other than Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Centella uniflora | Centella | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Centipeda minima subsp. minima | sneezeweed, centipeda | Dicotyledonous Herbs - Composites | Threatened - Nationally Endangered | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Centipeda minima subsp. minima | sneezeweed, centipeda | Dicotyledonous Herbs - Composites | Threatened - Nationally Endangered | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Cerastium fontanum subsp. vulgare* | | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Cerastium glomeratum* | annual mouse-ear chickweed | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |

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|---|---|---|---|---|---|---|---|
| Cirsium vulgare* | Scotch thistle | Dicotyledonous Herbs - Composites | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Cirsium vulgare* | Scotch thistle | Dicotyledonous Herbs - Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Cirsium vulgare* | Scotch thistle | Dicotyledonous Herbs - Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Clematis paniculata | white clematis, puawananga | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Colobanthus muelleri | | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Coprosma acerosa | sand Coprosma | Dicotyledonous Trees & Shrubs | At Risk - Declining | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Coprosma areolata | thin-leaved Coprosma | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Coprosma grandifolia | kanono, manono, large-leaved coprosma, raurekau | Dicotyledonous Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Coprosma lucida | karamu, shining karamu | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Coprosma repens | taupata, looking glass plant, mirror plant | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Coprosma repens | taupata, looking glass plant, mirror plant | Dicotyledonous Trees & Shrubs | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Coprosma rhamnoides | | Dicotyledonous Trees & Shrubs | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Coprosma robusta | karamu, glossy karamu | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Coprosma robusta | karamu, glossy karamu | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Cordyline australis | cabbage tree, ti, ti kouka, palm lily | Monocotyledonous Trees and Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Cordyline australis | cabbage tree, ti, ti kouka, palm lily | Monocotyledonous Trees and Shrubs | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Cordyline australis | cabbage tree, ti, ti kouka, palm lily | Monocotyledonous Trees and Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Corybas orbiculatus | Spider Orchid | Orchids | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |

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|---|---|---|---|---|---|---|---|
| Corynocarpus laevigatus | Karaka, kopi | Dicotyledonous Trees & Shrubs | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Cotula coronopifolia | bachelor's button, yellow buttons, waterbuttons | Dicotyledonous Herbs - Composites | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Crassula sieberiana | none known | Dicotyledonous Herbs other than Composites | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Crepis capillaris* | hawksbeard | Dicotyledonous Herbs - Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Cyathea dealbata | silver fern, ponga | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Cyathea medullaris | black tree fern, mamaku, black mamaku | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Cyathea smithii | katote, Smiths tree fern, soft tree fern | Ferns | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Cyperus congestus* | purple umbrella sedge | Sedges | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Cyperus congestus* | purple umbrella sedge | Sedges | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Cyperus congestus* | purple umbrella sedge | Sedges | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Cyperus eragrostis* | umbrella sedge | Sedges | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Cyperus eragrostis* | umbrella sedge | Sedges | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Cyperus ustulatus | Coastal cutty grass, Giant umbrella sedge, cyperus | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Cyperus ustulatus | Coastal cutty grass, Giant umbrella sedge, cyperus | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Dacrycarpus dacrydioides | kahikatea, white pine | Gymnosperm Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Dacrydium cupressinum | rimu, red pine | Gymnosperm Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Dactylis glomerata* | cocksfoot | Grasses | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Dactylis glomerata* | cocksfoot | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Daucus carota* | wild carrot | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Dicksonia squarrosa | rough tree fern, harsh tree fern, wheki | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Dicksonia squarrosa | rough tree fern, harsh tree fern, wheki | Ferns | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |

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|---|---|---|---|---|---|---|---|
| Digitalis purpurea* | foxglove | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Discaria toumatou | matagouri, wild Irishman | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Disphyma australe subsp. australe | horokaka, native ice plant, New Zealand ice plant | Dicotyledonous Herbs other than Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Dodonaea viscosa | akeake | Dicotyledonous Trees & Shrubs | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Earina mucronata | bamboo orchid, peka-a-waka, spring earina | Orchids | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Elatostema rugosum | parataniwha, New Zealand Begonia | Dicotyledonous Herbs other than Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Eleocharis acuta | sharp spike sedge | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Eleocharis acuta | sharp spike sedge | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Eleocharis acuta | sharp spike sedge | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Eleocharis gracilis | slender spike sedge | Sedges | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Epilobium billardiereanum | willowherb | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Epilobium billardiereanum | willowherb | Dicotyledonous Herbs other than Composites | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Epilobium insulare | willowherb | Dicotyledonous Herbs other than Composites | Data Deficient | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Epilobium komarovianum | creeping willowherb | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Epilobium nummulariifolium | Creeping willowherb | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Epilobium nummulariifolium | Creeping willowherb | Dicotyledonous Herbs other than Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Epilobium pallidiflorum | tarawera, swamp willowherb | Dicotyledonous Herbs other than Composites | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Epilobium pallidiflorum | tarawera, swamp willowherb | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Erigeron sumatrensis* | broad-leaved flea-bane | Dicotyledonous Herbs - Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |

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|---|---|---|---|---|---|---|---|
| Erigeron sumatrensis* | broad-leaved flea-bane | Dicotyledonous Herbs - Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Erigeron sumatrensis* | broad-leaved flea-bane | Dicotyledonous Herbs - Composites | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Euchiton involucratus | | Dicotyledonous Herbs - Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Euphorbia lathyrus* | caper spurge | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Ficinia nodosa | wiwi, knobby club rush, ethel sedge | Sedges | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Ficinia spiralis | pingao, golden sand sedge, pikao | Sedges | At Risk - Declining | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Fuchsia excorticata | kotukutuku, tree Fuchsia | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Gahnia lacera | cutty grass | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Galium aparine* | cleavers | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Galium palustre subsp. palustre* | marsh bedstraw | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Galium palustre subsp. palustre* | marsh bedstraw | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Geniostoma ligustrifolium var. ligustrifolium | hangehange | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Geranium molle* | doves foot cranesbill | Dicotyledonous Herbs other than Composites | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Glossostigma elatinoides | | Dicotyledonous Herbs other than Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Glyceria declinata* | blue sweet grass, glaucous sweet grass | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Haloragis erecta subsp. erecta | toatoa, fire weed, shrubby Haloragis | Dicotyledonous Herbs other than Composites | Not Threatened | 27/03/1994 | Wild | DOC data | Lake Marahau |
| Haloragis erecta subsp. erecta | toatoa, fire weed, shrubby Haloragis | Dicotyledonous Herbs other than Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Hebe stricta var. atkinsonii | koromiko | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |

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|---|---|---|---|---|---|---|---|
| Hedycarya arborea | Porokaiwhiri, Pigeonwood | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Hoheria sexstylosa | Houhere, lacebark | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Holcus lanatus* | Yorkshire fog | Grasses | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Holcus lanatus* | Yorkshire fog | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Holcus lanatus* | Yorkshire fog | Grasses | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Holcus lanatus* | Yorkshire fog | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Holcus lanatus* | Yorkshire fog | Grasses | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Hydrocotyle elongata | | Dicotyledonous Herbs other than Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Hydrocotyle moschata var. moschata | Hairy pennywort | Dicotyledonous Herbs other than Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Hydrocotyle pterocarpa | | Dicotyledonous Herbs other than Composites | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Hydrocotyle sulcata | | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Hymenophyllum demissum | Drooping filmy fern, Irirangi, Piripiri | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Hypericum pusillum | swamp hypericum | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Hypochaeris radicata* | catsear | Dicotyledonous Herbs - Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Hypolepis ambigua | | Ferns | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Isachne globosa | swamp millet | Grasses | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Isolepis cernua var. cernua | slender clubrush | Sedges | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Juncus articulatus* | jointed rush | Rushes and Allied Plants | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Juncus articulatus* | jointed rush | Rushes and Allied Plants | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Juncus articulatus* | jointed rush | Rushes and Allied Plants | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Juncus articulatus* | jointed rush | Rushes and Allied Plants | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |

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|---|---|---|---|---|---|---|---|
| Juncus australis | leafless rush, wiwi | Rushes and Allied Plants | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Juncus australis | leafless rush, wiwi | Rushes and Allied Plants | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Juncus caespiticius | grass-leaved rush | Rushes and Allied Plants | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Juncus distegus | two storey rush | Rushes and Allied Plants | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Juncus edgariae | Wiwi, Edgars rush | Rushes and Allied Plants | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Juncus edgariae | Wiwi, Edgars rush | Rushes and Allied Plants | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Juncus edgariae | Wiwi, Edgars rush | Rushes and Allied Plants | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Juncus pallidus | giant rush, leafless rush | Rushes and Allied Plants | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Juncus sarophorus | Fan-flowered rush | Rushes and Allied Plants | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Knightia excelsa | Rewarewa, NZ honeysuckle | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Lachnagrostis billardierei subsp. billardierei | sand wind grass | Grasses | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Lagurus ovatus* | harestail | Grasses | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Landoltia punctata* | purple-backed duckweed | Monocotyledonous Herbs | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Lastreopsis glabella | Smooth shield fern | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Lastreopsis hispida | Hairy fern | Ferns | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Lemna disperma | Common duckweed | Monocotyledonous Herbs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Lemna disperma | Common duckweed | Monocotyledonous Herbs | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Lepidium didymum* | twin cress | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Leptopteris hymenophylloides | Crape fern, Single crape fern, Heruheru | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Leucopogon fasciculatus | Mingimingi, tall mingimingi | Dicotyledonous Trees & Shrubs | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Libertia ixioides | Mikoikoi, NZ iris | Monocotyledonous Herbs | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Lilaeopsis novae-zelandiae | | Dicotyledonous Herbs other than Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |

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|---|---|---|---|---|---|---|---|
| Lilaeopsis novae-zelandiae | | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Linum bienne* | pale flax | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Lobelia anceps | New Zealand Lobelia, shore Lobelia | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Lobelia angulata | Pratia | Dicotyledonous Herbs other than Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Lolium perenne* | perennial rye grass | Grasses | Exotic | 1/01/1978 | Wild | DOC data | Lake Marahau |
| Lotus pedunculatus* | lotus | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Loxogramme dictyopteris | Lance fern | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Ludwigia palustris* | Water purslane, marsh ludwigia | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Ludwigia palustris* | Water purslane, marsh ludwigia | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Lupinus arboreus* | tree lupin | Dicotyledonous Trees & Shrubs | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Luzula picta var. picta | | Rushes and Allied Plants | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Lycium ferocissimum* | boxthorn | Dicotyledonous Trees & Shrubs | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Lycium ferocissimum* | boxthorn | Dicotyledonous Trees & Shrubs | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Lycium ferocissimum* | boxthorn | Dicotyledonous Trees & Shrubs | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Lythrum hyssopifolia* | hyssop loosestrife | Dicotyledonous Herbs other than Composites | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Machaerina rubiginosa | Baumea | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Machaerina rubiginosa | Baumea | Sedges | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Medicago lupulina* | black medick | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Melicytus ramiflorus | mahoe, hinahina, whitey wood | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |

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|---|---|---|---|---|---|---|---|
| Melilotus indicus* | King Island melilot | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Metrosideros diffusa | white rata | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Metrosideros fulgens | rata, akatawhiwhi | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Metrosideros perforata | white rata, akatorotoro, akatea | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Microlaena avenacea | bush rice grass, oat grass | Grasses | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Microlaena stipoides | meadow rice grass, slender rice grass | Grasses | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Microsorum pustulatum subsp. pustulatum | hounds tongue, kowaowao, paraharaha | Ferns | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Microsorum scandens | fragrant fern, mokimoki | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Microtis unifolia | onion-leaved orchid | Orchids | Not Threatened | site visit | | | |
| Muehlenbeckia australis | Pohuehue, large-leaved muehlenbeckia | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Muehlenbeckia complexa var. complexa | Small-leaved pohuehue, scrub pohuehue, wire vine | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Muehlenbeckia complexa var. complexa | Small-leaved pohuehue, scrub pohuehue, wire vine | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Muehlenbeckia complexa var. complexa | Small-leaved pohuehue, scrub pohuehue, wire vine | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Myoporum laetum | Ngaio | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Myosotis laxa subsp. caespitosa* | water forget-me-not | Dicotyledonous Herbs other than Composites | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Myosotis laxa subsp. caespitosa* | water forget-me-not | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Myriophyllum propinquum | Common water milfoil | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Myrsine australis | Red mapou, red matipo, mapau, red maple | Dicotyledonous Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Nasturtium microphyllum* | one-rowed watercress | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |

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|---|---|---|---|---|---|---|---|
| Nasturtium officinale* | watercress | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Nasturtium officinale* | watercress | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Nasturtium officinale* | watercress | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Nestegis lanceolata | White maire | Dicotyledonous Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Oenothera stricta* | sand primrose | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Olearia rani var. colorata | Heketara | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Orobanche minor* | broomrape | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Oxalis rubens | | Dicotyledonous Herbs other than Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Ozothamnus leptophyllus | Tauhinu | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Parsonsia heterophylla | New Zealand jasmine | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Paspalum dilatatum* | paspalum | Grasses | Exotic | 1/01/1978 | Wild | DOC data | Lake Marahau |
| Paspalum distichum* | mercer grass | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Paspalum distichum* | mercer grass | Grasses | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Paspalum distichum* | mercer grass | Grasses | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Passiflora tetrandra | Kohia, NZ passionflower, NZ passionfruit | Dicotyledonous Lianes and Related Trailing Plants | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Pellaea rotundifolia | round-leaved fern, New Zealand cliff brake | Ferns | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Persicaria decipiens | | Dicotyledonous Herbs other than Composites | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Persicaria decipiens | | Dicotyledonous Herbs other than Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Persicaria hydropiper* | water pepper | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |

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|---|---|---|---|---|---|---|---|
| Phormium tenax | flax, harakeke, korari (maori name for inflorescence). | Monocotyledonous Herbs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Phormium tenax | flax, harakeke, korari (maori name for inflorescence). | Monocotyledonous Herbs | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Pinus muricata* | bishop pine | Gymnosperm Trees & Shrubs | Exotic | 11/01/1956 | Wild | DOC data | Waikato Lake |
| Pinus muricata* | bishop pine | Gymnosperm Trees & Shrubs | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Piper excelsum subsp. excelsum | kawakawa, pepper tree | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Pittosporum crassifolium | Karo | Dicotyledonous Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Pittosporum crassifolium | Karo | Dicotyledonous Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Pittosporum tenuifolium | Kohukohu, kohuhu, black matipo | Dicotyledonous Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Plantago australis* | swamp plantain | Dicotyledonous Herbs other than Composites | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Pneumatopteris pennigera | gully fern, feather fern, piupiu | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Poa anceps | Broad-leaved poa | Grasses | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Poa pratensis* | Kentucky bluegrass | Grasses | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Podocarpus totara var. totara | Totara | Gymnosperm Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Polycarpon tetraphyllum* | allseed | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Polystichum neozelandicum subsp. zerophyllum | shield fern | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Polystichum neozelandicum subsp. zerophyllum | shield fern | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Potamogeton cheesemanii | red pondweed | Monocotyledonous Herbs | Not Threatened | 1/01/1978 | Wild | DOC data | Lake Marahau |
| Potamogeton crispus* | curly pondweed | Monocotyledonous Herbs | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Potamogeton crispus* | curly pondweed | Monocotyledonous Herbs | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |

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|---|---|---|---|---|---|---|---|
| Potamogeton crispus* | curly pondweed | Monocotyledonous Herbs | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Potamogeton crispus* | curly pondweed | Monocotyledonous Herbs | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Potamogeton ochreatus | blunt pondweed | Monocotyledonous Herbs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Potamogeton ochreatus | blunt pondweed | Monocotyledonous Herbs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Prumnopitys ferruginea | Miro, brown pine | Gymnosperm Trees & Shrubs | Not Threatened | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Prunella vulgaris* | self-heal | Dicotyledonous Trees & Shrubs | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Pseudognaphalium luteoalbum | | Dicotyledonous Herbs - Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Pseudognaphalium luteoalbum | | Dicotyledonous Herbs - Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Pseudognaphalium luteoalbum | | Dicotyledonous Herbs - Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Pseudopanax arboreus | Fivefinger, five finger, whauwhaupaku | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Pseudopanax crassifolius | Horoeka, lancewood | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Pteridium esculentum | bracken, rarauhe, bracken fern | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Pteridium esculentum | bracken, rarauhe, bracken fern | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Pteridium esculentum | bracken, rarauhe, bracken fern | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Pteridium esculentum | bracken, rarauhe, bracken fern | Ferns | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Pteris macilenta | Sweet fern | Ferns | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Pyrrosia eleagnifolia | leather-leaf fern, Pyrrosia | Ferns | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Ranunculus acaulis | sand buttercup, shore buttercup | Dicotyledonous Herbs other than Composites | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Ranunculus macropus | Swamp buttercup | Dicotyledonous Herbs other than Composites | Data Deficient | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |

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|---|---|---|---|---|---|---|---|
| Ranunculus reflexus | Hairy buttercup, Maru, Maruru, Kopukapuka, Pirikau | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Ranunculus repens* | buttercup | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Ranunculus repens* | buttercup | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Ranunculus repens* | buttercup | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Ranunculus repens* | buttercup | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Ranunculus sceleratus* | celery-leaved buttercup | Dicotyledonous Herbs other than Composites | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Ranunculus sceleratus* | celery-leaved buttercup | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Ranunculus sceleratus* | celery-leaved buttercup | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | DOC data | Waitotara |
| Ranunculus trichophyllus* | water buttercup | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Ranunculus trichophyllus* | water buttercup | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Ranunculus trichophyllus* | water buttercup | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Rhabdothamnus solandri | New Zealand gloxinia, taurepo, kaikaiatua, mata, matata, waiuatua | Dicotyledonous Trees & Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Rhopalostylis sapida | Nikau palm | Monocotyledonous Trees and Shrubs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Ripogonum scandens | Supplejack, kareao | Monocotyledonous Lianes | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Rorippa palustris | Marsh yellow cress, poniu | Dicotyledonous Herbs other than Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Rubus cissoides | Tataramoa, bush lawyer | Dicotyledonous Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Rumex acetosella* | sheep's sorrel | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Rumex obtusifolius* | broad-leaved dock | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rumex obtusifolius* | broad-leaved dock | Dicotyledonous Herbs other than Composites | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Sagina procumbens* | procumbent pearlwort | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Salix xfragilis* | crack willow | Dicotyledonous Trees & Shrubs | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Samolus repens var. repens | Sea primrose, shore pimpernel, water pimpernel | Dicotyledonous Herbs other than Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Sarcocornia quinqueflora subsp. quinqueflora | glasswort | Dicotyledonous Herbs other than Composites | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Schedonorus arundinaceus* | tall fescue | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Schedonorus arundinaceus* | tall fescue | Grasses | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Schedonorus arundinaceus* | tall fescue | Grasses | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Schefflera digitata | Patete, pate, seven-finger | Dicotyledonous Trees & Shrubs | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Schizeilema nitens | None known | Dicotyledonous Herbs other than Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Schoenoplectus pungens | three-square | Sedges | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Schoenoplectus tabernaemontani | kuawa | Sedges | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Schoenoplectus tabernaemontani | kuawa | Sedges | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Schoenoplectus tabernaemontani | kuawa | Sedges | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Selliera radicans | Selliera, remuremu, bonking grass | Dicotyledonous Herbs other than Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Selliera rotundifolia | Selliera | Dicotyledonous Herbs other than Composites | At Risk - Declining | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Senecio bipinnatisectus* | Australian fireweed | Dicotyledonous Herbs - Composites | Exotic | 1/01/2000 | Wild | DOC data | Hawkens Lagoon |
| Senecio bipinnatisectus* | Australian fireweed | Dicotyledonous Herbs - Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Senecio bipinnatisectus* | Australian fireweed | Dicotyledonous Herbs - Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Senecio bipinnatisectus* | Australian fireweed | Dicotyledonous Herbs - Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Senecio elegans* | purple groundsel | Dicotyledonous Herbs - Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Senecio glomeratus subsp. glomeratus | fireweed | Dicotyledonous Herbs - Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Senecio lautus | Shore groundsel, variable groundsel | Dicotyledonous Herbs - Composites | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Senecio minimus | fireweed | Dicotyledonous Herbs - Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Senecio minimus | fireweed | Dicotyledonous Herbs - Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Senecio skirrhodon* | gravel groundsel | Dicotyledonous Herbs - Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Sherardia arvensis* | field madder | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Silene gallica* | catchfly | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Sisyrinchium "blue"* | | Monocotyledonous Herbs | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Sisyrinchium "blue"* | | Monocotyledonous Herbs | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Solanum laciniatum | poroporo, bullibulli | Dicotyledonous Trees & Shrubs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Solanum nigrum* | black nightshade | Dicotyledonous Herbs other than Composites | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Solanum nigrum* | black nightshade | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Solanum nigrum* | black nightshade | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Solanum nigrum* | black nightshade | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Soliva sessilis* | Onehunga weed | Dicotyledonous Herbs - Composites | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Sonchus asper* | prickly sow thistle | Dicotyledonous Herbs - Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Sonchus asper* | prickly sow thistle | Dicotyledonous Herbs - Composites | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Sonchus kirkii | Puha, shore puha, New Zealand sow thistle | Dicotyledonous Herbs - Composites | At Risk - Declining | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sonchus oleraceus* | sow thistle, sowthistle | Dicotyledonous Herbs - Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Sonchus oleraceus* | sow thistle, sowthistle | Dicotyledonous Herbs - Composites | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |
| Spinifex sericeus | Spinifex, kowhangatara | Grasses | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Sporobolus africanus* | rat's tail | Grasses | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Stellaria media subsp. media* | chickweed | Dicotyledonous Herbs other than Composites | Exotic | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Stellaria media subsp. media* | chickweed | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Stellaria parviflora | New Zealand chickweed | Dicotyledonous Herbs other than Composites | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Streblus heterophyllus | small-leaved milk tree, turepo | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Symphyotrichum lanceolatum * | sea aster | Dicotyledonous Herbs - Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Symphyotrichum lanceolatum * | sea aster | Dicotyledonous Herbs - Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Symphyotrichum lanceolatum * | sea aster | Dicotyledonous Herbs - Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Thelymitra longifolia | White sun orchid | Orchids | Not Threatened | site visit | | | |
| Trifolium dubium* | suckling clover | Dicotyledonous Herbs other than Composites | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Trifolium repens* | white clover | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Trifolium subterraneum* | subclover | Dicotyledonous Herbs other than Composites | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Triglochin striata | Triglochin | Monocotyledonous Herbs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Typha orientalis | raupo, bullrush | Monocotyledonous Herbs | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Typha orientalis | raupo, bullrush | Monocotyledonous Herbs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Ulex europaeus* | gorse | Dicotyledonous Trees & Shrubs | Exotic | 2/12/1997 | Wild | DOC data | Lake Marahau |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ulex europaeus* | gorse | Dicotyledonous Trees & Shrubs | Exotic | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Ulex europaeus* | gorse | Dicotyledonous Trees & Shrubs | Exotic | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |
| Vulpia bromoides* | Vulpia hair grass, brome fescue, squirrel-tailed fescue | Grasses | Exotic | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Wahlenbergia violacea | Violet Harebell | Dicotyledonous Herbs other than Composites | Not Threatened | 13/08/1989 | Wild | Plant list data | Hawkens Swamp |
| Wahlenbergia violacea | Violet Harebell | Dicotyledonous Herbs other than Composites | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Weinmannia racemosa | kamahi, tawheo, tawhero, tawherowhero | Dicotyledonous Trees & Shrubs | Not Threatened | 27/05/1993 | Wild | Plant list data | Lake Marahau |
| Wolffia australiana | water-meal | Monocotyledonous Herbs | Not Threatened | 11/05/1977 | Wild | Plant list data | Waitotara to Snapper Rock east of Waiinu |
| Zoysia minima | Prickly couch, zoysia | Grasses | Not Threatened | 1/01/1966 | Wild | Plant list data | Ngawaierua SR (NGWE) |

# Appendix 3: Native & Endemic Avifauna

The following table lists species native or endemic avifauna species recorded within the OSNZ atlas square which encompasses the subject site, and for which habitat is available within the site.

For the purpose of this report, primary habitat (dark green) refers to the habitat in which the species spends most of its time. Secondary habitats (light green) are other habitat types which the species may also utilise.

The table also identifies those species from this list which were recorded while on site.

*Table 15: A species list of both potential bird species previously recorded in the area and species observed while on site visit (grey). And there corresponding primary habitat (dark green) and secondary habitat (light green). Note threatened and at risk species are highlighted in red.*

| SPECIES - Robertson et al. 2012 | | CONSERVATION STATUS - Robertson et al. 2013 | | | Native forest | Exotic Forest | Scrub / shrubland | Farmland / open country | Freshwater / wetlands | Coastal / Estuary | Oceanic | Urban/Residential | Site Observation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australasian bittern | *Botaurus poiciloptilus* | Native | Threatened | Nationally Endangered[D] P Sp TO | | | | | | | | | |
| Australasian gannet | *Morus serrator* | Native | Not Threatened | Not Threatened[D] e Inc SO | | | | | | | | | |
| Australian coot | *Fulica atra australis* | Coloniser | Coloniser | Coloniser[Inc] SO | | | | | | | | | |
| Bellbird | *Anthornis m. melanura* | Endemic | Not Threatened | Not Threatened | | | | | | | | | |
| Black shag | *Phalacrocorax carbo novaehollandiae* | Native | At Risk | Naturally Uncommon[S] O Sp | | | | | | | | | |
| Black swan | *Cygnus atratus* | Native | Not Threatened | Not Threatened[S] O | | | | | | | | | |
| Black-backed gull | *Larus d. dominicanus* | Native | Not Threatened | Not Threatened[S] O | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blackbird | *Turdus merula* | Introduced | Introduced | Introduced & Naturalised[SO] | | | | | | | | | |
| Canada goose | *Branta canadensis* | Introduced | Introduced | Introduced & Naturalised[SO] | | | | | | | | | |
| Chaffinch | *Fringilla coelebs* | Introduced | Introduced | Introduced & Naturalised[SO] | | | | | | | | | |
| Feral goose | *Anser anser* | Introduced | Introduced | Introduced & Naturalised[SO] | | | | | | | | | |
| Goldfinch | *Carduelis carduelis* | Introduced | Introduced | Introduced & Naturalised[SO] | | | | | | | | | |
| Greenfinch | *Carduelis chloris* | Introduced | Introduced | Introduced & Naturalised[SO] | | | | | | | | | |
| Grey duck | *Anas s. superciliosa* | Native | Threatened | Nationally Critical[SO] | | | | | | | | | |
| Grey teal | *Anas gracilis* | Native | Not Threatened | Not Threatened[Inc SO] | | | | | | | | | |
| Grey warbler | *Gerygone igata* | Endemic | Not Threatened | Not Threatened | | | | | | | | | |
| House sparrow | *Passer domesticus* | Introduced | Introduced | Introduced & NaturalisedSO | | | | | | | | | |
| Dunnock | *Prunella modularis* | Introduced | Introduced | Introduced & NaturalisedSO | | | | | | | | | |
| Kingfisher | *Todiramphus sanctus vagans* | Native | Not Threatened | Not Threatened | | | | | | | | | |
| Little black shag | *Phalacrocorax sulcirostris* | Native | At Risk | Naturally Uncommon[RR] | | | | | | | | | |
| Little shag | *Phalacrocorax melanoleucos brevirostris* | Native | Not Threatened | Not Threatened[Inc] | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Magpie | *Gymnorhina tibicen* | Introduced | Introduced | Introduced & Naturalised[S O] | | | | | | | | | |
| Mallard | *Anas platyrhynchos* | Introduced | Introduced | Introduced & Naturalised[S O] | | | | | | | | | |
| North Island fantail | *Rhipidura fuliginosa placabilis* | Native | Not Threatened | Not Threatened[EF] | | | | | | | | | |
| North Island fernbird | *Bowdleria punctata vealeae* | Endemic | At Risk | Declining[DP] | | | | | | | | | |
| NZ dabchick | *Poliocephalus rufopectus* | Endemic | Threatened | Nationally Vulnerable[St] | | | | | | | | | |
| NZ pipit | *Anthus n. novaeseelandiae* | Native | At Risk | Declining | | | | | | | | | |
| NZ scaup | *Aythya novaeseelandiae* | Endemic | Not Threatened | Not Threatened[In c] | | | | | | | | | |
| NZ shoveler | *Anas rhynchotis variegata* | Native | Not Threatened | Not Threatened | | | | | | | | | |
| Paradise shelduck | *Tadorna variegata* | Endemic | Not Threatened | Not Threatened | | | | | | | | | |
| Pheasant | *Phasianus colchicus* | Introduced | Introduced | Introduced & Naturalised[S O] | | | | | | | | | |
| Pied stilt | *Himantopus h. leucocephalus* | Native | At Risk | Declining[SO] | | | | | | | | | |
| Pukeko | *Porphyrio m. melanotus* | Native | Not Threatened | Not Threatened[In c SO] | | | | | | | | | |
| Rock pigeon | *Columba livia* | Introduced | Introduced | Introduced & Naturalised[S O] | | | | | | | | | |
| Silvereye | *Zosterops lateralis lateralis* | Native | Not Threatened | Not Threatened[S O] | | | | | | | | | |
| Skylark | *Alauda arvensis* | Introduced | Introduced | Introduced & Naturalised[S O] | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Song thrush | *Turdus philomelos* | Introduced | Introduced | Introduced & Naturalised[S O] | | | | | | | | | |
| Spotless crake | *Porzana t. tabuensis* | Native | At Risk | Relict[DP SO] | | | | | | | | | |
| Spur-winged plover | *Vanellus miles novaehollandiae* | Native | Not Threatened | Not Threatened[S O] | | | | | | | | | |
| Starling | *Sturnus vulgaris* | Introduced | Introduced | Introduced & Naturalised[S O] | | | | | | | | | |
| Swamp harrier | *Circus approximans* | Native | Not Threatened | Not Threatened[S O] | | | | | | | | | |
| Variable oystercatcher | *Haematopus unicolor* | Endemic | At Risk | Recovering[Inc] | | | | | | | | | |
| Welcome swallow | *Hirundo n. neoxena* | Native | Not Threatened | Not Threatened[Inc SO] | | | | | | | | | |
| White heron | *Ardea modesta* | Native | Threatened | Nationally Critical[OL SO St] | | | | | | | | | |
| White-faced heron | *Egretta novaehollandiae* | Native | Not Threatened | Not Threatened[S O] | | | | | | | | | |
| White-fronted tern | *Sterna s. striata* | Native | At Risk | Declining[DP] | | | | | | | | | |
| Yellowhammer | *Emberiza citrinella* | Introduced | Introduced | Introduced & Naturalised[S O] | | | | | | | | | |

# Appendix 4: Potential Lizard Species

The table below provides information regarding the threat classification, habitat preferences and distribution of lizard species known to occur within the Area.

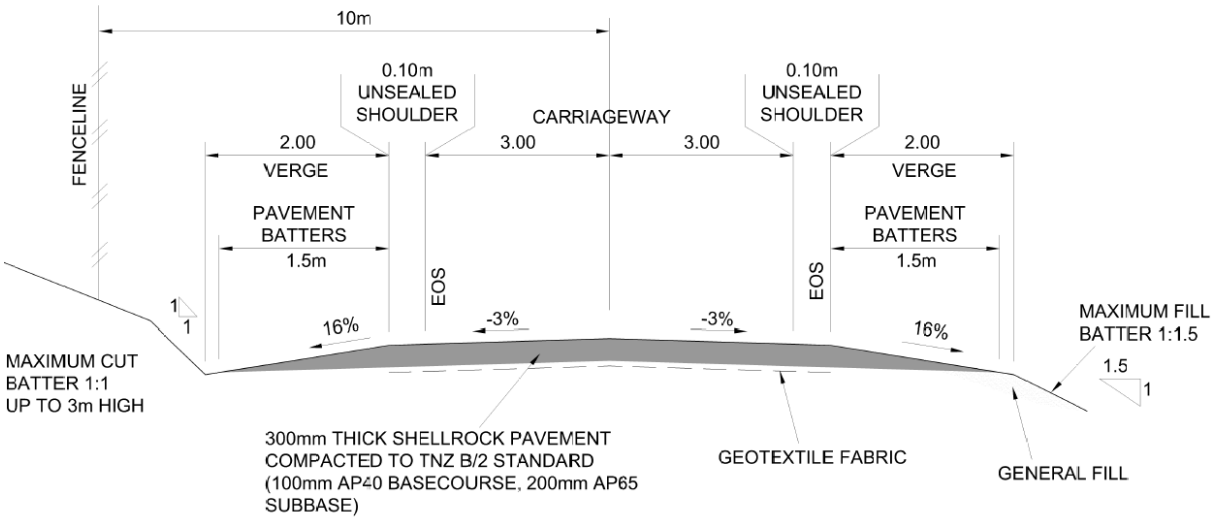
| Taxonomically determinate | Species | Threat Classification[1] | Distribution | Habitat |
|---|---|---|---|---|
| N | *Oligosoma aff. infrapunctatum* "southern North Island" Speckled skink | Nationally vulnerable | Population along the Whanganui coast "definitely a separate species" (Jewell 2008). *Chapple and Hitchmough (2016) does not support this* | ▪ Lowland generalist<br>▪ Open forest, scrubby areas, rough pasture with debris and rock piles and well vegetated cobble and boulder beaches.<br>▪ Diurnal, cryptic but avid sunbasker |
| Y | *Oligosoma ornatum* Ornate skink | At Risk – Declining | Widespread across the North Island | ▪ Typically in moist habitats amongst leaf litter, rocks and logs and dense vegetation and forests, shrublands.<br>▪ Crepuscular, terrestrial |
| Y | *Oligosoma aeneum* Copper skink | Not threatened | Widespread in the North Island | ▪ Rough grasslands, among leaf litter, under rocks and logs.<br>▪ Diurnal, terrestrial |
| Y | *Oligosoma zelandicum* Brown skink | At Risk – Declining | South-western North Island from Taranaki to Wellington | • Densely vegetated and typically damp or shady habitats in lowland areas, including forest, scrub, farmland and coastlines, including among pohuehue on boulder banks.<br>• Found occasionally on boulder beaches or within dense coastal forest<br>• Diurnal, heliothermic, cryptozoic (inhabits leaf litter) |
| Y | *Oligosoma polychroma* Northern grass skink | Not threatened | Widespread from Stewart Island to the central North Island | • The species occupies a very wide range of generally open habitats including grasslands, shrublands, rocky sites, and subalpine grasslands and herbfields |

[1] Hitchmough et al. (2016)

| Taxonomically determinate | Species | Threat Classification[1] | Distribution | Habitat |
|---|---|---|---|---|
| | | | | • Diurnal, heliothermic |
| Y | *Dactylocnemis pacificus*<br>*(Pacific gecko)* | Relict | North Island but sparse<br>**very unlikely** probably just indicative of historic records | • Forest, shrubland, creviced clay banks and rock bluffs, rock outcrops, and associated scrubby vegetation including flax<br>• Nocturnal, arboreal |
| Y | *Woodworthia chrysosiretica*<br>*(Goldstripe gecko)* | Relict | Disjunct distribution along the Taranaki coast from Mohakatino-Patea and inland to Rotokare (Taranaki region) | • Coastal forest and scrub<br>• Diurno-nocturnal |
| Y | **Mokopirirakau "southern North Island"*<br>*(Ngahere gecko)*<br>*OR:*<br>**Mokopirirakau granulatus*<br>*(Forest gecko)* | At Risk – Declining<br><br>At Risk – Declining | Information poor – historic records from Whanganui<br><br>Northern half of the North Island | • Forest and shrublands. Generally occurs on trunks and larger branches of trees, but occasionally found nearer to ground in shrubs or ferns, or in creviced clay banks.<br>• Nocturnal or diurno-nocturnal, arboreal<br>As above |
| Y | Naultinus punctatus<br>(Barking gecko)<br>OR:<br>Naultinus elegans<br>(Elegant gecko) | At Risk – Declining<br><br>At Risk – Declining | South-eastern North Island from Wanganui to East Cape and southern North Island<br>Central and northern North Island | • Forest and scrub, including manuka and kanuka shrubland.<br>• Diurnal, arboreal<br>As above |

*The site borders the "Taupo line" as it applies to lizards – where relevant I've provided both of the likely species, but note that they are not sympatric, and only would be present.

# Appendix 5: Road Alignment: Design




**TYPICAL CROSS SECTION**

**NOT TO SCALE**

H:\HAW\707485 0113 Professional Services Extension\STR9040 Road Maintenance\STR9040.03 - Sthn Road Maintenance 2011_2014\Emergency Works June 2015\Limeworks Bridge\LIMEWORKS - ALTERNATIVE ACCESS\TYPICAL CROSS SECTION.dwg, 1 /07/2015 4:43:51 p.m.