Appendices to Technical Assessment #5: Terrestrial and Wetland Ecology

Contents

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Appendix 1 Methods

1.0 Process for vegetation identification and mapping

1.1 Overview

Vegetation mapping for the Project has combined extensive on-site ground surveys by an experienced team; formal vegetation plots, and the use of recently commissioned, high-definition aerial imagery to help precisely identify and confirm extents and values. Particular importance has been placed on identifying and mapping vegetation close to and within the proposed wind farm footprint and significant vegetation across the site, as well as undertaking accurate wetland delineation.

A wind farm was proposed on the same site 17 years ago, for which Wildland Consultants was also commissioned in 2008 to do ecological reports including mapping the vegetation. This provided useful staff knowledge of the site but Contact never received permission to use it. Therefore, previous information has not been relied upon in identifying or assessing ecological or other values at the Site.

1.2 Wetland identification and mapping

Wetland mapping in a Southland context

In the context of Southland, wetlands have been significantly reduced in extent on a national basis, and are poorly protected. Swamp and marsh wetlands have undergone the largest decreases in extent, while less productive bog and fen wetlands have suffered less loss. Southland is a national stronghold for bog and fen wetlands. Recent analyses have shown that there is ongoing loss of wetland extent in Southland[1], especially on the Southland Plains, and almost all on private land holdings[2].

Wildlands was commissioned in 2019 by Environment Southland to assess causes of wetland loss in Southland Region. Wildlands first performed a desktop assessment on 130 wetlands that revealed drainage was the most widespread cause of wetland loss, followed by mechanical clearance, then weed invasion because hydrology changed. Seventeen wetlands had been cleared totally, and 19 wetlands have lost half their area. Ground truthing a sample of these wetlands largely confirmed the desktop assessment[3].

Later, the National Policy Statement for Freshwater Management (2020) and National Environmental Standards for Freshwater (2020) have set up strong policy and regulations around wetlands, and this is reflected in Southland Water and Land Plan 2024.

[1] Robertson, H.A., Ausseil, A-G, Rance B., Betts H., and Pomeroy E. (2019). Loss of wetlands since 1990 in Southland New Zealand. *New Zealand Journal of Ecology 4*3:3555

[2] Statement of Evidence in Env Court of Kelvin Lloyd on behalf of Southland Regional Council. 14 December 2018.

[3] Wildland Consultants 2019. Causes of wetland loss in Southland. *Wildland Consultants Ltd Contract Report 5223*. Prepared for Environment Southland. 26 pp.

Wetland mapping at the Southland Wind Farm Site

We note that all the ecologists agreed during Covid Fast-track expert conferencing for the Project that vegetation mapping on the Jedburgh Plateau was challenging. The many successional types of vegetation in terrestrial habitats and induced wetlands following deforestation make mapping the site particularly complicated. For example, hard boundaries are difficult to discern when two or more habitats are overlapping (or grading into each other). Nonetheless, a robust, iterative process combining high-resolution photography and extensive ground truthing and confirmation using accepted wetland protocols has been followed to give a very high level of confidence about the extents, values and measures to avoid and minimise effects of the Project on wetlands.

The first step in wetland identification and mapping was a desktop assessment using aerial imagery taken to map wetlands in close proximity to the wind farm turbine layout and existing forestry track through the Port Blakely Forest (proposed as a construction access track and for part of the transmission line route). Apparent wetland boundaries adjacent to and within 100 metres of the proposed turbine and road locations were digitised prior to the initial field surveys undertaken in March-April 2023.

The initial wind farm layout was subsequently revised in order to avoid and minimise impacts on the identified wetlands and high value vegetation, and has been the subject of regular refinement, avoidance and minimisation as further and more detailed survey results have been delivered.

1.3 Wetland delineation protocols

The status and boundaries of wetlands on the wind farm site were determined using the wetland vegetation delineation protocols (Clarkson 2013, MFE 2022), which are the current standard for delineating wetlands in New Zealand. Three tests were carried out during field assessments, the rapid test as well as the plot-based dominance and prevalence tests. All three of these tests rely on the presence and/or relative abundance of hydrophytic plants as indicators. Hydrophytes are plant species capable of growing in soils that are often or constantly saturated with water during the growing season. Wetland indicator plants have been divided into the following categories (Clarkson et al. 2021[1]):

- Obligate (OBL): occurs almost always in wetlands (estimated probability >99% in wetlands).
- Facultative Wetland (FACW): occurs usually in wetlands (67–99%).
- Facultative (FAC): equally likely to occur in wetlands or non-wetlands (34–66%).
- Facultative Upland (FACU): occurs occasionally in wetlands (1–33%).
- Upland (UPL): rarely occurs in wetlands (<1%), almost always in 'uplands' (non-wetlands).

According to the wetland delineation protocols described by MfE (2022) and Clarkson (2013[2]), rapid wetland assessments are to be used initially when determining the boundaries of a wetland. If the result is uncertain, then the dominance and prevalence tests

[1] Clarkson B.R., Champion, P.D., Forester L., and Rance B.D. 2021: New Zealand Wetland Plant List 2021. Landcare Research Contract Report: LC3975. Prepared for Hawke's Bay Regional Council.

[2] Clarkson B.R. 2013: A vegetation tool for wetland delineation in New Zealand. Landcare Research Contract Report LC1793. 42 p.

can be used to provide more certainty. For a rapid test to confirm the area as a wetland, all dominant species must be either OBL or FACW species.

Preliminary mapping of wetland boundaries is based on field surveys and delineation was made during the field work undertaken in March / April 2023 and has been the subject of subsequent further assessment and revision through the interpretation of satellite and drone imagery.

Rapid tests were used in the field during walk-through surveys. For situations where the rapid test was difficult to assess in the field or inconclusive, the dominance and prevalence tests were applied. The dominance test is used to identify dominant wetland species by applying the 50/20 rule. Essentially, an area is identified as a wetland if the dominant species plus species with more than 20% cover exceed 50% cover and comprise obligate (OBL), facultative wetland (FACW), or facultative (FAC) plant species. Facultative upland (FACU) and upland (UPL) plants are not wetland indicators. If the threshold is met but all of the dominant species are facultative plants, then the Prevalence Index can be used to provide further evidence of wetland status.

The Prevalence Index is a vegetation-based method of weighted averages, using the cover values of all vascular species (and Sphagnum) in the plant community. Under these protocols, an area is generally considered to be wetland if the Prevalence Index value is ≤3. If the index is >3 then the area is not considered to be a wetland.

Plots were established within representative vegetation types, 2 × 2-metre plots in grassland and herbfield, 5-metre radius plots in shrubland, and 10 × 10-metre plots in forest, generally within or adjacent to the wind farm footprint. All plants within each plot were recorded and given a percentage cover score. Vegetation data collected in the field was processed offsite, with plots being assigned a status of 'wetland' or 'not wetland' based on the results of the dominance and prevalence tests.

Soil and hydrology tests were undertaken to assist with wetland determination during the April 2024 wetland delineation surveys at Matariki (as per the protocols in MfE 2021[1] and Fraser et al. 2018[2]). In situations where the vegetation test was inconclusive (where the dominance test and prevalence index were not in agreement) soil and hydrological indicators were used to determine if the plot met the wetland criteria. A Munsell colour chart was used to help determine the presence of low chroma soils, which indicate hydric soils. Other indicators of hydric soils including redox-mottling and gleyed soils were not present during site visits. Hydrological indicators including ground water within <30cm depth from the ground surface and the presence of surface water were used to help determine if an area is considered a wetland.

1.4 Field mapping outcomes

Detailed mapping of the wetlands (including ground truthing via vegetation plots and wetland delineation protocols) was undertaken across the entire Project Site between March-April 2023. This provided a more accurate understanding of the location and extent of the wetland areas than was previously available through the initial desktop survey. A second survey was undertaken on 11-13 October 2023, focussing on the Jedburgh Plateau

[1] Ministry for the Environment. 2021: Wetland delineation hydrology tool for Aotearoa New Zealand. Wellington.

[2] Fraser S., Singleton P., Clarkson B. 2018: Hydric soils- field identification guide. *Landcare research contract report.* Prepared for Tasman District Council. 83pp.

where an additional 27 wetland delineation plots were measured to more accurately map the fen and bog wetlands in conjunction with the interpretation of recent (2023) LINZ aerial imagery. This resulted in slight changes to the extent of some wetland areas and an overall slight increase in total wetland area. Following this work, Riley revised their civil design in order to reduce wetland loss as much as practicable.

An additional site visit was undertaken on 15 May 2023 to specifically assess marsh wetlands on a property on Davidson Road East (at the end of Kaiwera Downs Rd) that had been purchased by Contact in March 2023. The purpose of this visit was to assess the potential of this site for enhancement measures that could help compensate for any unavoidable adverse effects on wetland extent or other biodiversity features and values within the Project site. In March 2024, seven wetland plots were measured at Matariki, at turbines MAT-9, MAT-10, MAT-11, MAT-12, MAT-13, and MAT-14.

In April 2025, the opportunity was taken for a fourth and final survey to measure 38 additional wetland plots and undertake ground-truthing within and adjacent to the wind farm footprint on the Jedburgh Plateau. This also had the benefit of 3-centimetre resolution drone photography flown in mid-January 2025, which assisted in precisely determining areas of potential fen and bog habitats, as well as better defining the boundaries of other terrestrial vegetation types.

Together, all these steps have provided a solid and detailed foundation to our understanding of the potential effects on wetlands. It has also fed into another revision of the proposed Project layout by Contact to refine and micro-site its infrastructure to avoid and minimise impacts, resulting in even further wetland loss being achieved.

Understandably, given how many refinements and iterations had already been made as more precise information has come to light, these changes were fairly minor and do not change our approach to addressing residual effects in terms of quanta of offsetting and compensation.

The locations of all wetland delineation plots are mapped in Figure Ecology-1A in the Ecological Assessment.

1.5 Vegetation plots to inform offsetting model

Surveys were undertaken throughout February and March 2024 to collect data to inform robust biodiversity accounting and biodiversity outcome monitoring. A total of 73 plots were established and measured at Jedburgh Station and seven plots at Matariki Forest (Figure Ecology-1A in the Ecological Assessment). Five wetland plots were measured at the proposed wetland compensation site at Davidson Road East. In addition, three plots were measured in pāhautea forest in the Slopedown Conservation Area to better determine benchmark values for this forest type.

Permanent 10 x 10 metre RECCE vegetation plots were selected as they have proven to be an efficient and effective monitoring method and can be used to detect long-term changes in forest composition and structure. The 10x10 methodology has been used by Wildland Consultants for over 15 years across a number of habitat types throughout Aotearoa New Zealand.

Plot locations were predetermined prior to the field surveys, with a number of points generated across each vegetation and habitat type to ensure a randomised and representative spread across the site. Plots were also established inside and outside of the

wind farm footprint at Jedburgh Station and Matariki Forest. At each plot, the following information was collected:

- Environmental covariates: vegetation/habitat structure, history, aspect, slope, landform, and drainage.
- General condition, scored from 1-5.
- % Cover of all vascular plant species under 1.35m, absolute cover of non-vascular plants, litter, bare ground, rock and open water.
- Canopy, liana, epiphyte and emergent cover
- Plot description and notes (including a plot drawing, if helpful to relocate the plot).
- Several measures of vegetation height.
- Species list and % cover of each species.
- Browse intensity.
- Faecal pellet index.
- Woody seedling/sapling counts in three tiers (15cm-50cm, 50cm-1m, 1m+).
- Diameter at Breast Height (DBH) for all stems with a DBH over 2.5cm.
- Measures of indicator species (counts and size estimates).

2.0 Avifauna

2.1 Desktop survey

A desktop assessment of avifauna was carried out by searching the on-line database eBird. Records of indigenous and exotic species within 15 kilometres of the proposed wind farm from 1 January 2021 to 15 September 2022 were collated. Data from the Department of Conservation's national biodiversity monitoring programme was also checked, as this programme carried out a survey at the site of the proposed wind farm in 2017.

2.2 Five-minute bird counts

A three-day field survey was undertaken 3-5 April 2023 to evaluate the presence of avifauna within the proposed wind farm site. The proposed Wind Farm Site covers a large area comprising exotic pasture, exotic plantation forest, exotic scrub and shrubland, indigenous forest, scrub and shrubland, copper tussock grassland, and various wetlands. Monitoring sites were selected to provide a representative assessment of the habitats present within the Wind Farm Site (Figure AMP–1, Attachment 1: Management Plan maps).

Four representative habitat types were selected for the survey:

- Indigenous forest dominated by southern rata and kāmahi at Jedburgh Station.
- Wetland-shrubland mosaic characterised by bog, fen, and low stature shrubland on the Jedburgh Plateau.
- Exotic forest comprising radiata pine and Douglas fir at Matariki Forest.
- Open farmland at Glencoe Station comprising pasture and small remnants of mānuka forest and scrub.

Eighty five-minute bird count surveys were undertaken along eight transects within the Wind Farm Site. Two transects were completed in each of the four representative habitat types. Each transect comprised eight count stations spaced at least 200 metres apart.

In October/November 2024, two additional transects were established within the Matariki Forest near turbines MAT-02 to MAT-05 and MAT-06 to Mat-08 comprising of eight count stations spaced at least 200 metres apart. A total of twelve transects were surveyed during visits to the Wind Farm Site in October/November 2024, February 2025, and May 2025. The locations of each transect and bird count station are shown in the Avifauna Management Plan.

The count methodology followed Dawson and Bull (19751) and Hartley and Greene (20122). Upon arriving at the count station, the observer stood quietly and recorded all birds seen and heard within a radius of approximately 200 metres over a five-minute period. No individual bird was knowingly counted more than once. All five-minute bird counts were completed during daylight, i.e. between 1.5 hours after sunrise and 1.5 hours before sunset. Locations of transects and five-minute bird count stations were recorded using a hand-held GPS unit.

Incidental bird observations were recorded in the Wind Farm Site when travelling to, from, and between bird count stations. These records include all additional bird species seen or heard within the Wind Farm Site that were not observed during the five-minute bird counts. All locations where kārearea/Eastern falcon (*Falco novaeseelandiae novaeseelandiae*; Threatened - Nationally Vulnerable) or mātātā/fernbird (*Poodytes punctata punctata*; At Risk - Declining) were incidentally seen or heard were recorded using a hand-held GPS unit.

2.3 Bittern monitoring

In October/November 2023, fifteen acoustic bird monitoring devices were deployed during the peak matuku-hūrepo/Australasian bittern (*Botaurus poiciloptilus*; Threatened – Nationally Critical) booming season to determine their presence within wetland habitats on the Jedburgh Plateau and in the large marsh wetlands within the Port Blakely Douglas Fir Forest. While optimal bittern habitat is not present within the Wind Farm Site, it is noted that bittern is a large, highly mobile bird species with a threat ranking of 'Nationally Critical'. As a precautionary measure, acoustic surveys were undertaken to target potential bittern breeding habitat in the broader landscape, namely, the Port Blakely Douglas Fir wetland complex, which is approximately three kilometres from the nearest wind turbine.

On 11 October 2023, five acoustic monitoring devices were installed in large fens on the Plateau and ten devices were placed in marsh wetlands at Port Blakely. The devices were collected on 26 October and the data was analysed using the AviaNZ software package.

Flight height and path surveys

Flight height surveys were carried out in October/November 2024, and February and May 2025, at flight height monitoring stations throughout the Project Site, with data collection concurrent with five-minute bird counts. The surveys were conducted at 20 turbine sites or within 200 metres of the proposed turbine location. The flight height surveys provide baseline information on birds varying flight heights and flight paths, through the area.

As an added precaution, flight height surveys were undertaken at monitoring stations along the proposed transmission line route twice during the February 2025 and May 2025

[1] Dawson D.G. and Bull P.C. 1975: Counting birds in New Zealand forests. Notornis 22(2). 101- 109.

[2] Hartley L. and Greene T. 2012: Birds: incomplete counts - five-minute bird counts. Inventory and Monitoring Toolbox: Birds. DOCDM-534972. Department of Conservation, Wellington. 22 pp.

surveys. Locations of the surveys were at six sites along the transmission line Figure AMP-1 (Attachment 1: Management Plan maps).

2.4 Kārearea/eastern falcon surveys

Kārearea/eastern falcon surveys occurred at six fixed-point stations twice during the October/November 2024 and February and May 2025 surveys throughout the Wind Farm Site. Surveys were undertaken at each observation points for at least 10 minutes using binoculars.

Observation stations have been selected based on previous sighting records and the presence of preferred habitat types, e.g. rocky outcrops, scarps, and ledges. Data collected during five-minute bird counts also recorded any kārearea/eastern falcon observations, and their flight paths were also noted. Habitat features were recorded, including vegetation type, slope, aspect, elevation, terrain, and distance to water. Data on habitat features will be used to predict the probability of future kārearea/eastern falcon nesting in unoccupied areas. Where possible, surveys were undertaken in fine weather with good visibility. Flight data of other large bird species (e.g. kaka, kererū, tui) observed were also recorded during these surveys.

2.5 Cryptic species playback surveys

Recorded audio playbacks of mātātā/South Island fernbird (At Risk – Declining), kotoreke/marsh crake (*Zapornia pusilla affinis*; At Risk – Declining) and matuku-hūrepo/Australasian bittern (Threatened – Nationally Critical) calls were played at each survey station during the October/November 2024 survey and February and May 2025 surveys (Figure AMP-1 of Attachment 1: Management Plan maps). Each call was played for a 15 second period followed by a 30 second listening period. This was repeated twice for each species.

2.6 Acoustic surveys

Twenty-two ARF4 digital acoustic recorders were deployed within the five survey areas (four per survey area) and in locations close to as many turbines as possible in October/November 2024, February 2025, and May 2025. The recorders were programmed to record nightly from 20:05-06:35, and set to the "high" recording protocol, which captures audio with a 32kHz sample rate and 16-bit depth. This aim was to record the calls of nocturnal and any cryptic species that may be present, including mātātā/South Island fernbird, kotoreke/marsh crake, matuku-hūrepo/Australasian bittern, ruru/morepork (*Ninox novaeseelandiae novaeseelandiae*; Not Threatened) as well as migrating seabirds in flight. The deployment period was a minimum of two weeks. All acoustic recorders had one battery change and one SD card change.

Once collected from the field, the data from the SD cards were provided to DigiLab Ltd, which used a “trained” AI model to detect calls from the following target bird species:

- Kotoreke/marsh crake
- Kuaka/bar-tailed godwit
- Mātātā/South Island fernbird
- Matuku-hurepo/bittern
- Ruru/morepork
- Tara/white-fronted tern

- Taranui/Caspian tern
- Tarapirohe/Black-fronted tern
- Titi/sooty shearwater
- Torea/South Island pied oystercatcher

3.0 Lizards

Thirteen areas within Matariki Forest and Jedburgh Station were selected for the initial lizard survey, using tracking tunnels to detect ground-dwelling lizards. These areas were selected based on the previous desktop assessment to cover as many potential lizard habitats as possible. Areas considered to represent potential high quality lizard habitat were targeted.

A two-day site visit was undertaken over 20-21 December 2022 to assess potential lizard habitats at the site. Sixty-five tracking tunnels were installed across both properties at 13 locations (i.e. five tracking tunnels at each location) – these being selected as having the best lizard habitat on the wind farm site. Tracking tunnels were checked on 27 January 2023, five weeks after the initial set up.

Following the tracking tunnel survey, which detected the presence of skinks in six tracking tunnels, 65 Onduline Artificial Cover Objects (ACOs) were placed alongside tracking tunnels (one beside each tracking tunnel). An additional 75 ACOs were placed in four other areas considered to be potential high quality lizard habitat, but which had not been surveyed using tracking tunnels. In total, 140 Onduline ACOs were deployed across Jedburgh Station and Matariki Forest on 26-27 January 2023.

ACOs were then checked over 13-17 April 2023. Each ACO was checked four times over four days. A total of 552 ACO checks were undertaken during the survey. ACOs were collected at Jedburgh Station on 16 April 2023 and at Matariki Forest on 17 April 2023, following the four days of checks.

In order to target potential arboreal gecko species such as Tautuku gecko, 126 tree-mounted ACOs were installed in mānuka forest and scrub at JED-6 and between JED-20-21, JED-29-30, and JED-33-34 in October 2024. These ACOs were left in the field for four months before checking so that resident lizards could habituate to them.

The first checks of tree-mounted ACOs commenced on 16 February 2025 and were completed on 18 February 2025. The second round of checks commenced on 23 February 2025 and were completed on 28 February 2025. The third round of checks were undertaken in April 2025, and also included one night of spotlighting along the bush edge near JED-21. The number of ACOs checked during each survey are as follows:

- JED-06: 20 tree-mounted ACO checks.
- JED-20-21: 8 tree-mounted ACO checks.
- JED-33-34: 64 tree-mounted ACO checks.
- JED-29-30: 19 terrestrial ACO checks.

Lizard survey areas and results are illustrated in Figures LMP–1a to 1c of Attachment 1: Management Plan maps.

4.0 Invertebrates

4.1 Survey locations

Due to the size of the Wind Farm Site, and in order to obtain a more accurate understanding of invertebrate diversity, the invertebrate surveys were targeted to specific areas of indigenous vegetation (Figures TIMP – 1 &2 in Attachment 1: Management Plan maps), which:

- Contain one of the key invertebrate habitats identified in the preliminary surveys (see below).
- Likely to contain habitat that forms a biological corridor between two similar patches of a key invertebrate habitat type.
- Likely to contain notable species.

4.2 Preliminary invertebrate survey

A general terrestrial invertebrate survey was undertaken over 13-16 April 2023. The survey covered different habitat types likely to be impacted by the development, primarily within the mānuka forest and the Jedburgh Plateau, as well as Matariki Forest. The survey followed the same locations as the lizard survey.

Hand-searching and sweep-netting were used to assess invertebrate species present or likely to be present. Hand-searching involved moving slowly through vegetation and lifting objects, including artificial cover objects (ACOs) previously checked for lizards on the same day. The lizard team also notified the entomologist of any invertebrates they found under ACOs during the lizard survey. Spotlighting at night was also used to survey for nocturnal invertebrates. Every notable invertebrate (both indigenous and non-indigenous) observed was recorded as a GPS waypoint, except commonly-observed invertebrates noted below. Invertebrate habitat values were also recorded.

4.3 General invertebrate survey

In February 2024, a comprehensive invertebrate survey was carried out over the whole Project Footprint. This survey assessed general invertebrate abundance and biodiversity, as well as searching for notable invertebrate species.

In the general invertebrate survey, two search techniques were used:

- Hand-searching (day and night), including sweep netting, turning over logs and rocks, and beating vegetation; and
- Heath light traps were set for 1-2 hours in potential notable nocturnal flying insect habitat, particularly forest and wetland areas where invertebrates are likely to be impacted (for example by vegetation clearance or increased edge effects).

4.4 Carnivorous land snail survey

A carnivorous land snail survey was undertaken on the 20-21 March 2024. The Jedburgh Plateau was searched thoroughly for shells and live snails hiding in roost plants or leaf litter during the day, and for any active live snails at night. Conditions were good for snail activity, being warm during the day and with recent rain and damp ground.

4.5 Targeted Helms' stag beetle surveys and general invertebrate pitfall trapping

Targeted surveys for Helms' stag beetles (*Geodorcus helmsi*) were conducted to approximate their distribution on-site, using spotlit searches at night combined with pitfall trapping. The surveys consisted of two surveying rounds. Other invertebrates were also recorded during these surveys if they had not previously been found, or if they were notable. A more detailed description of these surveys is included in Wildland Consultants (2025[1]).

The first round of surveying occurred between 6 and 11 November 2024, with the second round occurring between 21 and 27 January 2025. Weather during night searches for both 2024 and 2025 survey periods was generally good for stag beetles.

Wildlands deployed 28 trap grids (each comprised of five live-capture pitfall traps) throughout the site, with eight deployed within the Matariki Forest and 20 at Jedburgh Station. Pitfall traps were out for at least four fine nights before being retrieved. No targeted surveys for Helms' stag beetles were conducted in Glencoe Station as no suitable habitat was identified.

Traps were initially checked two days after deployment. Traps ran for a minimum of four nights, after which they were removed, any captured animals recorded if necessary and released, and the holes filled in.

Helms' stag beetle habitat was also searched at night by two people for two hours each, using headlamps (during both surveys). Each area was subject to one night search. Areas 4 and 6 were previously searched at night during the general invertebrate surveys (Area 6) and the targeted giant land snail survey (Area 4). Therefore, there was no need to search for them again.

5.0 Assessment methodology

5.1 Ecological significance

Vegetation and habitats present within the proposed site were assessed for significance against the ecological significance criteria listed in Appendix 3 of the Southland Regional Policy Statement (RPS). The presence of Threatened, At Risk, and Rare ecosystems listed in Appendix 2 of the Southland RPS were identified based on vegetation habitat types described in Appendix 1 of this document.

5.2 Ecological Impact Assessment

The Ecological Impact Assessment Guidelines (EcIAG) (Roper-Lindsay et al. 2018) were used to assist in the assessment of terrestrial and wetland values and the Project's potential effects. The guidelines assist by providing a consistent and transparent method to assess values and effects. The guidelines have been applied in the assessment of ecological effects for large-scale infrastructure projects arounds Aotearoa New Zealand, and have been accepted by the Environment Court. The EcIAG state that the purpose of the document is

[1] Wildland Consultants (2025). Helms' stag beetle and other invertebrate survey results (2024–2025) at Southland Wind Farm, Slopedown Range, Southland. Wildland Consultants Contract Report No. 7362. Prepared for Contact Energy Ltd. 12pp.

to outline a framework to provide guidance on good practice, however, practitioners may deviate from the guidelines where it is considered ecologically relevant and justifiable to do so.

The basis of the EcIAG assessment comprises a series of tables that are included below for reference. The EcIAG approach utilises the following steps:

Step 1 – Assigning Ecological Value

Categories used to assign an ecological value to habitats or species include 'Negligible', 'Low', 'Moderate', 'High' or 'Very High'. Habitat values and species values are identified against criteria set out in the EcIAG (Tables 4 and 5 respectively).

For habitats, the ecological value assessment is broadly based on habitat threat status and habitat condition or quality and assessed on four sub-criteria, including representativeness, rarity/distinctiveness, diversity and ecological context.

For species, the value assigned is based on the national threat status (Townsend et al. 2008), i.e. 'Not Threatened', 'At Risk', 'At Risk' (declining) or 'Nationally Threatened'. If applicable, the regional threat status may also be used, and species that are 'Not Threatened' but that are critical to ecological integrity may also be assessed as being of higher ecological value than that assigned by their national threat status.

Typically, any differences in expert opinion tend to focus on whether values have been applied correctly, as this process is critical and affects the final outcome. In this project, values have been applied conservatively. For example, bogs induced by deforestation were given the same value as natural bogs, i.e. Very high value.

Step 2 – Assess Magnitude of Effect

The 'Magnitude of Effect' is a measure of the extent or scale of the effect of an activity and the degree of change that it will cause after measures to avoid, remedy, or mitigate for effects. The magnitude of an effect categories include: 'Negligible', 'Low', 'Moderate', 'High' or 'Very High' (Roper-Lindsay et al. 2018) and are assessed in terms of:

- Spatial scale of the effect proportional to the availability of that particular habitat in the immediate surrounds and wider landscape;
- Intensity of the effect;
- Duration, frequency, and permanence of the effect; and
- Level of confidence in understanding the expected effect.

For this assessment we have focused on:

- The areal extent of vegetation/habitat type loss *per se*.
- The proportion of vegetation/habitat type impacted relative to its availability in the surrounding landscape (which equates to the approximate 5,800-hectare Wind Farm Site). The following categories were applied:
  - Negligible: <1% loss of extent relative to the surrounding landscape.
  - Low: >1% to <5%.
  - Moderate: >5% to <25%.
  - High: >25% to <50%.
  - Very high: >50%.

- Operational phase effects, in particular the potential for blade strike on birds.
- Potential edge effects in habitat adjacent to impacted areas, including:
  - the impact of altered environmental conditions, such as reduced shading or more extreme temperatures.
  - increased potential for general construction or operation related disturbance (e.g., noise or dust).
- Potential effects of fragmentation and loss of connectivity.
- The temporary lag between biodiversity loss and recovery at rehabilitation sites (i.e. spoil deposition or temporary construction sites).

Step 3 – Assessment of the Overall Level of Effects

The overall level of effect is determined using a matrix based on the ecological values and the magnitude of effects on these values after measures to avoid, remedy or mitigate. Level of effect categories include 'Positive', 'Negligible', 'Low', 'Moderate', 'High' and 'Very High' (Table 1 in the EcIAG).

The overall level-of-effect categories are used to determine if residual effects management is required over and above measures to reduce the severity of effects through efforts to avoid, remedy or mitigate adverse effects. Usually, if the level of residual effect is assessed as being 'Moderate' or greater (Roper-Lindsay *et al.* 2018) (Table 1 in the EcIAG) this warrants efforts to offset or compensate for these effects. Under the Southland RPS, there is policy direction that offsetting or compensation will be undertaken for significant residual effects only, which has been interpreted to include residual effects assessed as 'Moderate', 'High' or 'Very high' under the EcIAG assessment.

Table 1 – Criteria for describing overall level of ecological effects.

Magnitude of Effect	Ecological Value				
	Very High	High	Moderate	Low	Negligible
Very High	Very High	Very High	High	Moderate	Low
High	Very High	Very High	Moderate	Low	Very Low
Moderate	High	High	Moderate	Low	Very Low
Low	Moderate	Moderate*	Low	Very low	Very Low
Negligible	Low	Very low	Very low	Very low	Very Low

* We have taken a more conservative approach for a 'High' ecological value x 'Low' magnitude of effect scenario by applying an overall Level of Effect of 'Moderate' rather than 'Low' as per Table 4.1 in Roper-Lindsay *et al.* (2018).

Residual effects management approach

The type and quantum of restoration and habitat enhancement activities for addressing residual adverse effects of the proposed Wind Farm was determined in accordance with offsetting and compensation requirements as set out in the Southland RPS. This includes addressing significant residual adverse effects that cannot be avoided, remedied, or mitigated.

A Biodiversity Offset Accounting Model (BOAM; Maseyk *et al.* 2018[1]) has been developed to demonstrate offsetting, i.e. No Net Loss or Net Gain outcomes for addressing residual adverse effects on terrestrial habitats within the Wind Farm Site.

The loss of wetland habitats on the Jedburgh Station plateau will be compensated by restoring *c*.5.11 hectares of copper tussock-rautahi marsh on land purchased by Contact Energy. As such, the BOAM does not address wetland loss given it is not strictly offsetting (i.e. not like for like). Nevertheless, a BOAM outcome has been calculated for wetlands in an attempt to show the compensation is realistic.

Limits to offsetting

A limits-to-offsetting assessment was undertaken to help evaluate the degree to which project effects adhere to the limits-to-offsetting principle.

We applied a framework that includes a "level of effects" and "offsetability" evaluation as described and in general accordance with Markham et al. (2022[2]). Any residual adverse effects assessed as being "High" or higher after measures to avoid, remedy, or mitigate (minimise) effects have been applied requires an assessment of biodiversity offset opportunity, technical feasibility, and outcome certainty. This assessment is adapted from Pilgrim's offsetability test (Pilgrim et al. 2013[3]).

The final "limit" is evaluated based on combining the level of effects assessment and the offsetability assessment.

6.0 Methodology for developing and applying the BOAM

6.1 Overview

Biodiversity offsetting is the fourth management measure in the effects management hierarchy to address more than minor residual adverse effects where they cannot be avoided, minimised, or remedied. Biodiversity offsetting is only appropriate where steps to avoid, minimise, and remedy are demonstrated to have been substantially exhausted, and where offsetting will achieve a net gain in type, amount, and condition of indigenous biodiversity compared to that lost. The primary purpose of biodiversity offsetting is to "counter-balance the unavoidable impacts of development activities on biodiversity by enhancing the state of biodiversity elsewhere" (Maseyk et al. 2015). As indicated in the original EcIA, we have since lodgement applied the Biodiversity Offsetting and Accounting Model (BOAM) to the proposed offset measures.

Biodiversity offsetting is proposed to address the residual effects on significant terrestrial vegetation at the wind farm site.

[1] Maseyk F., Ussher G., Kessels, Christensen M., and Brown M. 2018: Biodiversity Offsetting under the Resource Management Act. Prepared for the Biodiversity Working Group on behalf of the BioManagers Group.

[2] Markham J., Baber M. Quinn J., Christensen M., Ryan T., Lowe M., Knowles S., and Ussher G. 2022: Assessing limits to biodiversity offsetting in Aotearoa: a proposed framework. Resource Management Journal, Resource Management Law Association (November 2022.)

[3] Pilgrim J.D., Brownlie S., Ekstrom J.M.M., Gardner T.A., von Hase A. ten Kate, K., Savy C.E., Stephens R.T.T., Temple H.J., Treweek, J., Ussher G.T., Ward G. 2013. A framework for assessing offsetability of biodiversity impacts. Conservation Letters 6(5): 376–384.

In contrast, biodiversity compensation is proposed as the primary mechanism to address the loss of wetland extent at the Wind Farm Site. This will occur through increasing indigenous wetland extent and enhancing existing wetland on land owned by Contact at Davidson Road East (while at the same time fen and bog habitats at Jedburgh Station will still benefit from offset measures such as ungulate exclusion and control).

We have provided a basic offset model to demonstrate that onsite and offsite management interventions together are highly likely to result in a net positive outcome for wetlands, and provide an additional layer of robustness.

6.2 Principles of biodiversity offsetting and compensation

Biodiversity offsetting is based on a number of widely accepted principles that provide a critical checklist of project design considerations for a well-developed and well-applied offset to be considered in consenting process (Maseyk et al. 20181). These principles have been adopted into the Southland RPS. The proposed offsetting and compensation measures to address significant residual adverse effects have been assessed against each principle in Table 1.1. Residual effects assessed as 'Moderate', 'High' or 'Very high' under the EcIAG assessment have been interpreted as 'significant' in the context of the Southland RPS.

Table 1.1 – Assessment of proposed effects packaged against the Southland RPS principles for biodiversity offsetting

Biodiversity Offset Principle	Assessment
No Net Loss	The BOAMs will demonstrate that net gains can be achieved for terrestrial habitats and indigenous birds. Compensation proposed for wetlands exceeds the projected quantum of wetland loss by at least *c*.2.7 hectares.
Additional conservation outcomes	The Project will demonstrate that all biodiversity offsets and compensation are additional. No other conservation measures or projects are existing at or planned for the Wind Farm Site outside of the proposed biodiversity offset.
Limits to offsetting	The offsetability of fens and bogs was considered when addressing the final level of effect on these habitats. The relatively small loss for each habitat in the context of the larger extent of unaffected wetlands together with proposed offsite compensation means the proposal would not exceed the accepted threshold for offset ability, particularly given that: (a) there is already a nominated compensation site available in which to undertake restoration works; (b) there is a plan to guide the implementation of the restoration works (which will also be bound by conditions of consent); (c) the restoration works can begin in advance of the wind farm construction to minimise time lags between impacts and biodiversity gains; (d) approximately 18 hectares of fen and 1.5 hectares of bog wetland will be physically protected from ungulates within the 245-hectare Jedburgh Station Ecological Enhancement Area; and

[1] Maseyk F., Ussher G., Kessels, Christensen M., and Brown M. 2018: Biodiversity Offsetting under the Resource Management Act. Prepared for the Biodiversity Working Group on behalf of the BioManagers Group.

Biodiversity Offset Principle	Assessment
	(d) Contact Energy will be required to maintain the compensation site as a condition of consent.
Proximity	All biodiversity offsetting measures will be undertaken within the Wind Farm Site (e.g., stock exclusion, deer control, and wide-scale predator control). Environmental compensation is proposed to be undertaken on land owned by Contact (wetlands *c*.6 km from the Wind Farm Site but still within the Project Site area).
Like-for-Like	Protection and enhancement of *c*.200 hectares of mānuka forest and scrub an *c*.31 hectares [mānuka]/tauhinu-inaka-*Veronica odora* scrub and shrubland within the 245-hectare Jedburgh Station Ecological Enhancement Area will meet the like-for-like principle. The proposed restoration of wetland habitats on Contact land is not like-for-like given that copper tussock rautahi marsh is being restored to address the loss of fen and bog, i.e., environmental compensation. However, there is a 'trading up' element to this approach given that fen is not a Threatened, At Risk or Rare habitat type in Southland while copper tussock/rautahi marsh is a Threatened habitat type.
Long-term outcomes	Fencing to exclude stock and deer would be permanent. Widespread predator control combined with stock exclusion and targeted deer control would provide significant benefits for the duration of the consents.
Timing	It is likely that net gains onsite for terrestrial vegetation within the fenced 245-hectare Jedburgh Station Ecological Enhancement Area will be realised within 10 to 20 years following the removal of stock and eradication of feral deer and pigs. It is likely that improvements in the condition of southern rātā-kāmahi forest on Jedburgh Station will be realised within 5 to 10 years following the control of feral deer, possums, and rats. Likely gains for offsite copper tussock marsh wetland restoration will be realised in 5 to 8 years, provided the appropriate post-planting maintenance is implemented for a minimum period of five years.

For all BOAMs, we prioritised offsetting loss of extent by improving **ecological condition** (rather than offsetting extent by replacing extent). This is in line with best practice biodiversity offsetting principles.

Methods

The BOAM presented in the Guidance on Good Practice Biodiversity Offsetting in Aotearoa New Zealand was used in calculating biodiversity offsets for the Project. As per the user guide[1], the BOAM:

- Accounts only for 'like for like' biodiversity trades aimed at demonstrating No Net Loss (the model does not address 'like for unlike' exchanges);
- Relies on three hierarchical levels to categorise biodiversity (biodiversity types, biodiversity components, and biodiversity attributes);

[1] Maseyk, F., Maron, M., Dutson, G., Possingham, H., Seaton, R., Carlyon G. and A. Beveridge. 2015. A Biodiversity Offsets Accounting Model for New Zealand: User guide. Contract Report No: 2014-008, prepared for the Department of Conservation.

- Calculates net present biodiversity value ("NPBV") or individual biodiversity attributes and an average NPBV across the range of attributes representing a biodiversity component;
- Uses NPBV to estimate whether No Net Loss is achieved in the exchange (with project level No Net Loss being demonstrated when all components demonstrate No Net Loss) for individual biodiversity attributes and average NPBV across the range of attributes representing a biodiversity component; Note, this can mean net loss for some attributes, so long as there is no net loss of average NPBV;
- Incorporates the use of a discount rate; and
- Adjusts for uncertainty of success regarding the proposed offset actions.

The robustness of the BOAM outputs depends on the quality of the inputs (such as field data, assumptions used, and level of confidence) and the decisions to place attributes into biodiversity components. Data or assumptions that are incorrect can result in the BOAM producing 'false positives', whereby No Net Loss or Net Gain has been erroneously demonstrated when in fact the opposite may be true.

The biodiversity type, component, and attributes used in the BOAM, together with a summary of the Net Present Biodiversity Values results for terrestrial and wetland vegetation types, are provided in Table 1 of Appendix 7.

The of impact and expected climax community for all significant terrestrial vegetation types affected by the proposed wind farm is presented in Table 1.2.

Table 1.2 – Area of impact and expected climax community for all significant terrestrial vegetation types affected by the proposed wind farm.

Vegetation type	Expected climax community	Area affected (ha)
[Mānuka]/tauhinu-inaka-*Vernonica odora* scrub and shrubland	Pāhautea forest	25.24
Mānuka-haumakaroa-mountain holly forest	Pāhautea forest	1.07
Southern rātā-kāmahi forest	Southern rātā-rimu forest	0.74
Mānuka forest and scrub	Southern rātā-rimu forest	16.88
Mānuka scrub	Southern rātā-rimu forest	0.71
Mānuka scrub and shrubland	Southern rātā-rimu forest	1.61
Inaka scrub	Southern rātā-rimu forest	0.96
Copper tussock grassland	Southern rātā-rimu forest	0.23
Mānuka/copper tussock grassland	Southern rātā-rimu forest	2.86
[Gorse]/copper tussock grassland	Southern rātā-rimu forest	0.21
[Mānuka-gorse]/copper tussock grassland	Southern rātā-rimu forest	0.56
[Wilding conifer]/copper tussock shrubland	Southern rātā-rimu forest	1.36
[Wilding conifer]/copper tussock grassland	Southern rātā-rimu forest	0.02
Mānuka-inaka-mountain holly-(gorse) scrub and shrubland	Southern rātā-rimu forest	3.67
Mixed indigenous-conifer forest and scrub	Southern rātā-rimu forest	0.44
Indigenous scrub and shrubland	Southern rātā-rimu forest	0.45
Total		**57.01**

Grouping of terrestrial vegetation types for offsetting purposes

The exclusion of stock and feral deer from 245 hectares at Jedburgh Station (the Jedburgh Station Ecological Enhancement Area) and *c*.8 hectares at Matariki Forest (the Copper Tussock Enhancement and Skink Protection Area), together with sustained ungulate, possum and rat control across *c*.1,400 hectares of the Wind Farm Site (the Jedburgh Station Pest Control Area) for the life of the consent, will allow successional processes to occur. It is expected that indigenous scrub and shrubland and copper tussock-dominant terrestrial vegetation will revert to two broad habitat types: **southern rātā-rimu forest** and **pāhautea forest**.

We have used these two vegetation types to group all significant terrestrial vegetation types affected by the proposed wind farm, based on their expected successional trajectories. Even though we have separated woody and non-woody (copper tussock-dominant) vegetation types in the EcIA, for the purposes of offsetting it is appropriate to assume that all non-woody terrestrial habitats will revert to indigenous forest once restoration measures have been implemented, even though this will likely take decades to occur.

Grouping of terrestrial habitat types was required to avoid the parameterisation of upwards of 20 models for individual habitat types, which would have undermined transparency in modelling outcomes for the site: a matrix habitat that spatially varies in its successional stages. The design ensures the disaggregated nature of the model was maintained (no trades are being made across currencies). Individual habitats were assessed for attribute values prior to impact, after impact, prior to offsetting and in response to offsetting. A single value for each attribute was then derived for each grouping by using an area-weighted average approach.

Accounting for multiple management interventions

The BOAM framework does not provide a simple approach to incorporating different biodiversity management strategies across multiple spatially discrete locations. The framework was adapted to include measures across multiple tabs. This structure was chosen both because the existing matrix habitat differs between different management areas and because different outcomes are expected from the various management interventions. Reliance on the original structure would have obscured modelling assumptions.

In simple terms, the workflow included:

- The calculation per management interventions as per the original model structure, replicating tabs for each management intervention.
  - In woody habitats, this included separate calculations for interventions within the proposed feral ungulate exclusion area, and separate calculations for interventions outside of the feral ungulate exclusion area but where management is to occur.
  - In wetland habitats, this included four separate calculations for management interventions: the two interventions described for woody habitats, as well the revegetation of degraded habitat at Jedburgh Station and, separately, the enhancement of existing wetland habitats at Jedburgh Station.
- The addition of a new summary tab, where the multiple management intervention tabs were integrated. This followed similar methodology as is typically used in the BOAM structure: the addition of biodiversity value at the attribute level at the impact site and at each offset site to generate an attribute-specific Net Present Biodiversity Values (NPBVs).

- From the attribute-level NPBVs, a component-level NPBV was calculated using the original BOAM formula.

We note that this model structure presents a calculation with the same level of transparency and disaggregation as the original BOAM structure, despite the matrix nature of the habitat. We consider that using an additive formula for the integration of multiple management interventions on adjacent land is likely most ecologically plausible. The strategy may be considered conservative, given that positive interactions can be expected from multiple management interventions at landscape scales.

Attribute selection

Attributes were selected to ensure that a variety of ecological features pertaining to both ecosystem structure and function were included. This ensures that management interventions are targeted towards the creation of self-sustaining ecosystems.

Attribute selection included measures that capture both the values that are predicted to be lost and those that may respond to management interventions. This can be contrasted with an oft-employed strategy of focussing on measures that may be expected to respond to planned management interventions, which structurally biases modelling outcomes towards favourable NPBV outcomes. Our strategy provides confidence that a true Net Gain in biodiversity can be expected, assuming management interventions result in the expected outcomes.

We also note that attributes were focussed on numerically-based quantifiable metrics that can be directly used to inform adaptive management strategies.

Results for terrestrial and wetland offset models

<u>Southern rātā-rimu forest</u>

The BOAM calibrated for matrix habitats that are expected to succeed to southern rātā-rimu forest associations indicates an expected Net Gain in biodiversity across all five components. Both management interventions inside and outside the feral ungulate exclusion area are expected to contribute to a Net Gain, indicating the importance of both strategies as part of the management package.

For plant community diversity, notable species recruitment, and habitat function, modelled outcomes are expected to be universally positive for all attributes.

For vegetation condition, some loss is expected for the attribute “indigenous dominance in higher tiers”. This outcome is expected, as existing habitats at both impacts and offset sites have typically high indigenous dominance in canopy layers. Therefore, the loss in indigenous canopy at the impact site cannot be overcome through gains in the canopies of offset sites, which have little space for improvement. Nevertheless, at the level of the component, we see large increases, because losses in this attribute are outweighed by significantly greater gains in both indigenous dominance in lower tiers and a reduction in weed richness. Therefore, this trade is considered to be both logically expected and an indication of improved habitat integrity in the future.

For vegetation community structure, some losses are expected for the attribute “total basal area”. This is expected, because basal area is an ecological measure that is expected to respond very slowly to management interventions. In the relevant timescales, basal area is not a response to management, rather a function of existing vegetative structure. Similarly to vegetation condition, at the component level, vegetation community structure is

expected to increase. In this case, this is because both vegetation height and non-vascular plant cover are expected to increase. This intra-component trade is considered acceptable in the context of the generally positive outcomes of the management package as a whole.

This BOAM indicates that the 245 hectares of enhancement (in which ungulates will be excluded), together with pest control across the wider Plateau and forest, greatly exceeds the enhancement area needed to result in no net loss of significant indigenous vegetation on a successional path to southern rātā-rimu forest.

Pāhautea forest

The BOAM calibrated for matrix habitats that are expected to succeed to pāhautea forest associations indicates an expected Net Gain in biodiversity across four of five tested components. For this habitat type, results are positive but somewhat more mixed than in southern rātā-rimu associations. Both management interventions inside and outside the feral ungulate exclusion area are expected to greatly contribute to a Net Gain in all five components, indicating the importance of both strategies as components of the proposed management package for this habitat type also.

For vegetation and community structure and habitat function, expected outcomes are expected to be universally positive for all attributes.

For the notable species component, loss is expected for pāhautea recruitment. This is an expected outcome, as pāhautea seedling are considered broadly unpalatable to grazing animals, and the greatest effect of management interventions is the removal of grazers. Therefore, the loss of pāhautea seedlings existing at the impact site is difficult to offset. At the component level, gains in palatable species outweigh this loss. This is considered an overall positive outcome for this habitat type, ensuring a full complement of species in the canopy of this ecosystem in the future, as opposed to a canopy dominated by unpalatable species.

For the plant community diversity component, loss is expected for diversity in ground tiers, although the loss is outweighed by gains in the diversity of higher tiers and the richness of threatened, At Risk and notable taxa, resulting in a positive result at the component scale. We consider that this modelled loss in the diversity in ground tiers attribute may be, in part, driven by the difficulty of parameterising this attribute. The Shannon index can be challenging to predict; it is not a parameter that is recorded as seen in the field. Rather, it is calculated based on both the identity of species at their site and their relative abundance. For this reason, all parameterisation of Shannon index-based attributes has been undertaken very conservatively throughout all modelling. Outcomes should be interpreted in the context of this conservative parameterisation.

Small-scale losses are expected in vegetative condition for this habitat type. This is driven by losses in indigenous dominance in both ground and higher tiers, although this is mostly offset by weed richness.

In conclusion, we expect the project to result in an overall Net Gain in biodiversity for pāhautea forest-associated habitat types, although results are more mixed than for southern rātā-rimu forest habitat types. This mixed result is not a function of smaller benefits to pāhautea forest-associated habitat types from management interventions, rather because there is proportionally more of this habitat type within the impact area relative to in the offset area, relative to the ratio seen for southern rātā-rimu associated habitats.

We are confident that the offsetting of these habitat types is sufficient, and thus provides adequate measurable offsetting. From a highly conservative perspective, it may be concluded that the management package constitutes, in part, compensation, where pāhautea forest associations are being traded for to southern rātā-rimu forest associations.

While we disagree with such a highly conservative model interpretation, we note that even in this framing, this management package is considered preferable: highly targeted management interventions to ensure "clean" outcomes for the model would come at a loss of ecologically pragmatic choices that result in greater overall biodiversity outcomes at the scale of the site.

Wetland habitats

Addressing effects on wetlands under the proposed compensation package is classed as compensation, not offsetting. Therefore, the parameterisation of a BOAM is not required. The modelling for this habitat has been undertaken from an approach that emphasises an abundance of caution to ensure that quantitative evidence exists that compensation is sufficient for this habitat type.

As such, we emphasise that the BOAM calibrated for wetlands habitats should be considered as indicative only. We intend the BOAM to reflect whether compensation (as opposed to offset) actions are broadly adequate. In this model, aggregation occurs across habitats that fundamentally differ from one another. There is no basis for concluding that management interventions will result in convergence of wetlands at compensation sites in response to management interventions with those currently at impact sites. Therefore, the trades proposed by the management package are not guaranteed to be like-for-like and their incorporation into a single model does not align with robust offset modelling practices.

For wetland habitats, a smaller complement of biodiversity attributes and components was included, due to their intended indicative nature. We expect positive outcomes at the scale of the component for all three measured components.

In this model, four management interventions are included. Although all portions of the management package contribute to overall positive outcomes in the model for wetlands, different management interventions contribute to the compensation of different biodiversity attributes. This underlines the importance of the proposed variety of compensation actions to adequately address compensation requirements in a way that is as near to best-practice offsetting principles as possible.

The BOAM predicts universally positive outcomes from the management package for vegetation condition and habitat function.

For plant community diversity, small losses are expected in indigenous species richness, although these losses are expected to be outweighed by gains in Shannon-index based diversity measures. This is an expected outcome because two management interventions (removal of grazing pressure within and outside of the feral ungulate exclusion area) include no diversity enhancement plantings. We expect wetland communities in these areas to respond to the removal of grazing not through the appearance of new species, but by the increased propensity of palatable species to grow to a mature size. This trade is considered favourable as the outcome favours palatable species, which typically persist in the landscape at low levels. We consider this to be a beneficial outcome in the context of known pressures on wetlands at both regional and national levels.

This modelling outcome could be improved through the planting of a wider complement of species at the ecological enhancement and revegetation sites. We consider that this would be an ecologically weaker strategy as we have lower confidence in the ability of additionally planted species to persist in the long term. Instead, the strategy reflects a focus on the restoration of basic habitat conditions, and doing it relatively quickly (within ten years) compared with woody habitats. It is expected that as additional wetlands species naturally spread to revegetated and enhanced sites at the Kaiwera Downs property, the attribute will be wholly compensated for. However, dispersal rates are notoriously difficult to predict and are therefore not modelled explicitly.

Appendix 2 Vegetation descriptions

Pāhautea/southern rātā-kāmahi forest

Forest with emergent pāhautea above a canopy of southern rātā and kāmahi is present in a small area at the southern edge of the site at high elevations (Plate A2-1). Occasional trees of Halls tōtara (*Podocarpus laetus*) are in the canopy. A subcanopy of kapuka, haumakaroa, *Phyllocladus alpinus*, *Carpodetus serratus*, *Pseudopanax colensoi*, pink pine (*Halocarpus biformis*) and horopito. Shrub layer of horopito, *Cyathea smithii*, *Coprosma rotundifolia*, *Coprosma colensoi*, and *Coprosma rhamnoides*. *Blechnum* species (mainly crown fern), *Nertera villosa*, *Luzuriaga parvifolia*, *Microlaena avenoides*, and *Carex* species on the ground layer, filmy ferns (*Hymenophyllum* spp.) on the tree trunks.

This vegetation was not assessed on foot. As noted in the ecological assessment, pāhautea forest was probably the predominant vegetation cover on the broad ridges on upland parts of the wind farm site prior to anthropogenic vegetation clearance. Sporadic young individuals of pāhautea are still present in these areas.

Plate A2-1 – Pāhautea/southern rātā-kāmahi forest. 16 April 2024.

Southern rātā-kāmahi forest

The gully in the centre of the site comprises forest dominated by southern rātā and kāmahi with a canopy height of approximately 10 metres. Pink pine, Hall's tōtara (*Podocarpus laetus*) and kāpuka/broadleaf (*Griselinia littoralis*) are usually present in the canopy at lower abundance. Horopito (*Pseudowintera colorata*) and soft tree fern (*Cyathea smithii*) are key components of the

subcanopy (Plate A2-1), the abundance of these unpalatable species suggesting historical feral animal or stock browse pressure in this forest. Hooked sedges (*Carex* species) and ferns (*Blechnum discolor* and *Hymenophyllum* species) are present in the understorey. Forest of this type also occupies land administered by the Department of Conservation on the margins of the eastern scarp.

Plate A2-2 – Southern rātā-kāmahi forest. 4 April 2023.

Mānuka-haumakaroa-mountain holly forest

Low forest of mānuka, haumakaroa (*Raukaua simplex*), and mountain holly (*Olearia ilicifolia*) often occurs on the margins of the two forest types described above and is present in scattered locations on scarps. This forest is older than the mānuka forest and scrub associations described below, with trees of greater stature growing at lower density. It appears to represent an older stage of vegetation succession following historical vegetation clearance.

Mānuka forest and scrub

Forest and scrub with a near exclusive canopy of mānuka forms an extensive vegetation cover at middle elevations on Jedburgh Station, is also common on the upland parts of the property and is restricted to gullies at low elevation within paddocks. The understorey and ground cover are generally sparse, with *Coprosma dumosa* the most common shrub, with occasional weeping māpou (*Myrsine divaricata*) and porcupine shrub (*Melicytus alpinus*), woody species are typically low stature with few saplingings and small trees. Scattered herbs, ferns, grasses and sedges are present in the ground cover, including catsear, forest violet (*Viola filicaulis*), pig fern (*Hypolepis ambigua*), sweet vernal (*Anthoxanthum odoratum*) and *Carex* species (Plate A2-3).

Mānuka scrub at higher elevations is denser and lower stature, other shrubs including *Veronica odora* and inaka are occasionally present within the canopy in the transition zone between mānuka forest and scrub and [mānuka]/tauhinu-inaka-*Veronica odora*-scrub and shrubland.

Mānuka forest, scrub and shrubland is also present within Matariki Forest.

Mānuka scrub and shrubland in Matariki forest includes inaka (Plate A2-4).

Plate A2-3 – Mānuka-dominant forest and scrub. 4 April 2023.

Plate A2-4 – Mānuka scrub and shrubland near MAT-15. May 2024.

[Mānuka]/tauhinu-inaka-*Veronica odora*-scrub and shrubland

Most of the upland part of the site comprises a mosaic of shrubland and scrub, dominated by tauhinu (*Ozothamnus vauvilliersii*), inaka, and *Veronica odora* (Plate A2-5). Scrub and shrubland is generally low stature and under 1.5 metres tall with some localised taller vegetation where mānuka is dominant or more common. *Olearia laxiflora* is present in shrubland around a bog at the southern boundary of the site and occasionally found in wetter parts of the site.

Coprosma cheesemanii and prostrate snowberry (*Gaultheria macrostigma*) are common subshrubs and shrublands in well-drained areas while *Coprosma decurva* and *Coprosma dumosa* are occasionally present. Grasses, herbs and ferns include sweet vernal (*Anthoxanthum odoratum*), browntop (*Agrostis capillaris*), *Rytidosperma gracile*, catsear *(Hypochaeris radicata),* pekapeka/slender mountain daisy (*Celmisia gracilenta*), mountain kiokio (*Blechnum montanum*) and little hard fern (*Blechnum penna-marina*). Sedges and rushes are also present amongst grasses and herbs including rautahi (*Carex coriacea*), *Juncus* species, and *Oreobolus strictus.*

Plate A2-5 – [Mānuka]/tauhinu-inaka-*Veronica odora* shrubland. 4 April 2023.

Mānuka-inaka-(gorse) scrub and shrubland

Vegetation to the north-east that connects with Matariki Forest boundary comprises dense inaka and mānuka scrub and shrubland with localised patches of gorse. Additional woody species are present at low abundance, including kāmahi, haumakaroa, southern rātā, weeping māpou (*Myrsine divaricata*), pink pine, mountain holly, *Coprosma decurva*, and rare mountain toatoa (*Phyllocladus alpinus*). Mountain kiokio is usually abundant in the ground layer, with scattered shield fern and rautahi.

Exotic unmanaged grassland

An open grassland which is transitioning to shrubland is present on broad ridges near the southwest boundary of the site. Vegetation is comprised of sweet vernal and browntop (*Agrostis capillaris*) with *Rytidosperma gracile* and cats ear, with abundant prostrate snowberry (*Gaultheria macrostigma*) present within grasses and herbs (Plate A2-6). Scattered, low *Veronica odora* and tauhinu are also present.

Plate A2-6 – Example of exotic unmanaged grassland with scattered shrubs. April 2025.

Fen wetland

The majority of wetlands present in Jedburgh Station are fens within gullies (Plate A2-8). Vegetation comprises rautahi, comb sedge (*Oreobolus pectinatus, O. strictus*) and sphagnum moss (*Sphagnum* spp.) with scattered inaka and occasional upland shrubs (*Veronica odora*, mānuka). Other wetland species including copper tussock, *Carpha alpina*, *Gonocarpus micranthus,* swamp kiokio (*Blechnum minus*) are common and locally dominant with occasional wire rush (*Empodisma minus*) and species of *Juncus* (*Juncus articulatus, J. edgariae,* and *J. effusus*) and star sedge (*Carex echinata*) present in wetter areas. Herbs and grasses are also common, particularly on fen margins, including sweet vernal, *Rytidosperma gracile,* cats ear*,* pekapeka/ slender mountain daisy, and scattered shrubs of *Androstoma empetrifolium.* Gorse is occasionally present in these areas but is rare and localised.

Plate A2-8 – A large fen wetland in a shallow depression on Jedburgh Station plateau. 4 April 2023.

Bog wetland

Bog wetlands are occasionally present on broad ridges on the Jedburgh Plateau. Their vegetation is dominated by low stature inaka (0.5-1 metre) with occasional mānuka, *Olearia laxiflora*, and *Coprosma elatirioides* (Plate A2-9). Rautahi and comb sedge or sphagnum moss comprise most of the ground cover with *Carpha alpina*, swamp kiokio, prostrate snowberry, *Androstoma empetrifolium,* little hard fern (*Blechnum penna-marina*), *Rytidosperma gracile*, and localised wire rush. The indigenous orchid *Aporostylis bifolia* is sometimes abundant in these bog wetlands.

Plate A2-9 – Inaka-dominant bog on the Jedburgh Station plateau. 4 April 2023.

Copper tussock/rautahi marsh

Copper tussock wetlands are present in the Mimihau North Branch site (outside the Wind Farm Site), either side of the road running through the Port Blakely Douglas fir forest. Vegetation comprises abundant copper tussock, particularly in the interior with rautahi (Plate A2-10). Exotic grasses and herbs are present in inter tussock areas, including sweet vernal, cocksfoot, Yorkshire fog, Timothy, lotus, selfheal, white clover, and creeping buttercup. The exotic oval sedge (*Carex leporina*) is locally common throughout, while exotic grasses and herbs are more common at the edge of the road.

In the southern group of copper tussock/rautahi marsh wetlands, woody species are occasionally present, including wilding Douglas fir (*Pseudotsuga menziesii*) at the edge of the wetland, and gorse and broom in some areas. Indigenous woody species are uncommon but also present, including desert broom (*Carmichaelia petriei*) and inaka.

Plate A2-10 – Copper tussock/rautahi marsh within the Mimihau North Branch site (outside the Wind Farm Site), April 2023.

Mānuka/copper tussock grassland

This vegetation type is present near MAT-14 and characterised by copper tussock (*Chionochloa rubra* subsp. *cuprea*) inter-dispersed with areas of mānuka shrubland (Plate A2-11). Copper tussock areas include emergent inaka, whaririki and mānuka, prostrate snow berry (*Gaultheria macrostigma*) and mountain kiokio are common below, localized areas with wire rush (*Empodisma minus*), comb sedge (*Oreobolus strictus*) and rautahi (*Carex geminata*) are also present, particularly on hill crests. Gorse is locally common and non-vascular plants are abundant throughout. Another example is present near MAT-06, and includes scattered inaka, whaririki and mānuka with exotic grasses and herbs.

Plate A2-11 – Mānuka/copper tussock grassland near MAT-14, April 2023.

Mānuka/copper tussock shrubland

This is a variation of the above vegetation type, Mānuka-gorse/copper tussock grassland, where mānuka is substantially more abundant.

Wilding conifers/mānuka-copper tussock shrubland

Vegetation composition is similar to mānuka-copper tussock shrubland and copper tussock vegetation types. Emergent wildling conifers are present as well as indigenous shrubs, copper tussock, exotic grasses, and gorse.

Wilding conifers/copper tussock grassland and shrubland

Wilding radiata pine and Douglas fir are emergent in an area dominated by copper tussock with frequent indigenous shrubs, ferns, exotic grasses, and herbs (Plate A2-12, A2-13). A small depression within this vegetation type contains wetland vegetation, which is described in detail in the copper tussock-rautahi marsh (wetland) vegetation type below.

Plate A2-12 – Wilding conifers/copper tussock grassland, within MAT-9 footprint. March 2024.

Plate A2-13 – Wilding conifers/copper tussock shrubland within MAT-11 footprint. March 2024.

Mixed indigenous-conifer forest and scrub

This vegetation type is characterized by wilding radiata pine and Douglas fir with locally common gorse (Plate A2-14). Indigenous shrubs such as mountain holly, whaririki, inaka, small-leaved *Coprosma* species and mānuka are also common. Swamp kiokio and *Histiopteris incisa* occupy open areas.

Plate A2-14 – Interior of dense mixed indigenous-conifer forest and scrub.

Gorse/copper tussock grassland

Copper tussock grassland with scattered gorse is locally common around MAT-16 and MAT-17 (Plate A2-15). Indigenous shrubs such as mountain tauhinu, *Veronica odora*, *Coprosma Dumosa* are common, while lower stature species such as little hard fern, mountain kiokio, and prostrate snow berry occur throughout the tussock with frequent exotic grasses and herbs. Gorse is locally common, particularly in disturbed areas and roadsides. Whaririki and mountain holly are also common where this vegetation type occurs near MAT-07. Parts of this vegetation type are transitioning to shrubland and scrub.

Plate A2-15 – Gorse/copper tussock grassland near MAT-07, April 2024.

Mānuka-gorse/copper tussock grassland

A large copper tussock grassland is present around MAT-10, which has been selected as an enhancement area (as described in the Assessment of Terrestrial and Wetland Ecological Effects)[1]. Vegetation is characterised by copper tussock grassland with localised stands of mānuka scrub and shrubland (Plate A2-16). Other indigenous shrubs are also present, including *Veronica odora*, mountain tauhinu, inaka, mountain holly (*Olearia ilicifolia*) and *Coprosma* species. Swamp kiokio, whaririki, and pūniu are common and exotic grasses and herbs are present amongst the tussock.

Scattered wildling conifers and gorse are also present.

Plate A2-16 – Mānuka-gorse/copper tussock grassland within the copper tussock enhancement area.

Inaka scrub

A band of inaka scrub is present above the road within the footprint of MAT-10. This vegetation type is dominated by *c.*1-2 metre tall inaka with occasional mountain kiokio, prostrate snowberry, and locally common rautahi.

[1] Section 14.4.2 of the Assessment of Terrestrial and Wetland Ecological Effects for the Proposed Southland Wind Farm. Version dated 19-12-23.

Mānuka-gorse/copper tussock shrubland

Hill slopes that support two north-facing gully systems have been mapped as 'Mānuka-gorse/copper tussock shrubland' (Plate A2-17). Gorse has heavily invaded this vegetation type, particularly on upper hillslopes which would previously have been dominated by copper tussock. Mountain holly and mānuka are scattered throughout the gullies. Other shrubs including mountain tauhinu, inaka, and *Veronica odora* are present, and whaririki is common. Species present in the ground cover include ferns (mountain kiokio, little hard fern), prostrate snow berry, and exotic grasses.

Plate A2-17 – Mānuka-gorse/copper tussock shrubland (foreground) and gorse scrub on upper hillslope.

Gorse scrub

Gorse is abundant throughout Matariki, occupying areas that have been harvested for logs. It has also invaded habitats that were formerly dominated by copper tussock. Exotic grasses and herbs are present in areas where gorse is more open, while scattered indigenous shrubs, broom, and wildling conifers are also present in varying amounts.

Copper tussock/rautahi marsh

Wetlands dominated by copper tussock and rautahi with a combined area of 0.21 hectares are present around MAT-9, MAT-12, MAT-13, and MAT-14, and a small fragment is present near MAT-11 (Plate A2-18). Rautahi and sphagnum moss are abundant, particularly in examples around MAT-12, MAT--13, and MAT-14, with prostrate snowberry and scattered rushes. Inaka and whaririki are also present while woody indigenous species such as *Veronica odora* and tauhinu (*Ozothamnus vauvilliersii*) are common on the wetland margins with exotic grasses and herbs.

Vegetation mapped as 'Copper tussock/rautahi marsh' (wetland) within Matariki Forest is more diverse with fewer exotic species than the 'Copper tussock/rautahi marsh' areas mapped within Port Blakely Forest.

Plate A2-18 – Copper tussock/rautahi marsh (wetland) near MAT-14.

Mānuka-inaka/copper tussock marsh

A wetland dominated by copper tussock under stunted inaka and scattered mānuka is present near MAT-06, on the western boundary of Matariki Forest (Plate A2-19). Rautahi and sphagnum are also common. This wetland is approximately 1.67 hectares
.

Plate A2-19 – Ground cover within mānuka-inaka/copper tussock marsh (wetland).

Appendix 3 Vegetation maps

LEGEND

Wind Farm

- Wind Turbines
- Permanent Meteorological Mast
- Sub Station
- Potential Water Take Location
- Batching Plant Envelope Areas
- O&M Building Location Envelope Area
- Substation Envelope Area
- Civil Works Design
- Wind Farm Site

Grid Connection

- Grid Injection Point (GIP)
- Transmission Line Route
- GIP Envelope Area
- Transmission Line Corridor (200m Wide)

Property

Wind Farm Properties

- Glencoe Station
- Matariki (Venlaw) Forests
- Jedburgh Station

Transmission Line Properties

- Salvation Army Trust
- Port Blakely

Other Properties

- Contact Energy Property

Other

- Transpower 220kV Transmission Line
- District Council Boundary
- Regional Council Boundary
- DOC Conservation Area (Conservation Park)
- DOC Conservation Area (Stewardship)

MAP SCALE	PRINT DATE
N Scale: 1:65,000	25/07/2025
	VERSION 1.0

Kilometers
0 0.5 1 2 3 4

TITLE

FIGURE PROJECT DESCRIPTION - 2

SOUTHLAND WIND FARM
PROJECT SITE PLAN

Service Layer Credits: Environment Southland, Maxar

LEGEND

- Wind Turbines
- Grid Injection Point (GIP)
- Sub Station
- Transmission Line Route
- Transpower 220kV Transmission Line
- Civil Works Design
- Wind Farm Site

Threatened Environments Classification (2012)

- < 10% indigenous cover left
- 10-20% indigenous cover left
- > 30 % left and > 20% protected

< 10% indigenous cover left
Environments with < 10 % indigenous cover left. In these environments, the loss of habitats for indigenous species has been greatest in the past. Little indigenous biodiversity remains in these environments.

10-20% indigenous cover left
Environments with 10-20% indigenous cover left. Indigenous biodiversity in these environments has been severely reduced and remaining habitats are sparsely distributed in the landscape.

Indigenous vegetation in these environments are less reduced (> 30% indigenous cover left) and fragmented than the above categories, with > 20% of the area legally protected from clearance. Indigenous vegetation cover is still vulnerable to threats such as pests, weeds, logging and other extractive land uses.

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MAP SCALE	PRINT DATE
N Scale: 1:65,000	6/08/2025
	VERSION
	1.0

Kilometers
0 0.5 1 2 3 4

TITLE

FIGURE TERRESTRIAL ECOLOGY - 5

THREATENED ENVIRONMENT CLASSIFICATION

Service Layer Credits: Eagle Technology, LINZ

LEGEND

Wind Farm

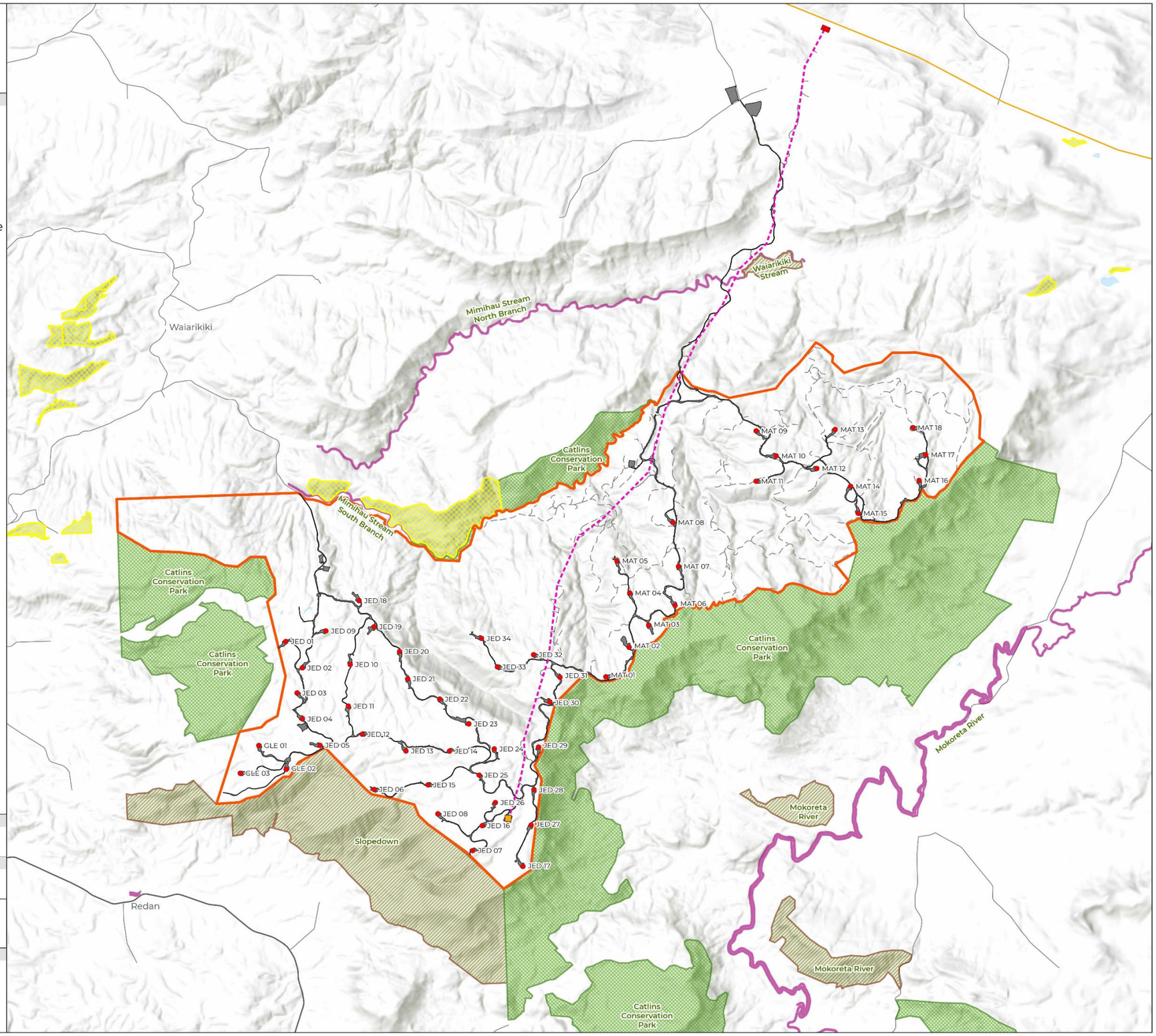
- Wind Turbines
- Grid Injection Point (GIP)
- Sub Station
- Transmission Line Route
- Transpower 220kV Transmission Line
- Civil Works Design
- Wind Farm Site

Conservation Areas

- QEII National Trust Covenants

DOC Public Conservation Land

- Conservation Park (s.19)
- Fixed Marginal Strip (s.24(3))
- Stewardship Area (s.25)



MAP SCALE	PRINT DATE
N Scale: 1:65,000	6/08/2025
	VERSION 1.0

Kilometers
0 0.5 1 2 3 4

TITLE

FIGURE TERRESTRIAL ECOLOGY - 6

PROTECTED AREAS IN THE VICINITY OF THE WIND FARM PROJECT SITE

Service Layer Credits: Eagle Technology, LINZ

LEGEND

- Wind Turbines
- Civil Works Design
- Wind Farm Site

Vegetation Type and Ecological Value

Very high
- 1,Bog wetland
- 7,Fen wetland
- 4,Southern rātā-kamahi forest

Moderate
- 5,[Mānuka]/tauhinu-inaka-*Veronica odora* scrub and shrubland
- 8,Mānuka forest and scrub
- 9,Copper tussock-rautahi swamp
- 28,Mānuka scrub
- 29,Kohuhu/gorse/rarauhe scrub
- 30,Exotic conifer plantation forest

Negligible
- 21,Gorse scrub
- 31,Exotic grazed grassland

Low
- 2,Exotic unmanaged grassland

MAP SCALE	PRINT DATE
N Scale: 1:20,000	12/08/2025
	VERSION 1.0

Kilometers
0 0.25 0.5 1

CREDITS:

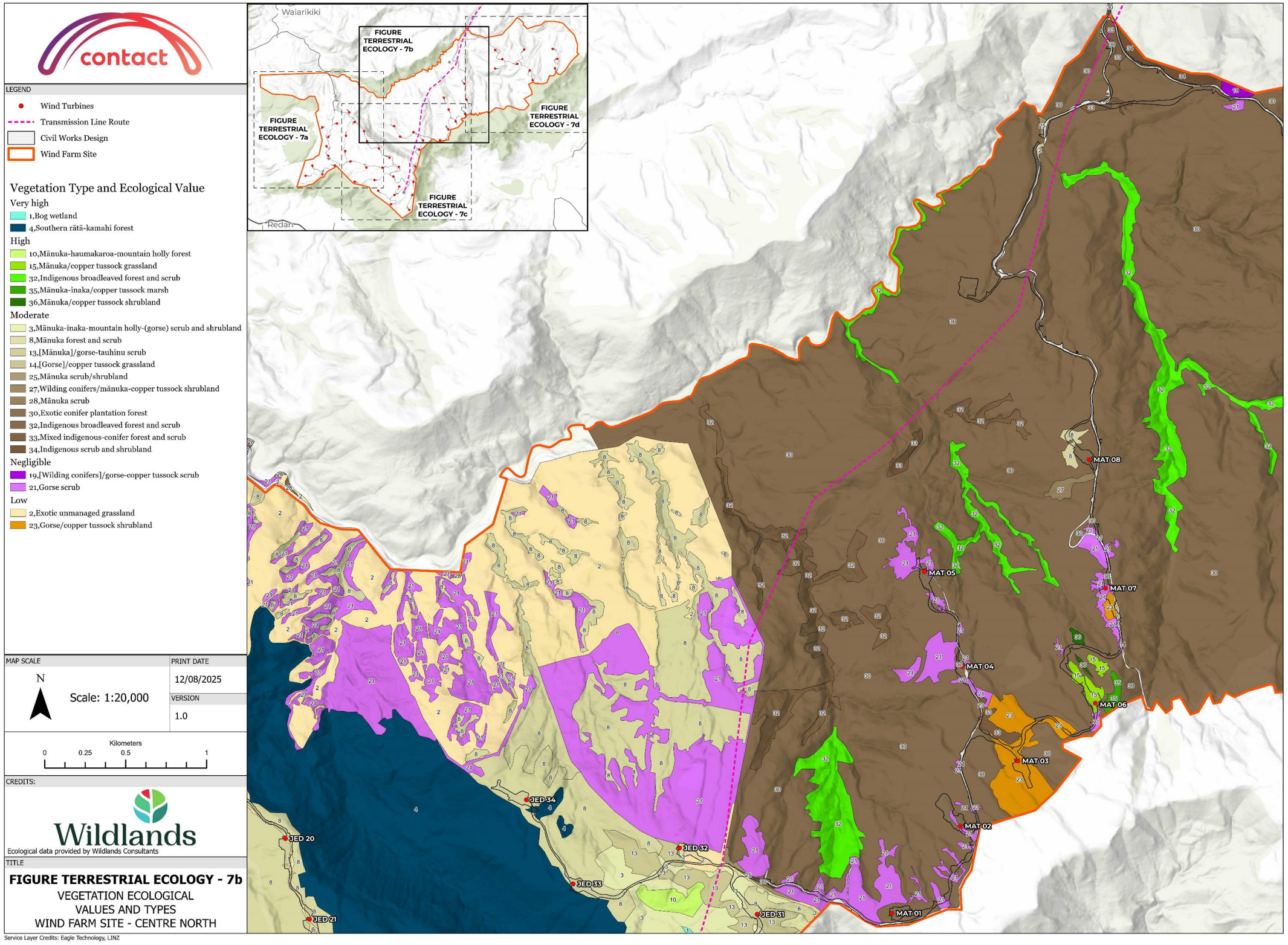
Ecological data provided by Wildlands Consultants

TITLE

FIGURE TERRESTRIAL ECOLOGY - 7a

VEGETATION ECOLOGICAL VALUES AND TYPES WIND FARM SITE - WEST

Service Layer Credits: Eagle Technology, LINZ


contact
LEGEND
Wind Turbines
Transmission Line Route
Civil Works Design
Wind Farm Site
Vegetation Type and Ecological Value
Very high
1,Bog wetland
4,Southern rātā-kamahi forest
High
10,Mānuka-haumakaroa-mountain holly forest
15,Mānuka/copper tussock grassland
32,Indigenous broadleaved forest and scrub
35,Mānuka-inaka/copper tussock marsh
36,Mānuka/copper tussock shrubland
Moderate
3,Mānuka-inaka-mountain holly-(gorse) scrub and shrubland
8,Mānuka forest and scrub
13,[Mānuka]/gorse-tauhinu scrub
14,[Gorse]/copper tussock grassland
25,Mānuka scrub/shrubland
27,Wilding conifers/mānuka-copper tussock shrubland
28,Mānuka scrub
30,Exotic conifer plantation forest
32,Indigenous broadleaved forest and scrub
33,Mixed indigenous-conifer forest and scrub
34,Indigenous scrub and shrubland
Negligible
19,[Wilding conifers]/gorse-copper tussock scrub
21,Gorse scrub
Low
2,Exotic unmanaged grassland
23,Gorse/copper tussock shrubland
Waiarikiki
Redan
FIGURE TERRESTRIAL ECOLOGY - 7a
FIGURE TERRESTRIAL ECOLOGY - 7b
FIGURE TERRESTRIAL ECOLOGY - 7c
FIGURE TERRESTRIAL ECOLOGY - 7d
MAT 08
MAT 07
MAT 06
MAT 05
MAT 04
MAT 03
MAT 02
MAT 01
JED 34
JED 32
JED 33
JED 31
JED 20
JED 21
MAP SCALE
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Scale: 1:20,000
PRINT DATE
12/08/2025
VERSION
1.0
Kilometers
0
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0.5
1
CREDITS:
Wildlands
Ecological data provided by Wildlands Consultants
TITLE
FIGURE TERRESTRIAL ECOLOGY - 7b
VEGETATION ECOLOGICAL VALUES AND TYPES
WIND FARM SITE - CENTRE NORTH
Service Layer Credits: Eagle Technology, LINZ

LEGEND

- Wind Turbines
- Sub Station
- Transmission Line Route
- Civil Works Design
- Wind Farm Site

Vegetation Type and Ecological Value

Very high
- 1,Bog wetland
- 7,Fen wetland
- 11,Pahautea/southern rātā-kāmahi forest
- 4,Southern rātā-kamahi forest

High
- 10,Mānuka-haumakaroa-mountain holly forest
- 15,Mānuka/copper tussock grassland
- 32,Indigenous broadleaved forest and scrub
- 35,Mānuka-inaka/copper tussock marsh
- 36,Mānuka/copper tussock shrubland

Moderate
- 3,Mānuka-inaka-mountain holly-(gorse) scrub and shrubland
- 5,[Mānuka]/tauhinu-inaka-*Veronica odora* scrub and shrubland
- 8,Mānuka forest and scrub
- 13,[Mānuka]/gorse-tauhinu scrub
- 14,[Gorse]/copper tussock grassland
- 25,Mānuka scrub/shrubland
- 28,Mānuka scrub
- 29,Kohuhu/gorse/rarauhe scrub
- 30,Exotic conifer plantation forest
- 32,Indigenous broadleaved forest and scrub
- 33,Mixed indigenous-conifer forest and scrub

Negligible
- 21,Gorse scrub
- 31,Exotic grazed grassland

Low
- 2,Exotic unmanaged grassland
- 23,Gorse/copper tussock shrubland

MAP SCALE	PRINT DATE
N Scale: 1:20,000	12/08/2025
	VERSION 1.0

Kilometers
0 0.25 0.5 1

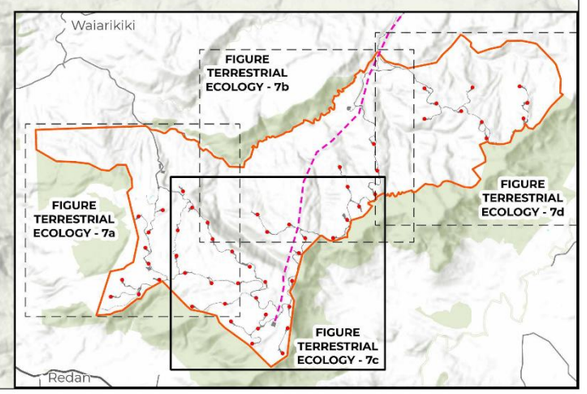
CREDITS:

Wildlands
Ecological data provided by Wildlands Consultants

TITLE

FIGURE TERRESTRIAL ECOLOGY - 7c
VEGETATION ECOLOGICAL VALUES AND TYPES WIND FARM SITE - CENTRE SOUTH

Service Layer Credits: Eagle Technology, LINZ



LEGEND

- Wind Turbines
- Grid Injection Point (GIP)
- Sub Station
- Transmission Line Route
- Transpower 220kV Transmission Line
- Civil Works Design
- Wind Farm Site

Vegetation Type and Ecological Value

Very high
- 6,Copper tussock/rautahi marsh

High
- 15,Mānuka/copper tussock grassland
- 20,Copper tussock grassland
- 32,Indigenous broadleaved forest and scrub
- 35,Mānuka-inaka/copper tussock marsh

Moderate
- 14,[Gorse]/copper tussock grassland
- 16,[Mānuka-gorse]/copper tussock grassland
- 17,[Wilding conifers]/copper tussock shrubland
- 18,[Wilding conifers]/copper tussock grassland
- 24,Inaka scrub
- 25,Mānuka scrub/shrubland
- 26,Mānuka-gorse/copper tussock shrubland
- 27,Wilding conifers/mānuka-copper tussock shrubland
- 30,Exotic conifer plantation forest
- 33,Mixed indigenous-conifer forest and scrub
- 34,Indigenous scrub and shrubland

Negligible
- 19,[Wilding conifers]/gorse-copper tussock scrub
- 21,Gorse scrub

Low
- 22,Gorse/copper tussock grassland
- 23,Gorse/copper tussock shrubland

MAP SCALE	PRINT DATE
N Scale: 1:20,000	12/08/2025
	VERSION
	1.0

Kilometers
0 0.25 0.5 1

CREDITS:

Wildlands
Ecological data provided by Wildlands Consultants

TITLE

FIGURE TERRESTRIAL ECOLOGY - 7d
VEGETATION ECOLOGICAL VALUES AND TYPES
WIND FARM SITE - EAST

Service Layer Credits: Eagle Technology, LINZ

MAT 07
MAT 09
MAT 10
MAT 11
MAT 12
MAT 13
MAT 14
MAT 15
MAT 16
MAT 17
MAT 18

INSET 1
INSET 2

Waiarikiki

FIGURE TERRESTRIAL ECOLOGY - 7a
FIGURE TERRESTRIAL ECOLOGY - 7b
FIGURE TERRESTRIAL ECOLOGY - 7c
FIGURE TERRESTRIAL ECOLOGY - 7d

Wildlands

LEGEND

Wind Farm

- Wind Turbines
- Grid Injection Point (GIP)
- Sub Station
- Transmission Line Route
- GIP Envelope Area
- Jedburgh Plateau
- Wind Farm Site

Ecology

Watercourses

- Intermittent

Ecological Value

- Very high
- High
- Moderate
- Low
- Negligible

Vegetation and habitat types

31. Exotic grazed grassland

MAP SCALE	PRINT DATE
N Scale: 1:1,750	25/07/2025
	VERSION 1.0

Meters
0 50 100

TITLE

FIGURE APPENDIX - 4F

VEGETATION AND HABITAT TYPES AT
THE PROPOSED SOUTHLAND WIND FARM

Service Layer Credits: Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors, Eagle Technology, LINZ, Path: E:\gis\Wildlands\WindFarm\mxd\2025\Figure_Vegetation_SStationEnvelop_1_Contact.aprx

LEGEND

Wind Farm

- Wind Turbines
- Sub Station
- Transmission Line Route
- Civil Works Design
- Jedburgh Plateau
- Wind Farm Site

Indicative Surplus Fill Disposal Sites

- Blanket Surplus Fill Disposal Sites
- Gully Surplus Fill Disposal Sites
- Shoulder Surplus Fill Disposal Sites

MAP SCALE	PRINT DATE
N Scale: 1:25,000	6/08/2025
	VERSION 1.0

Kilometers

0 0.25 0.5 1 1.5

CREDITS:

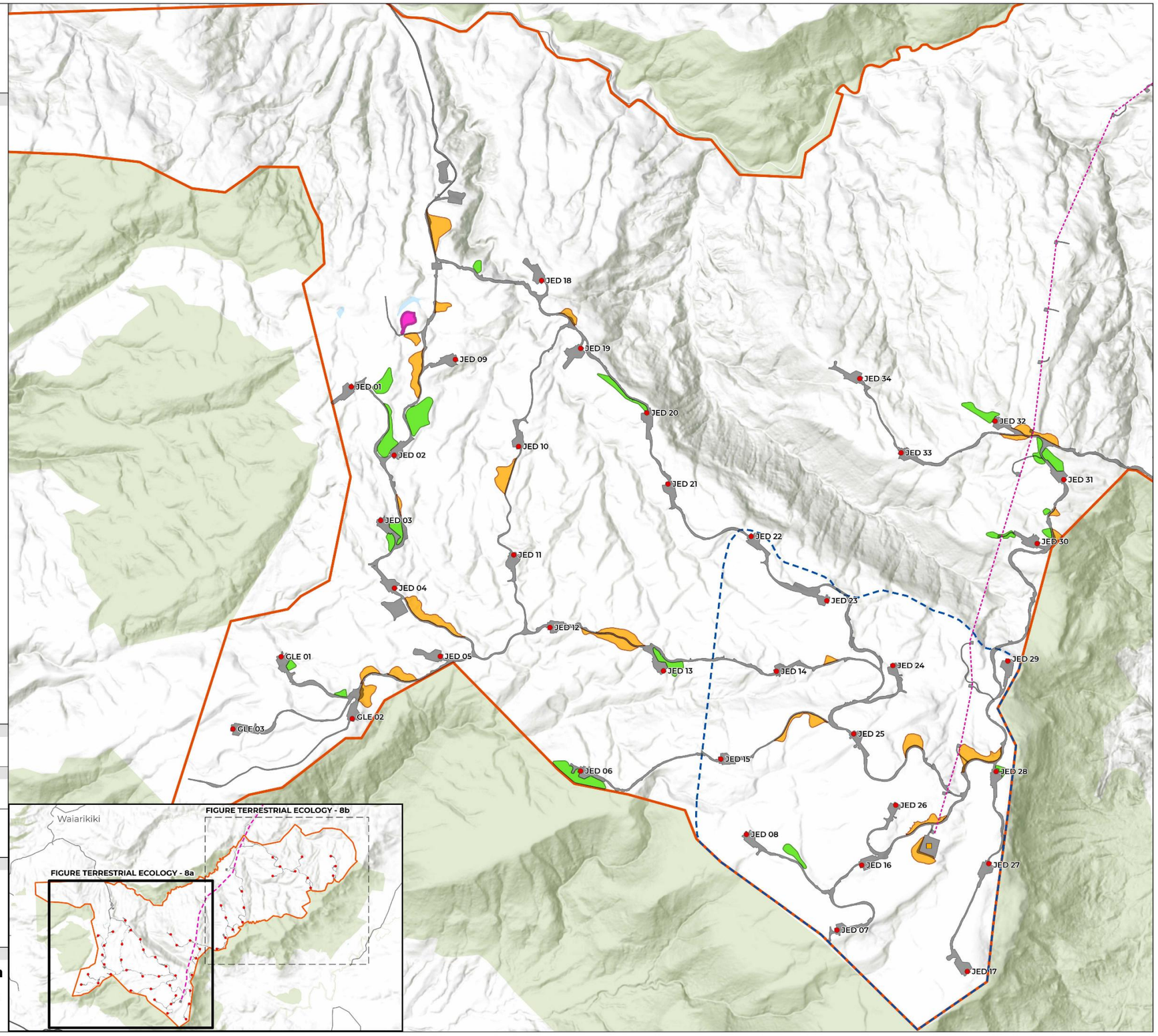
Indicative Surplus Fill Disposal Sites by Riley

TITLE

FIGURE TERRESTRIAL ECOLOGY - 8a

INDICATIVE SURPLUS FILL DISPOSAL SITES
WIND FARM SITE - WEST

Service Layer Credits: Eagle Technology, LINZ



LEGEND

Wind Farm

- Wind Turbines
- Transmission Line Route
- Civil Works Design
- Wind Farm Site

Indicative Surplus Fill Disposal Sites

- Blanket Surplus Fill Disposal Sites
- Gully Surplus Fill Disposal Sites
- Shoulder Surplus Fill Disposal Sites

MAT 01
MAT 02
MAT 03
MAT 04
MAT 05
MAT 06
MAT 07
MAT 08
MAT 09
MAT 10
MAT 11
MAT 12
MAT 13
MAT 14
MAT 15
MAT 16
MAT 17
MAT 18

INSET 1

Inset 1

Waiarikiki

FIGURE TERRESTRIAL ECOLOGY - 8a

FIGURE TERRESTRIAL ECOLOGY - 8b

MAP SCALE	PRINT DATE
N Scale: 1:25,000	6/08/2025
	VERSION 1.0

Kilometers
0 0.25 0.5 1 1.5

CREDITS:

Indicative Surplus Fill Disposal Sites by Riley

TITLE

FIGURE TERRESTRIAL ECOLOGY - 8b

INDICATIVE SURPLUS FILL DISPOSAL SITES
WIND FARM SITE - WEST

Service Layer Credits: Eagle Technology, LINZ

Appendix 4 Flora and fauna species lists

Table 1 – List of vascular plant species recorded at the Southland Wind Farm Site

*Denotes exotic species, wetland indicator rating assigned by Wildlands in itlaics

Species	Common name	Plant type	Wetland indicator rating
Abrotanella linearis		Herb	FACW
Acaena anserinifolia	bidibidi, piripiri	Herb	FACU
Acaena inermis	bidibidi, piripiri	Herb	*UPL*
Acaena novae-zelandiae	red bidibidi	Herb	FACU
Acaena species	bidibidi, piripiri	Herb	
*Achillea millefolium**	yarrow	Herb	FACU
Aciphylla aurea	golden spaniard	Herb	UPL
Aciphylla glaucescens	speargrass, spaniard	Herb	*UPL*
*Agrostis capillaris**	brown top	Grass	FACU
*Agrostis stolonifera**	creeping bent	Grass	FACW
*Aira caryophyllea**	silvery hair grass	Grass	FACU
*Alopecurus geniculatus**	kneed foxtail	Grass	FACW
Anaphalioides bellidioides	everlasting daisy, hells bells	Herb	FACU
Androstoma empetrifolium		Shrub	FACW
Anisotome aromatica	kopoti	Herb	FACU
*Anthoxanthum odoratum**	sweet vernal	Grass	FACU
Aporostylis bifolia		Herb	FACW
Asplenium flaccidum	Makawe, hanging spleenwort	Fern	UPL
Astelia nervosa		Herb	FACU
Azorella species		Herb	*FACW*
*Bellardia viscosa**		Herb	FAC
*Bellis perennis**	daisy	Herb	FACU
*Betula pendula**	silver birch	Tree	FAC
Blechnum discolor	Piupiu, crown fern	Fern	FACU
Blechnum fluviatile	kiwakiwa	Fern	FACU
Blechnum minus	swamp kiokio	Fern	FACW
Blechnum montanum	mountain kiokio	Fern	FACU
Blechnum novae-zelandiae	kiokio	Fern	FAC
Blechnum penna-marina	little hard fern	Fern	FAC
Blechnum procerum	small kiokio	Fern	FACU
Blechnum species		Fern	
Blechnum vulcanicum	korokio	Fern	*UPL*
Brachyglottis lagopus	groundsel, yellow rock daisy	Herb	*UPL*
Caladenia species		Orchid	
Cardamine species		Herb	*UPL*
Carex coriacea	rautahi, cutty grass	Sedge	FACW
Carex corynoidea		Sedge	*UPL*
Carex crispa	hook grass	Sedge	*UPL*
Carex dissita	forest sedge	Sedge	FAC

Species	Common name	Plant type	Wetland indicator rating
Carex echinata	star sedge	Sedge	OBL
Carex egmontiana	hook grass	Sedge	FACW
Carex gaudichaudiana		Sedge	OBL
Carex geminata	rautahi, cutty grass	Sedge	FACW
Carex horizontalis	hooked sedge	Sedge	FAC
Carex lectissima	hooked sedge	Sedge	*UPL*
*Carex leporina**	oval sedge	Sedge	FACW
Carex megalepis	hooked sedge	Sedge	*UPL*
Carex minor	hooked sedge	Sedge	*UPL*
Carex punicea		Sedge	FAC
Carex silvestris	hook grass	Sedge	*UPL*
Carex sinclairii		Sedge	OBL
Carex species		Sedge	*UPL*
Carex uncinata	hooked sedge	Sedge	FACU
Carex virgata	pūrei, swamp sedge	Sedge	FACW
Carmichaelia petriei	desert broom	Shrub	*UPL*
Carpha alpina		Sedge	OBL
Carpodetus serratus	piripiriwhata, marbleleaf	Tree	FACU
Celmisia gracilenta	pekapeka, slender mountain daisy	Herb	FAC
Centella uniflora	centella	Herb	FACW
*Cerastium fontanum**	mouse-ear chickweed	Herb	FACU
*Cerastium glomeratum**	annual mouse-ear chickweed	Herb	FACU
Chaerophyllum colensoi	mountain myrrh	Herb	FACU
Chaerophyllum ramosum	myrrh	Herb	FAC
Chiloglottis cornuta	bird orchid, ant orchid	Herb	FACU
Chionochloa rubra subsp. cuprea	copper tussock	Grass	FAC
*Cirsium arvense**	Californian thistle	Herb	FACU
*Cirsium palustre**	marsh thistle	Herb	FACW
*Cirsium vulgare**	Scotch thistle	Herb	FACU
Clematis paniculata	puawānanga	Vine	UPL
Clematis species		Vine	*UPL*
Coprosma cheesemanii		Shrub	FACU
Coprosma ciliata		Shrub	*UPL*
Coprosma colensoi		Shrub	*UPL*
Coprosma crassifolia	mikimiki, thick-leaved coprosma	Shrub	*UPL*
Coprosma cuneata		Shrub	*UPL*
Coprosma decurva		Shrub	*UPL*
Coprosma depressa		Shrub	*UPL*
Coprosma dumosa		Tree	FAC
Coprosma elatirioides		Shrub	FACW
Coprosma foetidissima	Hūpiro, stinkwood	Tree	FACU
Coprosma linariifolia	yellow-wood	Tree	UPL
Coprosma propinqua	mingimingi, mikimiki	Tree	FAC
Coprosma rhamnoides	mingimingi, mikimiki	Shrub	UPL
Coprosma rotundifolia	mikimiki, round-leaved coprosma	Shrub	FAC
Coprosma rugosa		Shrub	FACU

Species	Common name	Plant type	Wetland indicator rating
Coprosma species		Shrub or tree	
Corybas species	spider orchid	Orchid	*UPL*
Corybas trilobus	spider orchid	Orchid	*UPL*
*Crepis capillaris**	hawksbeard	Herb	FACU
Cyathea colensoi	rough tree fern, mountain tree fern	Treefern	*UPL*
Cyathea dealbata	Ponga, silver fern	Treefern	UPL
Cyathea smithii	kātote, soft tree fern	Treefern	FACU
*Cynosurus cristatus**	crested dogstail	Grass	UPL
*Cytisus scoparius**	scotch broom	Shrub	FACU
*Dactylis glomerata**	cocksfoot	Grass	FACU
Deyeuxia avenoides	oat grass	Grass	UPL
Dichelachne crinita	plume grass	Grass	*UPL*
Dicksonia squarrosa	whekī	Treefern	FACU
*Digitalis purpurea**	foxglove	Herb	UPL
Dracophyllum longifolium	inaka	Tree	FACU
Drosera spatulata	sundew, wahu	Herb	FACW
Elaeocarpus hookerianus	pōkākā	Tree	FAC
Eleocharis acuta	sharp spike sedge	Sedge	OBL
Empodisma minus	wire rush	Rush	OBL
Epilobium alsinoides	willow herb	Herb	FACU
Epilobium brunnescens subsp. brunnescens	willow herb	Herb	*FACW*
*Epilobium ciliatum**	tall willowherb	Herb	FAC
Epilobium nerteroides	willow herb	Herb	FAC
Epilobium pallidiflorum	swamp willowherb, tarawera	Herb	OBL
Epilobium pedunculare	willow herb	Herb	*UPL*
Epilobium species	willow herb	Herb	
*Erythranthe moschata**	musk	Herb	OBL
Euchiton audax	native cudweed	Herb	FACU
Euchiton species	cudweed	Herb	
Euchiton sphaericus	native cudweed	Herb	*UPL*
*Euphrasia nemorosa**	European eyebright	Herb	*UPL*
Euphrasia zelandica	eyebright	Herb	FAC
*Festuca rubra**	red fescue	Grass	FACU
Fuchsia excorticata	kōtukutuku, tree fuchsia	Tree	FACU
*Fumaria muralis**	scrambling fumitory	Herb	UPL
*Galium aparine**	cleavers	Herb	FACU
Galium perpusillum	dwarf bedstraw	Herb	FAC
Galium propinquum	native bedstraw	Herb	FACU
Galium species		Herb	
Gaultheria antipoda	tāwiniwini, bush snowberry	Shrub	FACU
Gaultheria crassa		Shrub	*UPL*
Gaultheria depressa	snowberry	Shrub	*FACU*
Gaultheria macrostigma	prostrate snowberry	Shrub	FACU
Gentianella grisebachii		Herb	FACW
Geranium potentilloides		Herb	*FACU*
Gleichenia alpina		Fern	FACW

Species	Common name	Plant type	Wetland indicator rating
Gleichenia dicarpa	matua-rarauhe, tangle fern, swamp umbrella fern	Fern	FACW
Gonocarpus aggregatus		Herb	FACU
Gonocarpus micranthus		Herb	FAC
Gonocarpus montanus		Herb	*FACU*
Gonocarpus species		Herb	
Graminaceae	Grass family	Grass	
Griselinia littoralis	Kāpuka, broadleaf	Tree	FACU
Gunnera dentata	native gunnera	Herb	FACW
Gunnera monoica	native gunnera	Herb	FAC
Gunnera prorepens	native gunnera	Herb	OBL
Gunnera species		Herb	
Halocarpus biformis	pink pine	Tree	FAC
Helichrysum filicaule	slender everlasting daisy	Shrub	FACU
Herpolirion novae-zelandiae		Herb	FAC
*Hieracium lepidulum**	tussock hawkweed	Herb	UPL
Hierochloe species	karetu, holy grass	Grass	
Histiopteris incisa	Mātātā, water fern	Fern	FAC
*Holcus lanatus**	Yorkshire fog	Grass	FAC
Hydrocotyle heteromeria	waxweed	Herb	FACU
Hydrocotyle moschata	pennywort	Herb	FAC
Hydrocotyle novae-zeelandiae	pennywort	Herb	FAC
Hymenophyllum demissum	Irirangi, filmy fern	Fern	UPL
Hymenophyllum flabellatum	Mauku, filmy fern	Fern	*UPL*
Hymenophyllum multifidum	Mauku, filmy fern	Fern	UPL
Hymenophyllum rarum	Mauku, filmy fern	Fern	*UPL*
Hymenophyllum revolutum	mauku, filmy fern	Fern	*UPL*
Hymenophyllum villosum	Mauku, filmy fern	Fern	*UPL*
*Hypochaeris radicata**	catsear	Herb	FACU
Hypolepis ambigua	pig fern	Fern	UPL
Hypolepis millefolium	thousand-leaved fern	Fern	*UPL*
Isolepis habra		Rush	FACW
Isolepis species	club rush	Rush	
*Jacobaea vulgaris**	ragwort	Herb	FACU
Juncus antarcticus		Rush	OBL
*Juncus articulatus**	jointed rush	Rush	FACW
*Juncus bufonius**	toad rush	Rush	FACW
*Juncus bulbosus**	bulbous rush	Rush	OBL
Juncus edgariae	wi, wīwī	Rush	FACW
*Juncus effusus**	soft rush	Rush	FACW
Juncus novae-zelandiae	Wīwī, dwarf rush	Rush	FACW
Juncus species		Rush	
Kelleria dieffenbachii		Herb	*UPL*
Lachnagrostis lyallii	mountain wind grass	Grass	FACU
Lachnagrostis species	wind grass	Grass	
Lagenophora cuneata		Herb	*UPL*

Species	Common name	Plant type	Wetland indicator rating
Lagenophora petiolata	parani	Herb	FAC
Lagenophora pumila	papataniwhaniwha	Herb	FAC
Lagenophora strangulata	parani	Herb	*UPL*
Lastreopsis hispida	hairy shield fern	Fern	*UPL*
*Leontodon saxatilis**		Herb	FAC
Leptospermum scoparium	mānuka	Tree	FAC
Leptostigma setulosum		Herb	*FACU*
*Leycesteria formosa**	Himalayan honeysuckle	Shrub	FACU
Libocedrus bidwillii	Pāhautea, kaikawaka, NZ cedar	Tree	FAC
Lobelia angulata	pānakenake	Herb	FAC
*Lolium perenne**	ryegrass	Grass	FACU
Lolium species*		Grass	
*Lotus pedunculatus**	lotus	Herb	FAC
Luzula picta	woodrush	Rush	*UPL*
Luzula rufa var. rufa	woodrush	Rush	*UPL*
Luzula species	woodrush	Rush	
Luzuriaga parviflora		Herb	*UPL*
Lycopodium fastigiatum	Mātukutuku, alpine clubmoss, mountain clubmoss	Fern	FAC
Lycopodium scariosum	Mātukutuku, creeping clubmoss	Fern	*UPL*
Lycopodium volubile	Waewae-koukou, climbing clubmoss	Fern	FACU
Melicytus alpinus	porcupine shrub	Shrub	FACU
Melicytus ramiflorus	māhoe, whiteywood	Tree	FACU
Metrosideros umbellata	southern rātā	Tree	UPL
Microlaena avenacea	bush rice grass	Grass	FACU
Microsorum pustulatum	kōwaowao, pāraharaha, hound's tongue fern	Fern	UPL
Microtis oligantha	small onion orchid	Herb	FAC
Microtis unifolia	māikaika, onion orchid	Orchid	FAC
Muehlenbeckia australis	large-leaved pōhuehue	Vine	FACU
Muehlenbeckia complexa	Pōhuehue	Vine	FACU
*Mycelis muralis**	wall lettuce	Herb	FACU
Myriophyllum propinquum	common water milfoil	Herb	OBL
Myrsine australis	māpou	Tree	FACU
Myrsine divaricata	weeping māpou	Tree	FAC
Neomyrtus pedunculata	Rōhutu	Tree	FAC
Nertera balfouriana	nertera	Herb	FACW
Nertera ciliata	nertera	Herb	FAC
Nertera depressa	nertera	Herb	FACU
Nertera villosa	nertera	Herb	*UPL*
Notogrammitis billardierei	common strap fern	Fern	*UPL*
Notogrammitis heterophylla	comb fern	Fern	UPL
Olearia avicenniifolia	mountain akeake	Tree	*UPL*
Olearia ilicifolia	hakeke, mountain holly	Tree	FACU
Olearia laxiflora	twiggy tree daisy	Shrub	FACW
Oreobolus pectinatus	comb sedge	Sedge	OBL

Species	Common name	Plant type	Wetland indicator rating
Oreobolus strictus		Sedge	FACW
Oxalis magellanica	white oxalis, tūtae-kāhu	Herb	FAC
Oxalis species		Herb	
Ozothamnus vauvilliersii	mountain tauhinu	Shrub	*FACU*
Paesia scaberula	ring fern, pig root fern	Fern	FACU
Pentachondra pumila	dwarf mountain heath	Shrub	FAC
Phlegmariurus varius	clubmoss	Fern	UPL
*Phleum pratense**	timothy	Grass	FACU
Phormium cookianum	whaririki, mountain flax	Herb	FACU
Phormium tenax	harakeke, lowland flax	Herb	FACW
Phyllocladus alpinus	Toatoa, mountain toatoa	Tree	FACU
*Pilosella officinarum**	mouse-ear hawkweed	Herb	FACU
*Pinus radiata**	radiata pine	Tree	FACU
Pittosporum tenuifolium	Kōhūhū	Tree	FACU
*Poa annua**	annual poa	Grass	FACU
Poa breviglumis		Grass	*UPL*
Poa colensoi	blue tussock	Grass	*UPL*
Poa species		Grass	
Podocarpus laetus	Thin bark tōtara, Hall's tōtara	Tree	FACU
Polystichum vestitum	pūniu, prickly shield fern	Fern	FACU
Prasophyllum colensoi	leek orchid	Herb	FAC
Prumnopitys ferruginea	Miro	Tree	FACU
*Prunella vulgaris**	selfheal	Herb	FACU
Pseudognaphalium luteoalbum	pukatea, jersey cudweed	Herb	FACU
Pseudopanax colensoi	orihou, mountain five finger	Tree	UPL
Pseudopanax crassifolius	horoeka, lancewood	Tree	FACU
*Pseudotsuga menziesii**	Douglas fir	Tree	FACU
Pseudowintera colorata	horopito, peppertree	Tree	FACU
Pteridium esculentum	Rārahu, bracken	Fern	FACU
Pterophylla racemosa	kāmahi	Tree	FACU
Pterostylis banksii	green-hooded orchid	Herb	*UPL*
Pterostylis species	green-hooded orchid	Herb	*UPL*
Ranunculus amphitrichus	kawariki	Herb	OBL
Ranunculus cheesemanii	buttercup	Herb	OBL
Ranunculus glabrifolius	kawariki	Herb	OBL
Ranunculus reflexus	Mārūrū, hairy buttercup	Herb	FACU
*Ranunculus repens**	creeping buttercup	Herb	FAC
Raukaua simplex	haumangōroa, three-finger	Tree	UPL
Rubus cissoides	tātarāmoa, bush lawyer	Vine	FACU
*Rumex acetosella**	sheeps sorrel	Herb	FACU
*Rumex obtusifolius**	broad-leaved dock	Herb	FAC
Rytidosperma gracile	danthonia	Grass	FACU
Rytidosperma pumilum	danthonia	Grass	*UPL*
Rytidosperma species	danthonia	Grass	
*Sagina procumbens**	procumbent pearlwort	Herb	FACU
*Salix ´fragilis**	crack willow	Tree	FACW

Species	Common name	Plant type	Wetland indicator rating
Senecio glomeratus	Pukatea	Herb	FACU
Senecio minimus	native fireweed	Herb	FACU
*Sonchus asper**	prickly sow thistle	Herb	FACU
*Stellaria media**	chickweed	Herb	FACU
Stellaria parviflora	native chickweed	Herb	*UPL*
Stylidium subulatum		Herb	OBL
*Taraxacum officinale**	dandelion	Herb	FACU
Thelymitra species	sun orchid	Orchid	
Tmesipteris tannensis	fork fern, chain fern	Fern	*UPL*
*Trifolium pratense**	red clover	Herb	FACU
*Trifolium repens**	white clover	Herb	FACU
*Ulex europaeus**	gorse	Shrub	FACU
Veronica odora		Shrub	*FACU*
Veronica salicifolia	koromiko	Shrub	FACU
*Veronica serpyllifolia**	turf speedwell	Herb	FAC
Viola cunninghamii	white violet	Herb	FAC
Viola filicaulis	forest violet	Herb	FAC

Table 2 – List of bird species recorded at the Southland Wind Farm Site

Common name	Scientific name	Threat status
Eastern falcon/kārearea	*Falco novaeseelandiae novaeseelandiae*	Threatened – Nationally Vulnerable
Long-tailed cuckoo/koekoeā	*Eudynamys taitensis*	Threatened - Nationally Vulnerable
New Zealand pipit/pīhoihoi	*Anthus novaeseelandiae novaeseelandiae*	At Risk – Declining
South Island fernbird/mātātā	*Poodytes punctata punctata*	At Risk – Declining
South Island pied oystercatcher/tōrea	*Haematopus finschi*	At Risk – Declining
Kawau/black shag	*Phalacrocorax carbo novaehollandiae*	At Risk - Relict
Bellbird/korimako	*Anthornis melanura melanura*	Not Threatened
Brown creeper/pīpipi	*Mohoua novaeseelandiae*	Not Threatened
Grey warbler/riroriro	*Gerygone igata*	Not Threatened
Kererū	*Hemiphaga novaeseelandiae*	Not Threatened
New Zealand pigeon/kererū	*Hemiphaga novaeseelandiae*	Not Threatened
Paradise shelduck/pūtangitangi	*Tadorna variegata*	Not Threatened
Rifleman/tītitipounamu	*Acanthisitta chloris*	Not Threatened
Shining cuckoo/pīpīwharauroa	*Chrysococcyx lucidus lucidus*	Not Threatened
Silvereye/tauhou	*Zosterops lateralis lateralis*	Not Threatened
South Island fantail/pīwakawaka	*Rhipidura fuliginosa fuliginosa*	Not Threatened
South Island rifleman/tītitipounamu	*Acanthisitta chloris chloris*	Not Threatened
South Island tomtit/ngirungiru	*Petroica macrocephala macrocephala*	Not Threatened
Southern black-backed gull/ karoro	*Larus dominicanus dominicanus*	Not Threatened
Spur-winged plover	*Vanellus miles novaehollandiae*	Not Threatened
Swamp harrier/kāhu	*Circus approximans*	Not Threatened
Tūī	*Prosthemadera novaeseelandiae novaeseelandiae*	Not Threatened
Welcome swallow/warou	*Hirundo neoxena neoxena*	Not Threatened
Australian magpie	*Gymnorhina tibicen*	Introduced and Naturalised
Blackbird	*Turdus merula*	Introduced and Naturalised
California quail	*Callipepla californica*	Introduced and Naturalised
Chaffinch	*Fringilla coelebs*	Introduced and Naturalised
Dunnock	*Prunella modularis*	Introduced and Naturalised
Goldfinch	*Carduelis carduelis*	Introduced and Naturalised
Greenfinch	*Carduelis chloris*	Introduced and Naturalised
House sparrow	*Passer domesticus*	Introduced and Naturalised
Magpie	*Gymnorhina tibicen*	Introduced and Naturalised
Mallard	*Anas platyrhynchos*	Introduced and Naturalised
Redpoll	*Carduelis flammea*	Introduced and Naturalised
Skylark	*Alauda arvensis*	Introduced and Naturalised
Song thrush	*Turdus philomelos*	Introduced and Naturalised
Starling	*Sturnus vulgaris*	Introduced and Naturalised
Yellowhammer	*Emberiza citrinella*	Introduced and Naturalised

Table 3 – List of invertebrate species recorded at the Southland Wind Farm Site

Scientific Name	Common Name[1]	Location Found	Notes
Megadromus meritus	Ground beetle	Jedburgh, Matariki	Notable species found commonly throughout site, all three colour morphs found
Sigaus campestris	Short-horned grasshopper	Jedburgh	Notable species on the Jedburgh plateau
Geodorcus helmsi	Helms' stag beetle	Jedburgh, Matariki	Notable species
Peripatoides sp.	Ngaokeoke	Jedburgh	Notable species
Athorocophoridae sp. 1	Leaf-veined slug	Jedburgh	Notable species
Platanurida sp.	Giant springtail	Jedburgh	Notable species
Athoracophoridae sp. 2	Leaf-veined slug	Matariki	Notable species
Cantuaria sp.	Trapdoor spider	Jedburgh, Matariki	Notable species
Holcaspis sp.	Ground beetle	Jedburgh	Notable species
Megadromus sp.	Ground beetle	Jedburgh	Notable species
?Icosidesmus sp.	Red and black millipede	Jedburgh, Matariki	Notable species
Anderus fiordensis	Ground wētā	Matariki	Notable species
Chalcodrya sp.	Darkling beetle	Jedburgh	
Gnaphosidae sp.	Ground spider	Jedburgh, Matariki	
Desidae sp.	Spider	Jedburgh	
Tetragnathidae sp.	Stretch spider	Jedburgh	
Dolomedes minor	Nurseryweb spider	Jedburgh	Very common throughout Jedburgh
Carabidae	Ground beetle	Jedburgh	Larvae
Linyphiidae	Money spider	Jedburgh	Many webs in *Veronica odora* shrubs
Sigaus sp.	Grasshopper	Matariki	
Neocicindela sp.	Tiger beetle	Matariki	Larvae in clay banks beside track
Cambridgea sp.	Sheetweb spider	Jedburgh	Webs only
Mamoea sp.	Intertidal spider	Jedburgh	Despite their common name, these spiders are not restricted to the coast.
Phaulacridium marginale	Grasshopper	Jedburgh	In rock outcrop. Winged individual
Monteithiella humeralis	Pittosporum shield bug	Jedburgh	
Hemiandrus sp.	Ground wētā	Jedburgh	In tracking tunnel
Nysius huttoni	Wheat bug	Jedburgh	Many found on and under ACOs
Cambridgea antipodiana	Sheetweb spider	Jedburgh	Under ACO
Socca pustulosa	Garden orb weaver	Jedburgh	Scrub. Many present
Lepidoptera	Caterpillar	Jedburgh	Larva in mud casing on coprosma.
Colaranea viriditas	Orb weaver	Jedburgh	Tauhinu
Acrididae	Grasshopper	Jedburgh	On ACO
Cermatulus nasalis	Brown soldier bug	Jedburgh	On ACO

[1] Many invertebrate common names are shared between different species. For example, short-horned grasshopper refers to many different species in the family Acrididae. Scientific names are most useful for referring to invertebrate species.

Coccinella leonina	Orange-spotted ladybird	Jedburgh	On ACO
Anoteropsis hilaris	Garden wolf spider	Jedburgh	On ACO
Argiope protensa	Tailed grass spider	Jedburgh	Dracophyllum
Pieris rapae	Cabbage white	Jedburgh	
Vanessa itea	Yellow admiral	Jedburgh	
Rhaphidophoridae	Cave wētā	Jedburgh	Dead mānuka
Theridion zantholabio	Tangleweb spider	Jedburgh	Dead mānuka
Pseudococcidae	Mealybug	Jedburgh	Dead mānuka
Zealaranea crassa	White-banded orb weaver	Jedburgh	Coprosma bush
Clubionidae	Sac spider	Jedburgh	Coprosma bush
Segestria sp.	Tube-dwelling spider	Jedburgh	Coprosma bush
Rhomphaea urquharti	Dew-drop spider	Jedburgh	Coprosma
Xanthorhoe semifissata	Barred pink looper	Jedburgh	Coprosma
Zealaranea prina	Orb weaver	Jedburgh	
Acalitus cottieri	Coprosma bud gall mite	Jedburgh	
Oxidus gracilis	Greenhouse millipede	Jedburgh	
Australomimetus sp.	Pirate spider	Jedburgh	On tree
Artystona sp.	Lichen darkling beetle	Jedburgh	On tree
Liothula omnivora	New Zealand bagworm	Jedburgh	Dead mānuka tree
Eudonia leptalaea	Grass moth	Jedburgh	Dead mānuka tree
Acanthoxyla prasina	Spiny stick insect	Jedburgh	
Hexathele waipa	Banded tunnelweb	Jedburgh	
Celatoblatta sp.	New Zealand cockroach	Jedburgh	On tree
Poecilasthena schistaria	Kānuka looper	Jedburgh	Gorse, mānuka, coprosma
Pseudocoremia suavis	Common forest looper	Jedburgh	Gorse, mānuka, coprosma
Hemiandrus ?maculifrons	Ground wētā	Jedburgh	Grass
Zeanecrophilus sp.	Carrion beetle	Jedburgh	Clay bank
Forsteropsalis sp.	Harvestman	Jedburgh	
Plecoptera	Stonefly	Jedburgh	On bush by stream
Cycloctenus sp.	Scuttle spider	Jedburgh	On clay bank beneath Coprosma
Mycetophila unispinosa	Fungus gnat	Jedburgh	Uncommon species. Displaying unusual clustering behaviour around a dead gnat.

Appendix 5 Ecological values

Ecological Values assessment for vegetation and habitat types in the Southland Wind Farm Site.

Vegetation/Habitat Type	Attributes to be Considered	Assigned Value
Southern rātā-kāmahi forest	Representativeness – *Comprises a typical diversity of species that are representative of rimu-matai-kahiktaea-miro-totara/kamahi-southern rata forests that originally occurred within the region.*	High
	Rarity/Distinctiveness – *Vegetation type is listed as Threatened in Southland Region. Indigenous vegetation on an Acutely Threatened Land Environment. Kārearea/New Zealand falcon observed in this habitat.*	High
	Diversity and Pattern – *Moderate diversity in canopy and sub-canopy. Palatable species missing in understorey due to deer browse.*	Moderate
	Ecological Context – *Relatively large gully that provides important buffering to major watercourse and also provides important linkage across Jedburgh Station. Provides habitat for indigenous fauna species moving through the local landscape.*	High
	Overall Ecological Value: Very high	
Mānuka-haumakaroa-mountain holly forest	Representativeness – *Vegetation is dominated by indigenous species and is representative of regenerating habitats.*	Moderate
	Rarity/Distinctiveness – *Vegetation type is listed as At Risk in Southland Region.*	High
	Diversity and Pattern – *Moderate diversity in canopy and sub-canopy. Palatable species likely to be missing in understorey due to deer browse.*	Moderate
	Ecological Context – *Provides buffering to and linkages with adjacent southern rātā-kāmahi forest.*	Moderate
	Overall Ecological Value: High	
Pāhautea /southern rata-kamahi forest	Representativeness – *Comprises a typical diversity of species that are representative of rimu-matai-kahikatea-miro-totara/kāmahi-southern rātā forests that originally occurred within the region.*	High
	Rarity/Distinctiveness – *Vegetation type is listed as Threatened in Southland Region. Indigenous vegetation on Acutely Threatened Land Environments.*	High
	Diversity and Pattern – *Moderate diversity in canopy and sub-canopy. Palatable species missing in understorey due to deer browse.*	Moderate
	Ecological Context – *Provides important linkage between forested habitats on DOC land and the Hedburgh Plateau. Provides habitat for indigenous fauna species moving through the local landscape.*	Moderate

Vegetation/Habitat Type	Attributes to be Considered	Assigned Value
	Overall Ecological Value: Very high	
Mānuka forest and scrub	Representativeness – *Vegetation is dominated by indigenous species and is representative of regenerating habitats.*	Moderate
	Rarity/Distinctiveness – *Indigenous vegetation on Acutely Threatened Land Environments.*	High
	Diversity and Pattern – *Supports a low diversity of indigenous species, which is partly due to deer and stock browsing. Supports Helm's stag beetle and peripatus.*	Low
	Ecological Context – *Provides linkage between indigenous forest on DOC-administered land southern rātā-kāmahi at Jedburgh Station. Provides habitat for indigenous fauna species moving through the local landscape.*	Moderate
	Overall Ecological Value: Moderate	
[Mānuka]/tauhinu-inaka-*Veronica odora* scrub and shrubland	Representativeness – *Vegetation is dominated by indigenous species and is representative of regenerating habitats.*	Moderate
	Rarity/Distinctiveness – *Indigenous vegetation on Acutely Threatened Land Environments. Supports southern grass skink (At Risk – Declining*).	High
	Diversity and Pattern – *Supports a low diversity of indigenous plant species. Palatable species are adversely affected by deer browse.*	Low
	Ecological Context – *Relatively large area of vegetation that provides linkages between other vegetation types*. *Provides habitat for indigenous fauna species moving through the local landscape.*	Moderate
	Overall Ecological Value: Moderate	
Mānuka-inaka-mountain holly-(gorse) scrub and shrubland	Representativeness – *Vegetation is dominated by indigenous species and is representative of regenerating habitats.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. South Island fernbird (At Risk – Declining) recorded in this habitat.*	High
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	
[Mānuka]/gorse-tauhinu scrub	Representativeness – *Vegetation is dominated by indigenous species and is representative of regenerating habitats.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	

Vegetation/Habitat Type	Attributes to be Considered	Assigned Value
Mānuka scrub and shrubland	Representativeness – *Vegetation is dominated by indigenous species and is representative of regenerating habitats.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small area that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	
Mānuka scrub	Representativeness – *Vegetation is dominated by indigenous species and is representative of regenerating habitats.*	Moderate
	Rarity/Distinctiveness – *Indigenous vegetation on Acutely Threatened Land Environments. Not known to support threatened fauna or flora.*	High
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	
Inaka scrub	Representativeness – *Vegetation is dominated by indigenous species and is representative of regenerating habitats.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	
Inaka/copper tussock scrub	Representativeness – *Vegetation is dominated by indigenous species and is representative of regenerating habitats.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	

Vegetation/Habitat Type	Attributes to be Considered	Assigned Value
Exotic unmanaged grassland	Representativeness – *Dominated by exotic vegetation. Not representative of any indigenous vegetation types.*	Very low
	Rarity/distinctiveness – *Does not support indigenous plant communities, although provides potential habitat for southern grass skink (At Risk – Declining).*	Moderate
	Diversity and Pattern – *Does not support indigenous plant communities.*	Very low
	Ecological Context – *Limited ecological context values.*	Low
	Overall Ecological Value: Low	
Exotic grazed grassland	Representativeness – *Dominated by exotic vegetation. Not representative of any indigenous vegetation types.*	Very low
	Rarity/distinctiveness – *Does not support indigenous plant communities, although provides potential habitat for bird species such as pipit (At Risk – Declining)*	Moderate
	Diversity and Pattern – *Does not support indigenous plant communities.*	Very low
	Ecological Context – *Limited ecological context values*	Very low
	Overall Ecological Value: Negligible	
Fen wetland	Representativeness – *Highly representative of blanket fen wetlands present in Southland.*	High
	Rarity/distinctiveness - *Habitat type is not Threatened, At Risk, or Rare in Southland Region. South Island fernbird (At Risk – Declining) recorded in this habitat.*	High
	Diversity and Pattern – *Supports a high diversity of plant species.*	High
	Ecological Context - *Provides infiltration for water and is part of a habitat network for wetland fauna in the local area.*	Moderate
	Overall Ecological Value: Very high	
Bog wetland	Representativeness – *Highly representative of bog wetlands present in Southland.*	High
	Rarity/distinctiveness - *Vegetation type is listed as Threatened in Southland Region. The indigenous orchid Aporostylis bifolia is sometimes abundant in these wetlands.*	High
	Diversity and Pattern – *Supports a high diversity of plant species.*	High
	Ecological Context - *Provides infiltration for water and is part of a habitat network for wetland fauna in the local area.*	Moderate
	Overall Ecological Value: Very high	

Vegetation/Habitat Type	Attributes to be Considered	Assigned Value
Copper tussock/rautahi marsh	Representativeness - *Highly representative of marsh wetlands present in Southland.*	High
	Rarity/Distinctiveness – *Marshes are a Threatened habitat type in Southland Region. Indigenous vegetation on Acutely Threatened Land Environments. Wetlands provide potential foraging and breeding habitat for bittern.*	High
	Diversity and Pattern - *Supports the expected diversity of indigenous species for this habitat type.*	Moderate
	Ecological Context – *Although relatively isolated, these wetlands are likely to provide important stepping stone habitat for mobile wetland bird species.*	High
	Overall Ecological Value: Very high	
Mānuka-inaka/copper tussock marsh	Representativeness – *Highly representative of copper tussock-dominant vegetation types in Southland.*	High
	Rarity/Distinctiveness – *Vegetation type is listed as Threatened in Southland Region.*	High
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small area largely surrounded by pine plantation.*	Low
	Overall Ecological Value: High	
[Gorse]/copper tussock grassland	Representativeness – *Moderately representative of copper tussock-dominated vegetation types in Southland.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	
Mānuka/copper tussock shrubland	Representativeness – *Moderately representative of copper tussock-dominated vegetation types in Southland.*	High
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Likely habitat for threatened skink species (tussock skink). Likely to support protected and notable invertebrate species.*	High
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: High	

Vegetation/Habitat Type	Attributes to be Considered	Assigned Value
Mānuka/copper tussock grassland	Representativeness – *Moderately representative of copper tussock-dominated vegetation types in Southland.*	High
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Confirmed habitat for threatened skink species (tussock skink). Likely to support protected and notable invertebrate species.*	High
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: High	
[Mānuka-gorse]/copper tussock grassland	Representativeness – *Vegetation is dominated by indigenous species and is moderately representative of copper tussock-dominated vegetation types in Southland.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	
[Wilding conifer]/copper tussock shrubland	Representativeness – *Moderately representative of copper tussock-dominated vegetation types in Southland.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species, although palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	
[Wilding conifer]/copper tussock grassland	Representativeness – *Moderately representative of copper tussock-dominated vegetation types in Southland.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species. Palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Very areas that provide minimal buffering and linkage functions.*	Very low
	Overall Ecological Value: Moderate	

Vegetation/Habitat Type	Attributes to be Considered	Assigned Value
Copper tussock grassland	Representativeness – *Representative of copper tussock grassland present in Southland region.*	High
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports the expected diversity of plant species for the habitat type. Palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Very areas that provide minimal buffering and linkage functions.*	Very low
	Overall Ecological Value: High	
Gorse scrub	Representativeness – *Dominated by exotic vegetation. Not representative of any indigenous vegetation types.*	Very low
	Rarity/distinctiveness – *Does not support threatened habitats, plants or animals.*	Very low
	Diversity and Pattern – *Does not support indigenous plant or animal communities.*	Very low
	Ecological Context – *Provides limited buffering to some indigenous vegetation types.*	Low
	Overall Ecological Value: Negligible	
Gorse/copper tussock grassland	Representativeness – *Moderately representative of copper tussock-dominated vegetation types in Southland.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a low diversity of indigenous plant species. Palatable species are adversely affected by deer browse.*	Low
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Low	
Gorse/copper tussock shrubland	Representativeness – *Moderately representative of copper tussock-dominated vegetation types in Southland.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a low diversity of indigenous plant species. Palatable species are adversely affected by deer browse.*	Low
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Low	

Vegetation/Habitat Type	Attributes to be Considered	Assigned Value
[Wilding conifer]/gorse-copper tussock scrub	Representativeness – *Not considered representative of copper tussock-dominated vegetation types in Southland due to presence of exotic plant species.*	Low
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a low diversity of indigenous plant species. Palatable species are adversely affected by deer browse.*	Low
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Negligible	
Mānuka-gorse/copper tussock shrubland	Representativeness – *Vegetation is adversely affected by exotic species.*	Low
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland Region. Confirmed habitat for threatened skink species (tussock skink).*	High
	Diversity and Pattern – *Supports a moderate diversity of indigenous plant species. Palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	
Wilding conifer /mānuka-copper tussock shrubland	Representativeness – *Moderately representative of copper tussock-dominated vegetation types in Southland.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Supports a low diversity of indigenous plant species. Palatable species are adversely affected by deer browse.*	Low
	Ecological Context – *Small areas that provide minimal buffering and linkage functions.*	Low
	Overall Ecological Value: Low	
Exotic broom shrubland	Representativeness – *Dominated by exotic vegetation. Not representative of any indigenous vegetation types.*	Very low
	Rarity/distinctiveness – *Does not support threatened habitats, plants or animals.*	Very low
	Diversity and Pattern – *Does not support indigenous plant or animal communities.*	Very low
	Ecological Context – *Provides limited buffering to watercourse.*	Low
	Overall Ecological Value: Negligible	

Vegetation/Habitat Type	Attributes to be Considered	Assigned Value
Kōhūhū/gorse/rarauhe scrub	Representativeness – *Dominated by indigenous species. Moderately representative of regenerating vegetation in Southland region.*	Moderate
	Rarity/Distinctiveness – *Indigenous vegetation on an Acutely Threatened Land Environment.*	High
	Diversity and Pattern – *Supports a low diversity of indigenous plant species. Palatable species likely to be browsed by deer.*	Low
	Ecological Context – *Small, isolated area that provides limited buffering and linkage functions.*	Low
	Overall Ecological Value: Moderate	
Exotic conifer plantation forest	Representativeness – *Dominated by exotic species, but includes small areas of indigenous riparian vegetation.*	Low
	Rarity/Distinctiveness – *Long-tailed bats (Threatened – Nationally Critical) have been recorded.*	High
	Diversity and Pattern – *Supports a low diversity of indigenous plant species. Floral community may provide seeds and insects for indigenous birds.*	Low
	Ecological Context – *Forms part of a large indigenous-exotic tract of forest that has connectivity to the Catlins Forest Park. Likely to be used by mobile fauna as stepping stone habitat.*	Moderate
	Overall Ecological Value: Moderate	
Indigenous scrub and shrubland	Representativeness – *Dominated by indigenous species. Moderately representative of regenerating vegetation in Southland region.*	Moderate
	Rarity/Distinctiveness – *Habitat type is not Threatened, At Risk, or Rare in Southland region. Not known to support threatened fauna or flora.*	Low
	Diversity and Pattern – *Likely to support a moderate diversity of indigenous plant species. Palatable species are adversely affected by deer browse.*	Moderate
	Ecological Context – Small and narrow; partially buffered by exotic conifer plantation forest	Low
	Overall Ecological Value: Moderate	
Mixed indigenous-conifer forest and scrub	Representativeness – *Presence of gorse and wilding conifers reduces representativeness of this vegetation type.*	Low
	Rarity/Distinctiveness – *Potential habitat for threatened skinks species.*	Moderate
	Diversity and Pattern –*Supports a moderate diversity of indigenous plant species, although palatable species may be adversely affected by deer browse.*	Moderate
	Ecological Context – *Small areas that provide minimal buffering and linkage functions. Largely buffered by plantation forest*	Low
	Overall Ecological Value: Moderate	

Appendix 6 Bird collision modelling report (Bluewattle Ecology Ltd)

Contact Energy Limited

Southland Wind Farm
Bird Strike Modelling

Bluewattle Ecology
ecological assessment + restoration

TABLE OF CONTENTS

Prepared by: Derek Christie & Gerry Kessels

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EXECUTIVE SUMMARY

The purpose of this modelling exercise is to assist in the assessment of potential effects of the Southland Wind Farm project on bird strike of avifauna to inform the applications under the Fast-track Approvals Act 2024.

Contact Energy Limited (Contact) is seeking various approvals necessary for the construction, operation and maintenance of a wind farm in Slopedown, Mimihau, Southland (the Project). The Project includes up to 55 wind turbines and associated infrastructure.

This site contains, and is adjacent to, high value habitats for indigenous birds, including Threatened or At Risk species, which may be at high or moderate risk of colliding with turbine blades when the wind farm becomes operational.

Wildland Consultants Ltd (Wildlands) has completed a number of avifauna surveys across the Southland Windfarm, including the most recent three avifauna surveys to collect 'data on seasonal bird abundance and diversity, flight heights, and flight paths.' The first of these targeted surveys was conducted in October and November 2024, the second in February 2025, and the third in May 2025. This assessment collates data from Wildlands to model bird strike risk caused by the proposed Southland Wind Farm.

Of the eleven species modelled, harrier, bellbird and black-backed gull are predicted to have reasonably common strike events. For the other species, the predicted strike risk is very low.

In terms of perceived and actual collision risk (based on overseas and available New Zealand literature on wind farms in similarly high value bird habitat areas), we consider the Southland Wind farm to be a low-risk site.

1 INTRODUCTION

1.1 SCOPE

Contact Energy Limited (Contact) is seeking various approvals necessary for the construction, operation and maintenance of a wind farm in Slopedown, Southland (the Project). The Project includes up to 55 wind turbines and associated infrastructure. As part of these investigations, Contact Energy commissioned Bluewattle Ecology to undertake a preliminary modelling assessment of potential turbine strike risk on birds. The objectives of this report are as follows:

i. Compile existing bird survey data for the site, collected in 2024 and 2025 by Wildlands, to feed into the 'Band' turbine strike risk model. Wildlands has gathered data, which informs seasonal bird abundance and diversity, flight heights, and flight paths to build the model. Literature and datasets were also used to further inform the model inputs.

ii. Identify the probability of bird mortalities from turbine blade collisions by applying the 'Band' turbine strike risk model to key species, using available data and metrics to determine to the likelihood of turbine collisions.

iii. This assessment focuses on bird species most at risk of striking operational wind turbine blades. It does not include risk modelling for species deemed to be at low risk of turbine strike, as assessed by Wildlands (2025). Consequently, priority has been given to evaluating collision risk for indigenous species identified as potentially moderate to high risk of turbine strike.

1.2 AUTHOR QUALIFICATIONS

The authors of this report have been involved in the study and assessment of wind farm projects in New Zealand over the last 20 years.

Mr. Kessels is an experienced ecologist and independent hearing commissioner. He has undertaken ecological assessments or peer reviews of wind farms since 1998, including Tararua Wind Farm, Te Uku, Hauāuru Mā Raki (HMR), Puketoi, Mt Cass, and review of several others, such as the Castle Hill, Waipipi (Waverly) and Kaiwaikawe. In 2011, Mr Kessels presented the findings of his research on assessing and predicting avian bird strike risk in New Zealand to the first International Wildlife and Wind Farm Conference in Norway on behalf of the NZ Ecological Society.

Mr Christie is a qualified wildlife statistician with over 25 years' teaching and consulting experience in statistics. He has carried out statistical analysis for avifauna and bat assessments and advised on the statistical aspects of monitoring and mitigation for a number of windfarms in New Zealand since 2008. His special interest is in nonstandard analyses with unusually distributed data. He has contributed towards several scientific papers related to New Zealand birds, wind farms, and Monte Carlo risk analysis.

1.3 KEY DEFINITIONS

Project Footprint:	Refers to the extent of physical works; site compounds, laydown areas, roading, turbine platforms, fill sites.
The Site:	Refers to the properties within which the wind farm will be developed.
Study Area:	Refers to the potential receiving environment and the extent of any fauna distribution studies.
Resident Birds:	A population of non-migratory birds which reside within the site and use it for roosting and nesting.
Local Birds:	A population of non-migratory birds whose home range extends to include all or part of the Southland Windfarm site but do not roost or nest within the site.
Migrant Birds	Birds which undertake regular seasonal movement, often north and south along a flyway, between breeding and wintering grounds.
Native or Indigenous:	In its broadest sense, a species is defined as native or indigenous if it has originated or occurs in New Zealand as the result of a natural process (without human involvement). A species which is native to NZ may also be native to other countries (e.g. kingfisher, inanga).
Endemic:	This can be considered a subset of native. A species is defined as endemic if it has evolved and occurs and breeds naturally only in New Zealand (e.g. tui, red beech, long tailed bat).
Introduced:	A species that has been introduced accidentally or deliberately by human activity outside its natural range.
CRM	Collision Risk Modelling
MC - Monte Carlo	Monte Carlo Simulation is a computer simulation that seeks to determine the likelihood of various scenarios by running multiple simulations using random variables. The results of the Monte Carlo simulation show the most likely outcomes (thefreedictionary.com).

2 METHODOLOGY

2.1 SPECIES MODELLED

This section presents the results of the Band modelling for turbine strike risk at the Southland Wind Farm. Contact Energy requested that eleven species were modelled as listed:

- bellbird
- tui
- kereru
- pipit
- harrier
- paradise duck
- black-backed gull
- South Island fernbird
- South Island pied oystercatcher (SIPO)
- bittern
- falcon

We analysed eight of these species using five-minute bird count (5MBC) data provided by Wildlands. SIPO, bittern and falcon were modelled separately using conventional trail density data estimates to calculate mortality.

2.2 DESKTOP REVIEW OF LITERATURE DATA

2.2.1 KEY DATASETS USED

This assessment began with a review of relevant documents, and previous reports prepared for the area and its surroundings, primarily using the data obtained by Wildlands from the following surveys used to assess effects on avifauna by the Project, including:

- Five-minute count data from surveys undertaken in April 2023, Oct/Nov 2024, February 2025, and May 2025 (including flight height surveys).
- Fixed point falcon surveys undertaken in Oct/Nov 2024, February 2025, and May 2025.
  Cryptic wetland bird playback and bioacoustic surveys undertaken in April 2023, Oct/Nov 2024, February 2025, and May 2025 (Molles & Bedoya 2025) .

2.3 COLLISION RISK MODELLING METHOD

2.3.1 OVERVIEW: COLLISION RISK MODELLING - THE BAND MODEL

Avian collision risk models are valuable tools used in the impact assessment of wind farms. In the UK, the most frequently used avian collision risk model for onshore windfarms is commonly known as 'the Band model' developed for onshore wind turbines (Band et al., 2007) and promoted as guidance by Scottish Natural Heritage (Scottish Natural Heritage, 2005). The Band model for wind farm collision risk modelling has been used widely in New Zealand and overseas. While all models have their limitations, the Band model has been trialled and improved over time and is generally considered to be statistically sound (Chamberlain et al., 2005; Masden & Cook, 2016). NatureScot continually updates its advice and information on the model.

1. The model starts with some measure of flight activity across the proposed farm for some particular species. In our case we use the trail density for that species. Imagine that every bird of our species at the wind farm is equipped with a GPS tracker, and the complete trail for every bird over the course of a year is plotted on a master map. A 1 km grid is laid on the map. The total length of trail in each 1 km square on average is the trail density measured in total km of trails per square km per year.
2. Next, we use flight height data for our species to estimate the trail density at rotor height.
3. A simple formula now allows us to estimate the number of birds that will fly through the actual turbine circles each year. The number of flights through the turbines = number of turbines x trail density at rotor height x $\pi/4$ x turbine diameter.
4. Most birds pass through the turbines unharmed. Part of the Band model is a spreadsheet that takes in details of the bird's size and speed, as well as the turbine specifications, and returns the turbine risk for a single flight through a turbine. Typically, about 5% of transits result in death. This figure is applied to the result of step 3.
5. Finally, we have assumed that the birds' flying behaviour is the same before and after turbine construction. This is far from true. Studies have shown that a very high proportion of birds avoid turbines. NatureScot collates and updates lists of avoidance rates (AR) for particular species and for classes of birds. Many are over 99% (that is, less than 1% of the pre-construction flights are seen post-construction). For some of our species, it may be possible to find a close surrogate species, but NatureScot gives a default AR of 98% for other species. This value can be regarded as precautionary. This AR is applied to step 4.
6. If the information is available, it may be possible to adjust the step 5 result to account for the time the turbines are stationary due to low wind or maintenance.

The model used for this strike risk analysis is a refined version of the Band model, tested through peer review (Christie & Urquhart, 2015) and technical expert review for the HMR Wind Farm consent application (Craig, et al., 2015).

The general application of this refined Band model for the Southland Wind Farm uses the trail density calculated within the site based on the 5MBC data and our expert opinion on utilisation of the site based on this data. The strike risk analysis addresses the uncertainties underlying the lack of on-site data by using a Monte Carlo Risk Analysis (MCRA).

2.3.2 MODELLING METRICS

To run the model, a range of metrics are required, relating to each species of bird, to the turbines, and to the wind farm site and layout. These metrics are outlined in the following sections.

2.3.2.1 TURBINES

To determine the level of risk the wind farm would pose to resident, local, and migratory species, the following turbine metrics are required for the Band model:

- Number of turbines
- Number of blades
- Maximum chord (width of the blade) (m)
- Pitch (degrees)
- Rotor diameter (m)
- Rotation period (sec)
- Height to nacelle, and the upper and lower blade tip height (m)

The turbine specifications for the SWF Windfarm are shown in Table 1.

Table 1: Turbine Specifications used for the strike risk model

Designation	SWF – indicative 6.6MW turbine	Fixed/Variable
K	1	N/A
No Blades	3	Fixed
Max Chord (m)	4.5	Fixed
Pitch (degrees)	2	Variable
Rotor Dia (m)	170	Fixed
Rotation Period (sec)	6.8 - 11.8	Variable
Height to Nacelle	135	Fixed
Turbine Downtime	9 – 12%	Variable
Lower Blade tip	50	Fixed
Upper Blade tip	220	Fixed
Allowance for overlap	0%	N/A

2.3.2.2 AVIFAUNA

The following information is required for each avifauna species for the model:

- Bird metrics (length, wingspan, speed of flight) of each species of concern;
- A measure of the bird activity in the farm area. For this analysis the trail density is used and is the average total lengths of flights per square km per year.
- The percent of birds crossing the footprint which flies within the RSA (rotor swept area);
- The turbine strike risk - the percentage of birds entering a turbine circle that are killed: and
- The turbine avoidance rate.

2.3.2.3 OTHER METRICS

- Turbine downtime; when wind velocity is too low or too high for generation and blades drift.
- Windfarm - 55 turbines.

2.3.3 MODELLING USING FIVE MINUTE BIRD COUNT DATA

The overall aim of the modelling is to assess the risk that the proposed Southland Wind Farm poses to key bird species of concern, including those both resident and migrating through the site.

The most systematic and complete bird survey data we have comes from 352 five-minute bird count (5MBC) sessions over late 2024 and early 2025 (Wildlands 2024 and 2025). 5MBC data is usually used to compare relative population density over space or time, but we will consider it from the perspective of quadrat sampling which can be used to estimate absolute densities. Each 5MBC session counts the birds within 200 m, so each can be regarded as a circular quadrat sample of radius 200 m. For each particular species, field survey experts need to estimate the proportion of birds present which are likely to be detected and the average distance individual birds will fly each day.

2.3.4 MONTE CARLO RISK ANALYSIS (MCRA)

All the mortality calculations have a degree of uncertainty. The underlying concept of a MCRA is that uncertain model inputs are given a distribution of plausible values from which a random but plausible input is taken. A set of random inputs gives a plausible scenario. The range of plausible scenarios gives a distribution of plausible mortalities. Statistical inferences about mortality can thus be made from this distribution.

The four important MCRA principles are:

i. All randomly generated inputs must be plausible.

ii. All plausible inputs must have some chance of being generated.

iii. The likelihood of any particular input value being generated must reflect the likelihood of that value occurring in real life.

iv. A 'worst case or precautionary analysis' is only undertaken once and at the end of the process.

To run a MCRA analysis, we give each uncertain input a random but plausible value from its MC distribution. These random but plausible inputs create a random but plausible scenario for the Band model, resulting in random but plausible scenario mortality for the species. A large number of these plausible mortalities are collated to give a plausible range for the species mortality.

The 20th and 80th percentiles of the collated MC mortality make a quick and easy to understand range. The true value is more likely than not to be in that range, and there is an 80% chance that the mortality is less than the worst value.

2.3.5 DETERMINATION OF THE AVOIDANCE RATE (AR).

The first stage of the collision risk model (CRM) assumes that birds approaching a turbine do not attempt to avoid it. However, it is known that all birds have a significant avoidance behaviour. The CRM accounts for this by applying an avoidance rate.

The NatureScot guidance for use of the Band CRM provides recommended avoidance rates for a number of key species. The guidance is updated when robust new information becomes available. The 2018 version, referenced here, replaces previous 2010 and 2016 versions and is the most current available (NatureScot, 2018).

In this guidance, a precautionary avoidance rate of 98% has been recommended for species where existing data is not available. However, for the majority of species groups where data is available, avoidance lies between 99% and 100%. For this study, we have chosen to do MCRA of risk using a three point distribution of avoidance rates - low 98%, mode 98.7% and high 99.5%.

3 STRIKE RISK ASSESSMENT

3.1 WHAT WE KNOW TO DATE

Collision mortality monitoring is an important tool for evaluation of the operational effects of wind farms on birds. However, results from collision mortality monitoring at operational wind farms are available from only few sites across Aotearoa New Zealand.

Fuller (2021) presented a summary of collision data from five onshore wind farms across Aotearoa New Zealand at the 2022 conference of the New Zealand Wind Energy Association (NZWEA). This presentation concluded that of 21 commissioned wind farms, data from systematic monitoring programmes were only available from five. It was found that most collisions (80%) were from just five species/groups: harrier, finch species, skylark, magpie, and mallard duck, although it appears there was variation across the wind farms. Collision rates, for example, varied from 1–11 mortalities per turbine per year and depended on a range of factors, such as differences in topography, habitat types, turbine configuration, and avifaunal community composition.

3.2 MODELLING RESULTS

Using the dataset supplied by Wildlands from the 5MBC surveys, an estimation of the trail density was determined for each species where 5MBC data was collected on site. This allowed for sufficient inputs into the step 1 of the Band model. Height data observed during the 5MBC surveys for the species yield sufficient data to input into step 2. The remaining steps of the Band Model were completed using turbine and species metrics.

Table 2 summarises the outputs of predicted strike risk of the key species where 5MBC data was available, and Appendix 1 shows screen shots of the model outputs for each of these species.

Table 2: Summary of Collision Risk Mortality for the Proposed Southland Wind Farm for each bird species modelled (for detailed model outputs see Appendix I).

KEY SPECIES	CONSERVATION STATUS	5MBC (total observations)	Modelled result Mortality of Birds/Year	Assessed magnitude of effect
Harrier	Not Threatened	14	20 - 40 birds/year	Moderate to High
Bellbird	Not Threatened	186	2 - 4 birds/year	Moderate
Southern black-backed gull	Not Threatened	16	4 - 8 birds/year	Moderate
Kererū	Not Threatened	8	1 bird every 3 - 6 years	Low
Paradise shelduck	Not Threatened	5	1 bird every 4 - 8 years	Low
Tūī	Not Threatened	5	1 bird every 5 - 9 years	Low
Pipit	At Risk - Declining	40	1 bird every 20 - 40 years	Negligible
South Island fernbird	At Risk - Declining	6	Virtually 0	Negligible
South Island Pied Oystercatcher	At Risk - Declining	See text	1 bird every 8 to 16 years	Low
New Zealand falcon (*Falco novaeseelandiae*), eastern form	Threatened - Nationally Vulnerable	See text	1 bird every 15 - 40 years	Negligible
Australasian bittern	Threatened – Nationally Critical	See text	Virtually 0	Negligible

3.2.1 FALCON

Falcons have been observed anecdotally and during fixed-point surveys, although they were not observed during the 5MBC sessions. As such, this method was not able to be used to calculate strike risk for falcon. However, trail density was estimated from the size of their home range and their predictable hunting behaviour. A MC analysis used an average home range distribution from 20 to 180 km^2 centred on the farm footprint, and experts estimated the average distance each falcon flies each day to be between 20 and 60 km, and the proportion of flights at rotor height to be between 14% and 24% considering the ground clearance. This analysis assumes that every part of the farm is within the home range of a pair of falcons. If this is not true, then the estimated mortality is even less.

3.2.2 BITTERN

No bitterns have been seen on site, but it is possible that the occasional one may fly over some part of the farm exploring or moving from one suitable habitat to another. One approach to this is to estimate the number of flights over the farm which will produce one fatality. A MC analysis found that it would take between 7,000 and 13,000 flights to produce one bittern death due to turbine blade strike.

Even if a bittern flew over the farm every day for a year, then the mortality would probably be one death every 18 to 35 years, so we can conclude that bittern mortality will be essentially zero.

3.2.3 SOUTH ISLAND PIED OYSTER CATCHER (SIPO)

SIPO breeding on the SWF site are at risk and could potentially be occasionally struck. However, SIPO from the estuaries along the Southland coast from about Riverton to Fortrose migrate NE/SW to and from the east coast. Some of these birds may cross the SWF footprint and be at risk.

If specific data is needed about the SWF site, there are few alternatives to having observers on the farm during the migration periods. However, another approach that will provide useful information is to determine the average annual trail density in the area to the north and east of the Southland coast and use the Band model. From this, we can estimate the mortality for a general 55 turbine farm in the migration corridor. SWF lies in that corridor, and there is no reason the SWF mortality will differ noticeably from the average.

Southland wader census data from OSNZ show that over the last 10 years or so, on average, about 2,300 SIPO travel NE/SW from the Southland coast to the South Island east coast each year and back again. This gives an estimated total of 4,600 flights per year. Assuming the migration corridor is about 100 km wide, the trail density about 46 flights/km/year. The calculation now follows the standard Band model steps. One essential input to the Band model is the percentage of flights at rotor height. A large collection of SIPO heights from the Hauāuru mā raki Wind Farm radar and observer-based studies over three years (Craig et al 2015) and adjusted for the SWF turbine dimensions, shows that approximately 50% of flights will be at the height of SWF rotors.

3.2.4 LIMITATIONS

The model is based on a seasonal snapshot of data which gathered metrics of seasonal bird abundance and diversity, flight heights, and flight paths across two survey periods.

4 CONCLUSION

This site contains, and is adjacent to, high value habitats for indigenous birds, including Threatened or At Risk species, which may be at high or moderate risk of colliding with turbine blades when the wind farm becomes operational.

Of the eleven species modelled, harrier, bellbird and black-backed are predicted to have reasonably common strike events.

For the other species, the predicted strike risk is very low.

In terms of perceived and actual collision risk (based on overseas and available New Zealand literature on wind farms in similarly high value bird habitats areas), we consider the Southland Wind farm to be a low-risk site.

ACKNOWLEDGMENTS

We would like to thank the Wildlands avifauna team for providing data and review of modelling exercise; particularly Nick Goldwater and Dr Della Bennet. We would also like to thank Eva Kessels for complying the report and relevant data. The Southland branch of the ornithological society supplied wader census data which was of invaluable assistance in determining strike risk for South Island pied oyster catcher.

REFERENCES & BIBLIOGRAPHY

Alerstam, T., Rosen, M., Backman, J., Ericson, G., & Hellgren, O. (2007). Flight speeds among bird species: Allometric and phylogenetic effects. PLoS Biology, 5(8), 1656–1662.

Band, W., Madders, M., & Whitfield, D. P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In Birds and Wind Farms: Risk Assessment and Mitigation (pp. 259–275). Lynx Edicions.

Battley, P.F.; Schuckard, R.; Melville, D.S. 2011: Movements of bar-tailed godwits and red knots within New Zealand. Science for Conservation 315. Department of Conservation, Wellington. 56 p.

Boffa Miskell (2019). Waverley Wind farm Bird Collision Monitoring Plan Methodology. Prepared for Tilt Renewables Limited. Boffa Miskell Limited Contract Report No. W18053-002. 50pp.

Boffa Miskell (2022). Kaiwaikawe wind farm. Bird collision monitoring plan (Draft). Prepared for Tararua Wind Power. 45 pp.

Boffa Miskell Bull L.S., Fuller S., and Sim D. (2013). Post-construction avian mortality monitoring at Project West Wind. New Zealand Journal of Zoology 40: 28-46.

Bull L.S., Fuller S., and Sim D. (2013). Post-construction avian mortality monitoring at Project West Wind. New Zealand Journal of Zoology 40: 28-46.

Chamberlain, D., Freeman, S., & Rehfisch, M. (2005). Appraisal of Scottish Natural Heritage's wind farm collision risk model and its application (BTO Research Report No. 401; pp. 1–53). British Trust for Ornithology.

Christie, D., & Urquhart, B. (2015). A refinement of the Band spreadsheet for wind turbine collision risk allowing for oblique entry. New Zealand Journal of Zoology, 42(4), 290–297.

Craig, J. L., Kessels, G., Langlands, P., & Daysh, S. (2015). Planning for Net Biodiversity Gains: A case study of Hauāuru mā raki Wind Farm, New Zealand. Wind and Wildlife: Proceedings from the Conference on Wind Energy and Wildlife Impacts, October 2012, Melbourne, Australia, 69–91.

Cromarty, P., & Scott, D.A. (eds). (1995). A directory of wetlands in New Zealand. Department of Conservation, Wellington, New Zealand.

Department of Conservation. (2024). Director-General, Department of Conservation Comment on the Waiuku Wind Farm fast Tracking application: www.epa.govt.nz/assets/Uploads/Documents/Fast-track-consenting/Waiuku-Wind-Farm/comments-received/57.-2Jul24-DOC-Comments-received.pdf

Dowding, J. E. (2001). Natal and breeding dispersal of northern New Zealand dotterels (Conservation Advisory Science Notes No. 338). Department of Conservation.

Dowding, J. E. (2009). Taharoa wind farm resident bird plan: Management of New Zealand Dotterels and other resident shorebirds at Taharoa beach. Taharoa C.

Dowding, J. E. (2019). Sites of importance to shorebirds and seabirds in the Waikato region (Waikato Regional Council Technical Report TR2019/20). Prepared by DM Consultants for Waikato Regional Council.

Dowding, J. E., & Moore, S. J. (2006). Habitat networks of indigenous shorebirds in New Zealand (Science for Conservation No. 261). Department of Conservation.

EBird. (n.d.). New Zealand Bird Atlas: Atlas effort. https://ebird.org/atlasnz/effortmap

Everaert, J. (2003). Wind turbines and birds in Flanders: Preliminary study results and recommendations. Natuur.Oriolus, 69, 145–155.

Everaert, J., & Stienen, E. W. M. (2007). Impacts of wind turbines on birds in Zeebrugge (Belgium): Significant effect on breeding tern colony due to collisions. Biodiversity and Conservation, 16, 3345–3359.

Fuller, S. A. (2021). Statement of evidence of Stephen Fuller in the matter of a resource consent application by Tararua Wind Power Ltd under section 88 of the RMA for the Kaiwaikawe Wind Farm, Northland (Evidence No. W18144C). Prepared by Boffa Miskell Ltd for Tararua Wind Power Ltd.

Fuller, S. A., McLennan, J., Dowding, J. E., Barea, L., & Craig, J. (2009). Assessment of potential avian mortality at the proposed Taharoa Wind Farm, Taharoa Beach, Kawhia, Waikato. Unpublished report to The Proprietors of Taharoa C, Department of Conservation and Waitomo District Council.

Heather, B. D., & Robertson, H. A. (2015). The field guide to the birds of New Zealand. Penguin Books.

IUCN. (n.d.). The IUCN red list of threatened species. Retrieved July 26, 2013, from http://www.iucnredlist.org/

Kessels & Associates Ltd. 2009. NZ Windfarms Ltd Te Rere Hau Wind Farm eastern extension: Assessment of ecological effects. Prepared by Kessels & Associates Ltd for NZ Windfarms Ltd.

Masden, E. A., & Cook, A. S. C. P. (2016). Avian collision risk models for wind energy impact assessments. Environmental Impact Assessment Review, 56, 43–49.

Marques A.T., Batalha H. and Bernadino J. (2021). Bird displacement by wind turbines: assessing current knowledge and recommendations for future studies. Birds 2021(2): 460-475.

Miskelly, C. M. (n.d.). New Zealand Birds Online. https://nzbirdsonline.org.nz/

Molles,L. & Bedoya, C. 2025. Nocturnal Acoustic Analysis Multispecies analysis — Southland Wind Farm May 2025. DigiLab Sound Science

NatureScot. (2018). Wind farm impacts on birds – Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model. Scottish Natural Heritage. https://nature.scot/doc/wind-farm-impacts-birds-use-avoidance-rates-naturescot-wind-farm-collision-risk-model

O'Donnell, C.F.J.; Williams, E.M. 2015. Protocols for the inventory and monitoring of populations of the endangered Australasian bittern in New Zealand. Department of Conservation Technical Series No 38. Department of Conservation, Wellington.

Pennycuick, C. (1997). Actual and "optimum" flight speeds: Field data reassessed. Journal of Experimental Biology, 200(17), 2355–2361.

Powlesland, R. G. (2009). Bird species of concern at wind farms in New Zealand (DOC Research & Development Series No. 317). Department of Conservation.

Robertson, C. J. R., Hyvonen, P., Fraser, M. J., & Pickard, C. J. (2007). Atlas of bird distribution in New Zealand: 1999-2004. Ornithological Society of New Zealand.

Robertson, H. A., Baird, K. A., Elliott, G. P., Hitchmough, R. A., McArthur, N., Makan, T. D., Miskelly, C. M., Sagar, P. M., Scofield, R. P., Taylor, G. A., & Michel, P. (2021). Conservation status of birds in Aotearoa New Zealand, 2021 (New Zealand Threat Classification Series No. 36). Department of Conservation.

Schuster E., Bulling L. and Köppel J. (2015). Consolidating the state of knowledge: a synoptical review of wind energy's wildlife effects. Environmental Management 56: 300-331.

Scottish Natural Heritage. (2005). Guidance: Survey methods for use in assessing the impacts of onshore windfarms on bird communities. Scottish Natural Heritage.

Scottish Natural Heritage. (2018). Wind farm impacts on birds - Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model (p. 4). Scottish Natural Heritage. https://www.nature.scot/

Southey, I. (2009a). Migration in New Zealand. Southern Bird, 40, 9–10.

Southey, I. (2009b). Numbers of waders in New Zealand 1994-2003 (DOC Research & Development Series No. 308). Department of Conservation.

Stewart, P. (2016). Acoustic recorders for detection of cryptic avifauna: A trial of two coastal wetlands in the Waikato Region (Waikato Regional Council Technical Report TR 2016/06). Prepared by Red Admiral Ecology for Waikato Regional Council.

Tucker, V. A., & Schmidt-Koenig, K. (1971). Flight speeds of birds in relation to energetics and wind directions. The Auk, 88(1), 97–107.

Wildland Consultants (2025a). *Southland Wind Farm Avifauna Survey Results 2024*. Wildland Consultants Contract Report No. 7362b. Prepared for Contact Energy Ltd. 18pp.

Wildland Consultants (2025b). Avifauna Survey Results February 2025. Wildland Consultants Contract Report No. 7362e. Prepared for Contact Energy Ltd. 19pp.

Williams, EM. 2021. Statement of Evidence for Director General of Conservation for application by Tararua Wind Power under section 88 of the RMA for the Kaiwaikawe Wind Farm.

Williams EM. 2024. Conservation management of the critically endangered matuku-hūrepo/Australasian bittern: A review of threats and preliminary management techniques. Science for Conservation 339. Department of Conservation, Wellington. In press.

Various authors. (2006). Handbook of Australian, New Zealand and Antarctic birds: Volumes 1 to 7. Oxford University Press.

APPENDIX I – DETAILED STRIKE RISK MODELLING RESULTS

Species metrics for mortality modelling:

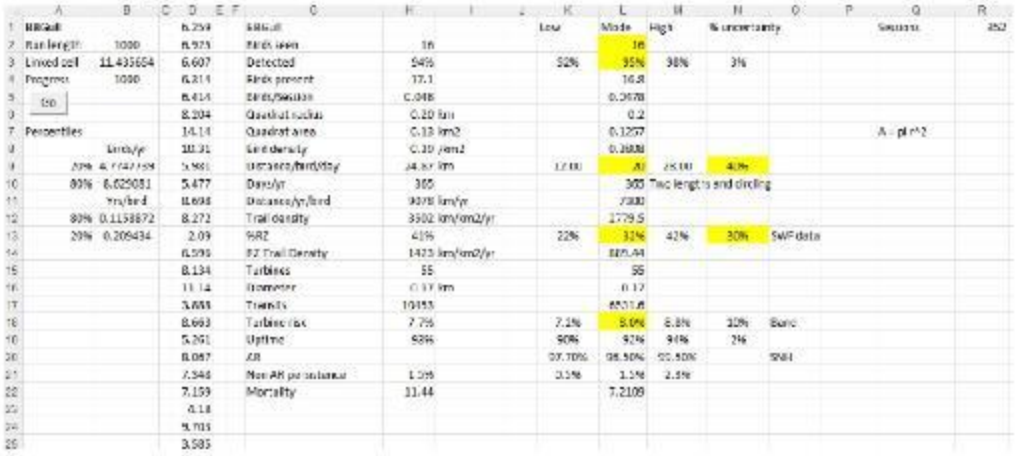
Example below shows the various inputs, their uncertainties, and a typical MC scenario.

Migrating SIPO

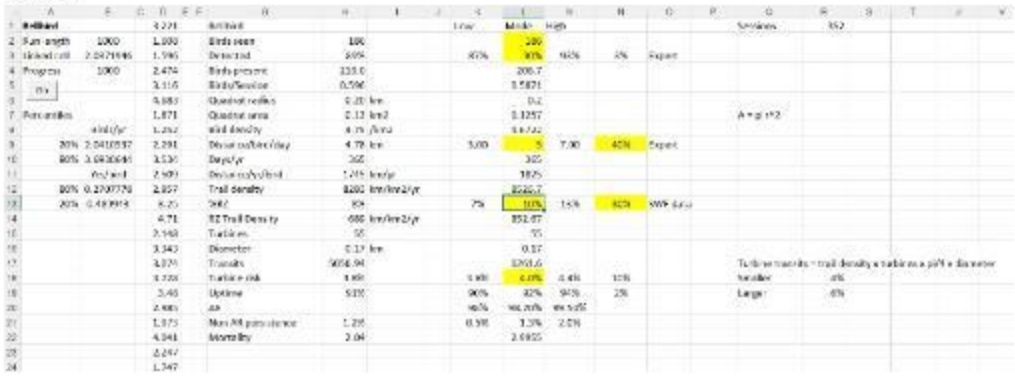
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	**Migrating SIPO**			0.055			Migrating SIPO	Scenario			Low	Mode	High			
2	Run length	1000		0.1			Birds migrating	2220			1300	2300	3300		OSNZ	
3	Linked cell	0.024		0.096			Two migration flights	4439				4600				
4	Progress	1000		0.124			Front	101	km		60	100	140	40%	DoC map	
5	Go			0.135			Trail density	44				46				
6				0.103			% in Rotor Zone	49%			40%	50%	60%		HMR data	
7	Percentiles			0.244			Trail density Rotor Zone	21.4	/km/yr			23				
8		Birds/yr		0.108			Turbines	55				55				
9	20%	0.062		0.118			Diameter	0.17	km			0.17			Turbine specs	
10	80%	0.132		0.084			Turbine transits	157	/yr			169				
11		Yrs/bird		0.122			Turbine risk	5.1%			4.7%	5.20%	5.7%	10%	Band	
12	80%	7.6		0.126			Avoidance rate	99.67%			98%	98.50%	99.80%		NatScot	
13	20%	16.2		0.183				89.92%			83.6%	88%	92.4%	5%	Client	
14				0.197			Mortality birds/year	0.02375	Scenario			0.116				
15				0.095												

Fernbird

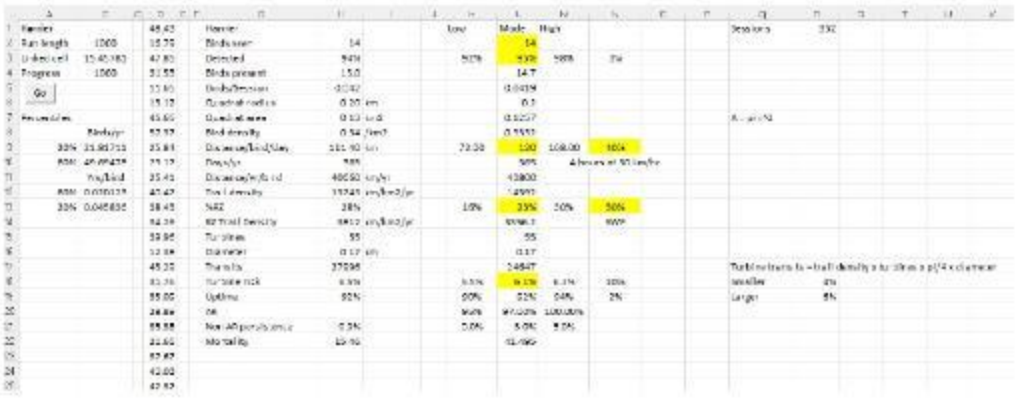
Black-backed gull



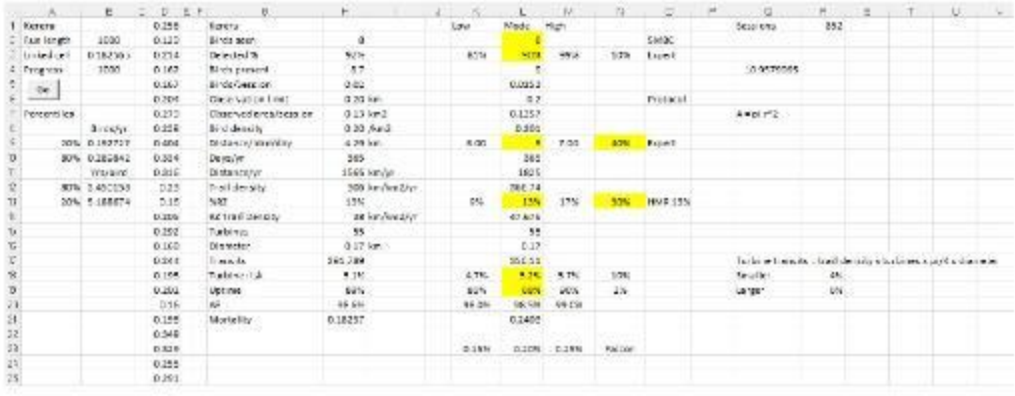
Bellbird



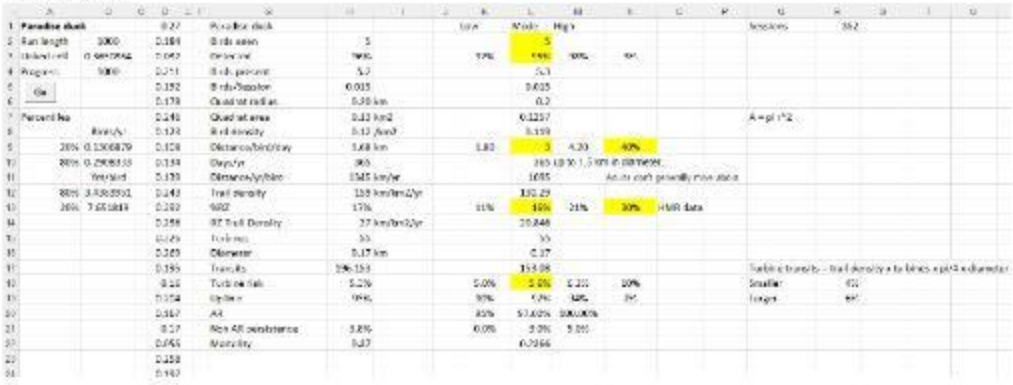
Harrier



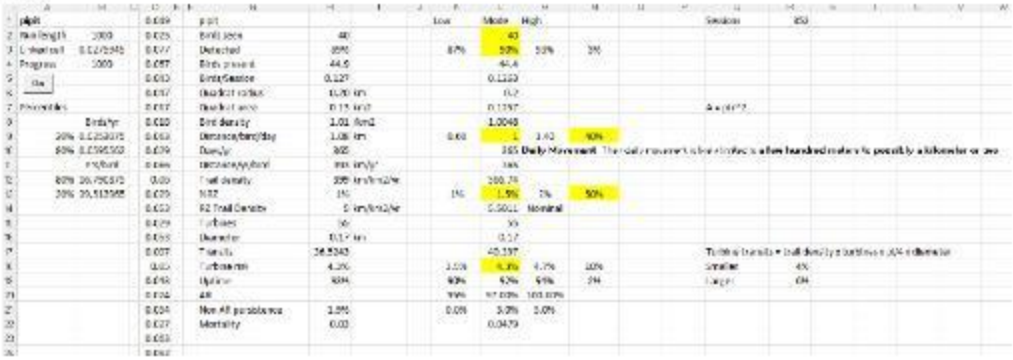
Kereru



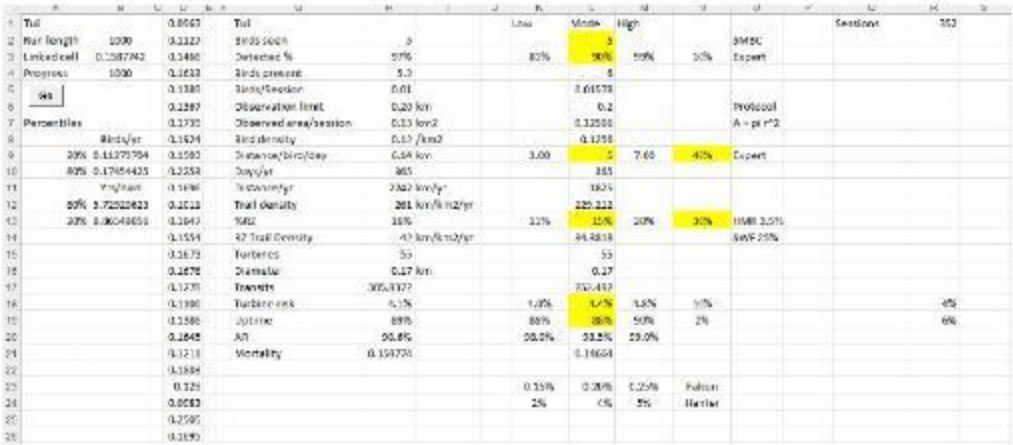
Paradise duck



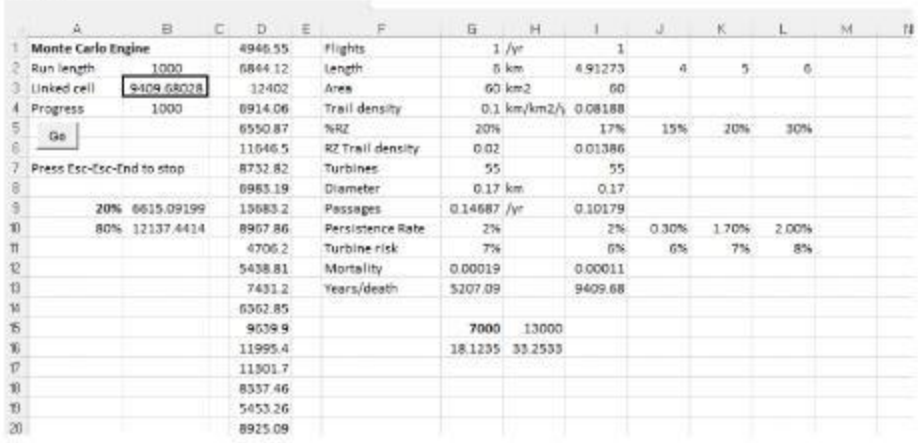
Pīpīt



Tūī

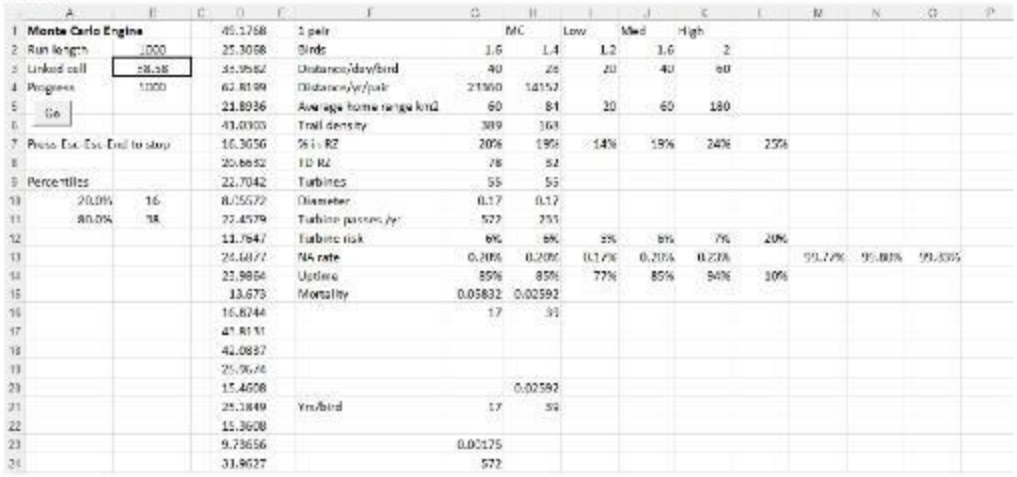


Bittern



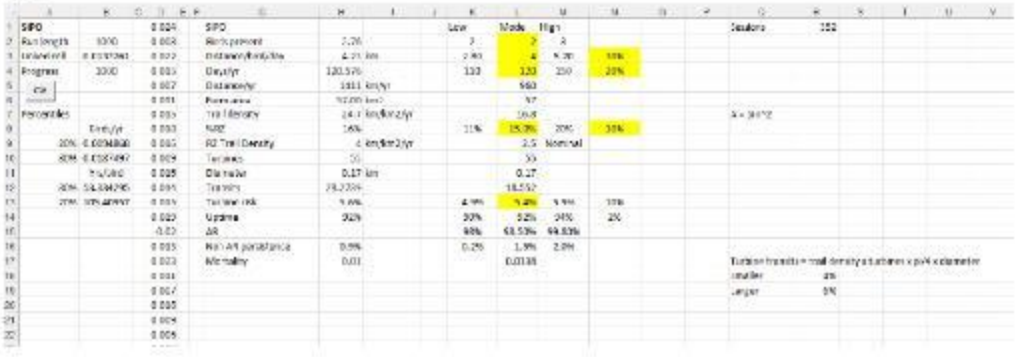
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Monte Carlo Engine**			4946.55		Flights	1	/yr	1				
2	Run length	1000		6844.12		Length	6	km	4.91273	4	5	6	
3	Linked cell	9409.68028		12402		Area	60	km2	60				
4	Progress	1000		8914.06		Trail density	0.1	km/km2/y	0.08188				
5	Go			6550.87		%RZ	20%		17%	15%	20%	30%	
6				11646.5		RZ Trail density	0.02		0.01386				
7	Press Esc-Esc-End to stop			8732.82		Turbines	55		55				
8				6983.19		Diameter	0.17	km	0.17				
9	**20%**	6615.09199		15683.2		Passages	0.14687	/yr	0.10179				
10	80%	12137.4414		8967.86		Persistence Rate	2%		2%	0.30%	1.70%	2.00%	
11				4706.2		Turbine risk	7%		6%	6%	7%	8%	
12				5438.81		Mortality	0.00019		0.00011				
13				7431.2		Years/death	5207.09		9409.68				
14				6362.85									
15				9639.9			**7000**	13000					
16				11995.4			18.1235	33.2533					
17				11301.7									
18				8337.46									
19				5453.26									
20				8925.09									

Falcon



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**Monte Carlo Engine**			46.1768		1 pair		MC	Low	Med	High				
2	Run length	1000		25.3058		Birds	1.6	1.4	1.2	1.6	2				
3	Linked cell	28.38		55.9582		Distance/day/bird	40	20	20	40	60				
4	Progress	1000		62.8189		Distance/yr/pair	21900	14157							
5	Go			21.8936		Average home range km2	60	81	30	60	180				
6				41.0303		Trail density	389	163							
7	Press Esc-Esc-End to stop			16.3056		% in RZ	20%	19%	14%	19%	24%	25%			
8				20.8652		In RZ	78	32							
9	Percentiles			22.7042		Turbines	55	55							
10	20.0%	16		8.05572		Diameter	0.17	0.17							
11	80.0%	38		22.4579		Turbine passes /yr	522	251							
12				11.7647		Turbine risk	6%	6%	5%	6%	7%	20%			
13				24.6077		NA rate	0.20%	0.20%	0.17%	0.20%	0.23%		99.77%	99.80%	99.83%
14				23.9854		Uptime	85%	85%	77%	85%	94%	10%			
15				13.673		Mortality	0.05832	0.02592							
16				16.8244			17	39							
17				41.8131											
18				42.0887											
19				25.9674											
20				15.4658				0.02592							
21				25.1849		Yrs/bird	17	39							
22				15.3608											
23				9.73656			0.03175								
24				31.9027			572								

SIPO



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	**SIPO**			0.024		**SIPO**					Low	Mode	High				Doubles	152				
2	Run length	1000		0.008		Risk percent	2.0%				2	2	2									
3	Linked cell	0.0197061		0.022		Distance/bird/day	2.21 km				2.40	4	5.20	30%								
4	Progress	1000		0.015		Day/yr	120.5%				133	133	150	20%								
5	Go			0.007		Distance/yr	1811 km/yr					960										
6				0.011		Home area	92.00 km2					57										
7	Percentiles			0.015		Trail density	14.1 km/km2/yr					16.8					3 = 30/10					
8		Birds/yr		0.010		%RZ	16%				11%	15.3%	20%	30%								
9	20%	0.0054860		0.015		RZ Trail Density	2 km/km2/yr					2.5	Nominal									
10	80%	0.0357497		0.004		Turbines	55					55										
11		Yrs/bird		0.005		Diameter	0.17 km					0.17										
12	20%	54.594795		0.015		Turbines	78.2286					78.552										
13	80%	109.48997		0.015		Turbine risk	5.6%				4.9%	5.2%	5.5%	10%								
14				0.022		Uptime	92%				90%	92%	94%	2%								
15				0.02		ΔR					88%	88.53%	94.83%									
16				0.015		Non-NA persistance	0.9%				0.2%	1.9%	2.8%									
17				0.023		Mortality	0.01					0.0138					Turbine hazards = trail density x turbines x pi/4 x diameter					
18				0.011													smaller	4%				
19				0.017													larger	5%				
20				0.015																		
21				0.004																		
22				0.005																		

Appendix 7 Biodiversity offsetting tables

Table 1 - Summary of Net Present Biodiversity Values results for terrestrial vegetation types

Biodiversity type	Biodiversity Component	Biodiversity attribute	Biodiversity Value at Impact Site	Biodiversity Value at Offset Site		Attribute NPBV	Winners and Losers	Component NPBV
				Outside Feral Ungulate Exclusion Area	Inside Feral Ungulate Exclusion Area			
Cedar (pāhautea) forest	Plant community diversity	Richness of Threatened/ At-risk/notable taxa	-3.33	4.45	4.44	5.56	✓	3.55
		Diversity of higher tiers (>1.35m)	-3.31	18.52	4.30	19.52	✓	
		Diversity in ground tiers (< 1.35m)	-22.27	7.06	0.79	-14.42	✗	
	Vegetation condition	Indigenous dominance in higher tiers (>1.35m)	-25.49	4.41	0.39	-20.70	✗	-6.53
		Indigenous dominance in ground tiers (< 1.35m)	-18.02	-5.95	1.54	-22.44	✗	
		Weed richness	-15.27	33.98	4.85	23.55	✓	
	Vegetation community structure	Non-vascular plant cover	-3.38	4.47	10.54	11.63	✓	6.88
		Vegetation height	-4.22	7.87	5.92	9.57	✓	
		Total basal area	-1.47	0.71	0.21	-0.56	✗	
	Notable species	Cedar	-9.49	0.00	7.56	-1.93	✗	0.63
		Kapuka	-0.37	0.30	2.23	2.16	✓	
		Haumakaroa	0.00	1.26	0.39	1.65	✓	
	Habitat function	Number of indicator species seedlings (<0.15m)	-0.88	6.02	2.16	7.30	✓	19.09
		Faecal pallet index (ungulate)	-11.07	45.63	7.27	41.83	✓	
		Palatable species seedlings/saplings	-0.12	5.86	2.40	8.14	✓	

Biodiversity type	Biodiversity Component	Biodiversity attribute	Biodiversity Value at Impact Site	Biodiversity Value at Offset Site		Attribute NPBV	Winners and Losers	Component NPBV
				Outside Feral Ungulate Exclusion Area	Inside Feral Ungulate Exclusion Area			
Southern rata/rimu forest	Plant community diversity	Richness of Threatened/ At-risk/notable taxa	-2.04	132.02	44.89	174.87	✓	94.69
		Diversity of higher tiers (>1.35m)	-1.07	70.12	20.17	89.22	✓	
		Diversity in ground tiers (<1.35m)	-25.07	59.01	-13.96	19.98	✓	
	Vegetation condition	Indigenous dominance in higher tiers (>1.35m)	-27.93	4.56	-27.59	-50.97	✗	21.47
		Indigenous dominance in ground tiers (<1.35m)	-23.98	146.14	-15.00	107.15	✓	
		Weed richness	-21.80	33.09	-3.08	8.21	✓	
	Vegetation community structure	Non-vascular plant cover	-7.07	24.65	34.46	52.04	✓	26.96
		Vegetation height	-8.38	32.42	-3.35	20.69	✓	
		Total basal area	0.00	6.49	1.65	8.14	✓	
	Notable species	Kapuka	-1.56	43.36	57.64	99.44	✓	88.19
		Haumakaroa	-0.04	23.15	53.83	76.94	✓	
	Habitat function	Number of indicator species seedlings (<0.15m)	-2.04	14.52	36.56	49.04	✓	54.42
		Faecal pallet index (ungulate)	-16.70	72.66	14.89	70.85	✓	
		Palatable species seedlings/saplings	-0.72	14.88	29.23	43.39	✓	

Table 2 - Summary of Net Present Biodiversity Values results for wetland vegetation types

Biodiversity type	Biodiversity Component	Biodiversity attribute	Biodiversity Value at Impact Site	Biodiversity Value at Offset Site				Attribute NPBV	Winners and Losers	Component NPBV
				Outside Feral Ungulate Exclusion Area	Inside Feral Ungulate Exclusion Area	Davidson Road wetland revegetation	Davidson Road wetkland enhancement			
Wetlands	Plant community	Indigenous species richness	-1.86	0.00	0.32	0.63	0.49	-0.43	✗	2.90
		Diversity in ground tiers (< 1.35m)	-1.67	5.57	0.76	0.98	0.23	5.88	✓	
	Vegetation condition	Indigenous dominance in ground tiers (< 1.35m)	-1.28	7.16	1.08	2.35	1.00	10.32	✓	6.22
		Weed richness	-1.38	0.00	0.00	2.20	0.55	1.37	✓	
	Habitat function	Faecal pallet index (ungulate)	-1.34	4.63	2.32	0.00	0.00	5.61	✓	5.61

Appendix 8 Wetland plot results

Plot information			Final wetland determination	Vegetation			Hydrology		Soils[1]		Notes
Plot ID	**Date**	**Location (NZTM)**		**Dominance score**	**Prevalence score**	**Wetland?**	**Primary indicators**	**Water table depth (cm)**	**Matrix colour**	**Matrix colour**	
1-a	Mar-23	E1297932, n4857969	Not wetland	40%	3.48	No					
2-a	29/03/2023	E1297931, n4857983	**Wetland**	50%	2.41	Inconclusive					Determined to be wetland, dominance score is very close to being wetland and prevalence score is low
3-a	29/03/2023	E1297929, n4857998	**Wetland**	75%	1.53	Yes					
4-a	29/03/2023	Location: e1297896, n4858219	Not wetland	40%	3.54	No					
5-a	29/03/2023	E1297406, n4859039	**Wetland**	67%	2.2	Yes					
6-a	29/03/2023	E1297398, n4859069	**Wetland**	50%	2.12	Inconclusive					Determined to be wetland, dominance score is very close to being wetland and prevalence score is low

[1] Wetland soils indicated in bold

Plot information			Final wetland determination	Vegetation			Hydrology		Soils[1]		Notes
Plot ID	Date	Location (NZTM)		Dominance score	Prevalence score	Wetland?	Primary indicators	Water table depth (cm)	Matrix colour	Matrix colour	
7-a	29/03/2023	E1297171, n4859530	**Wetland**	50%	1.52	Inconclusive					Determined to be wetland, dominance score is very close to being wetland and prevalence score is low
8-a	3/04/2023	E1297007, n4860470	**Wetland**	60%	2.03	Yes					
1-b	11/10/2023		**Wetland**	50%	1.3	Yes					Determined to be wetland, dominance score is very close to being wetland and prevalence score is low
2-b	11/10/2023		Not wetland	25%	3.44	No					
3-b	11/10/2023		Not wetland	0%	4	No					
4-b	11/10/2023		**Wetland**	67%	2.62	Yes					
5-b	11/10/2023		**Wetland**	50%	2.17	Inconclusive					Determined to be wetland, dominance score is very close to being wetland and prevalence score is low
6-b	11/10/2023		Not wetland	33%	3.33	No					
7-b	11/10/2023		Not wetland	33%	3.62	No					
8-b	11/10/2023		**Wetland**	33%	2.57	Inconclusive					Assigned wetland based on low prevalence score
9-b	11/10/2023		Not wetland	0%	4.01	No					
10-b	11/10/2023		Not wetland	33%	3.73	No					

Plot information			Final wetland determination	Vegetation			Hydrology		Soils[1]		Notes
Plot ID	Date	Location (NZTM)		Dominance score	Prevalence score	Wetland?	Primary indicators	Water table depth (cm)	Matrix colour	Matrix colour	
11-b	11/10/2023		**Wetland**	50%	2.13	Inconclusive					Determined to be wetland, dominance score is very close to being wetland and prevalence score is low
12-b	11/10/2023		Not wetland	0%	3.95	No					
14-b	12/10/2023		**Wetland**	33%	2.8	Inconclusive					
15-b	12/10/2023		**Wetland**	25%	2.83	Inconclusive					
16-b	12/10/2023		Not wetland	0%	4	No					
17-b	12/10/2023		Not wetland	40%	3.43	No					
18-b	12/10/2023		Not wetland	0%	3.97	No					
19-b	12/10/2023		Not wetland	33%	3.29	No					
20-b	12/10/2023		Not wetland	0%	3.99	No					
21-b	12/10/2023		**Wetland**	50%	1.75	Inconclusive					**Determined to be wetland, dominance score is very close to being wetland and prevalence score is low**
22-b	12/10/2023		**Wetland**	25%	2.52	Inconclusive					
23-b	12/10/2023		**Wetland**	40%	2.74	Inconclusive					**Determined to be wetland, dominance score is very close to being wetland and prevalence score is low**
24-b	12/10/2023		Not wetland	20%	3.31	No					

Plot information			Final wetland determination	Vegetation			Hydrology		Soils[1]		Notes
Plot ID	**Date**	**Location (NZTM)**		**Dominance score**	**Prevalence score**	**Wetland?**	**Primary indicators**	**Water table depth (cm)**	**Matrix colour**	**Matrix colour**	
25-b	12/10/2023		**Wetland**	43%	2.81	Inconclusive					**Determined to be wetland, dominance score is very close to being wetland and prevalence score is low**
26-b	12/10/2023		**Wetland**	60%	2.41	Yes					
27-b	12/10/2023		**Wetland**	40%	**2.29**	**Inconclusive**					**Determined to be wetland, dominance score is very close to being wetland and prevalence score is low**
28-b	12/10/2023		Not wetland	33%	3.13	No					
1-c	10/04/2025	E1297305, N4859215	Not wetland	20%	3.74	No	Gw <30cm, soil saturation	17cm	**0-20cm, 3/2 (7.5 yr)**		Water table likely to be high following heavy rain,
2-c	10/04/2025	E1297343, N4859198	Not wetland	35%	2.99	Inconclusive	None	30cm	0-35 1/3 (7.5 yr), mineral		Not wetland based on soil color and lack of hydrological indicators
3-c	10/04/2025	E1297472, N4859331	Not wetland	40%	3.11	No	Gw <30cm	28cm	0-30 1/3 (7.5 yr), mineral		Water table still possibly high following heavy rain prior to site visit
4-c	10/04/2025	E1297481, N4859319	**Wetland**	33%	2.84	Inconclusive	Gw <30cm	13cm	0-13 3/3 (10 yr), organic, peaty topsoil	N/a	

Plot information			Final wetland determination	Vegetation			Hydrology		Soils[1]		Notes
Plot ID	**Date**	**Location (NZTM)**		**Dominance score**	**Prevalence score**	**Wetland?**	**Primary indicators**	**Water table depth (cm)**	**Matrix colour**	**Matrix colour**	
5-c	10/04/2025	E1297725, N4859169	**Wetland**	50%	2.39	Inconclusive	Gw <30cm	10cm	0-13 2.5/3 (7.5 yr) organic	**13-20cm 2.5/1 (7.5 yr), mineral**	
6-c	10/04/2025	E1297982, N4859165	Not wetland	35%	3.43	No	Not taken				
7-c	11/04/2025	E1297796, N4859953	**Wetland**	67%	2.87	Yes	Gw <30cm	28cm	0-30 1/3 (7.5 yr)mineral	N/a	
8-c	11/02/2025	E1297804, N4859942	**Wetland**	67%	2.96	Yes	Gw <30cm, surface water		Soil not taken, assumed to be similar to 7	N/a	Unknown carex with 5% cover, the wetland indicator ranking of the species will impact the prevenance test (i.e. Change from wetland to terrestrial)
9-c	11/02/2025	E1298152, N4859917	**Wetland**	33%	2.96	Inconclusive		30cm	**0-5cm 3/2 (10 yr), organic, possibly peat/ poorly broken down**	**5-30cm 3/2 (10 yr) mineral**	Gravel at 30cm

Plot information			Final wetland determination	Vegetation			Hydrology		Soils[1]		Notes
Plot ID	**Date**	**Location (NZTM)**		**Dominance score**	**Prevalence score**	**Wetland?**	**Primary indicators**	**Water table depth (cm)**	**Matrix colour**	**Matrix colour**	
10-c	11/02/2025	E1298083, N4859787	**Wetland**	67%	2.42	Yes	None	31cm	**0-5cm 3/2 (10 yr), organic, poorly broken down/ peat like**	**5-30cm 3/2 (10 yr) mineral**	
11-c	11/11/2025	E1298143, N4859339	**Wetland**	67%	2.43	Yes	None	Not reached	0-20cm 3/3 (10 yr), peaty poorly broken down	**20-30 3/2 (10 yr), mineral**	
12-c	11/04/2025	E1298081, N4858771	**Wetland**	33%	2.45	Inconclusive					Soils, hydrology not checked, conservatively deemed wetland based on low prevalence score
13-c	11/04/2025	E1297672, N4858772	Not wetland	50%	2.87	Inconclusive	None	32	Not taken		Determined to be terrestrial based on lack of hydrological indicators
14-c	11/04/2025	E1297699, N4858809	Not wetland	50%	2.96	Inconclusive	None	>30	0-20cm 2/3 (10 yr) organic and poorly broken down	**20-40 2.5/2 (7.5 yr) mineral**	Determined to to be terrestrial based on lack of hydrological and soil indicators

Plot information			Final wetland determination	Vegetation			Hydrology		Soils[1]		Notes
Plot ID	**Date**	**Location (NZTM)**		**Dominance score**	**Prevalence score**	**Wetland?**	**Primary indicators**	**Water table depth (cm)**	**Matrix colour**	**Matrix colour**	
15-c	12/04/2025	E1297157, N4859514	**Wetland**	33%	2.33	Inconclusive	Wet soils, surface water	Not recorded	0-2 3/3 (10 yr) organic, poorly broken down	**2-40cm 3/2 (10 yr) mineral**	Saturated soils
16-c	12/04/2025	E1297189, N4859493	Not wetland	50%	3.03	No	None		**0-5cm 3/2 (10 yr) organic**	5-30 3/3 (10 yr) mineral	
17-c	12/04/2025	E1297144, N4859538	**Wetland**	50%	2.56	Inconclusive	None	30cm	0-35 2/3 (10 yr) mineral		
18-c	12/04/2025	E1297190, E4859354	**Wetland**	44%	2.23	Inconclusive	Surface water/ some standing water				
19-c	12/04/2025	E1297164, N4859271	Not wetland	50%	2.99	Inconclusive					
20-c	12/04/2025	E1297246, N4859029	**Wetland**	60%	2.97	Yes					
21-c	12/04/2025	E1297387, N4859027	Not wetland	50%	2.97	Inconclusive					
22-c	12/04/2025	E1297387, N4859009	Not wetland	0%	3.69	No	Gw<30	29cm	0-30cm 3/3 (10 yr) mineral		

Plot information			Final wetland determination	Vegetation			Hydrology		Soils[1]		Notes
Plot ID	**Date**	**Location (NZTM)**		**Dominance score**	**Prevalence score**	**Wetland?**	**Primary indicators**	**Water table depth (cm)**	**Matrix colour**	**Matrix colour**	
23-c	12/04/2025	E1297160, N4858752	**Wetland**	80%	2.53	Yes	Gw <30	20cm	**0-30 3/2 (10 yr) mineral, wet soil**		
24-c	12/04/2025	E1297170, N4858612	Not wetland	0%	3.99	No	None		**0-30 2/2 (10 yr) mineral**		
25-c	12/04/2025	E1297445, N4858809	**Wetland**	50%	2.15	Inconclusive	Gw <30, standing water				
26-c	12/04/2025	E1297459, N4858810	Not wetland	0%	3.94	No	Not taken				
27-c	12/04/2025	E1297610, N4858756	Not wetland	17%	3.41	No	Not taken				
28-c	12/04/2025	E1297016, N4859573	**Wetland**	75%	2.68	Yes	Not taken				
29-c	12/04/2025	E1296366, N4858816	Not wetland	0%	3.66	No	Not taken				
30-c	13/04/2025	E1297662, N4858728	**Wetland**	25%	2.84	Inconclusive	Gw <30	28-29 cm			
31-c	13/04/2025	E1297117, N4859532	Not wetland	33%	3.29	No	None	>30 cm			
32-c	13/04/2025	E1297252, N4859976	**Wetland**	33%	2.83	Inconclusive	Gw <30	28			
33-c	13/04/2025	E1297359, N4860115	Not wetland	50%	3.38	No	None	>30cm			
34-c	13/04/2025	E1296938, N4860495	**Wetland**	80%	2.87	Yes					

Plot information			Final wetland determination	Vegetation			Hydrology		Soils[1]		Notes
Plot ID	**Date**	**Location (NZTM)**		**Dominance score**	**Prevalence score**	**Wetland?**	**Primary indicators**	**Water table depth (cm)**	**Matrix colour**	**Matrix colour**	
35-c	13/04/2025	E1296584, N4860001	Not wetland	20%	3.8	No	None	Not reached			
36-c	13/04/2025	E1296570, N4859972	Not wetland	0%	3.97		None		Not assessed		
37-c	13/04/2025	E1295783, N4859971	Not wetland	33%	3.58	No	None		Not assessed		
38-c	13/04/2025	E1295751, N4860014	Not wetland	0%	3.91	No	None		Not assessed		

March 2023 Wetland plot results

Plot JED 1-a (Plate A9-1)
Location: E1297932, N4857969

Vegetation Plot Data						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Ozothamnus vauvilliersii*	Mountain tauhinu	25	Yes	FACU	
	Veronica odora		25	Yes	FACU	
	Olearia laxiflora		15	Yes	FACW	
	Gaultheria macrostigma		5	NO	FACU	
	Coprosma cheesemanii		2	NO	FACU	
	Myrsine divaricata	Weeping mapou	1	NO	FAC	
	Coprosma dumosa		1	NO	FAC	
	Aristotelia fruticosa		0	NO	UPL	
	Coprosma elatirioides		0	NO	FACW	
		Total Cover:	74			
		20% Cover:	15			
		50% Cover:	37			
Herb	*Lycopodium scariosum*	Alpine clubmoss	0	NO	UPL	N
	Anthoxanthum odoratum	Sweet vernal	5	Yes	FACU	Y
	Carex coriacea	Rautahi	5	Yes	FACW	N
	Agrostis capillaris	Browntop	2	NO	FACU	Y
	Blechnum minus	Swamp kiokio	2	NO	FACW	N
	Blechnum penna-marina	Alpine hard fern	2	NO	FAC	N
	Rytidosperma gracile		2	NO	FACU	N
	Juncus edgariae		0	NO	FACW	N
	Aporostylis bifolia	Odd-leaved orchid	0	NO	FACW	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
		Total Cover:	18			
		20% Cover:	4			
		50% Cover:	9			

Pasture Exclusion Test	
Pasture Species Cover =	7
Total Vegetation Cover =	92.8
% Cover of Pasture Species =	8%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	5
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	40%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	22.3	x 2 =	44.6
FAC	4	x 3 =	12
FACU	66.2	x 4 =	264.8
UPL	0.3	x 5 =	1.5
Total (A)	92.8	Total (B)	322.9
		Prevalence Index (B/A) =	3.48
		Wetland vegetation determination =	**NOT WETLAND**

Plot JED 2-a (Plate A9-2)
Location: E1297931, N4857983

Vegetation Plot Data						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub r = 5 m	*Dracophyllum longifolium*	Inaka, Inanga	10	YES	FACU	
	Olearia laxiflora		10	YES	FACW	
	Gaultheria macrostigma		8	YES	FACU	
	Androstoma empetrifolium		3	NO	FACW	
	Coprosma elatirioides		2	NO	FACW	
	Coprosma cheesemanii		1	NO	FACU	
	Leptospermum scoparium	Mānuka	1	NO	FAC	
	Veronica odora		1	NO	FACU	
	Myrsine divaricata	Weeping mapou	0	NO	FAC	
	Ozothamnus vauvilliersii	Tauhinu	0	NO	FACU	
		Total Cover:	36			
		20% Cover:	7			
		50% Cover:	18			
Herb 2 x 2 m	*Oreobolus strictus*		50	YES	FACW	N
	Carex coriacea	Rautahi	8	NO	FACW	N
	Blechnum minus	Swamp kiokio	2	NO	FACW	N
	Carpha alpina	Straw sedge	2	NO	OBL	N
	Lycopodium scariosum	Alpine clubmoss	1	NO	UPL	N
	Anthoxanthum odoratum	Sweet vernal	0	NO	FACU	Y
	Celmisia gracilenta	Mountain daisy, Pekapeka	0	NO	FAC	N
	Hierochloe recurvata	Holy grass	0	NO	UPL	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
		Total Cover:	63			
		20% Cover:	13			
		50% Cover:	31			

Pasture Exclusion Test	
Pasture Species Cover =	0.1
Total Vegetation Cover =	98.6
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	50%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Mulitplied % Cover**
OBL	2	x 1 =	2
FACW	75	x 2 =	150
FAC	1.2	x 3 =	3.6
FACU	19.8	x 4 =	79.2
UPL	0.6	x 5 =	3
Total (A)	98.6	Total (B)	237.8
		Prevalence Index (B/A) =	2.41
		Wetland vegetation determination =	**WETLAND**

Plot JED 3-a (Plate A9-3)
Location: E1297929, N4857998

Vegetation Plot Data						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Dracophyllum longifolium*	Inaka, Inanga	8	Yes	FACU	
	Olearia laxiflora		3	Yes	FACW	
	Coprosma elatirioides		2	NO	FACW	
	Gaultheria macrostigma		2	NO	FACU	
	Androstoma empetrifolium		1	NO	FACW	
	Coprosma cheesemanii		1	NO	FACU	
	Ozothamnus vauvilliersii	Tauhinu	1	NO	FACU	
	Veronica odora		1	NO	FACU	
		Total Cover:	18			
		20% Cover:	4			
		50% Cover:	9			
Herb	*Empodisma minus*	Wire rush	40	YES	OBL	N
	Oreobolus pectinatus	Comb sedge	30	YES	OBL	N
	Carex coriacea	Rautahi	5	NO	FACW	N
	Carpha alpina	Straw sedge	1	NO	OBL	N
	Rytidosperma gracile		1	NO	FACU	N
	Lycopodium scariosum	Alpine clubmoss	1	NO	UPL	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	0	NO	FAC	N
	Chionochloa rubra subsp. *cuprea*		0	NO	FAC	N
		Total Cover:	78			
		20% Cover:	16			
		50% Cover:	39			

Pasture Exclusion Test	
Pasture Species Cover =	0
Total Vegetation Cover =	95.2
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	3
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	75%
Wetland vegetation determination =	**WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	71	x 1 =	71
FACW	11	x 2 =	22
FAC	0.2	x 3 =	0.6
FACU	12.5	x 4 =	50
UPL	0.5	x 5 =	2.5
Total (A)	95.2	Total (B)	146.1
		Prevalence Index (B/A) =	1.53
		Wetland vegetation determination =	**WETLAND**

Plot JED 4-a (no photo)
Location: E1297896, N4858219

Vegetation Plot Data						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Ozothamnus vauvilliersii*	Tauhinu	30	Yes	FACU	
	Dracophyllum longifolium	Inaka, Inanga	25	Yes	FACU	
	Veronica odora		10	NO	FACU	
	Coprosma cheesemanii		3	NO	FACU	
	Coprosma elatirioides		2	NO	FACW	
	Pseudopanax colensoi	Mountain five-finger	2	NO	UPL	
	Gaultheria macrostigma		1	NO	FACU	
	Coprosma decurva		1	NO	FACU	
		Total Cover:	74			
		20% Cover:	15			
		50% Cover:	37			
Herb	*Carex coriacea*	Rautahi	7	YES	FACW	N
	Oreobolus pectinatus	Comb sedge	7	YES	OBL	N
	Nertera depressa		5	YES	FACU	N
	Rytidosperma gracile		4	NO	FACU	N
	Juncus edgariae		2	NO	FACW	N
	Androstoma empetrifolium		1	NO	FACW	N
	Anthoxanthum odoratum	Sweet vernal	1	NO	FACU	Y
	Blechnum minus	Swamp kiokio	1	NO	FACW	N
	Gaultheria macrostigma		1	NO	FACU	N
	Agrostis capillaris	Browntop	1	NO	FACU	Y
	Juncus bulbosus	Bulbous rush	1	NO	OBL	N
	Blechnum penna-marina	Alpine hard fern	0	NO	FAC	N
	Hierochloe recurvata	Holy grass	0	NO	UPL	N
	Astelia nervosa	Mountain astelia	0	NO	FACU	N
	Lobelia angulata	Panakenake	0	NO	FAC	N
	Chaerophyllum colensoi		0	NO	FACU	N
		Total Cover:	32			
		20% Cover:	6			
		50% Cover:	16			

Pasture Exclusion Test	
Pasture Species Cover =	2
Total Vegetation Cover =	105.5
% Cover of Pasture Species =	2%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	5
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	40%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	8	x 1 =	8
FACW	13	x 2 =	26
FAC	0.2	x 3 =	0.6
FACU	82.2	x 4 =	328.8
UPL	2.1	x 5 =	10.5
Total (A)	105.5	Total (B)	373.9
		Prevalence Index (B/A) =	3.54
		Wetland vegetation determination =	**NOT WETLAND**

Plot JED 5-a (Plate A9-4)
Location: E1297406, N4859039

Vegetation Plot Data						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub r = 5 m	*Dracophyllum longifolium*	Inaka, Inanga	17	Yes	FACU	
	Coprosma cheesemanii		5	NO	FACU	
	Coprosma elatirioides		5	NO	FACW	
	Veronica odora		2	NO	FACU	
	Gaultheria macrostigma		2	NO	FACU	
	Androstoma empetrifolium		2	NO	FACW	
	Olearia laxiflora		1	NO	FACW	
		Total Cover:	34			
		20% Cover:	7			
		50% Cover:	17			
Herb 2 x 2 m	*Carpha alpina*	Straw sedge	26	YES	OBL	N
	Oreobolus pectinatus	Comb sedge	26	YES	OBL	N
	Rytidosperma gracile		9	NO	FACU	N
	Blechnum minus	Swamp kiokio	2	NO	FACW	N
	Blechnum penna-marina	Alpine hard fern	1	NO	FAC	N
	Carex coriacea	Rautahi	1	NO	FACW	N
	Agrostis capillaris	Browntop	0	NO	FACU	Y
	Astelia nervosa	Mountain astelia	0	NO	FACU	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	0	NO	FAC	N
	Chaerophyllum colensoi		0	NO	FACU	N
	Chionochloa rubra subsp. cuprea		0	NO	FAC	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
	Juncus edgariae		0	NO	FACW	N
	Lycopodium scariosum	Alpine clubmoss	0	NO	UPL	N
	Gonocarpus micranthus	Piripiri	0	NO	FAC	N
	Drosera spatulata		0	NO	FACW	N
		Total Cover:	66			
		20% Cover:	13			
		50% Cover:	33			

Pasture Exclusion Test	
Pasture Species Cover =	0.1
Total Vegetation Cover =	100
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	67%
Wetland vegetation determination =	**WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	52	x 1 =	52
FACW	11.2	x 2 =	22.4
FAC	1.3	x 3 =	3.9
FACU	35.4	x 4 =	141.6
UPL	0.1	x 5 =	0.5
Total (A)	100	Total (B)	220.4
		Prevalence Index (B/A) =	2.20
		Wetland vegetation determination =	**WETLAND**

Plot JED 6-a (Plate A9-5)
Location: E1297398, N4859069

Vegetation Plot Data						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Dracophyllum longifolium*	Inaka, Inanga	10	Yes	FACU	
	Coprosma cheesemanii		4	YES	FACU	
	Androstoma empetrifolium		3	NO	FACW	
	Gaultheria macrostigma		2	NO	FACU	
	Ozothamnus vauvilliersii	Tauhinu	1	NO	FACU	
	Veronica odora		0	NO	FACU	
		Total Cover:	20			
		20% Cover:	4			
		50% Cover:	10			
Herb	*Oreobolus pectinatus*	Comb sedge	30	YES	OBL	N
	Carpha alpina	Straw sedge	10	YES	OBL	N
	Rytidosperma gracile		7	NO	FACU	N
	Agrostis capillaris	Browntop	0	NO	FACU	Y
	Blechnum minus	Swamp kiokio	0	NO	FACW	N
		Total Cover:	47			
		20% Cover:	9			
		50% Cover:	24			

Pasture Exclusion Test	
Pasture Species Cover =	0.1
Total Vegetation Cover =	67.3
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	50%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	40	x 1 =	40
FACW	3.1	x 2 =	6.2
FAC	0	x 3 =	0
FACU	24.2	x 4 =	96.8
UPL	0	x 5 =	0
Total (A)	67.3	Total (B)	143
		Prevalence Index (B/A) =	2.12
		Wetland vegetation determination =	**WETLAND**

Plot JED 7-a (Plate A9-6)
Location: E 1297171, N4859530

Vegetation Plot Data						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Coprosma cheesemanii*		8	Yes	FACU	
	Gaultheria macrostigma		6	YES	FACU	
	Dracophyllum longifolium	Inaka, Inanga	3	NO	FACU	
	Androstoma empetrifolium		1	NO	FACW	
	Veronica odora		1	NO	FACU	
	Ozothamnus vauvilliersii	Tauhinu	1	NO	FACU	
		Total Cover:	19			
		20% Cover:	4			
		50% Cover:	10			
Herb	*Oreobolus pectinatus*	Comb sedge	60	YES	OBL	N
	Carpha alpina	Straw sedge	30	YES	OBL	N
	Carex coriacea	Rautahi	2	NO	FACW	N
	Juncus antarcticus		1	NO	OBL	N
	Anthoxanthum odoratum	Sweet vernal	1	NO	FACU	Y
	Rytidosperma gracile		0	NO	FACU	N
	Chionochloa rubra subsp. cuprea		0	NO	FAC	N
	Juncus effusus	Soft rush	0	NO	FACW	N
	Blechnum penna-marina	Alpine hard fern	0	NO	FAC	N
	Chaerophyllum colensoi		0	NO	FACU	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	0	NO	FAC	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
	Lycopodium fastigiatum	Alpine clubmoss	0	NO	FAC	N
		Total Cover:	94			
		20% Cover:	19			
		50% Cover:	47			

Pasture Exclusion Test	
Pasture Species Cover =	0.5
Total Vegetation Cover =	112.86
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	50%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	91	x 1 =	91
FACW	3.1	x 2 =	6.2
FAC	0.13	x 3 =	0.39
FACU	18.63	x 4 =	74.52
UPL	0	x 5 =	0
Total (A)	112.86	Total (B)	172.11
		Prevalence Index (B/A) =	1.52
		Wetland vegetation determination =	**WETLAND**

Plot JED 8-a (no photo)
Location: E1297007, N4860470

Vegetation Plot Data						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Dracophyllum longifolium*	Inaka, Inanga	8	Yes	FACU	
	Gaultheria macrostigma		8	YES	FACU	
	Androstoma empetrifolium		5	YES	FACW	
	Coprosma cheesemanii		2	NO	FACU	
	Leptospermum scoparium	Mānuka	1	NO	FAC	
	Coprosma dumosa		1	NO	FAC	
	Veronica odora		0	NO	FACU	
		Total Cover:	25			
		20% Cover:	5			
		50% Cover:	12			
Herb	*Oreobolus pectinatus*	Comb sedge	40	YES	OBL	N
	Carex coriacea	Rautahi	35	YES	FACW	N
	Rytidosperma gracile		1	NO	FACU	N
	Gonocarpus micranthus	Piripiri	1	NO	FAC	N
	Anthoxanthum odoratum	Sweet vernal	1	NO	FACU	Y
	Blechnum penna-marina	Alpine hard fern	0	NO	FAC	N
	Chionochloa rubra subsp. cuprea		0	NO	FAC	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	0	NO	FAC	N
	Nertera depressa		0	NO	FACU	N
	Blechnum minus	Swamp kiokio	0	NO	FACW	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
		Total Cover:	78			
		20% Cover:	16			
		50% Cover:	39			

Pasture Exclusion Test	
Pasture Species Cover =	1
Total Vegetation Cover =	103.02
% Cover of Pasture Species =	1%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	3
Total number of dominant species across all strata (B) =	5
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	60%
Wetland vegetation determination =	**WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	40	x 1 =	40
FACW	40.01	x 2 =	80.02
FAC	2.8	x 3 =	8.4
FACU	20.21	x 4 =	80.84
UPL	0	x 5 =	0
Total (A)	103.02	Total (B)	209.26
		Prevalence Index (B/A) =	2.03
		Wetland vegetation determination =	**WETLAND**

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Vegetation Plot Data – Plot 1-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Dracophyllum longifolium*	Inaka	1	NO	FACU	
	Veronica odora		10	YES	FACU	
	Coprosma cheesemanii		1	NO	FACU	
	Ozothamnus leptophyllus	Tauhinu	0	NO	FACU	
	Ulex europaeus	Gorse	1	NO	FACU	
	Gaultheria macrostigma		1	NO	FACU	
		Total Cover:	12			
		20% Cover:	2			
		50% Cover:	6			
Herb	*Carpha alpina*	Straw sedge	60	YES	OBL	N
	Diphasium scariosum	Summer grass	0	NO	UPL	N
	Kelleria dieffenbachii		0	NO	UPL	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
	Oreobolus strictus		10	NO	FACW	N
	Agrostis capillaris	Browntop	0	NO	FACU	Y
	Gonocarpus micranthus	Piripiri	0	NO	FAC	N
		Total Cover:	71			
		20% Cover:	14			
		50% Cover:	35			

Plot 1-b

Pasture Exclusion Test	
Pasture Species Cover =	0
Total Vegetation Cover =	74
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	2
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	50%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	60	x 1 =	60
FACW	10	x 2 =	20
FAC	0	x 3 =	0
FACU	4	x 4 =	16
UPL	0	x 5 =	0
Total (A)	74	Total (B)	96
		Prevalence Index (B/A) =	1.33
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data – Plot 2-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Dracophyllum longifolium*	Inaka, Inanga	40	YES	FACU	
	Gaultheria macrostigma		20	YES	FACU	
	Veronica odora		5	NO	FACU	
	Ozothamnus leptophyllus	Tauhinu	5	NO	FACU	
	Coprosma cheesemanii		1	NO	FACU	
	Ulex europaeus	Gorse	1	NO	FACU	
	Leptospermum scoparium	Mānuka	0	NO	FAC	
	Androstoma empetrifolia		0	NO	FACW	
		Total Cover:	72			
		20% Cover:	14			
		50% Cover:	36			
Herb	*Oreobolus strictus*		25	YES	FACW	N
	Blechnum montanum	Mountain kiokio	15	YES	UPL	N
	Carpha alpina	Straw sedge	5	NO	FACU	N
	Blechnum penna-marina	Alpine hard fern	5	NO	FACU	N
	Diphasium scariosum		1	NO	UPL	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Agrostis capillaris	Browntop	0	NO	FAC	Y
		Total Cover:	52			
		20% Cover:	10			
		50% Cover:	26			

Plot 2-b

Pasture Exclusion Test	
Pasture Species Cover =	0
Total Vegetation Cover =	124
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	25%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	25	x 2 =	50
FAC	5	x 3 =	15
FACU	78	x 4 =	312
UPL	11	x 5 =	55
Total (A)	119	Total (B)	437
		Prevalence Index (B/A) =	3.44
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data – Plot 3-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Gaultheria macrostigma*		35	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	30	YES	FACU	
	Veronica odora		20	YES	FACU	
	Coprosma cheesemanii		5	NO	UPL	
	Dracophyllum longifolium	Inaka	1	NO	FACU	
	Ulex europaeus	Gorse	1	NO	FACU	
		20% Cover:	18			
		50% Cover:	46			
Herb	*Agrostis capillaris*	Browntop	3	YES	FACU	Y
	Blechnum montanum	Mountain kiokio	2	YES	FACU	N
	Nertera depressa		2	YES	FACU	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Carpha alpina	Straw sedge	0	NO	OBL	N
	Lobelia angulata	Panakenake	0	NO	FAC	N
	Carex coriacea	Rautahi	0	NO	FACW	N
		Total Cover:	8			
		20% Cover:	2			
		50% Cover:	4			

Plot 3-b

Pasture Exclusion Test	
Pasture Species Cover =	3
Total Vegetation Cover =	100
% Cover of Pasture Species =	3%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	0
Total number of dominant species across all strata (B) =	6
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	0%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	0	x 2 =	0
FAC	0	x 3 =	0
FACU	50	x 4 =	200
UPL	50	x 5 =	250
Total (A)	100	Total (B)	450
		Prevalence Index (B/A) =	4.00
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data – Plot 4-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Leptospermum scoparium*	Mānuka	5	YES	FAC	
	Dracophyllum longifolium	Inaka, Inanga	3	YES	FACU	
	Coprosma cheesemanii		2	NO	FACU	
	Ozothamnus leptophyllus	Tauhinu	1	NO	FACU	
	Androstoma empetrifolia		1	NO	FACW	
	Gaultheria macrostigma		1	NO	FACU	
		Total Cover:	13			
		20% Cover:	3			
		50% Cover:	7			
Herb	*Oreobolus strictus*		50	YES	FACW	N
	Carex coriacea	Rautahi	15	NO	FACW	N
	Diphasium scariosum		10	NO	UPL	N
	Blechnum montanum	Mountain kiokio	5	NO	FACU	N
	Carpha alpina	Straw sedge	1	NO	OBL	N
	Astelia nervosa	Mountain astelia	0	NO	FACU	N
		Total Cover:	81			
		20% Cover:	16			
		50% Cover:	41			

Plot 4-b

Pasture Exclusion Test	
Pasture Species Cover =	0
Total Vegetation Cover =	94
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	67%
Wetland vegetation determination =	**WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	1	x 1 =	1
FACW	65	x 2 =	130
FAC	5	x 3 =	15
FACU	11	x 4 =	44
UPL	12	x 5 =	60
Total (A)	94	Total (B)	250
		Prevalence Index (B/A) =	2.62
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data – Plot 5-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Leptospermum scoparium*	Mānuka	1	YES	FAC	
	Ozothamnus leptophyllus	Tauhinu	1	YES	FACU	
	Gaultheria macrostigma		1	YES	FACU	
	Androstoma empetrifolia		0	NO	FACW	
		20% Cover:	1			
		50% Cover:	2			
Herb	*Juncus effusus*	Soft rush	65	YES	FACW	N
	Gunnera dentata		3	NO	FACW	N
	Agrostis capillaris	Browntop	2	NO	FACU	Y
	Hypochaeris radicata	Catsear	2	NO	FACU	N
	Isolepis habra		1	NO	FACW	N
	Blechnum penna-marina	Alpine hard fern	0	NO	FAC	N
	Gonocarpus micranthus	Piripiri	0	NO	FAC	N
		Total Cover:	73			
		20% Cover:	15			
		50% Cover:	37			

Plot 5-b

Pasture Exclusion Test	
Pasture Species Cover =	2
Total Vegetation Cover =	76
% Cover of Pasture Species =	3%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	50%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	69	x 2 =	138
FAC	1	x 3 =	3
FACU	5	x 4 =	20
UPL	1	x 5 =	5
Total (A)	76	Total (B)	166
		Prevalence Index (B/A) =	2.17
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data – Plot 6-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Coprosma cheesemanii*		10	YES	FACU	
	Gaultheria macrostigma		10	YES	FACU	
	Androstoma empetrifolia		5	NO	FACW	
	Ozothamnus leptophyllus	Tauhinu	5	NO	FACU	
	Myrsine divaricata	Weeping mapou	1	NO	FAC	
	Veronica odora		1	NO	FACU	
	Dracophyllum longifolium	Inaka, Inanga	0	NO	FACU	
		Total Cover:	32			
		20% Cover:	6			
		50% Cover:	16			
Herb	*Oreobolus strictus*		5	YES	FACW	N
	Juncus effusus	Soft rush	1	NO	FACW	N
	Carpha alpina	Straw sedge	1	NO	OBL	N
	Agrostis capillaris	Browntop	0	NO	FACU	Y
	Hypochaeris radicata	Catsear	0	NO	FACU	N
	Blechnum penna-marina	Alpine hard fern	0	NO	FAC	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	0	NO	FAC	N
	Nertera depressa		0	NO	FACU	N
		Total Cover:	7			
		20% Cover:	1			
		50% Cover:	4			

Plot 6-b

Pasture Exclusion Test	
Pasture Species Cover =	0
Total Vegetation Cover =	39
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	33%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	1	x 1 =	1
FACW	6	x 2 =	12
FAC	1	x 3 =	3
FACU	20	x 4 =	80
UPL	11	x 5 =	55
Total (A)	39	Total (B)	151
		Prevalence Index (B/A) =	3.33
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data – Plot 7-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Dracophyllum longifolium*	Inaka	40	YES	FACU	
	Gaultheria macrostigma		25	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	10	NO	FACU	
	Coprosma cheesemanii		5	NO	FACU	
	Veronica odora		5	NO	FACU	
		Total Cover:	95			
		20% Cover:	19			
		50% Cover:	48			
Herb	*Oreobolus strictus*		20	YES	FACW	N
	Agrostis capillaris	Browntop	1	NO	FACU	Y
	Blechnum penna-marina	Alpine hard fern	1	NO	FAC	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	0	NO	FAC	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
	Carpha alpina	Straw sedge	0	NO	OBL	N
	Nertera depressa		0	NO	FACU	N
		Total Cover:	22			
		20% Cover:	4			
		50% Cover:	11			

Plot 7-b

Pasture Exclusion Test	
Pasture Species Cover =	1
Total Vegetation Cover =	107
% Cover of Pasture Species =	1%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	33%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	20	x 2 =	40
FAC	1	x 3 =	3
FACU	71	x 4 =	284
UPL	15	x 5 =	75
Total (A)	107	Total (B)	402
		Prevalence Index (B/A) =	3.62
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data – Plot 8-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Androstoma empetrifolia*		1	NO	FACW	
	Coprosma cheesemanii		1	NO	FACU	
	Ozothamnus leptophyllus	Tauhinu	10	NO	FACU	
	Gaultheria macrostigma		5	NO	FACU	
	Dracophyllum longifolium	Inaka, Inanga	10	NO	FACU	
	Veronica odora		0	NO	FACU	
		Total Cover:	26			
		20% Cover:	5			
		50% Cover:	13			
Herb	*Oreobolus strictus*		55	YES	FACW	N
	Carpha alpina	Straw sedge	5	NO	OBL	N
	Anthoxanthum odoratum	Sweet vernal	1	NO	FACU	Y
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	0	NO	FAC	N
	Chionochloa rubra	Narrow-leaved snow tussock	0	NO	UPL	N
		Total Cover:	61			
		20% Cover:	12			
		50% Cover:	31			

Plot 8-b

Pasture Exclusion Test	
Pasture Species Cover =	1
Total Vegetation Cover =	89
% Cover of Pasture Species =	1%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	33%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	5	x 1 =	5
FACW	55	x 2 =	110
FAC	0	x 3 =	0
FACU	18	x 4 =	72
UPL	11	x 5 =	55
Total (A)	89	Total (B)	242
		Prevalence Index (B/A) =	2.57
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data – Plot 9-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Gaultheria macrostigma*		75	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	1	NO	FACU	
	Leptospermum scoparium	Mānuka	0	NO	FAC	
		Total Cover:	76			
		20% Cover:	15			
		50% Cover:	38			
Herb	*Agrostis capillaris*	Browntop	20	YES	FACU	Y
	Leptostigma setulosa	Mānuka	1	NO	UPL	N
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
	Anisotome aromatica	Common aniseed	0	NO	FACU	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
	Lobelia angulata	Panakenake	0	NO	FAC	N
	Helichrysum filicaule	Slender everlasting daisy	0	NO	FACU	N
		Total Cover:	22			
		20% Cover:	4			
		50% Cover:	11			

Plot 9-b

Pasture Exclusion Test	
Pasture Species Cover =	20
Total Vegetation Cover =	98
% Cover of Pasture Species =	20%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	0
Total number of dominant species across all strata (B) =	2
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	0%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	0	x 2 =	0
FAC	0	x 3 =	0
FACU	96	x 4 =	384
UPL	2	x 5 =	10
Total (A)	98	Total (B)	394
		Prevalence Index (B/A) =	4.01
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data – Plot 10-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Gaultheria macrostigma*		40	YES	FACU	
	Coprosma cheesemanii		5	NO	FACU	
	Ozothamnus leptophyllus	Tauhinu	1	NO	FACU	
	Veronica odora		1	NO	FACU	
		Total Cover:	47			
		20% Cover:	9			
		50% Cover:	24			
Herb	*Agrostis capillaris*	Browntop	25	YES	FACU	Y
	Carex coriacea	Rautahi	10	NO	FACW	N
	Anthoxanthum odoratum	Sweet vernal	2	NO	FACU	Y
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Carpha alpina	Straw sedge	1	NO	OBL	N
	Diphasium scariosum	Summer grass	0	NO	UPL	N
	Blechnum montanum	Mountain kiokio	0	NO	FACU	N
	Helichrysum filicaule	Slender everlasting daisy	0	NO	FACU	N
	Blechnum penna-marina	Alpine hard fern	0	NO	FAC	N
		Total Cover:	39			
		20% Cover:	8			
		50% Cover:	20			

Plot 10-b

Pasture Exclusion Test	
Pasture Species Cover =	27
Total Vegetation Cover =	86
% Cover of Pasture Species =	31%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	0
Total number of dominant species across all strata (B) =	2
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	33%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	1	x 1 =	1
FACW	10	x 2 =	20
FAC	0	x 3 =	0
FACU	73	x 4 =	292
UPL	2	x 5 =	10
Total (A)	86	Total (B)	323
		Prevalence Index (B/A) =	3.73
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data – Plot 11-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Gaultheria macrostigma*		5	YES	FACU	
	Veronica odora		0	NO	FACU	
	Coprosma cheesemanii		1	NO	FACU	
		20% Cover:	1.02			
		50% Cover:	2.55			
Herb	*Agrostis capillaris*	Browntop	1	YES	FACU	Y
	Carex coriacea	Rautahi	55	NO	FACW	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Juncus edgariae		15	NO	FACW	N
	Oreobolus strictus		5	NO	FACW	N
	Nertera balfouriana		<1	NO	FACW	N
		Total Cover:	75.2			
		20% Cover:	15.04			
		50% Cover:	37.6			

Plot 11-b

Pasture Exclusion Test	
Pasture Species Cover =	1
Total Vegetation Cover =	80.3
% Cover of Pasture Species =	1%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	0
Total number of dominant species across all strata (B) =	1
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	50%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	75	x 2 =	150
FAC	0	x 3 =	0
FACU	5.3	x 4 =	21.2
UPL	0	x 5 =	0
Total (A)	80.3	Total (B)	171.2
		Prevalence Index (B/A) =	2.13
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data – Plot 12-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Veronica odora*		30	YES	FACU	
	Gaultheria macrostigma		25	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	20	YES	FACU	
	Coprosma cheesemanii		0	NO	FACU	
		Total Cover:	75			
		20% Cover:	15			
		50% Cover:	38			
Herb	*Agrostis capillaris*	Browntop	25	YES	FACU	Y
	Carex coriacea	Rautahi	1	NO	FACW	N
	Carpha alpina	Straw sedge	1	NO	OBL	N
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
	Hypochaeris radicata	Catsear	0	NO	FACU	N
	Juncus edgariae		0	NO	FACW	N
	Blechnum penna-marina	Alpine hard fern	0	NO	FAC	N
	Helichrysum filicaule	Slender everlasting daisy	0	NO	FACU	N
		Total Cover:	28			
		20% Cover:	6			
		50% Cover:	14			

Plot 12-b

Pasture Exclusion Test	
Pasture Species Cover =	25
Total Vegetation Cover =	103
% Cover of Pasture Species =	24%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	0
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	0%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	1	x 1 =	1
FACW	1	x 2 =	2
FAC	0	x 3 =	0
FACU	51	x 4 =	204
UPL	50	x 5 =	250
Total (A)	103	Total (B)	457
		Prevalence Index (B/A) =	3.95
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data plot 14-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Ozothamnus leptophyllus*	Tauhinu	5	YES	FACU	
	Dracophyllum longifolium	Inaka, Inanga	10	YES	FACU	
	Veronica odora		3	NO	FACU	
	Coprosma cheesemanii		2	NO	FACU	
	Androstoma empetrifolium		1	NO	FACW	
		Total Cover:	20			
		20% Cover:	4			
		50% Cover:	10			
Herb	*Oreobolus strictus*		35	YES	FACW	N
	Gaultheria macrostigma		10	NO	FACU	N
	Carpha alpina	Straw sedge	6	NO	OBL	N
	Carex coriacea	Rautahi	5	NO	FACW	N
	Blechnum penna-marina	Alpine hard fern	1	NO	FAC	N
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
	Astelia nervosa	Mountain astelia	1	NO	FACU	N
	Abrotanella linearis		1	NO	FACW	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	1	NO	FAC	N
	Anthoxanthum odoratum	Sweet vernal	1	NO	FACU	Y
		Total Cover:	64			
		20% Cover:	13			
		50% Cover:	32			

Plot 14-b

Pasture Exclusion Test	
Pasture Species Cover =	1
Total Vegetation Cover =	84
% Cover of Pasture Species =	1%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	3
Total number of dominant species across all strata (B) =	8
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	33%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	6	x 1 =	6
FACW	42	x 2 =	84
FAC	2	x 3 =	6
FACU	31	x 4 =	124
UPL	3	x 5 =	15
Total (A)	84	Total (B)	235
		Prevalence Index (B/A) =	2.80
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data- Plot 15-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Gaultheria macrostigma*		15	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	10	YES	FACU	
	Coprosma cheesemanii		10	YES	FACU	
	Dracophyllum longifolium	Inaka	5	NO	FACU	
	Androstoma empetrifolium		5	NO	FACW	
	Veronica odora		1	NO	FACU	
		Total Cover:	41			
		20% Cover:	8			
		50% Cover:	21			
Herb	*Oreobolus strictus*		45	YES	FACW	N
	Carpha alpina	Straw sedge	15	NO	OBL	N
	Rytidosperma gracile		13	NO	FACU	N
	Lycopodium scariosum	Alpine clubmoss	2	NO	UPL	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	1	NO	FAC	N
	Blechnum penna-marina	Alpine hard fern	1	NO	FAC	N
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Abrotanella linearis		1	NO	FACW	N
		Total Cover:	85			
		20% Cover:	17			
		50% Cover:	43			

Plot 15-b

Pasture Exclusion Test	
Pasture Species Cover =	0
Total Vegetation Cover =	126
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	25%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	15	x 1 =	15
FACW	51	x 2 =	102
FAC	2	x 3 =	6
FACU	55	x 4 =	220
UPL	3	x 5 =	15
Total (A)	126	Total (B)	358
		Prevalence Index (B/A) =	2.83
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data- 16-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Ozothamnus leptophyllus*	Tauhinu	60	YES	FACU	
	Coprosma cheesemanii		20	YES	FACU	
	Gaultheria macrostigma		15	NO	FACU	
	Veronica odora		5	NO	FACU	
		Total Cover:	100			
		20% Cover:	20			
		50% Cover:	50			
Herb	*Anthoxanthum odoratum*	Sweet vernal	30	YES	FACU	Y
	Blechnum montanum	Mountain kiokio	5	NO	FACU	N
	Geranium potentilloides		1	NO	UPL	N
	Juncus edgariae		1	NO	FACW	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Nertera depressa		1	NO	FACU	N
	Epilobium species		1	NO	UPL	N
	Astelia nervosa	Mountain astelia	1	NO	FACU	N
		Total Cover:	41			
		20% Cover:	8			
		50% Cover:	21			

Plot 16-b

Pasture Exclusion Test	
Pasture Species Cover =	30
Total Vegetation Cover =	141
% Cover of Pasture Species =	21%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	0
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	0%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	1	x 2 =	2
FAC	0	x 3 =	0
FACU	133	x 4 =	532
UPL	7	x 5 =	35
Total (A)	141	Total (B)	569
		Prevalence Index (B/A) =	4.00
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data- Plot 17-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Coprosma cheesemanii*		40	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	10	NO	FACU	
	Veronica odora		10	NO	FACU	
	Gaultheria macrostigma		5	NO	FACU	
	Ulex europaeus	Gorse	2	NO	FACU	
		Total Cover:	67			
		20% Cover:	13			
		50% Cover:	34			
Herb	*Carex coriacea*	Rautahi	15	YES	FACW	N
	Oreobolus strictus		15	YES	FACW	N
	Anthoxanthum odoratum	Sweet vernal	5	NO	FACU	Y
	Lycopodium scariosum	Alpine clubmoss	1	NO	UPL	N
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Nertera depressa		1	NO	FACU	N
	Blechnum penna-marina	Alpine hard fern	1	NO	FAC	N
	Juncus edgariae		1	NO	FACW	N
		Total Cover:	41			
		20% Cover:	8			
		50% Cover:	21			

Plot 17-b

Pasture Exclusion Test	
Pasture Species Cover =	5
Total Vegetation Cover =	108
% Cover of Pasture Species =	5%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	40%
Wetland vegetation determination =	**WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	31	x 2 =	62
FAC	1	x 3 =	3
FACU	65	x 4 =	260
UPL	11	x 5 =	55
Total (A)	108	Total (B)	380
		Prevalence Index (B/A) =	3.43
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data- Plot 18-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Sapling/ shrub	*Veronica odora*		60	YES	FACU	
	Coprosma cheesemanii		20	NO	FACU	
	Gaultheria macrostigma		15	NO	FACU	
	Ozothamnus leptophyllus	Tauhinu	10	NO	FACU	
		Total Cover:	105			
		20% Cover:	21			
		50% Cover:	53			
Herb	*Anthoxanthum odoratum*	Sweet vernal	40	YES	FACU	Y
	Blechnum montanum	Mountain kiokio	8	NO	FACU	N
	Blechnum penna-marina	Alpine hard fern	5	NO	FAC	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
		Total Cover:	54			
		20% Cover:	11			
		50% Cover:	27			

Plot 18-b

Pasture Exclusion Test	
Pasture Species Cover =	40
Total Vegetation Cover =	158.5
% Cover of Pasture Species =	25%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	0
Total number of dominant species across all strata (B) =	2
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	0%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	0	x 2 =	0
FAC	5	x 3 =	15
FACU	93.5	x 4 =	374
UPL	60	x 5 =	300
Total (A)	158.5	Total (B)	689
		Prevalence Index (B/A) =	3.97
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data- Plot 19-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Coprosma cheesemanii*		45	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	10	YES	FACU	
	Gaultheria macrostigma		5	NO	FACU	
	Veronica odora		5	NO	FACU	
	Androstoma empetrifolium		1	NO	FACW	
	Leptospermum scoparium	Mānuka	1	NO	FAC	
		Total Cover:	67			
		20% Cover:	13			
		50% Cover:	34			
Herb	*Oreobolus strictus*		40	YES	FACW	N
	Anthoxanthum odoratum	Sweet vernal	5	NO	FACU	Y
	Celmisia gracilenta	Mountain daisy, Pekapeka	1	NO	FAC	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Lycopodium scariosum	Alpine clubmoss	1	NO	UPL	N
	Blechnum penna-marina	Alpine hard fern	1	NO	FAC	N
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
	Astelia nervosa	Mountain astelia	1	NO	FACU	N
		Total Cover:	51			
		20% Cover:	10			
		50% Cover:	26			

Plot 19-b

Pasture Exclusion Test	
Pasture Species Cover =	5
Total Vegetation Cover =	118
% Cover of Pasture Species =	4%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	33%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	41	x 2 =	82
FAC	3	x 3 =	9
FACU	68	x 4 =	272
UPL	6	x 5 =	30
Total (A)	118	Total (B)	393
		Prevalence Index (B/A) =	3.29
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data- Plot 20-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Ozothamnus leptophyllus*	Tauhinu	40	YES	FACU	
	Veronica odora		30	YES	FACU	
	Gaultheria macrostigma		15	NO	FACU	
	Coprosma cheesemanii		10	NO	FACU	
		Total Cover:	95			
		20% Cover:	19			
		50% Cover:	48			
Herb	*Anthoxanthum odoratum*	Sweet vernal	40	YES	FACU	Y
	Agrostis capillaris	Browntop	5	NO	FACU	Y
	Blechnum penna-marina	Alpine hard fern	2	NO	FAC	N
	Geranium potentilloides		1	NO	UPL	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Viola species	Hāka, New Zealand native violet	1	NO	UPL	N
	Nertera species		1	NO	UPL	N
	Chaerophyllum colensoi		1	NO	FACU	N
	Juncus edgariae		1	NO	FACW	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	1	NO	FAC	N
	Carex species		1	NO	UPL	N
		Total Cover:	55			
		20% Cover:	11			
		50% Cover:	28			

Plot 20-b

Pasture Exclusion Test	
Pasture Species Cover =	45
Total Vegetation Cover =	150
% Cover of Pasture Species =	30%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	0
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	0%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	1	x 2 =	2
FAC	3	x 3 =	9
FACU	112	x 4 =	448
UPL	34	x 5 =	170
Total (A)	150	Total (B)	629
		Prevalence Index (B/A) =	3.99
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data-Plot 21-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Veronica odora*		1	YES	FACU	
	Gaultheria macrostigma		1	YES	FACU	
		Total Cover:	2			
		20% Cover:	0			
		50% Cover:	1			
Herb	*Juncus effusus*	Soft rush	23	YES	FACW	N
	Carpha alpina	Straw sedge	12	YES	OBL	N
	Juncus bulbosus	Bulbous rush	6	NO	OBL	N
	Carex gaudichaudiana		4	NO	OBL	N
	Stylidium subulatum		4	NO	OBL	N
	Gonocarpus micranthus	Piripiri	2	NO	FAC	N
	Anthoxanthum odoratum	Sweet vernal	1	NO	FACU	Y
	Abrotanella linearis		1	NO	FACW	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Chaerophyllum colensoi		1	NO	FACU	N
		Total Cover:	55			
		20% Cover:	11			
		50% Cover:	28			

Plot 21-b

Pasture Exclusion Test	
Pasture Species Cover =	1
Total Vegetation Cover =	57
% Cover of Pasture Species =	2%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	50%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	26	x 1 =	26
FACW	24	x 2 =	48
FAC	2	x 3 =	6
FACU	4	x 4 =	16
UPL	1	x 5 =	5
Total (A)	57	Total (B)	101
		Prevalence Index (B/A) =	1.75
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data- Plot 22-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Ulex europaeus*	Gorse	5	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	5	YES	FACU	
	Coprosma cheesemanii		5	YES	FACU	
	Veronica odora		1	NO	FACU	
		Total Cover:	16			
		20% Cover:	3			
		50% Cover:	8			
Herb	*Oreobolus strictus*		60	YES	FACW	N
	Juncus effusus	Soft rush	5	NO	FACW	N
	Anthoxanthum odoratum	Sweet vernal	5	NO	FACU	Y
	Celmisia gracilenta	Mountain daisy, Pekapeka	2	NO	FAC	N
	Carex coriacea	Rautahi	1	NO	FACW	N
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
		Total Cover:	74			
		20% Cover:	15			
		50% Cover:	37			

Plot 22-b

Pasture Exclusion Test	
Pasture Species Cover =	5
Total Vegetation Cover =	90
% Cover of Pasture Species =	6%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	25%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	66	x 2 =	132
FAC	2	x 3 =	6
FACU	21	x 4 =	84
UPL	1	x 5 =	5
Total (A)	90	Total (B)	227
		Prevalence Index (B/A) =	2.52
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data- Plot 23-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Dracophyllum longifolium*	Inaka	20	YES	FACU	
	Gaultheria macrostigma		10	YES	FACU	
	Androstoma empetrifolium		10	YES	FACW	
	Coprosma cheesemanii		5	NO	FACU	
	Libocedrus bidwillii	Kaikawaka, pāhautea	1	NO	FAC	
		Total Cover:	46			
		20% Cover:	9			
		50% Cover:	23			
Herb	*Oreobolus strictus*		50	YES	FACW	N
	Carex coriacea	Rautahi	5	NO	FACW	N
	Ozothamnus leptophyllus	Tauhinu	5	NO	FACU	N
	Abrotanella linearis		5	NO	FACW	N
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	1	NO	FAC	N
		Total Cover:	67			
		20% Cover:	13			
		50% Cover:	34			

Plot 23-b

Pasture Exclusion Test	
Pasture Species Cover =	0
Total Vegetation Cover =	113
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	4
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	50%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	70	x 2 =	140
FAC	2	x 3 =	6
FACU	41	x 4 =	164
UPL	0	x 5 =	0
Total (A)	113	Total (B)	310
		Prevalence Index (B/A) =	2.74
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data- Plot 24-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Dracophyllum longifolium*	Inaka, Inanga	15	YES	FACU	
	Gaultheria macrostigma		15	YES	FACU	
	Olearia laxiflora		10	YES	FACW	
	Coprosma cheesemanii		10	YES	FACU	
	Myrsine divaricata	Weeping mapou	5	NO	FAC	
	Androstoma empetrifolium		4	NO	FACW	
	Pseudopanax colensoi	Mountain five-finger	1	NO	UPL	
	Libocedrus bidwillii	Kaikawaka, pāhautea	1	NO	FAC	
	Leptospermum scoparium	Mānuka	1	NO	FAC	
		Total Cover:	62			
		20% Cover:	12			
		50% Cover:	31			
Herb	*Juncus edgariae*		15	YES	FACW	N
	Blechnum montanum	Mountain kiokio	5	YES	FACU	N
	Anthoxanthum odoratum	Sweet vernal	5	YES	FACU	Y
	Astelia nervosa	Mountain astelia	3	NO	FACU	N
	Hypochaeris radicata	Catsear	3	NO	FACU	N
		Total Cover:	31			
		20% Cover:	6			
		50% Cover:	16			

Plot 24-b

Pasture Exclusion Test	
Pasture Species Cover =	5
Total Vegetation Cover =	93
% Cover of Pasture Species =	5%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	5
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	20%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	29	x 2 =	58
FAC	7	x 3 =	21
FACU	56	x 4 =	224
UPL	1	x 5 =	5
Total (A)	93	Total (B)	308
		Prevalence Index (B/A) =	3.31
		Wetland vegetation determination =	**NOT WETLAND**

Vegetation Plot Data Plot 25-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Gaultheria macrostigma*		10	YES	FACU	
	Dracophyllum longifolium	Inaka	5	YES	FACU	
	Coprosma cheesemanii		5	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	1	NO	FACU	
	Veronica odora		1	NO	FACU	
		Total Cover:	22			
		20% Cover:	4			
		50% Cover:	11			
Herb	*Juncus edgariae*		20	YES	FACW	N
	Carex coriacea	Rautahi	10	YES	FACW	N
	Oreobolus strictus		10	YES	FACW	N
	Anthoxanthum odoratum	Sweet vernal	10	YES	FACU	Y
	Carpha alpina	Straw sedge	5	NO	OBL	N
	Lycopodium fastigiatum	Alpine clubmoss	1	NO	FAC	N
	Blechnum penna-marina	Alpine hard fern	1	NO	FAC	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	1	NO	FAC	N
	Nertera depressa		1	NO	FACU	N
	Gonocarpus micranthus	Piripiri	1	NO	FAC	N
	Gleichenia dicarpa	Tangle fern, Swamp umbrella fern	1	NO	FACW	N
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
		Total Cover:	63			
		20% Cover:	13			
		50% Cover:	32			

Plot 25-b

Pasture Exclusion Test	
Pasture Species Cover =	10
Total Vegetation Cover =	85
% Cover of Pasture Species =	12%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	3
Total number of dominant species across all strata (B) =	7
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	43%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	5	x 1 =	5
FACW	41	x 2 =	82
FAC	4	x 3 =	12
FACU	34	x 4 =	136
UPL	1	x 5 =	5
Total (A)	85	Total (B)	240
		Prevalence Index (B/A) =	2.81
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data Plot 26-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Dracophyllum longifolium*	Inaka, Inanga	15	YES	FACU	
	Gaultheria macrostigma		15	YES	FACU	
	Androstoma empetrifolium		5	NO	FACW	
	Coprosma dumosa		5	NO	FAC	
		Total Cover:	40			
		20% Cover:	8			
		50% Cover:	20			
Herb	*Carpha alpina*	Straw sedge	30	YES	OBL	N
	Juncus edgariae		10	YES	FACW	N
	Oreobolus strictus		10	YES	FACW	N
	Gleichenia dicarpa	Tangle fern, Swamp umbrella fern	5	NO	FACW	N
	Nertera depressa		1	NO	FACU	N
	grass		1	NO	UPL	N
		Total Cover:	57			
		20% Cover:	11			
		50% Cover:	29			

Plot 26-b

Pasture Exclusion Test	
Pasture Species Cover =	0
Total Vegetation Cover =	97
% Cover of Pasture Species =	0%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	60%
Wetland vegetation determination =	**WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	30	x 1 =	30
FACW	30	x 2 =	60
FAC	5	x 3 =	15
FACU	31	x 4 =	124
UPL	1	x 5 =	5
Total (A)	97	Total (B)	234
		Prevalence Index (B/A) =	2.41
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data Plot 27-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Dracophyllum longifolium*	Inaka	10	YES	FACU	
	Veronica odora		5	YES	FACU	
	Gaultheria macrostigma		5	YES	FACU	
	Ozothamnus leptophyllus	Tauhinu	1	NO	FACU	
	Androstoma empetrifolium		1	NO	FACW	
	Ulex europaeus	Gorse	1	NO	FACU	
	Coprosma cheesemanii		1	NO	FACU	
		Total Cover:	24			
		20% Cover:	5			
		50% Cover:	12			
Herb	*Carpha alpina*	Straw sedge	30	YES	OBL	N
	Carex coriacea	Rautahi	25	YES	FACW	N
	Oreobolus strictus		15	NO	FACW	N
	Juncus edgariae		5	NO	FACW	N
	Agrostis capillaris	Browntop	1	NO	FACU	Y
	Anthoxanthum odoratum	Sweet vernal	1	NO	FACU	Y
	Blechnum montanum	Mountain kiokio	1	NO	FACU	N
	Blechnum penna-marina	Alpine hard fern	1	NO	FAC	N
	Celmisia gracilenta	Mountain daisy, Pekapeka	1	NO	FAC	N
	Chaerophyllum colensoi		1	NO	FACU	N
	Epliobium species		1	NO	UPL	N
	Gonocarpus micranthus	Piripiri	1	NO	FAC	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Juncus novae-zelandiae		1	NO	FACW	N
		Total Cover:	85			
		20% Cover:	17			
		50% Cover:	43			

Plot 27-b

Pasture Exclusion Test	
Pasture Species Cover =	2
Total Vegetation Cover =	109
% Cover of Pasture Species =	2%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	2
Total number of dominant species across all strata (B) =	5
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	40%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	30	x 1 =	30
FACW	47	x 2 =	94
FAC	3	x 3 =	9
FACU	23	x 4 =	92
UPL	6	x 5 =	30
Total (A)	109	Total (B)	255
		Prevalence Index (B/A) =	2.29
		Wetland vegetation determination =	**WETLAND**

Vegetation Plot Data Plot 28-b						
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**	**Pasture Species?**
Shrub	*Coprosma cheesemanii*		20	YES	FACU	
	Dracophyllum longifolium	Inaka	10	YES	FACU	
	Veronica odora		5	NO	FACU	
	Androstoma empetrifolium		5	NO	FACW	
	Gaultheria macrostigma		5	NO	FACU	
		Total Cover:	45			
		20% Cover:	9			
		50% Cover:	23			
Herb	*Oreobolus strictus*		35	YES	FACW	N
	Anthoxanthum odoratum	Sweet vernal	15	NO	FACU	Y
	Carex coriacea	Rautahi	5	NO	FACW	N
	Hypochaeris radicata	Catsear	1	NO	FACU	N
	Lycopodium scariosum	Alpine clubmoss	1	NO	UPL	N
	Astelia nervosa	Mountain astelia	1	NO	FACU	N
	Juncus edgariae		1	NO	FACW	N
		Total Cover:	59			
		20% Cover:	12			
		50% Cover:	30			

Plot 28-b

Pasture Exclusion Test	
Pasture Species Cover =	15
Total Vegetation Cover =	104
% Cover of Pasture Species =	14%
Pasture determination =	**NOT PASTURE**

Dominance Test	
Number of dominant species OBL, FACW, or FAC (A) =	1
Total number of dominant species across all strata (B) =	3
Percent of dominant species that are OBL, FACW, or FAC (A/B) =	33%
Wetland vegetation determination =	**NOT WETLAND**

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Multiplied % Cover**
OBL	0	x 1 =	0
FACW	46	x 2 =	92
FAC	0	x 3 =	0
FACU	52	x 4 =	208
UPL	6	x 5 =	30
Total (A)	104	Total (B)	330
		Prevalence Index (B/A) =	3.13
		Wetland vegetation determination =	**NOT WETLAND**

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Plot 1-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria macrostigma*	Prostrate snowberry	30	YES	FACU
	Ozothamnus leptophyllus	Tauhinu, cottonhead	20	YES	FACU
	Veronica odora		15	YES	FACW
	Coprosma cheesemanii		7	NO	FACU
	Coprosma elatirioides		1	NO	FACW
		Total Cover:	73		
		20% Cover:	15		
		50% Cover:	37		
Herb 2 x 2 m	*Brown top*	Agrostis capillaris	40	YES	FACU
	Catsear	Hypochaeris radicata	20	YES	FACU
	Danthonia	Rytidosperma gracile	5	NO	FACU
	Little hard Fern	Blechnum penna-marina	5	NO	FAC
	Mountain kiokio	Blechnum montanum	3	NO	FACU
	Pratia	Lobelia angulata	2	NO	FAC
		Geranium potentilloides	1	NO	UPL
	Cutty Grass, rautahi	Carex coriacea	1	NO	FACW
	Slender everlasting daisy	Helichrysum filicaule	1	NO	FACU
		Total Cover:	78		
		20% Cover:	16		
		50% Cover:	39		

Prevalence Index			
Indicator Status	**Total % Cover**	**Multiplication Factor**	**Mulitplied % Cover**
OBL	0	x 1 =	0
FACW	17	x 2 =	34
FAC	7	x 3 =	21
FACU	126	x 4 =	504
UPL	1	x 5 =	5
TOTAL (A)	151		564
		Prevalence Index (B/A) =	3.74
		Wetland vegetation determination =	**NOT WETLAND**

Plot 2-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria macrostigma*	Prostrate snowberry	30	YES	FACU
	Coprosma cheesemanii		20	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	20	YES	FACU
	Veronica odora		10	NO	FACU
	Coprosma elatirioides		5	NO	FACW
		Total Cover:	85		
		20% Cover:	17		
		50% Cover:	43		
Herb 2 x 2 m	*Oreobolus strictus*		60	YES	FACW
	Carpha alpina		15	NO	OBL
	Carex punicea	Red Bastard Grass, Frost Flat Hook Grass	10	NO	FAC
	Carex dissita	Forest Sedge	10	NO	FAC
	Rytidosperma gracile	Danthonia	5	NO	FACU
	Agrostis capillaris	Brown top	5	NO	FACU
	Hypochaeris radicata	Catsear	3	NO	FACU
	Juncus bulbosus	Bulbous Rush	1	NO	OBL
	Nertera depressa	Nertera	1	NO	FACU
	Blechnum penna-marina	Little hard Fern	1	NO	FAC
	Juncus effusus	Soft Rush	1	NO	FACW
	Carex coriacea	Cutty Grass, rautahi	1	NO	FACW
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Geranium potentilloides		1	NO	UPL
		Total Cover:	115		
		20% Cover:	23		
		50% Cover:	58		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**25%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	16	x 1 =	16
FACW	67	x 2 =	134
FAC	22	x 3 =	66
FACU	94	x 4 =	376
UPL	1	x 5 =	5
TOTAL (A)	200	TOTAL (B)	597
Prevalence Index (B/A)			**2.99**

Plot 3-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Coprosma cheesemanii*		25	YES	FACU
	Veronica odora		25	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	10	NO	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	10	NO	FACU
	Coprosma elatirioides		5	NO	FACW
	Androstoma empetrifolia		1	NO	FACW
		Total Cover:	76		
		20% Cover:	15		
		50% Cover:	38		
Herb 2 x 2 m	*Juncus effusus*	Soft Rush	50	YES	FACW
	Agrostis capillaris	Brown top	30	YES	FACU
	Carex coriacea	Cutty Grass, rautahi	25	YES	FACW
	Carex punicea	Red Bastard Grass, Frost Flat Hook Grass	2	NO	FAC
	Chaerophyllum colensoi	Mountain myrrh	2	NO	FACU
	Carpha alpina		1	NO	OBL
	Hypochaeris radicata	Catsear	1	NO	FACU
	Geranium potentilloides		1	NO	None
		Total Cover:	112		
		20% Cover:	22		
		50% Cover:	56		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**40%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	1	x 1 =	1
FACW	81	x 2 =	162
FAC	2	x 3 =	6
FACU	103	x 4 =	412
UPL	0	x 5 =	0
TOTAL (A)	187	TOTAL (B)	581
Prevalence Index (B/A)			**3.11**

Plot 4-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Veronica odora*		15	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	15	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	10	NO	FACU
	Coprosma cheesemanii		10	NO	FACU
	Androstoma empetrifolia		3	NO	FACW
		Total Cover:	53		
		20% Cover:	11		
		50% Cover:	27		
Herb 2 x 2 m	*Oreobolus strictus*		40	YES	FACW
	Juncus effusus	Soft Rush	13	NO	FACW
	Carex coriacea	Cutty Grass, rautahi	10	NO	FACW
	Juncus bulbosus	Bulbous Rush	3	NO	OBL
	Hypochaeris radicata	Catsear	2	NO	FACU
	Carex dissita	Forest Sedge	2	NO	FAC
	Carpha alpina		2	NO	OBL
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Rytidosperma gracile	Danthonia	1	NO	FACU
	Blechnum montanum	Mountain kiokio	1	NO	FACU
	Chaerophyllum colensoi	Mountain myrrh	1	NO	FACU
	Gonocarpus micranthus		1	NO	FAC
		Total Cover:	77		
		20% Cover:	15		
		50% Cover:	39		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**33%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	5	x 1 =	5
FACW	66	x 2 =	132
FAC	4	x 3 =	12
FACU	55	x 4 =	220
UPL	0	x 5 =	0
TOTAL (A)	130	TOTAL (B)	369
Prevalence Index (B/A)			**2.84**

Plot 5-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Ozothamnus vauvilliersii*	Mountain tauhinu	10	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	10	YES	FACU
	Veronica odora		5	NO	FACU
	Dracophyllum longifolium subsp. longifolium	Inaka	5	NO	FACU
		Total Cover:	30		
		20% Cover:	6		
		50% Cover:	15		
Herb 2 x 2 m	*Oreobolus strictus*		45	YES	FACW
	Juncus effusus	Soft Rush	20	YES	FACW
	Carpha alpina	0	15	NO	OBL
	Carex coriacea	Cutty Grass, rautahi	10	NO	FACW
	Juncus antarcticus		3	NO	OBL
	Hypochaeris radicata	Catsear	2	NO	FACU
	Anthoxanthum odoratum	Sweet vernal	2	NO	FACU
		Total Cover:	97		
		20% Cover:	19		
		50% Cover:	49		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**50%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	18	x 1 =	18
FACW	75	x 2 =	150
FAC	0	x 3 =	0
FACU	34	x 4 =	136
UPL	0	x 5 =	0
TOTAL (A)	127	TOTAL (B)	304
Prevalence Index (B/A)			**2.39**

Plot 6-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Ozothamnus vauvilliersii*	Mountain tauhinu	50	YES	FACU
	Veronica odora		40	YES	FACU
	Coprosma cheesemanii		20	NO	FACU
	Coprosma elatirioides		5	NO	FACW
	Androstoma empetrifolia		5	NO	FACW
		Total Cover:	120		
		20% Cover:	24		
		50% Cover:	60		
Herb 2 x 2 m	*Agrostis capillaris*	Brown top	25	Yes	FACU
	Oreobolus strictus		20	Yes	FACW
	Carex coriacea	Cutty Grass, rautahi	15	NO	FACW
	Rytidosperma gracile	Danthonia	15	NO	FACU
	Carpha alpina		10	NO	OBL
	Hypochaeris radicata	Catsear	5	NO	FACU
		Total Cover:	90		
		20% Cover:	18		
		50% Cover:	45		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**25%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	10	x 1 =	10
FACW	45	x 2 =	90
FAC	0	x 3 =	0
FACU	155	x 4 =	620
UPL	0	x 5 =	0
TOTAL (A)	210	TOTAL (B)	720
Prevalence Index (B/A)			**3.43**

Plot 7-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Dracophyllum longifolium subsp. longifolium*	Inaka	60	YES	FACU
	Coprosma cheesemanii		10	NO	FACU
	Androstoma empetrifolia		5	NO	FACW
	Gaultheria macrostigma	Prostrate snowberry	5	NO	FACU
	Coprosma elatirioides		1	NO	FACW
	Coprosma decurva		1	NO	UPL
		Total Cover:	82		
		20% Cover:	16		
		50% Cover:	41		
Herb 2 x 2 m	*Oreobolus strictus*		30	YES	FACW
	Juncus antarcticus		30	YES	OBL
	Carex dissita	Forest Sedge	5	NO	FAC
	Juncus effusus	Soft Rush	2	NO	FACW
	Blechnum penna-marina	Little hard Fern	2	NO	FAC
	Nertera depressa	Nertera	1	NO	FACU
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
		Total Cover:	71		
		20% Cover:	14		
		50% Cover:	36		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**67%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	30	x 1 =	30
FACW	38	x 2 =	76
FAC	8	x 3 =	24
FACU	76	x 4 =	304
UPL	1	x 5 =	5
TOTAL (A)	153	TOTAL (B)	439
Prevalence Index (B/A)			**2.87**

Plot 8-c

Vegetation Plot Data 8-c					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/ shrub r = 5 m	*Dracophyllum longifolium subsp. longifolium*	Inaka	60	YES	FACU
	Androstoma empetrifolia	0	12	NO	FACW
	Gaultheria macrostigma	Prostrate snowberry	10	NO	FACU
	Coprosma cheesemanii	0	5	NO	FACU
	Coprosma elatirioides	0	5	NO	FACW
	Leptospermum scoparium	Mānuka, tea Tree	1	NO	FAC
		Total Cover:	93		
		20% Cover:	19		
		50% Cover:	47		
Herb 2 x 2 m	*Oreobolus strictus*		25	YES	FACW
	Juncus antarcticus		15	YES	OBL
	Carex coriacea	Cutty Grass, rautahi	5	NO	FACW
	unknown	unknown	5	NO	n/a
	Juncus bulbosus	Bulbous Rush	1	NO	OBL
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Blechnum penna-marina	Little hard Fern	1	NO	FAC
	Abrotanella linearis		1	NO	FACW
		Total Cover:	54		
		20% Cover:	11		
		50% Cover:	27		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**67%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	16	x 1 =	16
FACW	48	x 2 =	96
FAC	3	x 3 =	9
FACU	75	x 4 =	300
UPL	0	x 5 =	0
TOTAL (A)	142	TOTAL (B)	421
Prevalence Index (B/A)			**2.96**

Plot 9-c

Vegetation Plot Data Plot 9-c					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria macrostigma*	Prostrate snowberry	15	Yes	FACU
	Veronica odora	0	10	Yes	FACU
	Coprosma cheesemanii	0	5	NO	FACU
	Leptospermum scoparium	Mānuka, tea Tree	5	NO	FAC
	Ozothamnus vauvilliersii	Mountain tauhinu	5	NO	FACU
		Total Cover:	40		
		20% Cover:	8		
		50% Cover:	20		
Herb 2 x 2 m	*Oreobolus strictus*		35	Yes	FACW
	Carex coriacea	Cutty Grass, rautahi	2	NO	FACW
	Juncus effusus	Soft Rush	2	NO	FAC
	Blechnum penna-marina	Little hard Fern	1	NO	FAC
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Chionochloa rubra subsp. cuprea	Red tussock	1	NO	FACU
	Anthoxanthum odoratum	Sweet vernal	1	NO	FACU
	Gonocarpus micranthus		1	NO	FAC
		Total Cover:	44		
		20% Cover:	9		
		50% Cover:	22		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**33%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	39	x 2 =	78
FAC	9	x 3 =	27
FACU	36	x 4 =	144
UPL	0	x 5 =	0
TOTAL (A)	84	TOTAL (B)	249
Prevalence Index (B/A)			**2.96**

Plot 10-c

Vegetation Plot Data 10-c					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub	*Gaultheria macrostigma*	Prostrate snowberry	10	YES	FACU
r = 5 m	*Leptospermum scoparium*	Mānuka, tea Tree	10	YES	FAC
	Androstoma empetrifolia		5	NO	FACW
	Ozothamnus vauvilliersii	Mountain tauhinu	5	NO	FACU
	Dracophyllum longifolium subsp. longifolium	Inaka	2	NO	FACU
		Total Cover:	32		
		20% Cover:	6		
		50% Cover:	16		
Herb	*Oreobolus strictus*		75	YES	FACW
2 x 2 m	*Carex coriacea*	Cutty Grass, rautahi	4	NO	FACW
	Carpha alpina		2	NO	OBL
	Hypochaeris radicata	Catsear	1	NO	FACU
	Anthoxanthum odoratum	Sweet vernal	1	NO	FACU
	Chaerophyllum colensoi	Mountain myrrh	1	NO	FACU
	Gonocarpus micranthus		1	NO	FAC
		Total Cover:	85		
		20% Cover:	17		
		50% Cover:	43		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**67%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	2	x 1 =	2
FACW	84	x 2 =	168
FAC	11	x 3 =	33
FACU	20	x 4 =	80
UPL	0	x 5 =	0
TOTAL (A)	117	TOTAL (B)	283
Prevalence Index (B/A)			**2.42**

Plot 11-c

Vegetation Plot Data 11-c					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria depressa*	Snowberry	15	YES	FACU
	Androstoma empetrifolia		10	YES	FACW
	Ozothamnus vauvilliersii	Mountain tauhinu	5	NO	FACU
	Coprosma cheesemanii		5	NO	FACU
	Veronica odora		3	NO	FACU
	Leptospermum scoparium	Mānuka, tea Tree	1	NO	FAC
	Coprosma elatirioides		1	NO	FACW
		Total Cover:	40		
		20% Cover:	8		
		50% Cover:	20		
Herb 2 x 2 m	*Oreobolus strictus*		70	YES	FACW
	Empodisma minus	Wire Rush	15	NO	OBL
	Gonocarpus micranthus		3	NO	FAC
	Hypochaeris radicata	Catsear	2	NO	FACU
	Chionochloa rubra subsp. cuprea	Red tussock	1	NO	FAC
	Juncus effusus	Soft Rush	1	NO	FACW
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Rytidosperma gracile	Danthonia	1	NO	FACU
	Geranium potentilloides		1	NO	UPL
	Chaerophyllum colensoi	Mountain myrrh	1	NO	FACU
		Total Cover:	96		
		20% Cover:	19		
		50% Cover:	48		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**67%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	15	x 1 =	15
FACW	82	x 2 =	164
FAC	6	x 3 =	18
FACU	32	x 4 =	128
UPL	1	x 5 =	5
TOTAL (A)	136	TOTAL (B)	330
Prevalence Index (B/A)			**2.43**

Plot 12-c Plate A9-7

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria macrostigma*	Prostrate snowberry	15	YES	FACU
	Coprosma cheesemanii		5	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	1	NO	FACU
	Veronica odora		1	NO	FACU
		Total Cover:	22		
		20% Cover:	4		
		50% Cover:	11		
Herb 2 x 2 m	*Oreobolus strictus*		75	YES	FACW
	Juncus pallidus	Giant Rush, leafless Rush, wī	10	NO	FACW
	Gonocarpus micranthus		1	NO	FAC
	Carpha alpina		4	NO	OBL
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Hypochaeris radicata	Catsear	1	NO	FACU
	Chaerophyllum colensoi	Mountain myrrh	1	NO	FACU
	Rytidosperma gracile	Danthonia	1	NO	FACU
	Agrostis capillaris	Brown top	0	NO	FACU
		Total Cover:	99		
		20% Cover:	20		
		50% Cover:	50		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**33%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	4	x 1 =	4
FACW	85	x 2 =	170
FAC	6	x 3 =	18
FACU	26	x 4 =	104
UPL	0	x 5 =	0
TOTAL (A)	121	TOTAL (B)	296
Prevalence Index (B/A)			**2.45**

Plot 13-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Androstoma empetrifolia*		40	YES	FACW
	Veronica odora		30	YES	FACU
	Coprosma cheesemanii		25	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	15	NO	FACU
		Total Cover:	110		
		20% Cover:	22		
		50% Cover:	55		
Herb 2 x 2 m	*Oreobolus strictus*		50	YES	FACW
	Carex coriacea	Cutty Grass, rautahi	5	NO	FACW
	Lobelia angulata	Pratia	2	NO	FAC
	Carex punicea	Red Bastard Grass, Frost Flat Hook Grass	1	NO	FAC
	Carex horizontalis	Hook Grass	1	NO	UPL
	Hypochaeris radicata	Catsear	1	NO	FACU
		Total Cover:	60		
		20% Cover:	12		
		50% Cover:	30		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**50%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	95	x 2 =	190
FAC	3	x 3 =	9
FACU	71	x 4 =	284
UPL	1	x 5 =	5
TOTAL (A)	170	TOTAL (B)	488
Prevalence Index (B/A)			**2.87**

Plot 14-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub	*Gaultheria macrostigma*	Prostrate snowberry	30	YES	FACU
r = 5 m	*Coprosma cheesemanii*		5	NO	FACU
	Leptospermum scoparium	Mānuka, tea Tree	5	NO	FAC
	Androstoma empetrifolia		5	NO	FACW
	Veronica odora		5	NO	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	3	NO	FACU
	Dracophyllum longifolium subsp. longifolium	Inaka	1	NO	FACU
		Total Cover:	54		
		20% Cover:	11		
		50% Cover:	27		
Herb	*Oreobolus strictus*		40	YES	FACW
2 x 2 m	*Herpolirion novae-zelandiae*		10	NO	FAC
	Juncus edgariae	Leafless Rush, wī	5	NO	FACW
	Gonocarpus micranthus		3	NO	FAC
	Blechnum novae-zelandiae	Kiokio	1	NO	FAC
	Rytidosperma gracile	Danthonia	1	NO	FACU
		Total Cover:	60		
		20% Cover:	12		
		50% Cover:	30		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	2
% OBL/FACW/FAC (A/B)	**50%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	50	x 2 =	100
FAC	19	x 3 =	57
FACU	45	x 4 =	180
UPL	0	x 5 =	0
TOTAL (A)	114	TOTAL (B)	337
Prevalence Index (B/A)			**2.96**

Plot 15-c Plate A9-8, Plate A9-9

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Dracophyllum longifolium subsp. longifolium*	Inaka	10	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	5	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	1	NO	FACU
	Veronica odora		1	NO	FACU
	Coprosma elatirioides		1	NO	FACW
	Leptospermum scoparium	Mānuka, tea Tree	1	NO	FAC
		Total Cover:	19		
		20% Cover:	4		
		50% Cover:	10		
Herb 2 x 2 m	*Oreobolus strictus*		60	YES	FACW
	Carpha alpina		5	NO	OBL
	Carex coriacea	Cutty Grass, rautahi	1	NO	FACW
	Juncus edgariae	Leafless Rush, wī	1	NO	FACW
	Juncus bulbosus	Bulbous Rush	1	NO	OBL
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Juncus effusus	Soft Rush	1	NO	FACW
	Drosera spathulata	Sundew	1	NO	FACW
		Total Cover:	71		
		20% Cover:	14		
		50% Cover:	36		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**33%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	6	x 1 =	6
FACW	65	x 2 =	130
FAC	2	x 3 =	6
FACU	17	x 4 =	68
UPL	0	x 5 =	0
TOTAL (A)	90	TOTAL (B)	210
Prevalence Index (B/A)			**2.33**

Plot 16-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub	*Dracophyllum longifolium subsp. longifolium*	Inaka	30	YES	FACU
r = 5 m	*Veronica odora*		25	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	25	YES	FACU
	Coprosma cheesemanii		20	NO	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	15	NO	FACU
	Leptospermum scoparium	Mānuka, tea Tree	5	NO	FAC
	Coprosma elatirioides		5	NO	FACW
	Androstoma empetrifolia		5	NO	FACW
		Total Cover:	130		
		20% Cover:	26		
		50% Cover:	65		
Herb	*Oreobolus strictus*		50	Yes	FACW
2 x 2 m	*Carpha alpina*		25	Yes	OBL
	Agrostis capillaris	Brown top	5	NO	FACU
	Carex coriacea	Cutty Grass, rautahi	3	NO	FACW
	Juncus edgariae	Leafless Rush, wī	1	NO	FACW
		Total Cover:	84		
		20% Cover:	17		
		50% Cover:	42		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**40%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	25	x 1 =	25
FACW	64	x 2 =	128
FAC	5	x 3 =	15
FACU	120	x 4 =	480
UPL	0	x 5 =	0
TOTAL (A)	214	TOTAL (B)	648
Prevalence Index (B/A)			**3.03**

Plot 17-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub	*Dracophyllum longifolium subsp. longifolium*	Inaka	30	yes	FACU
r = 5 m	*Androstoma empetrifolia*	0	10	YES	FACW
	Gaultheria macrostigma	Prostrate snowberry	10	YES	FACU
	Coprosma elatirioides	0	5	NO	FACW
	Coprosma cheesemanii	0	5	NO	FACU
	Ulex europaeus	Gorse	1	NO	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	1	NO	FACU
	Veronica odora	0	1	NO	FACU
		Total Cover:	63		
		20% Cover:	13		
		50% Cover:	32		
Herb	*Oreobolus strictus*	0	70	YES	FACW
2 x 2 m	*Juncus antarcticus*	0	10	NO	OBL
	Carpha alpina	0	5	NO	OBL
	Drosera spathulata	Sundew	1	NO	FACW
	Carex coriacea	Cutty Grass, rautahi	1	NO	FACW
	Gonocarpus micranthus	0	1	NO	FAC
	Rytidosperma gracile	Danthonia	1	NO	FACU
	Agrostis capillaris	Brown top	1	NO	FACU
		Total Cover:	90		
		20% Cover:	18		
		50% Cover:	45		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**50%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	15	x 1 =	15
FACW	87	x 2 =	174
FAC	1	x 3 =	3
FACU	50	x 4 =	200
UPL	0	x 5 =	0
TOTAL (A)	153	TOTAL (B)	392
Prevalence Index (B/A)			**2.56**

Plot 18-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria macrostigma*	Prostrate snowberry	8	YES	FACU
	Dracophyllum longifolium subsp. longifolium	Inaka	5	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	3	NO	FACU
	Veronica odora		1	NO	FACU
	Leptospermum scoparium	Mānuka, tea Tree	1	NO	FAC
		Total Cover:	18		
		20% Cover:	4		
		50% Cover:	9		
Herb 2 x 2 m	*Carpha alpina*		50	YES	OBL
	Oreobolus strictus		15	NO	FACW
	Anthoxanthum odoratum	Sweet vernal	11	NO	FACU
	Gonocarpus micranthus		10	NO	FAC
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Juncus effusus	Soft Rush	1	NO	FACW
	Juncus bulbosus	Bulbous Rush	1	NO	OBL
	Blechnum montanum	Mountain kiokio	1	NO	FACU
	Hypochaeris radicata	Catsear	1	NO	FACU
	Carex punicea	Red Bastard Grass, Frost Flat Hook Grass	1	NO	FAC
	Nertera depressa	Nertera	1	NO	FACU
	Drosera spathulata	Sundew	1	NO	FACW
	Chaerophyllum colensoi	Mountain myrrh	1	NO	FACU
	Carex coriacea	Cutty Grass, rautahi	1	NO	FACW
		Total Cover:	96		
		20% Cover:	19		
		50% Cover:	48		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**33%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	51	x 1 =	51
FACW	18	x 2 =	36
FAC	13	x 3 =	39
FACU	32	x 4 =	128
UPL	0	x 5 =	0
TOTAL (A)	114	TOTAL (B)	254
Prevalence Index (B/A)			**2.23**

Plot 19-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Dracophyllum longifolium subsp. longifolium*	Inaka	25	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	15	YES	FACU
	Coprosma cheesemanii		5	NO	FACU
	Gaultheria macrostigma	Prostrate snowberry	5	NO	FACU
	Veronica odora		2	NO	FACU
	Leptospermum scoparium	Mānuka, tea Tree	1	NO	FAC
	Ulex europaeus	Gorse	1	NO	FACU
		Total Cover:	54		
		20% Cover:	11		
		50% Cover:	27		
Herb 2 x 2 m	*Oreobolus strictus*		30	YES	FACW
	Carpha alpina		20	YES	OBL
	Hypochaeris radicata	Catsear	8	NO	FACU
	Celmisia gracilenta	Slender mountain daisy, pekapeka	5	NO	FAC
	Anthoxanthum odoratum	Sweet vernal	5	NO	FACU
	Agrostis capillaris	Brown top	5	NO	FACU
	Chaerophyllum colensoi	Mountain myrrh	3	NO	FACU
	Carex coriacea	Cutty Grass, rautahi	2	NO	FACW
	Lobelia angulata	Pratia	2	NO	FAC
	Drosera spathulata	Sundew	1	NO	FACW
	Blechnum penna-marina	Little hard Fern	1	NO	FAC
	Juncus effusus	Soft Rush	1	NO	FACW
	Carex punicea	Red Bastard Grass, Frost Flat Hook Grass	1	NO	FAC
	Blechnum minus	Swamp kiokio	1	NO	FACW
		Total Cover:	85		
		20% Cover:	17		
		50% Cover:	43		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**50%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	20	x 1 =	20
FACW	35	x 2 =	70
FAC	10	x 3 =	30
FACU	74	x 4 =	296
UPL	0	x 5 =	0
TOTAL (A)	139	TOTAL (B)	416
Prevalence Index (B/A)			**2.99**

Plot 20-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub	*Gaultheria macrostigma*	Prostrate snowberry	15	YES	FACU
r = 5 m	*Coprosma elatirioides*		15	YES	FACW
	Coprosma cheesemanii		15	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	10	NO	FACU
	Veronica odora		5	NO	FACU
	Olearia laxiflora	Twiggy Tree daisy	2	NO	FACW
		Total Cover:	62		
		20% Cover:	12		
		50% Cover:	31		
Herb	*Juncus edgariae*	Leafless Rush, wī	40	YES	FACW
2 x 2 m	*Oreobolus strictus*		25	YES	FACW
	Chaerophyllum colensoi	Mountain myrrh	2	NO	FACU
	Carex coriacea	Cutty Grass, rautahi	2	NO	FACW
	Hypochaeris radicata	Catsear	2	NO	FACU
	Agrostis capillaris	Brown top	2	NO	FACU
	Rytidosperma gracile	Danthonia	2	NO	FACU
	Geranium potentilloides		1	NO	UPL
	Carex punicea	Red Bastard Grass, Frost Flat Hook Grass	1	NO	FAC
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
		Total Cover:	78		
		20% Cover:	16		
		50% Cover:	39		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	3
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**60%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	84	x 2 =	168
FAC	2	x 3 =	6
FACU	53	x 4 =	212
UPL	1	x 5 =	5
TOTAL (A)	140	TOTAL (B)	391
Prevalence Index (B/A)			**2.79**

Plot 21-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Dracophyllum longifolium subsp. longifolium*	Inaka	13	YES	FACU
	Coprosma elatirioides		10	YES	FACW
	Gaultheria macrostigma	Prostrate snowberry	10	YES	FACU
	Coprosma cheesemanii	0	8	NO	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	8	NO	FACU
	Veronica odora		5	NO	FACU
	Androstoma empetrifolia		5	NO	FACW
	Androstoma empetrifolia		5	NO	FACW
		Total Cover:	64		
		20% Cover:	13		
		50% Cover:	32		
Herb 2 x 2 m	*Oreobolus strictus*	0	50	YES	FACW
	Rytidosperma gracile	Danthonia	10	NO	FACU
	Agrostis capillaris	Brown top	5	NO	FACU
	Chaerophyllum colensoi	Mountain myrrh	5	NO	FACU
	Anthoxanthum odoratum	Sweet vernal	3	NO	FACU
	Hypochaeris radicata	Catsear	2	NO	FACU
	Carpha alpina		2	NO	OBL
	Gonocarpus micranthus		2	NO	FAC
	Herpolirion novae-zelandiae		2	NO	FAC
	Nertera depressa	Nertera	2	NO	FACU
	Carex coriacea	Cutty Grass, rautahi	1	NO	FACW
	Abrotanella linearis		1	NO	FACW
		Total Cover:	85		
		20% Cover:	17		
		50% Cover:	43		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**50%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	2	x 1 =	2
FACW	72	x 2 =	144
FAC	4	x 3 =	12
FACU	71	x 4 =	284
UPL	0	x 5 =	0
TOTAL (A)	149	TOTAL (B)	442
Prevalence Index (B/A)			**2.97**

Plot 22-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Ozothamnus vauvilliersii*	Mountain tauhinu	15	YES	FACU
	Coprosma cheesemanii	0	15	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	15	YES	FACU
	Veronica odora	0	10	NO	FACU
	Coprosma elatirioides	0	5	NO	FACW
	Dracophyllum longifolium subsp. longifolium	Inaka	5	NO	FACU
	Androstoma empetrifolia	0	2	NO	FACW
	Leptospermum scoparium	Mānuka, tea Tree	1	NO	FAC
		Total Cover:	68		
		20% Cover:	14		
		50% Cover:	34		
Herb 2 x 2 m	*Agrostis capillaris*	Brown top	10	YES	FACU
	Hypochaeris radicata	Catsear	3	YES	FACU
	Oreobolus strictus	0	2	NO	FACW
	Gonocarpus micranthus	0	2	NO	FAC
	Juncus edgariae	Leafless Rush, wī	2	NO	FACW
	Nertera depressa	Nertera	2	NO	FACU
	Blechnum montanum	Mountain kiokio	1	NO	FACU
	Rytidosperma gracile	Danthonia	1	NO	FACU
	Carex punicea	Red Bastard Grass, Frost Flat Hook Grass	1	NO	FAC
	Abrotanella linearis	0	1	NO	FACW
	Lycopodium fastigiatum	Alpine clubMoss, mountain clubMoss	1	NO	FAC
		Total Cover:	26		
		20% Cover:	5		
		50% Cover:	13		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	0
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**0%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	12	x 2 =	24
FAC	5	x 3 =	15
FACU	77	x 4 =	308
UPL	0	x 5 =	0
TOTAL (A)	94	TOTAL (B)	347
Prevalence Index (B/A)			**3.69**

Plot 23-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Leptospermum scoparium*	Mānuka, tea Tree	10	YES	FAC
	Coprosma elatirioides	0	10	YES	FACW
	Ozothamnus vauvilliersii	Mountain tauhinu	8	YES	FACU
	Veronica odora	0	7	NO	FACU
	Androstoma empetrifolia	0	5	NO	FACW
	Androstoma empetrifolia	0	5	NO	FACW
	Dracophyllum longifolium subsp. longifolium	Inaka	5	NO	FACU
	Coprosma cheesemanii		1	NO	FACU
		Total Cover:	51		
		20% Cover:	10		
		50% Cover:	26		
Herb 2 x 2 m	*Oreobolus strictus*		35	YES	FACW
	Carpha alpina		20	YES	OBL
	Rytidosperma gracile	Danthonia	15	NO	FACU
	Carex coriacea	Cutty Grass, rautahi	5	NO	FACW
	Agrostis capillaris	Brown top	1	NO	FACU
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Lobelia angulata	Pratia	1	NO	FAC
	Chaerophyllum colensoi	Mountain myrrh	1	NO	FACU
	Blechnum montanum	Mountain kiokio	1	NO	FACU
	Juncus effusus	Soft Rush	1	NO	FACW
		Total Cover:	81		
		20% Cover:	16		
		50% Cover:	41		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	4
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**80%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	20	x 1 =	20
FACW	61	x 2 =	122
FAC	12	x 3 =	36
FACU	39	x 4 =	156
UPL	0	x 5 =	0
TOTAL (A)	132	TOTAL (B)	334
Prevalence Index (B/A)			**2.53**

Plot 24-c Plate A9-10

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Veronica odora*		50	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	50	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	35	YES	FACU
	Coprosma cheesemanii		20	NO	FACU
		Total Cover:	155		
		20% Cover:	31		
		50% Cover:	78		
Herb 2 x 2 m	*Agrostis capillaris*	Brown top	15	YES	FACU
	Anthoxanthum odoratum	Sweet vernal	15	YES	FACU
	Polystichum vestitum	Prickly shield Fern, pūniu	4	NO	FACU
	Blechnum montanum	Mountain kiokio	3	NO	FACU
	Hypochaeris radicata	Catsear	2	NO	FACU
	Hypochaeris radicata	Catsear	2	NO	FACU
	Blechnum penna-marina	Little hard Fern	1	NO	FAC
		Total Cover:	42		
		20% Cover:	8		
		50% Cover:	21		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	0
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**0%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	0	x 2 =	0
FAC	1	x 3 =	3
FACU	196	x 4 =	784
UPL	0	x 5 =	0
TOTAL (A)	197	TOTAL (B)	787
Prevalence Index (B/A)			**3.99**

Plot 25-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria macrostigma*	Prostrate snowberry	5	YES	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	3	YES	FACU
	Coprosma elatirioides		1	NO	FACW
	Leptospermum scoparium	Mānuka, tea Tree	1	NO	FAC
	Veronica odora		1	NO	FACU
		Total Cover:	11		
		20% Cover:	2		
		50% Cover:	6		
Herb 2 x 2 m	*Carex coriacea*	Cutty Grass, rautahi	55	YES	FACW
	Oreobolus strictus		20	YES	FACW
	Carpha alpina		5	NO	OBL
	Juncus bulbosus	Bulbous Rush	2	NO	OBL
	Oreobolus pectinatus	Comb Sedge	2	NO	OBL
	Carex punicea	Red Bastard Grass, Frost Flat Hook Grass	1	NO	FAC
	Nertera depressa	Nertera	1	NO	FACU
	Hypochaeris radicata	Catsear	1	NO	FACU
	Lycopodium fastigiatum	Alpine clubMoss, mountain clubMoss	1	NO	FAC
	Carex echinata	Star Sedge	1	NO	OBL
		Total Cover:	89		
		20% Cover:	18		
		50% Cover:	45		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**50%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	10	x 1 =	10
FACW	76	x 2 =	152
FAC	3	x 3 =	9
FACU	11	x 4 =	44
UPL	0	x 5 =	0
TOTAL (A)	100	TOTAL (B)	215
Prevalence Index (B/A)			**2.15**

Plot 26-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria macrostigma*	Prostrate snowberry	60	YES	FACU
	Veronica odora		40	YES	FACU
	Coprosma cheesemanii		25	NO	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	20	NO	FACU
	Coprosma elatirioides		5	NO	FACW
		Total Cover:	150		
		20% Cover:	30		
		50% Cover:	75		
Herb 2 x 2 m	*Agrostis capillaris*	Brown top	50	YES	FACU
	Anthoxanthum odoratum	Sweet vernal	20	YES	FACU
	Blechnum penna-marina	Little hard Fern	3	NO	FAC
	Rytidosperma gracile	Danthonia	2	NO	FACU
	Hypochaeris radicata	Catsear	2	NO	FACU
	Geranium potentilloides		1	NO	UPL
	Viola cunninghamii	Mountain violet, White violet	1	NO	FAC
		Total Cover:	79		
		20% Cover:	16		
		50% Cover:	40		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	0
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**0%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	5	x 2 =	10
FAC	4	x 3 =	12
FACU	219	x 4 =	876
UPL	1	x 5 =	5
TOTAL (A)	229	TOTAL (B)	903
Prevalence Index (B/A)			**3.94**

Plot 27-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Ozothamnus vauvilliersii*	Mountain tauhinu	30	YES	FACU
	Veronica odora		25	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	25	YES	FACU
	Coprosma cheesemanii		15	NO	FACU
	Coprosma elatirioides		10	NO	FACW
	Androstoma empetrifolia		10	NO	FACW
		Total Cover:	115		
		20% Cover:	23		
		50% Cover:	58		
Herb 2 x 2 m	*Oreobolus strictus*		20	YES	FACW
	Agrostis capillaris	Brown top	10	YES	FACU
	Anthoxanthum odoratum	Sweet vernal	10	YES	FACU
	Empodisma minus	Wire Rush	5	NO	OBL
	Rytidosperma gracile	Danthonia	5	NO	FACU
	Juncus effusus	Soft Rush	2	NO	FACW
	Hypochaeris radicata	Catsear	2	NO	FACU
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
		Total Cover:	55		
		20% Cover:	11		
		50% Cover:	28		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	6
% OBL/FACW/FAC (A/B)	**17%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	5	x 1 =	5
FACW	42	x 2 =	84
FAC	1	x 3 =	3
FACU	122	x 4 =	488
UPL	0	x 5 =	0
TOTAL (A)	170	TOTAL (B)	580
Prevalence Index (B/A)			**3.41**

Plot 28-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Dracophyllum longifolium subsp. longifolium*	Inaka	40	yes	FACU
	Leptospermum scoparium	Mānuka, tea Tree	30	yes	FAC
	Gaultheria macrostigma	Prostrate snowberry	15	NO	FACU
	Coprosma elatirioides		10	NO	FACW
	Coprosma cheesemanii		10	NO	FACU
	Veronica odora		5	NO	FACU
		Total Cover:	110		
		20% Cover:	22		
		50% Cover:	55		
Herb 2 x 2 m	*Oreobolus strictus*		50	yes	FACW
	Carpha alpina		30	yes	OBL
	Carex coriacea	Cutty Grass, rautahi	5	NO	FACW
	Juncus antarcticus		5	NO	OBL
	Juncus edgariae	Leafless Rush, wī	3	NO	FACW
	Agrostis capillaris	Brown top	2	NO	FACU
	Epilobium nerteroides	Willow herb	1	NO	FAC
	Abrotanella linearis		1	NO	FACW
		Total Cover:	97		
		20% Cover:	19		
		50% Cover:	49		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	3
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**75%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	35	x 1 =	35
FACW	69	x 2 =	138
FAC	31	x 3 =	93
FACU	72	x 4 =	288
UPL	0	x 5 =	0
TOTAL (A)	207	TOTAL (B)	554
Prevalence Index (B/A)			**2.68**

Plot 29-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria macrostigma*	Prostrate snowberry	30	yes	FACU
	Coprosma depressa		25	yes	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	20	yes	FACU
	Coprosma elatirioides		10	NO	FACW
	Leptospermum scoparium	Mānuka, tea Tree	2	NO	FAC
		Total Cover:	87		
		20% Cover:	17		
		50% Cover:	44		
Herb 2 x 2 m	*Agrostis capillaris*	Brown top	15	yes	FACU
	Anthoxanthum odoratum	Sweet vernal	15	yes	FACU
	Carex coriacea	Cutty Grass, rautahi	5	NO	FACW
	Carex punicea	Red Bastard Grass, Frost Flat Hook Grass	3	NO	FAC
	Oreobolus strictus		3	NO	FACW
	Hypochaeris radicata	Catsear	1	NO	FACU
	Juncus edgariae	Leafless Rush, wī	1	NO	FACW
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
		Total Cover:	44		
		20% Cover:	9		
		50% Cover:	22		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	0
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**0%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	19	x 2 =	38
FAC	6	x 3 =	18
FACU	106	x 4 =	424
UPL	0	x 5 =	0
TOTAL (A)	131	TOTAL (B)	480
Prevalence Index (B/A)			**3.66**

Plot 30-c Plate A9-11

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Ozothamnus vauvilliersii*	Mountain tauhinu	5	YES	FACU
	Veronica odora		3	YES	FACU
	Coprosma elatirioides		1	NO	FACW
		Total Cover:	9		
		20% Cover:	2		
		50% Cover:	5		
Herb 2 x 2 m	*Carex coriacea*	Cutty Grass, rautahi	40	YES	FACW
	Agrostis capillaris	Brown top	20	YES	FACU
	Juncus effusus	Soft Rush	5	NO	FACW
	Anthoxanthum odoratum	Sweet vernal	3	NO	FACU
	Lobelia angulata	Pratia	2	NO	FAC
	Hydrocotyle novae-zeelandiae	Pennywort	2	NO	FAC
	Taraxacum officinale	Dandelion	2	NO	FACU
	Hypochaeris radicata	Catsear	1	NO	FACU
	Juncus antarcticus		1	NO	OBL
		Total Cover:	76		
		20% Cover:	15		
		50% Cover:	38		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**25%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	1	x 1 =	1
FACW	46	x 2 =	92
FAC	4	x 3 =	12
FACU	34	x 4 =	136
UPL	0	x 5 =	0
TOTAL (A)	85	TOTAL (B)	241
Prevalence Index (B/A)			**2.84**

Plot 31-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Dracophyllum longifolium subsp. longifolium*	Inaka	30	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	15	YES	FACU
	Veronica odora		8	NO	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	5	NO	FACU
	Coprosma cheesemanii		5	NO	FACU
	Androstoma empetrifolia		5	NO	FACW
		Total Cover:	68		
		20% Cover:	14		
		50% Cover:	34		
Herb 2 x 2 m	*Oreobolus strictus*		30	YES	FACW
	Anthoxanthum odoratum	Sweet vernal	5	NO	FACU
	Rytidosperma gracile	Danthonia	5	NO	FACU
	Juncus edgariae	Leafless Rush, wī	2	NO	FACW
	Carex coriacea	Cutty Grass, rautahi	1	NO	FACW
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
	Blechnum penna-marina	Little hard Fern	1	NO	FAC
	Carpha alpina		1	NO	OBL
	Lycopodium fastigiatum	Alpine clubMoss, mountain clubMoss	1	NO	FAC
		Total Cover:	47		
		20% Cover:	9		
		50% Cover:	24		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**33%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	1	x 1 =	1
FACW	38	x 2 =	76
FAC	3	x 3 =	9
FACU	73	x 4 =	292
UPL	0	x 5 =	0
TOTAL (A)	115	TOTAL (B)	378
Prevalence Index (B/A)			**3.29**

Plot 32-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Dracophyllum longifolium subsp. longifolium*	Inaka	30	YES	FACU
	Gaultheria macrostigma	Prostrate snowberry	15	YES	FACU
	Androstoma empetrifolia		10	NO	FACW
	Leptospermum scoparium	Mānuka, tea Tree	5	NO	FAC
	Coprosma elatirioides		1	NO	FACW
		Total Cover:	61		
		20% Cover:	12		
		50% Cover:	31		
Herb 2 x 2 m	*Oreobolus strictus*		40	Yes	FACW
	Juncus effusus	Soft Rush	5	NO	FACW
	Carex coriacea	Cutty Grass, rautahi	4	NO	FACW
	Juncus edgariae	Leafless Rush, wī	2	NO	FACW
	Carpha alpina		1	NO	OBL
	Celmisia gracilenta	Slender mountain daisy, pekapeka	1	NO	FAC
		Total Cover:	53		
		20% Cover:	11		
		50% Cover:	27		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**33%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	1	x 1 =	1
FACW	62	x 2 =	124
FAC	6	x 3 =	18
FACU	45	x 4 =	180
UPL	0	x 5 =	0
TOTAL (A)	114	TOTAL (B)	323
Prevalence Index (B/A)			**2.83**

Plot 33-c Plate A9-12

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Leptospermum scoparium*	Mānuka, tea Tree	70	YES	FAC
	Pseudopanax colensoi	Mountain five-finger	2	NO	UPL
	Coprosma dumosa	0	1	NO	FAC
	Myrsine divaricata	Weeping matipo, weeping māpou	1	NO	FAC
	Griselinia littoralis	Broadleaf, kāpuka	1	NO	FACU
		Total Cover:	75		
		20% Cover:	15		
		50% Cover:	38		
Herb 2 x 2 m	*Nertera depressa*	Nertera	30	YES	FACU
	Unknown grass		15	YES	FACU
	Blechnum penna-marina	Little hard Fern	5	NO	FAC
	Lobelia angulata	Pratia	2	NO	FAC
	Lycopodium fastigiatum	Alpine clubMoss, mountain clubMoss	1	NO	FAC
		Total Cover:	53		
		20% Cover:	11		
		50% Cover:	27		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	2
Total Dominant Spp. across strata (B)	4
% OBL/FACW/FAC (A/B)	**50%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	0	x 2 =	0
FAC	85	x 3 =	255
FACU	46	x 4 =	184
UPL	2	x 5 =	10
TOTAL (A)	133	TOTAL (B)	449
Prevalence Index (B/A)			**3.38**

Plot 34-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Gaultheria macrostigma*	Prostrate snowberry	20	yes	FACU
	Leptospermum scoparium	Mānuka, tea Tree	15	YES	FAC
	Ozothamnus vauvilliersii	Mountain tauhinu	10	NO	FACU
	Veronica odora		10	NO	FACU
	Coprosma decurva		5	NO	UPL
		Total Cover:	60		
		20% Cover:	12		
		50% Cover:	30		
Herb 2 x 2 m	*Juncus effusus*	Soft Rush	30	yes	FACW
	Carex coriacea	Cutty Grass, rautahi	25	yes	FACW
	Oreobolus strictus		20	yes	FACW
	Juncus edgariae	Leafless Rush, wī	10	NO	FACW
	Agrostis capillaris	Brown top	10	NO	FACU
	Holcus lanatus	Yorkshire fog	2	NO	FAC
	Blechnum montanum	Mountain kiokio	2	NO	FACU
	Chionochloa rubra subsp. cuprea	Red tussock	2	NO	FAC
	Blechnum penna-marina	Little hard Fern	1	NO	FAC
	Hypochaeris radicata	Catsear	1	NO	FACU
		Total Cover:	103		
		20% Cover:	21		
		50% Cover:	52		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	4
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**80%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	85	x 2 =	170
FAC	20	x 3 =	60
FACU	53	x 4 =	212
UPL	5	x 5 =	25
TOTAL (A)	163	TOTAL (B)	467
Prevalence Index (B/A)			**2.87**

Plot 35-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Ulex europaeus*	Gorse	40	yes	FACU
	Leptospermum scoparium	Mānuka, tea Tree	40	yes	FAC
	Ozothamnus vauvilliersii	Mountain tauhinu	5	NO	FACU
		Total Cover:	85		
		20% Cover:	17		
		50% Cover:	43		
Herb 2 x 2 m	*Agrostis capillaris*	Brown top	40	yes	FACU
	Hydrocotyle heteromeria	Pennywort	30	yes	FACU
	Anthoxanthum odoratum	Sweet vernal	30	yes	FACU
	Hypochaeris radicata	Catsear	3	NO	FACU
	Hieracium lepidulum	Tussock hawkweed	1	NO	UPL
	Geranium potentilloides	0	1	NO	UPL
		Total Cover:	105		
		20% Cover:	21		
		50% Cover:	53		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**20%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	0	x 2 =	0
FAC	40	x 3 =	120
FACU	148	x 4 =	592
UPL	2	x 5 =	10
TOTAL (A)	190	TOTAL (B)	722
Prevalence Index (B/A)			**3.80**

Plot 36-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Coprosma cheesemanii*		40	yes	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	35	yes	FACU
	Veronica odora		25	yes	FACU
	Gaultheria macrostigma	Prostrate snowberry	15	NO	FACU
		Total Cover:	115		
		20% Cover:	23		
		50% Cover:	58		
Herb 2 x 2 m	*Agrostis capillaris*	Brown top	35	yes	FACU
	Anthoxanthum odoratum	Sweet vernal	20	yes	FACU
	Blechnum montanum	Mountain kiokio	4	NO	FACU
	Lycopodium volubile	Climbing clubMoss, waewaekoukou	3	NO	FACU
	Hypochaeris radicata	Catsear	2	NO	FACU
	Carex egmontiana	Hook Grass	2	NO	FACW
	Rytidosperma gracile	Danthonia	1	NO	FACU
	Blechnum penna-marina	Little hard Fern	1	NO	FAC
		Total Cover:	68		
		20% Cover:	14		
		50% Cover:	34		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	0
Total Dominant Spp. across strata (B)	5
% OBL/FACW/FAC (A/B)	**0%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	2	x 2 =	4
FAC	1	x 3 =	3
FACU	180	x 4 =	720
UPL	0	x 5 =	0
TOTAL (A)	183	TOTAL (B)	727
Prevalence Index (B/A)			**3.97**

Plot 37-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Leptospermum scoparium*	Mānuka, tea Tree	60	yes	FAC
	Coprosma propinqua	Mingimingi, mikimiki	10	NO	FAC
	Coprosma linariifolia	Yellow-wood	2	NO	UPL
	Olearia laxiflora	Twiggy Tree daisy	1	NO	FACW
		Total Cover:	73		
		20% Cover:	15		
		50% Cover:	37		
Herb 2 x 2 m	*Carex horizontalis*	Hook Grass	15	yes	UPL
	Anthoxanthum odoratum	Sweet vernal	15	yes	FACU
	Hydrocotyle heteromeria	Pennywort	5	NO	FACU
	Agrostis capillaris	Brown top	5	NO	FACU
	Lagenophora strangulata	Parani	3	NO	UPL
	Nertera villosa	Nertera	2	NO	UPL
	Acaena anserinifolia	Bidibidi, piripiri	2	NO	FACU
	Blechnum penna-marina	Little hard Fern	1	NO	FAC
	Hypochaeris radicata	Catsear	1	NO	FACU
	Viola filicaulis	Forest violet	1	NO	FAC
		Total Cover:	50		
		20% Cover:	10		
		50% Cover:	25		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	1
Total Dominant Spp. across strata (B)	3
% OBL/FACW/FAC (A/B)	**33%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	1	x 2 =	2
FAC	72	x 3 =	216
FACU	28	x 4 =	112
UPL	22	x 5 =	110
TOTAL (A)	123	TOTAL (B)	440
Prevalence Index (B/A)			**3.58**

Plot 38-c

Vegetation Plot Data					
Stratum	**Species Name**	**Common Name**	**% Cover**	**Dominant?**	**Indicator Status**
Sapling/shrub r = 5 m	*Ulex europaeus*	Gorse	40	yes	FACU
	Veronica odora		5	NO	FACU
	Ozothamnus vauvilliersii	Mountain tauhinu	5	NO	FACU
		Total Cover:	50		
		20% Cover:	10		
		50% Cover:	25		
Herb 2 x 2 m	*Agrostis capillaris*	Brown top	75	yes	FACU
	Anthoxanthum odoratum	Sweet vernal	10	NO	FACU
	Juncus effusus	Soft Rush	5	NO	FACW
	Carex leporina	Oval Sedge	2	NO	FACW
	Holcus lanatus	Yorkshire fog	2	NO	FAC
	Hydrocotyle heteromeria	Pennywort	2	NO	FACU
	Hypochaeris radicata	Catsear	2	NO	FACU
	Rytidosperma species	Danthonia	2	NO	UPL
		Total Cover:	100		
		20% Cover:	20		
		50% Cover:	50		

Dominance Test	
No. Dominant Spp OBL/FACW/FAC (A)	0
Total Dominant Spp. across strata (B)	2
% OBL/FACW/FAC (A/B)	**0%**

Prevalence Index			
Total % Cover		Mulitpiled % Cover	
OBL	0	x 1 =	0
FACW	7	x 2 =	14
FAC	2	x 3 =	6
FACU	139	x 4 =	556
UPL	2	x 5 =	10
TOTAL (A)	150	TOTAL (B)	586
Prevalence Index (B/A)			**3.91**

Appendix 9 Wetland plot photographs

Plate A9-1 – Terrestrial vegetation in wetland delineation plot Jed 1-a.

Plate A9-2 – Vegetation in wetland delineation plot Jed 2-a.

Plate A9-3 – Vegetation in wetland delineation plot Jed 3-a.

Plate A9-4 – Vegetation in wetland delineation plot Jed 5-a.

Plate A9-5 – Vegetation in wetland delineation plot Jed 6-a.

Plate A9-6 – Vegetation in wetland delineation plot Jed 7-a.

Plate A9-7 – Plot 12-c, example of inconclusive wetland vegetation, areas conservatively mapped as wetland based on the low prevalence score, resulting in an additional wetland area being mapped near JED 27 following the April 2025 site visit.

Plate A9-8 – Plot 15-c, wetland vegetation determined in April 2025 based on the presence of wet soils and surface water.

Plate A9-9 – Soil sample taken at plot 15-c, poorly decomposed organic soil 0-2cm, dark chroma soils from 2-40cm.

Plate A9-10 – Terrestrial vegetation in wetland delineation plot 24-c within the JED16 footprint.

Plate A9-11 – Plot 30c , small wetland identified in the 2025 field survey.

Plate A9-12 – Plot 33 -c, terrestrial vegetation mapped as mānuka forest and scrub.