# [18] ECOLOGICAL ASSESSMENT

# QUEENSTOWN CABLE CAR

# Ecological Assessment of the Proposed Cable Car Project in Queenstown, Otago

Contract Report No. 7669

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**Contract Report No. 7669**

October 2025

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# Executive Summary

The Queenstown Cable Car Project is proposed to develop a cable car line that is connected by several stations with the majority of the initial line ascending over Te Tapunui/Queenstown Hill. Wildland Consultants Ltd have considered the ecological values present and the anticipated and known adverse effects this project may have on these values.

The proposed cable car line will pass urban development, productive farmland, exotic shrublands and forest that provide little to low value habitat for indigenous fauna. High value habitats has been identified on the higher altitude areas of Te Tapunui/Queenstown Hill and the Kimi-ākau/Shotover River. These high value ecosystems are diverse and consist of subalpine tall and short tussocklands, grey shrublands, wetlands, rocky outcrops, and braided river habitat. All of these various habitats provide important refuge and resources for indigenous birds, lizards and terrestrial invertebrates. A number of At Risk and Threatened plant species may also be present within the subalpine area.

Anticipated potential adverse effects on indigenous vegetation, fauna, and their habitats are likely to primarily occur during initial construction. With careful cable car tower placement and appropriate biodiversity management actions, the anticipated adverse effects can be avoided, minimised or remedied, and the overall level of ecological effect of the proposed cable car project will be very low.

Key management actions are to avoid works during avifauna breeding season, avoid wetlands, enhance habitat and develop a lizard management plan. Field surveys for lizards, terrestrial invertebrates, wetlands and threatened plants will help gain more information to better guide ecological management actions that will ensure adverse effects are kept to a minimum and/or result in a positive net gain for biodiversity.

# Contents

# 1.0 Introduction

Southern Infrastructure Limited is preparing a referral application under the Fast-track Approvals Act 2024 for the Queenstown Cable Car Project (QCC) The QCC project is a proposed offline public transport system comprising two lines and nine stations:

1. **Airport to Town Centre Line** – A connection between Queenstown Airport and the Queenstown Town Centre with five stations located at the Airport, Frankton Hub, Lake Johnson, Queenstown Hill, and the Town Centre.
2. **Ladies Mile Line** – A supplementary service to Ladies Mile with four stations. Two alternative alignments are under consideration:
    - **Route A**: Frankton North – Ladies Mile connecting to the Lake Johnson Station and with stations at Ferry Hill, Frankton North and Ladies Mile.
    - **Route B**: Frankton Flats – Ladies Mile connecting to the Frankton Hub Station with stations at Five Mile, Quail Rise, Lower Shotover and Ladies Mile.

The QCC project includes the construction of stations, towers to support the cableway, access roads for construction of infrastructure, and an access road near to the cableway alignment for long-term maintenance of the cable car. Ancillary activities are also required to support core maintenance and logistics for the operation of the cable car system. These will include a maintenance depot, cabin storage, staff carparking and bus park. The location of these ancillary activities will depend on the selected alignment for the Ladies Mile Line, located at Ferry Hill Station if Route A is chosen, or at Quail Rise Station if Route B is chosen.

To this end, Southern Infrastructure Limited has commissioned Wildland Consultants (Wildlands) to undertake a desktop assessment of the ecological values and describe anticipated and known adverse effects of the QCC project.

A full assessment of ecological effects would be included as part of a future substantive application for approvals under the Fast-Track Approvals Act 2024.

This report provides:

- Descriptions of the vegetation and habitat types present, as assessed from aerial imagery and local knowledge and expertise.
- Descriptions of the fauna that have been recorded or are likely to be present at or near the project area.
- An assessment of the ecological values of the site and the description of anticipated and known effects of the cable car development.
- Advice on ecological effects management and key future survey requirements.

# 2.0 Methods

## 2.1 Meeting

A strategy meeting with all relevant project members was held on the 6 June 2025. The meeting involved a project debrief and a brief site visit to the proposed Waipuna/Lake Johnson station.

## 2.2 Ecological assessment

### 2.2.1 Vegetation, habitats and flora

To understand the vegetation, habitat and flora values present a desktop assessment was undertaken. This involved searching relevant databases including iNaturalist, DOC Bioweb Threatened plant database, New Zealand Plant Conservation Network (NZPCN) plant lists and the Landcare Research Land Cover Database (Version 5.0). The DOC Bioweb Threatened plant database and iNaturalist was searched within a five-kilometre radius of the site. Aerial imagery of the area was also analysed; to determine likely vegetation and habitats present within each of the locations. Wildlands staff familiar with the location and with interpreting aerial imagery in the project area were also consulted.

### 2.2.2 Fauna

Targeted fauna surveys were beyond the scope of this report, however the suitability of the vegetation at the site to provide habitat for key indigenous fauna species was assessed. The relevant fauna databases for the surrounding landscape were reviewed and species collated. Avifauna within a two-kilometre radius of the sites was assessed by searching the online database eBird database maintained by Cornell University (accessed July 2025). Assessment of habitats included identification of resources within vegetation types that are or are likely to be occupied and used by specific taxa that may be present within that area/region. Assessments were informed by professional opinion and expertise, including liaison with subject matter experts as required.

The lizard assessment examined records from the Department of Conservation BioWeb Herpetofauna Database (updated December 2024).

The New Zealand Freshwater Fish Database (NZFFD, Stoffels 2022) was accessed for records from the Kimi-ākau/Shotover River and surrounding catchment. Wilderlab public records were searched for previous surveys near the site (Wilderlab 2025).

The Global Biodiversity Information Facility (GBIF.org 2025[1]) was searched for terrestrial invertebrate species records. To filter the data, a polygon was drawn encompassing the site plus the area within five kilometres of the site perimeter. The Scientific Name filter was also applied, using the terms Arachnida, Chilopoda, Diplopoda, Athoracophoridae, Rhytididae, Insecta, and Onychophora to represent arachnids, centipedes, millipedes, leaf-veined slugs, indigenous giant land snails, insects, and velvet worms respectively. From the records retrieved by the GBIF search, freshwater invertebrates were removed. Observations that were not identified further than order, or were marked as doubtful, were deleted. This dataset was used to characterise the fauna based on the most commonly-represented orders. Of the remaining records, those identified to a useful level (usually genus or species) were scanned for notable species[2]. These were compared with vegetation and habitat descriptions to judge the likelihood of each notable species occurring within the project area.

[1] GBIF.org (16 July 2025) GBIF Occurrence Download https://doi.org/10.15468/dl.4762du

[2] Notable species are locally endemic, known or suspected to be declining, naturally rare, particularly sensitive to habitat loss or predation by introduced mammals, protected under the Wildlife Act, or listed as Threatened or At Risk.

# 3.0 Ecological Context

## 3.1 Shotover Ecological District

The proposed QCC project is located near the edge of the Shotover Ecological District within the Lakes Ecological Region (Figure 1). Shotover Ecological District is large (*c.*92,200 hectares), and consists of the catchments of the Haehaenui/Arrow and lower Kimi-ākau/Shotover River. The ecological district consists of steep topography with deeply incised canyons. Altitudes range from 600 metres above sea level to the highest point at Mount Motatapu, 1991 metres above sea level (McEwen 1987).

The geology of the Shotover Ecological District mainly comprises steeply dipping Paleozoic Haast Schist with some Pleistocene outwash gravels and Holocene alluvium in the valley floors. On the upper slopes, extensive geological erosion occurs. The climate of the ecological district is characterised by hot summers and cold winters. The climate is dry, being affected by the rain shadow of the Main Divide. The ecological district is affected by northwest winds with occasional strong gales. Snow above 1,000 metres above sea level will persist for weeks during the winter season. Rainfall is moderately high and averages 650-1,600 millimetres per annum (McEwen 1987).

Soils in the ecological district are stony and are strongly leached to weakly podzolised steepland soils from schist and related slope deposits. Some soils are shallow to moderately deep draughty soils from loess over alluvium. On the terraces, fans, moraines and easier hills are till and schist.

Remnants of tawairaunui/red beech (*Fuscospora fusca*) forest cover occasional areas on the shores of Lake Whakatipu and Twelve Mile Creek Scenic Reserve. There are tawhairauriki/mountain beech (*Fuscospora cliffortioides*) forest up gullies up to the treeline. Tawhai/silver beech (*Lophozonia menziesii*) is also present within the Twelve Mile Creek. Extensive rarauhe/bracken (*Pteridum esculentum*) fernland persists on the Whakatipu faces with naturalised Douglas fir (*Pseudotsuga menziesii*), larch (*Larix decidua*) and other exotic conifers. Above the lake shore is extensive kōhūhū (*Pittosporum tenuifolium*) scrub and occasional areas of mānuka (*Leptospermum scoparium*) scrub. Above the treeline is tussock-shrubland (*Chionochloa rigida-Dracophyllum* sp.) and some subalpine *Dracophyllum* sp.-*Veronica* sp.-*Senecio* sp. scrub. Above 1,400 to 1,500 metres, *Chionochloa macra* replaces *Chionochloa rigida*. Where forest and scrub are absent, snow tussockland is extensive to the lower altitudes, as well as blue tussock (*Poa colensoi*)-hard tussock (*Festuca novaezeelandiae*)-exotic grasses grasslands. The lower altitude areas that have been disturbed occasionally have shrublands of *Olearia odorata*, tūmatakuru/matagouri (*Discaria toumatou*) and *Coprosma* spp. The alpine areas area relatively barren, with schist screes and herbfields. The *Chionochloa oreophila* grassland-herbfield is an important vegetation type featuring in the alpine areas (McEwen 1987).

A few indigenous avifauna inhabit the Shotover Ecological District. The kākāriki/yellow-crowned parakeet (*Cyanoramphus auriceps*) is present in the beech forests. Kārearea/falcons (*Falco novaeseelandiae)* are widespread over the ecological district. Pāpango/scaup (*Aythya novaeseelandiae)* occur on some of the smaller lakes and Lake Whakatipu. Kotoreke/marsh crake (*Zapornia pusilla affinis*) has been reported near Tāhuna/Queenstown and at Waiwhakaata/Lake Hayes. The Australian coot (*Fulica atra australis*) is also present on Waiwhakaata/Lake Hayes.

The jewelled gecko (*Naultinus gemmeus*) has also been reported within this ecological district.

Today, much of the Shotover Ecological District is grazed (sheep and cattle) and pest animals such as feral goats (*Capra hircus*) roam the district (McEwen 1987). Indigenous tall tussock grasslands (*c.*47.2%) are the dominant vegetation type, followed by exotic low producing grasslands (*c.*16.3%). Other indigenous vegetation types have been greatly reduced and are currently present include fernlands, mānuka and/or kānuka (*Kunzea* sp.) scrub/shrublands, broadleaved hardwood forest, subalpine

shrubland, tūmatakuru or grey scrub, and indigenous forest. These other indigenous vegetation types cover a total of *c.*10.8% of the ecological district (LCDBv5.0; Landcare Research 2020).

# 4.0 Overview of Site and the Development

## 4.1 Development

The proposed QCC project will consist of two lines and nine stations connected by a cableway and towers for the cable cars. The **'Airport to Town Centre Line'** will link the Queenstown Airport with the Queenstown Town Centre, with five stations located at the Airport, Frankton Hub, Lake Johnson, Queenstown Hill and the Town Centre. The **'Ladies Mile Line'** has two alternative alignments under consideration, which differ at the north-east of the cable car network. Route A, the Frankton North route would connect Ladies Mile via Ferry Hill with stations proposed at Ferry Hill, Frankton North, Lower Shotover and Ladies Mile. Route B would connect Ladies Mile via Frankton Hub, with stations at Five Mile, Quail Rise, Lower Shotover and Ladies Mile. An overview plan for the proposed cable car development is presented in Figure 1.

Key features of the QCC project include:

- Passenger cabins that can carry 10 passengers arriving every 12 seconds and capable of transporting up to 3,000 passengers per hour in each direction.
- Approximately 20-kilometre cableway route with towers.
- Electric-powered, low-emission cable car system with automated operations for reliability.

Construction is planned for 2027-2028, with operations commencing in 2029.

## 4.2 Site description

The cable car development will cross urban development, private farmland and council reserve (Figure 1).

At the location of the proposed Ferry Hill station in 2023 and 2024 the landowner commenced plantation forestry activities in accordance with the National Environment Standards for Plantation Foresty, along with ancillary earthworks. A retrospective resource consent is currently being sought from Queenstown Lakes District Council (QLDC) for the ancillary earthworks. These activities have been taken into account in the assessment of the ecological values in the project area.

The cable car development will also cross over a Conservation Covenant, where the Queenstown Hill Station is located. The Conservation Covenant is 430 hectares and located in the middle of the private property on Te Tapunui/Queenstown Hill (Record of title 670387). The Conservation Covenant is *"for the purpose and intent of preserving the natural environment by protecting the faces and skylines visible to the public from any construction or development or vegetation which could adversely affect the natural beauty of those feature and also by controlling the spread of self-sown exotic specific on said land."* Southern Infrastructure are planning to seek an amendment to the Covenant under the Fast-track Approvals Act (FTAA).

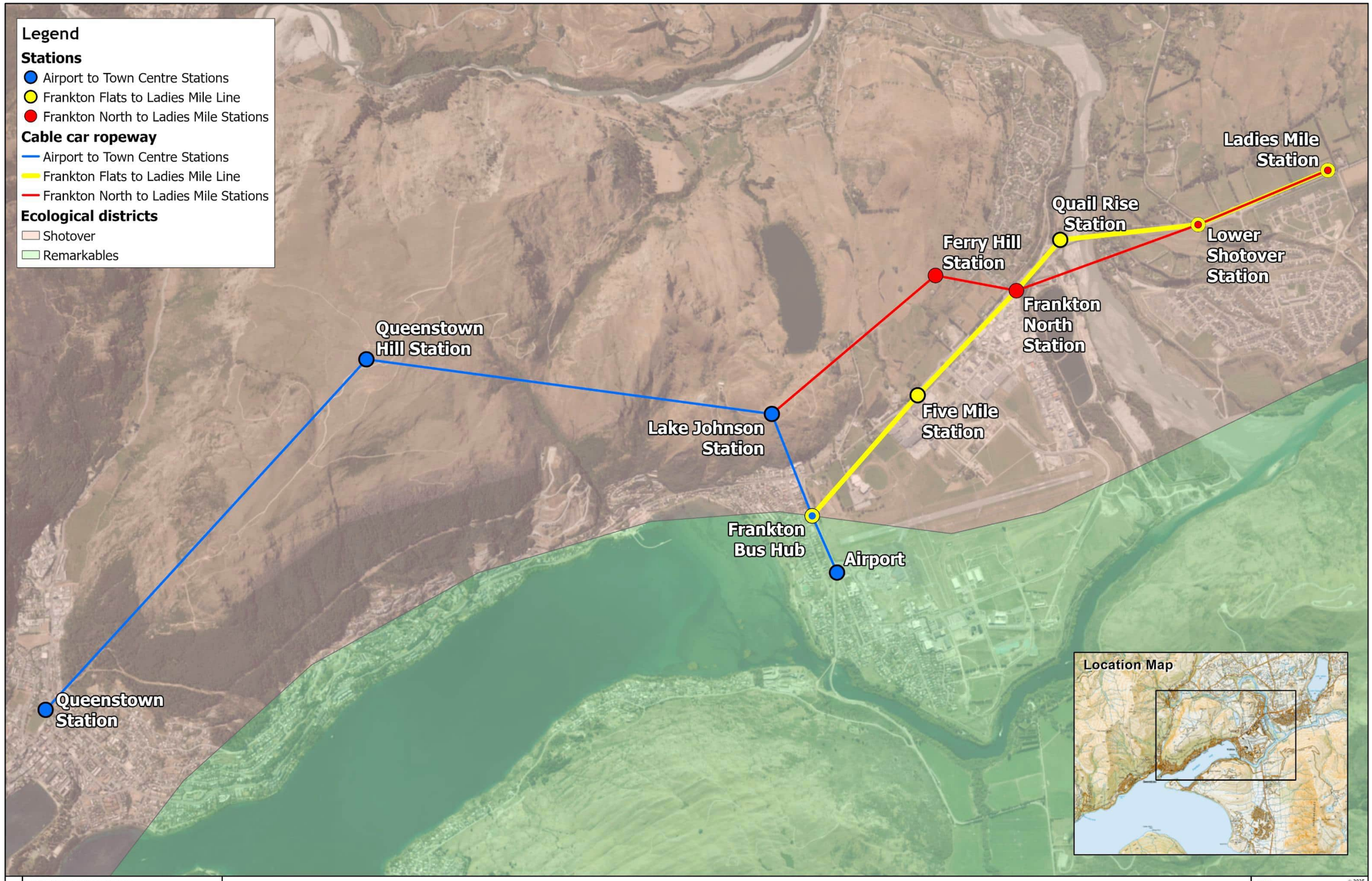



**Figure 1. Ecological Districts and the Proposed Layout of the Queenstown Car Project, Otago**

# 5.0 Ecological Values

## 5.1 Vegetation and habitat types

Broad vegetation and habitat types that are present in the wider project area can be seen in Figure 2 and include:

- Subalpine tussock grassland.
- Mixed exotic-indigenous shrubland.
- Exotic conifer forest.
- Exotic forest and treeland.
- Low to high producing exotic grassland.
- Rock outcrops.
- Wetlands.
- Tarns.
- River.

The upper area of Te Tapunui/Queenstown Hill from *c.*800 metres above sea level is covered by subalpine tussock grassland. The tussock grassland is dominated by a mix of exotic grasses, hard tussock (*Festuca novae-zealandie*), blue tussock (*Poa colensoi*) and the occasional larger snow tussocks (*Chionochloa rigida*). Patches of exotic and indigenous shrubs such as tūmatakuru/matagouri, īnaka/common grass tree (*Dracophyllum rosmarinifolium*), mānuka, and Scotch broom (*Cytisus scoparius*) are found within the grassland. Smaller indigenous species in between the tussocks are *Acrothamnus colensoi*, *Pentachondra pumila*, *Veronica pimeleoides*, pātotara (*Styphelia nesophila*), alpine clubmoss (*Lycopodium fastigiatum*), bidibid (*Acaena* spp.), *Raoulia* spp.) and harebell (*Wahlenbergia albomarginata*). Many exotic herb species such as catsear (*Hypochaeris radicata*) and mouse-eared hawkweed (*Pilosella officinarum*) will be intermixed in the grassland as well. Rock outcrops, wetlands and mixed shrublands are found amongst the tussock grassland throughout.

Indigenous and exotic shrublands are present on the lower slopes of the tussock grasslands and within sheltered gullies. The shrublands will either be dominated by indigenous species such as tūmatakura/matagouri, mikimiki, *Olearia* spp., and mānuka or exotic species such as gorse (*Ulex europaeus*), Scotch broom, wildling pine saplings, buddleia, hawthorn (*Crataegus monogyna), Cotoneaster* spp., rowan (*Sorbus aucuparia*), sweet briar (*Rosa rubiginosa*) and blackberry (*Rubus* spp.), or a mix of both indigenous and exotic species.

On the mid-slopes of Te Tapunui/Queenstown Hill in between the urban development and tussock grassland is a large linear band of exotic conifer forest. The exotic forest is the result of wilding pine invasion and is dominated by Douglas fir (*Pseudotsuga menziesii*). Other exotic conifers occasionally present are European larch (*Larix decidua*) and radiata pine (*Pinus radiata*). The forest is dense and the understorey is mostly unvegetated, except for the occasional areas that receive more light containing scattered patches of indigenous and exotic ferns, herbs and bryophytes.

An exotic forest and treeland is present above the urban development on the lower slopes. A mosaic of species is present. Sycamore (*Acer pseudoplatanus*), exotic conifers, silver birch (*Betula pendula*), hawthorn and rowan are a few of the most abundant species present. The occasional tawhairauriki/mountain beech may also be present.

High-producing grassland covers the flatter slopes surrounding Lake Johnson. Exotic species such as ryegrass (*Lolium perenne*) and herbs will dominate the high producing grasslands. Low producing grasslands cover the north-eastern lower slopes of Te Tapunui/Queenstown Hill. The low producing

grasslands will feature exotic grasses, herbs and the occasional indigenous species such as silver tussock (*Poa cita*) and/or hard tussock (*Festuca novae-zelandiae*). The proposed Ferry Hill Station area is covered with low-producing grasslands. The low-producing grasslands have now been planted with *Eucalyptus* sp., interplanted with indigenous plants. Before the plantings, this area would have contained shorter grazed exotic grasses due to its ongoing grazing at the time. Once the plantings were completed this area of grassland was retired to protect the plantings, this would mean that taller and thicker swards of exotic grass will now be present.

Rock outcrops are scattered across Te Tapunui/Queenstown Hill and nearby Waipuna/Lake Johnson. Most rock outcrops will be dominated with exotic grasses such as browntop (*Agrostis capillaris*) and herbs. A few indigenous species will be found in the crevices such as ground spleenwort (*Asplenium appendiculatum*), necklace fern (*Asplenium flabellifolium*), and porcupine shrub (*Melicytus alpinus*).

Wetlands of various types and sizes are present within gullies and basins, mostly within the tussock grasslands. Wetland types include bog, marsh and seepage wetlands. A few small tarns are also present amongst the tussock grasslands on Te Tapunui/Queenstown Hill.

The Kimi-ākau/Shotover River is a braided river. The braided river consists of mostly unvegetated open stone/gravelfields and river channels. Occasional exotic and indigenous herbs will be scattered across the stonefield. The braided river margins contain exotic shrubs and crack willow (*Salix xfragilis*).

## 5.2 Flora

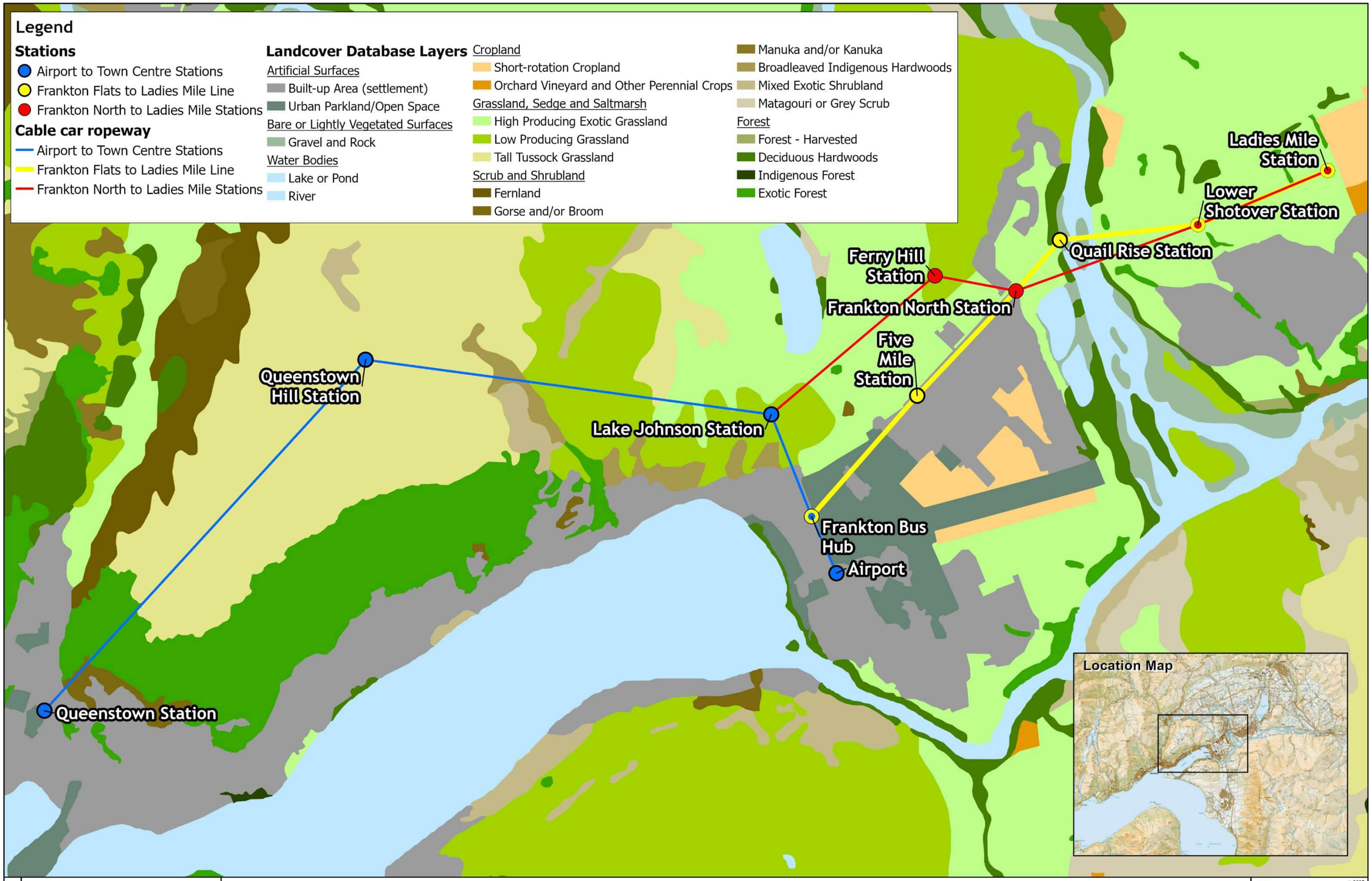
One hundred and twenty-four indigenous and 199 exotic vascular plant species were recorded nearby and within the project area (Appendix 1). Non-vascular species such as mosses, lichens, liverworts and hornworts will be present across the project area as well but are not considered in this assessment.

**Threatened and At Risk plants**

A number of Threatened and At Risk plant species have been recorded nearby and they are likely present within the project area:

- Pirita/yellow mistletoe (*Alepis flavida*; At Risk – Declining).
- Whipcord hebe/cypress hebe (*Veronica cupressoides,* Threatened – Nationally Endangered).
- Desert broom (*Carmichaelia petriei*; At Risk – Declining).
- Mākaka/New Zealand broom (*Carmichaelia australis*; At Risk – Declining).
- Hunangāmoho/wind grass/gossamer grass (*Anemanthele lessoniana*, At Risk – Relict).
- Jersey fern/annual fern (*Anogramma leptophylla*; At Risk – Declining).
- *Ranunculus maculatus* (At Risk – Naturally Uncommon).
- Scented tree daisy *(Olearia odorata;* At Risk – Declining).
- *Olearia lineata* (At Risk – Declining).
- Kirkianella *(Sonchus novae-zelandiae*; Threatened – Nationally Vulnerable).
- *Raoulia beauverdii* (At Risk – Declining).
- *Raoulia australis* (At Risk – Declining).
- *Rytidosperma buchananii* (At Risk – Declining).
- *Rytidosperma merum* (At Risk – Declining).
- *Pellaea calidirupium* (At Risk – Naturally Uncommon).

Most of these species will likely be present in the tussock grasslands on the upper slopes and terraces of Te Tapunui/Queenstown Hill. Scented tree daisy and *Olearia lineata* will likely be present within the shrublands. Pirita/yellow mistletoe could be present on any of the beech trees. Jersey fern and *Pellaea calidirupium* could be present around any of the rock outcrops. Hunangāmoho/wind grass utilises various habitats and could be present within the shrublands, forest or around cliff faces.




**Data Acknowledgment**

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**Figure 2. Broad Vegetation and Habitat Types and Proposed Layout of the Queenstown Cable Car Project, Otago**



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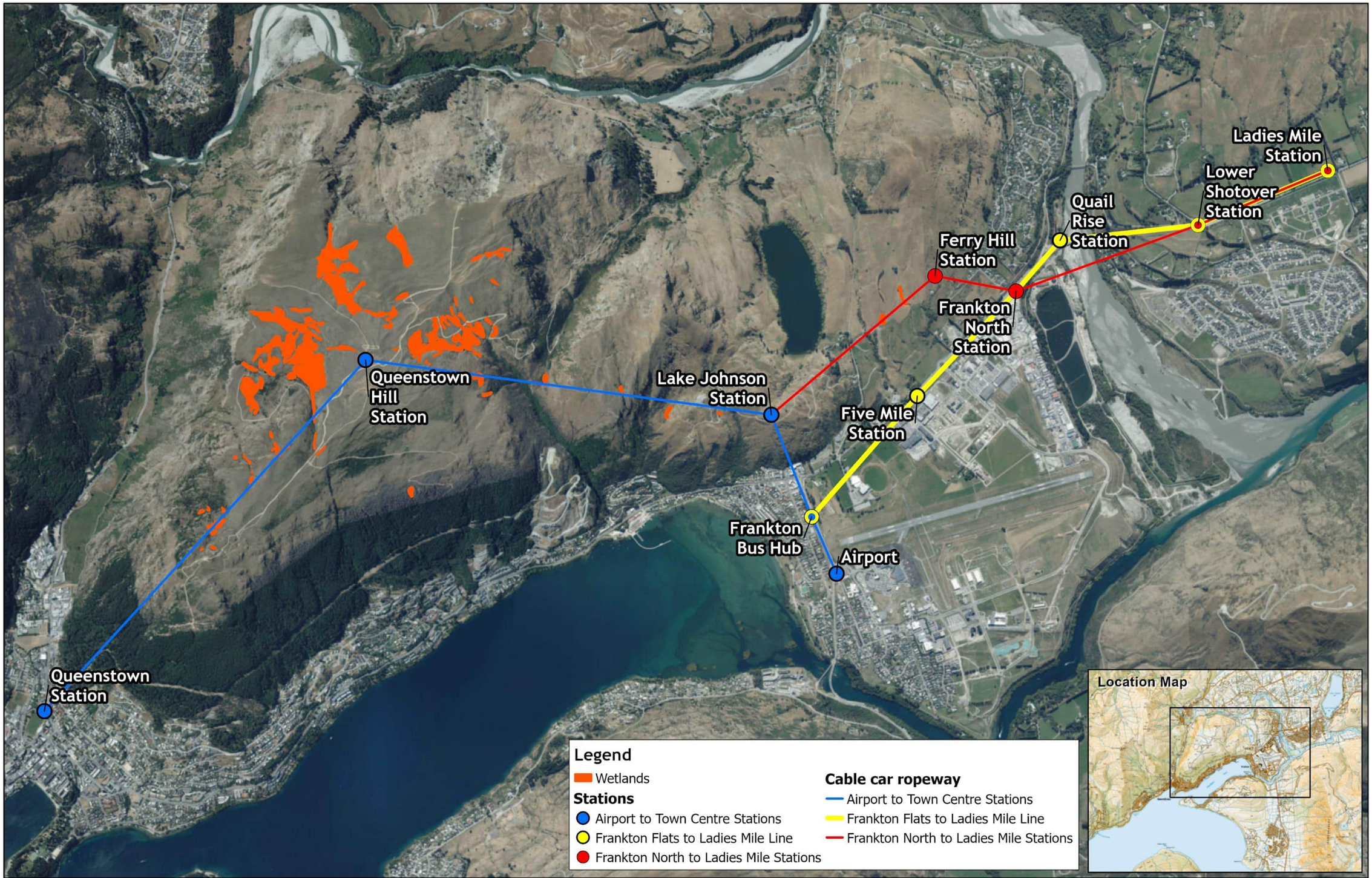


**Figure 3. Wetlands and Proposed Layout of the Queenstown Cable Car Project, Otago**

**Ecological weeds and pest plants**

Several ecological weeds[1] have been recorded nearby and a likely present within the project area. Four of these species, gorse, Scotch broom, Russell lupin (*Lupinus polyphyllus*) and sycamore are listed in the Otago Regional Pest Management Plan (Otago Regional Council 2019). Other species recorded nearby and within the project area include: rowan, Douglas fir, buddleia, cherry laurel (*Prunus laurocerasus*), radiata pine, European larch, tree lupin (*Lupinus arboreus*), crack willow, flowering current (*Ribes sanguineum*), holly (*Ilex aquifolium*), ivy (*Hedera helix*) and sweet briar. Each of these species is listed as an environmental weed in the latest national list published by the Department of Conservation (McAlpine and Howell 2024).

## 5.3 Avifauna

The eBird desktop assessment identified 30 indigenous and 17 exotic bird species within five kilometres of the project area recorded in between February 2024 and July 2025 (Appendix 2).

Exotic and a few indigenous forest bird species, such as pīwakawaka/South Island fantail (*Rhipidura fuliginosa fuliginosa*, Not Threatened) and ngirungiru/South Island tomtit (*Petroica macroocephala macrocephala*, Not Threatened), and riroriro/grey warbler *(Gerygone igata*, Not Threatened), will occasionally utilise the exotic conifer forest and shrublands. Kāhu/swamp harrier (*Circus approximans*, Not Threatened) occupy a wide range of habitats and will utilise most areas surrounding Te Tapunui/Queenstown Hill and are known to breed in wetlands, tall grasslands and dense vegetation. A few of the waterfowl species recorded such as the pāpango/scaup (*Aythya novaeseelandiae*, Not Threatened) and pūtangitangi/paradise shelduck (*Tadorna variegata,* Not Threatened) will occasionally visit the small tarns. Pūtangitangi/paradise shelduck, spur-winged plover (*Vanellus miles novaehollandiae*, Not Threatened) and many exotic bird species will regularly forage on the farmland areas.

**Threatened and At Risk birds**

Thirteen Threatened and At Risk bird species have been recorded near the project area (Appendix 2). Nine of the thirteen Threatened and At Risk bird species are likely to utilise the project area including:

- Tarapirohe/black-fronted tern (*Chlidonias albostriatus*, Threatened – Nationally Endangered).
- Kārearea/eastern falcon (*Falco novaeseelandiae novaeseelandiae*, Threatened – Nationally Vulnerable).
- Tarāpuka/black-billed gull (*Chroicocephalus bulleri*, At Risk – Declining).
- Tōrea/South Island oystercatcher (*Haematopus finschi*, At Risk – Declining).
- Pīhoihoi/New Zealand pipit (*Anthus novaeseelandiae novaeseelandiae*, At Risk – Declining).
- Pohowera/banded dotterel (*Charadrius bicinctus bicinctus*, At Risk – Declining).
- Kāruhiruhi/pied shag (*Phalacrocorax varius varius*, At Risk – Recovering).
- Kawaupaka/little shag (*Microcarbo melanoleucos brevirostris*, At Risk – Relict).
- Māpunga/black shag *(Phalacrocorax carbo novaehollandiae*, At Risk – Relict).

Tarapirohe/black-fronted tern may occasionally visit the farmland, shrubland and subalpine tussock grassland areas. Tarapirohe/black-fronted tern also breed and forage on braided rivers.

Kārearea/eastern falcon will use the rock outcrops for breeding and shrublands, forested areas, and tussock grassland habitats to hunt on Te Tapunui/Queenstown Hill.

[1] Also known as environmental weeds, and/or invasive weeds

Tarāpuka/black-billed gull preferred breeding habitats that are sparsely vegetated, gravel riverbeds and lake margins.

Pīhoihoi/New Zealand pipit will use the tussock grasslands and shrubland habitats to breed and forage. The tōrea/South Island pied oystercatcher and pīhoihoi/New Zealand pipit are known to visit farmland areas to forage. Tōrea/South Island pied oystercatcher are likely to breed within areas with good visibility around the nest and it is possible that pīhoihoi/New Zealand pipit will nest under tussocks and grass clumps, and partly or fully covered areas of vegetation.

Pohowera/banded dotterel preferred habitats including braided riverbed, open habitats with very short vegetation, such as farmland, and herbfields, for both nesting and foraging.

Kāruhiruhi/pied shag (*Phalacrocorax varius varius*, At Risk – Recovering), kawaupaka/little shag (*Microcarbo melanoleucos brevirostris*, At Risk – Relict) and māpunga/black shag *(Phalacrocorax carbo novaehollandiae*, At Risk – Relict) may use overhanging trees over waterways and braided rivers, and so may be encountered in these habitats in the project area, such as at the Kimi-ākau/Shotover River.

Other Threatened and At Risk bird species: kākā/South Island kaka (*Nestor meridionalis meridionalis*, Threatened – Nationally Vulnerable), kotoreke/marsh crake (*Zapornia pusilla affinis*, At Risk – Declining), pūteketeke/Australasian crested grebe (*Podiceps cristatus australis*, Threatened – Nationally Vulnerable), Australian coot (At Risk – Naturally Uncommon), have been recorded nearby. These species are unlikely to be within the proposed affected project area as their habitat preferences are not present within the project area.

## 5.4 Lizards

Records from the Department of Conservation BioWeb Herpetofauna Database within 30 kilometres of the project area were assessed to inform an assessment of lizard values on site (Appendix 3). The desktop assessment includes ten indigenous lizard species recorded within 30 kilometres of the project area. Four of these species are highly likely to be present on site and include:

- McCann's skink (*Oligosoma maccanni*; Not Threatened).
- Southern grass skink (*Oligosoma* aff. *polychroma* Clade 5; At Risk – Declining).
- Cryptic skink (*Oligosoma inconspicuum*; At Risk – Declining).
- South-western large gecko (*Woodworthia* "south-western large"; At Risk – Declining).

McCann's skink, southern grass skink, cryptic skink and south-western large gecko are considered highly likely to be present on site, particularly in areas of tussock grassland, rank exotic grassland and open shrubland, with south-western large gecko specifically found in rocky areas (e.g., under loose rocks) as well as in creviced rock outcrops. All other species are considered unlikely or highly unlikely to be present on site.

McCann's skink and southern grass skink are likely to be widespread across the project area, potentially including marginal habitats in lowland urban and suburban areas where there is ground cover vegetation/rocky cover, such as along road edges and near the Shotover River. On Te Tapunui/ Queenstown Hill, southern grass skink will likely be more restricted to areas of grassland with denser ground cover vegetation in comparison to McCann's skink, as well as damp areas such as wetland edges and gullies.

Cryptic skink have recently (2024) been recorded from the south-west area of Te Tapunui/Queenstown Hill. This species is likely to be found in tussock grassland where there is dense ground cover vegetation and abundant loose rocks, as well as damp well-vegetated areas around wetland edges and in gullies.

South-western large gecko is likely to be widespread on Te Tapunui/Queenstown Hill in rocky habitat. Some *Woodworthia* gecko species have been found on exotic pine trees under bark on the edge of exotic forestry plantations, and south-western large gecko may also be present on site along forest edges on tree species that have loose bark or provide other refuges (e.g. tree holes/crevices). This species is also associated with native beech forest and could potentially be present on site in beech trees. It is possible that, if suitable habitat is present (stable rock banks that do not get inundated with water), this species could also be present in rocky areas near the Kimi-ākau/Shotover River.

Nevis skink (*Oligosoma toka*; At Risk – Declining), Te Wāhipounamu skink (*Oligosoma pluvialis*; At Risk – Declining), Lakes skink (*Oligosoma* aff. *chloronoton* "West Otago"; Threatened – Nationally Vulnerable) and short-toed gecko (*Woodworthia* "southern mini"; At Risk – Declining) are considered unlikely to be present as these species are more commonly found at higher elevations and are usually associated with complex rocky habitats (e.g. abundant rock piles, scree slopes) amongst dense tussock grassland/indigenous shrubland, which may not be sufficiently present on Te Tapunui/Queenstown Hill to support these species.

Kawarau gecko (*Woodworthia* "Cromwell"; At Risk – Declining) are found in similar habitats to south-western large gecko, however, the site is considered likely to be outside of the distributional range of this species (with the western boundary of their distribution considered as approximately the Gibbston Valley and Crown Range). South-western large gecko are considered to replace this species in The Remarkables and west of the Crown Range, including within the project area. Therefore, Kawarau gecko are considered unlikely to be present on site.

Orange-spotted gecko (*Mokopirirakau* "Roys Peak"; At Risk – Declining) are considered highly unlikely to be present on site. This species is generally only known from higher elevations (above *c*.1,100 metres) outside of the altitudinal range of the project area, and is associated with extensive complex rocky habitats (scree slopes, talus, rocky indigenous shrubland) which do not appear to be sufficiently present on Te Tapunui/Queenstown Hill to support this species.

## 5.5 Freshwater fauna

The Kimi-ākau/Shotover River provides habitat for fish including longfin eels (*Anguilla dieffenbachii*, At Risk - Declining), bullies (common bully, *Gobiomorphus cotidianus*, and upland bully, *G. breviceps*, both Not Threatened), kōaro (*Galaxias brevipinnis*, At Risk - Declining), and trout (brown *Salmo trutta* and rainbow (*Oncorhynchus mykiss*), both Introduced and Naturalised) (Dunn *et al.* 2018; Stoffels 2022; Wilderlab 2024).

## 5.6 Terrestrial invertebrates

The GBIF search retrieved records of 460 terrestrial invertebrates that met the search terms. The invertebrate fauna was characterised mainly by beetles, flies, and moths. Of the species recorded, 436 had been identified to a level at which they could be assessed. The invertebrate fauna was predominately indigenous, with some exotic species recorded. Notable species are primarily crane flies, ground beetles and moths, and are presented in Table 1.

Only the airport to town centre stations were assessed, as the remaining Cable Car path options primarily traverse vegetation that is of relatively low value to terrestrial invertebrates. The exception is if any of the river bed is disturbed, as stilleto flies (*Anabarhynchus* sp., a notable invertebrate) lay their eggs in the silt and gravel of rivers.

**Table 1 – Notable invertebrates recorded within five kilometres of the site.**

| Species Name | Common Name | Threat Classification | Notability | Likelihood of Presence Within Project Area |
|---|---|---|---|---|
| Neoferonia sp. | Ground beetle | Not assessed | Likely to be a local endemic. | High |
| Amarophilus sp. | Ground beetle | Not assessed | Likely to be a local endemic. | High |
| Holcaspis sp. | Ground beetle | Not assessed | Likely to be a local endemic. | High |
| Mecodema sp. | Ground beetle | Not assessed | Likely to be a local endemic. | High |
| Haplolobus sp. | Weevil | Not assessed | Vulnerable to habitat loss. Likely to be also naturally rare and locally endemic. | Medium |
| Odontria sp. | Chafer beetle | Not assessed | Some chafer beetle species are locally endemic and threatened by predation and habitat loss. | High |
| *Ipana griseata* | Looper moth | At Risk – Declining | Naturally rare, and vulnerable to habitat loss. | Medium |
| *Demetrida moesta* | Ground beetle | Not assessed | Locally endemic | High |
| *Dicranomyia circularis* | Crane fly | Not assessed | Locally endemic | High |
| *Dicranomyia megastigmosa* | Crane fly | Not assessed | Locally endemic | High |
| *Gynoplistia hirsuticauda* | Crane fly | Not assessed | Locally endemic | High |
| *Hemiandrus maia* | Good mother ground wētā | Not assessed | Locally endemic, prone to predation | High |
| *Hilara vector* | Dance fly | Not assessed | Locally endemic | High |
| *Ichneutica nullifera* | Owlet moth | Not assessed | Large-bodied, vulnerable to predation and relies on *Aciphylla* spp. as a food source | High |
| *Inophloeus inuus* | Speargrass weevil | Not assessed | Large-bodied, vulnerable to predation and relies on *Aciphylla* spp. as a food source | High |
| *Izatha manubriata* | Lichen tuft moth | Not assessed | Locally endemic | High |
| *Kiwaia pharetria* | Moth | Not assessed | Locally endemic | High |
| *Kiwaia schematica* | Moth | Not assessed | Locally endemic | High |
| *Maoricicada otagoensis* | Cicada | At Risk – Naturally Uncommon | Locally endemic, naturally rare | Medium |
| *Mecodema costipenne* | Ground beetle | Not assessed | Locally endemic | High |
| *Mecodema impressum* | Ground beetle | Not assessed | Locally endemic | High |

| Species Name | Common Name | Threat Classification | Notability | Likelihood of Presence Within Project Area |
|---|---|---|---|---|
| *Mecodema lucidum* | Ground beetle | Not assessed | Vulnerable to predation and habitat loss | High |
| *Mecodema politanum* | Ground beetle | Not assessed | Vulnerable to predation | High |
| *Megadromus sandageri* | Ground beetle | Not assessed | Locally endemic | High |
| *Metalimnophila penicillata* | Crane fly | Not assessed | Locally endemic | High |
| *Ogcodes leptisoma* | Small-headed fly | Not assessed | Naturally rare | High |
| *Orocrambus scoparioides* | Grass moth | Not assessed | Locally endemic | High |
| *Orthodera novaezealandiae* | New Zealand praying mantis | At Risk – Declining | Declining due to competition with invasive South African mantis | High |
| *Paracladura curtisi* | Crane fly | Not assessed | Locally endemic | High |
| *Pasiphila acompsa* | Looper moth | Not assessed | Locally endemic | High |
| *Pharmacus notabilis* | Remarkables cave wētā | Not Threatened | Locally endemic | High |
| *Prodontria pinguis* | Furry chafer beetle | At Risk – Naturally Uncommon | Naturally rare, locally endemic. | Medium |
| *Pyrausta comastis* | Snout moth | Threatened – Nationally Vulnerable | Threatened | High |
| *Scelloides ornatipes* | Long-legged fly | Not assessed | Naturally rare, may be locally endemic. | High |
| *Tingena lassa* | Concealer moth | Not assessed | Local endemic. | High |
| *Tingena terrena* | Concealer moth | Not assessed | Local endemic. | High |
| *Tuiplatynus sophronitis* | Ground beetle | Not assessed | Local endemic. | High |
| *Udea adversa* | Grass moth | Not assessed | Local endemic | High |
| *Vanessa gonerilla* | New Zealand red admiral butterfly | Not assessed | Declining nationwide | Low |
| *Zelandomyia otagensis* | Crane fly | Not assessed | Locally endemic | High |
| *Zizina oxleyi* | New Zealand blue butterfly | Not assessed | Declining due to competition from common blue butterfly (*Zizina labradus*). | High |
| *Zolus subopacus* | Ground beetle | Not assessed | Locally endemic | High |
| *Anabarhynchus* sp. | Stiletto fly | Various | Many species are At Risk, Threatened, or locally endemic. | |

Amateur and expert observations alike are stored in GBIF, and though some data standards are applied, a desktop survey is no substitute for a field survey by a qualified entomologist. However, Wildlands is confident that the desktop and on-site vegetation surveys conducted so far have provided sufficient information for the following assessment and recommendations.

**Invertebrate habitat values**

The subalpine tussock grassland, mixed exotic-indigenous shrubland, rock outcrops and wetlands are likely to be important for notable moths, beetles, and crane flies, some of which are At Risk or Threatened (Table 1). The gravel and silt in the damp and dry areas of the Shotover river bed are important nesting grounds for stiletto flies, many of which are At Risk, Threatened, and/or locally endemic. Exotic conifer forest has little value to indigenous invertebrates, but may harbour some of the ground beetles. Exotic forest and treeland and the exotic grassland are likely to have low to moderate habitat values for indigenous invertebrates, as they provide highly modified habitat that is likely to support a reduced number of individuals compared to indigenous forest and grassland.

## 5.7 Taonga species

The Ngāi Tahu Claims Settlement Act, contains a list of taonga species (Schedule 97). Several taonga plant and bird species are present within the project area (Appendix 1 and 2). As the waterways will not be affected during this development the Schedule 98 Customary Fisheries doesn't apply.

## 5.8 Pest animals

The typical suite of small, introduced pest mammals is likely to be present within the project area including brushtail possum (*Trichosurus vulpecula*), rodents (*Rattus* spp. and *Mus musculus*), mustelids (*Mustela* spp.), feral cats (*Felis catus*), brown hare (*Lepus europaeus*), European rabbits (*Oryctolagus cuniculus*) and European hedgehogs (*Erinaceus europaeus*). These pest animals have a range of significant threats to indigenous plants and fauna, through predation of indigenous animals, competition and disturbance, and herbivory of indigenous plants (leaves, bark, and fruits).

Wild goats (*Capra hircus*) are abundant in the area. They will be inhibiting any possible large tussock, shrubland and forest regeneration. It's likely that wild deer (*Cervus* spp.) are also present.

# 6.0 Wildlife Act

All indigenous lizards, bats, most indigenous birds, and some indigenous invertebrates are protected under the Wildlife Act (1953). It is an offence to disturb or destroy protected wildlife without a Wildlife Act approval (WAA) from the Department of Conservation (DOC). A WAA may be required from the Department before any protected wildlife (and/or their habitats) can be disturbed, handled, translocated or killed. A WAA is required to carry out modification or land development that may have adverse impacts on indigenous New Zealand wildlife (DOC 2019).

Due to the likely presence and abundance of indigenous lizards, the proposed development is likely to require a WAA under Schedule 7 of the Fast-track Approvals Act (FTAA; Ministry for the Environment 2024) which includes approvals relating to the Wildlife Act (1953).

All indigenous lizards are protected under the Wildlife Act (1953) and approval under Schedule 7 of the Fast-track Approval Act must be obtained in order to permit the activity occurring, if lizards are present. This includes before any indigenous lizard can be disturbed or relocated on site (Schedule 7(2, 2, i)).

# 7.0 Anticipated and Known Ecological Effects and Proposed Actions to Mitigate these Effects

## 7.1 Overview

Anticipated potential effects are set out below for the range of ecological features present within and adjacent to the project area. Anticipated potential adverse effects on indigenous vegetation, fauna, and their habitats are likely to primarily occur during initial construction (Table 2). The earthworks that have already occurred at the Ferry Hill Station site have also been considered here.

No cable car towers will be built into the Kimi-ākau/Shotover River. However, there may be some foundations of a station built near the river margin. Due to the dynamic nature of the braided river and its ever-changing main channel, the potential effects of construction on the river margin are considered as a precautionary measure.

Potential adverse effects associated with construction include:

- Clearance of vegetation/habitat.
- Ecological weed introduction.
- Partial loss and/or damage to plant species.
- Damage to wetlands.
- Waterway degradation.
- Partial removal of habitat and habitat fragmentation for indigenous birds, lizards and terrestrial invertebrates.
- Disturbance to and/or mortality of indigenous birds, lizards, fish and terrestrial invertebrates.

Each of these anticipated potential effects is described in detail below along with the proposed mitigation/compensation.

## 7.2 Clearance of vegetation and habitats

Most of the vegetation to be cleared on the lower slopes and flat areas will be exotic vegetation. Areas of indigenous vegetation such as the shrublands and tussock grassland will need to be cleared and will have a future effects assessment.

Clearance of subalpine tussock grassland and mixed shrubland habitat can be remedied through restoration enhancement actions. The mixed shrubland can be remedied by controlling weeds and increasing the shrubland area by planting ecologically appropriate indigenous grey shrubland species. The subalpine tussock grassland can be remedied by undertaking weed control of exotic shrubs and trees such as Scotch broom and wildling pines.

## 7.3 Ecological weeds

Small fragments of exotic vegetation can be spread by contaminated equipment and machinery. Transportation of root, stem, seed and crown fragments of pest plants and/or ecological weeds propagate quickly once introduced. It is well known the detrimental effects of pest plants and environmental weeds on indigenous plant species, communities, and ecosystems (McAlpine *et al*. 2014).

**Table 2 – Summary of anticipated potential adverse effects following mitigation/compensation actions.**

| Potential Effect | Ecological Feature Affected | Timescale of Effect | Specific Effect | Measure to Address Effect |
|---|---|---|---|---|
| Clearance of vegetation | Habitat | Permanent | Removal of indigenous vegetation | Extend and enhance remaining shrublands by planting appropriate indigenous trees and shrub species. Enhance tussock grassland by removing ecological weeds and/or implement pest animal control. |
| Ecological weed introduction | Habitat | Temporary to permanent | Weed invasion and habitat degradation | Ensure equipment and machinery are well cleaned and inspected. |
| Loss and/or damage to flora | Threatened and/or At Risk plant species | Temporary to permanent | Removal and or damage to plant species | Undertake botanical survey to locate plant species and mark them out to be avoided. If plants can't be avoided enhance similar habitat or plant more individuals of the species nearby sourced from a nursery. |
| Damage to wetlands | Wetland | Temporary | Soil compaction and wetland drainage | Survey affected areas for wetlands. Mark out boundary of wetland with fence and avoid area. Design construction of any towers that are within 20 metres of a wetland to minimise effects on wetlands. Develop and implement wetland restoration plan if effects on wetlands are recorded after monitoring. |
| Disturbance to and/or mortality of indigenous birds | Threatened, At Risk, and protected bird species | Permanent | Removal of habitat, accidental injury/death/ displacement, disturbance during earthworks | Create more habitat and enhance current habitat. Avoid removing trees, tussock grassland and indigenous scrub/shrubland, or working close to or within the braided river during breeding season. |
| Disturbance to and/or mortality of, and loss and fragmentation of habitat for, indigenous lizards | Indigenous lizards (protected species) | Temporary to permanent | Accidental death/injury to lizards, disturbance to lizards during earthworks, partial loss of lizard habitats, fragmentation of lizard habitats, and lizard disturbance through sub-lethal effects | Continue grazing land. Undertake a lizard survey, prepare a Lizard Management Plan (LMP) and receive an approved WAA. Implement management actions in LMP. |
| Water degradation and harm to indigenous fish | Indigenous fish | Temporary to permanent | Indirect harm to fish through water degradation that could occur through sedimentation and spills. | Have sediment control plan and spill response plans. |
| Disturbance to and/or mortality of, and loss and fragmentation of habitat for, indigenous invertebrates | Indigenous invertebrates (notable species) | Temporary to permanent | Accidental death/injury to invertebrates, partial loss of invertebrate habitats, fragmentation of invertebrate habitats, disturbance to invertebrates during earthworks | Undertake an invertebrate survey, undertake habitat restoration, avoid important invertebrate habitats where possible. |

*

In absence of mitigation measures, all contractors should be made aware of the risks of dispersing propagules or seeds of pest plants, soil-borne pathogens, and pest animals on earthmoving equipment and materials (including gravel) that are contaminated with soil or biological materials.

## 7.4 Partial loss and/or damage to flora

Earthworks and vegetation clearance may result in the partial loss of some Threatened and/or At Risk plant species.

A botanical survey will be needed to determine if any of the Threatened and/or At Risk plant species are present. A survey will also identify other Threatened or At Risk plant species that may have been missed in the desktop assessment. Jersey fern is an annual fern and can only be observed in early spring to mid-summer. A survey for this species around the rock outcrop to be removed will need to be undertaken in between September and December. Understanding the distribution of potential threatened and/or At Risk plant species that are present will help guide any management actions needed.

## 7.5 Effects on wetlands

Cable car towers Ch800.00, CH850.00, CH1300.00, CH1350.00, CH1800.00, CH1850.00, CH1900.00, CH1950.00, CH2990.00 and CH2250.00, CH3100.00 are located nearby natural inland wetlands. The earthworks needed for the tower construction may temporarily affect the hydrology of the wetlands. The hole needed to be dug for the tower may temporarily drain the wetland. Once the tower is in place and the hole refilled, the water table should be restored to the wetland. However, there is a chance that soil hydrology may change.

All wetlands could be avoided with careful planning. A site visit to map wetlands and to help guide the pylon locations will be helpful to ensure wetlands are avoided. Contractors should be informed where the wetlands are, and informed not to drive through or near them. Any cable car towers to be constructed within 10-metres of a wetland should be monitored to ensure that the tower construction has not affected the hydrology of that wetland. Monitoring visits should occur before the construction starts and at least two monitoring visits post-construction. If monitoring results show signs of vegetational composition change, this could indicate possible hydrological damage. If these effects are recorded then a wetland restoration plan will need to be developed and implemented.

## 7.6 Effects on avifauna

Avifauna habitat is found throughout the property and partial loss of habitats cannot be avoided. This partial habitat loss will likely have little effect on the wider population of avifauna in the area. The proposed development will remove mostly exotic grassland, shrubland, treeland and forest. Indigenous bird species that may utilise existing open exotic grassland habitats present on site, such as kāhu/swamp harrier (*Circus approximans*), spur-winged plover (*Vanellus miles novaehollandiae*), pīhoihoi/New Zealand pipits and kārearea/eastern falcon will be able to disperse and utilise surrounding and nearby habitats. However, vegetation removal will reduce the habitat size.

Pīhoihoi/New Zealand pipits are known to nest in dense tussock grassland and shrubland areas. If vegetation clearance occurred during the breeding season, this would result in accidental death and/or injury to the bird.

Several braided river-associated species are also known in the area, including tarapirohe/black-fronted tern, tarāpuka/black-billed gull, tōrea/South Island oystercatcher, pīhoihoi/New Zealand pipit and pohowera/banded dotterel. If works occur during the breeding season, this may result in accidental death and/or injury, as well as disturbance to the birds, their nests and chicks.

Dust, vibration and noise caused by proposed cable car construction may disturb present avifauna. Given the relatively large ranges and high mobility of avifauna, there is the possibility of encountering birds outside of their usually preferred habitat. Nevertheless, avifauna mobility allows birds (outside of the breeding season) the ability to avoid adverse effects from construction activity.

If cable car construction is scheduled to be carried out during the breeding season (August to April), then bird distribution surveys need to be carried out to identify whether any breeding birds will be disturbed or the potential for nest mortality. These surveys should include physical searches. If breeding birds are detected, then an Avian Management Plan is required.

## 7.7 Effects on lizards

A lizard survey is required to confirm the lizard values at the site, which will inform the level of effects on lizards.

**Accidental death/injury to lizards**

Indigenous 'At Risk' and 'Not Threatened' lizards are likely to be present on site. Activities associated with vegetation and habitat clearance (e.g. construction works for stations, towers and access roads) can result in injury and/or death of lizards within the development footprint if lizards are present when the vegetation/habitat is being cleared (e.g. lizards directly killed or injured from crushing by machinery).

**Disturbance to lizards during earthworks**

Disturbance to lizards during construction works includes dust, vibration, and noise. This disturbance is likely to temporarily disrupt normal behaviour, increase stress, and negatively effect social dynamics in lizard populations adjacent to the development footprint as a result of construction activity. This may lead to reduced population functionality, such as poor breeding and low population recruitment.

**Loss of lizard habitats**

Potential lizard habitat has been identified on site. Lizard habitat may be lost through direct removal, such as from vegetation clearance. The loss of vegetation that likely provides lizard habitat (e.g. grassland) will reduce lizard habitat within the development footprint. If lizard habitat loss cannot be avoided, this will result in permanent and cumulative habitat loss for indigenous lizards at the site.

**Fragmentation of lizard habitats**

Habitat loss may result in the fragmentation of resident lizard populations, particularly from the construction of access roads, which will reduce connectivity by splitting previously contiguous habitat. However, the overall development footprint is likely to be minimal in comparison to the surrounding areas of lizard habitat, and following the development the remaining lizard habitat is likely to remain connected to extensive areas of surrounding habitat.

**Lizard disturbance through sub-lethal effects**

The size of existing lizard populations is likely constrained by predation pressure and availability of suitable refuges and food. As such, displacement of individuals into suboptimal surrounding habitat may have an adverse effect on resident populations. The following mechanisms may impact lizards:

- Displacement into pre-existing neighbouring habitat (such as surrounding areas of grassland).
- Increased competition for resources and consequent reduction in breeding success.
- High stress resulting from refuge loss.

**Continue grazing regime**

Maintaining the current grazing regime prior to undertaking construction or further lizard management will prevent additional growth of complex ground cover vegetation, which could support a higher density of lizards than is already present on site. This will reduce the number of lizards that will be impacted by proposed construction activities (as well as lizards impacted by associated management actions, such as lizard salvage).

**Undertake a lizard habitat assessment and survey**

Based on the desktop assessment indigenous lizards are likely to be present on site. A lizard habitat assessment and lizard survey are required to better understand the lizard values that may be affected by the proposed cable car and appropriate management actions required to avoid, remedy and/or mitigate adverse effects on lizards.

A lizard habitat assessment should include a walkover site visit of the specific construction and operation footprint. The habitat assessment will inform specific areas of habitat to include within the lizard survey as well as the most appropriate survey techniques to use.

Potential survey techniques are likely to include the use of lizard survey equipment such as Onduline Artificial Cover Objects (ACOs) and/or live trapping (e.g., using funnel traps or pitfall traps), as well as visual and manual systematic searching of lizard habitat.

Lizard surveys should only be undertaken during the warmer months (October-March) when lizards are most active, during appropriate weather conditions (usually warm, sunny days depending on survey techniques used).

**Avoid high-quality lizard habitats**

Avoidance of high-quality lizard habitats should be the most important measure considered for the management of effects on lizards. High-quality habitats will be determined based on the results of a lizard habitat assessment and lizard survey. High-quality habitats are likely to include rocky habitats and areas of indigenous vegetation (e.g., tussock grassland), and may also include areas of exotic vegetation (e.g., rank exotic grassland) where lizards are present in high densities. High-quality habitat areas could provide the basis for protected areas and ongoing enhancement of the site.

**Lizard Management Plan (LMP)**

Unless all areas of lizard habitat identified following a thorough lizard survey can be avoided from all adverse effects of development activities on lizards, then a WAA and associated LMP are likely to be required in order to address potential adverse effects on lizards. The actual details of lizard management (including any compensation measures) would be addressed in the LMP. If required, the LMP should include the following measures to manage adverse effects:

- Actions to adequately avoid adverse effects on lizards and their habitats where possible.
- Habitat restoration and enhancement, such as appropriate indigenous vegetation planting and/or pest animal and plant control.
- A thorough assessment of alternatives to lizard salvage, including compensation or other suitable means to enhance lizard populations offsite.
- If appropriate, a plan for salvage and relocation of lizards to an alternative location outside of the impact area, if sufficient avoidance or onsite mitigation is not feasible.

## 7.8 Freshwater fauna and waterway effects

Sediment inputs to the river may result from earthmoving, bank contouring, trampling, machinery during the construction phase. Excessive sedimentation alters and degrades instream habitat to favour pollution tolerant fauna. Fine deposited sediment may lead to alterations in the food chain and reduced biodiversity. Deposited sediment can also fill interstitial spaces, the crevices between rocks, reducing fish and macroinvertebrate habitat. A sediment plan should be in effect prior to any earthworks in or around the river bed or waterway channels.

Spillage of stockpiled cement, soil, or gravel into braided river may cause undesired effects. Spills may create blockages or contamination. If cement, soil, and gravel are managed appropriately, these effects should be minimal. Hazardous substances such as oil and diesel/petrol will be required for machinery to be used for construction. It is important that spills are avoided, however a spill response plan must be in effect to manage any possible spills to minimise their impact.

Changes to water quality arising from accidental spills of oil and diesel/petrol from heavy machinery can affect the physiological homeostasis of fish, due to the high toxicity of some of their components, such as polycyclic aromatic hydrocarbons (PAHs).

The effects may be more serious depending on a number of factors, including the synergistic effect (when other sources of stress occur, such as excess of sedimentation or pest fish competition), and the reduced water flow in the Kimi-ākau/Shotover River, which would strongly reduce the self-buffering potential of the water bodies.

## 7.9 Effects on invertebrates

Invertebrate effects are based on the desktop assessment alone, as a field survey was not undertaken. Effects on invertebrates have therefore been assessed conservatively, as the suitability of available habitat, invertebrate abundance and diversity, and presence and location of notable invertebrates on-site are not known.

Activities associated with vegetation and habitat clearance (e.g., construction works for stations, towers and access roads) is likely to result in injury and/or death of invertebrates using the habitat at the time, including notable invertebrates, within the development footprint.

Notable invertebrate habitat may be lost through clearance of vegetation, earthworks, and removal of rocky habitat and/or earthworks on the river bed. The loss of vegetation will reduce invertebrate habitat availability within the development footprint. If habitat loss cannot be avoided, this will result in permanent and cumulative habitat loss for indigenous invertebrates at the site.

Habitat removal and construction may result in the fragmentation of invertebrate populations, particularly from the construction of access roads, which will reduce connectivity by splitting previously contiguous habitat. Dispersal-limited, slow-moving species will be most affected, such as beetles. Host-specific species such as moths will also be affected as the average distance between host plants is likely to increase. Following the development the remaining invertebrate habitat on-site is likely to remain connected to extensive areas of surrounding habitat, but for less mobile species the barriers to movement will still impact connectivity on-site.

Disturbance to invertebrates during construction works includes dust, vibration, and noise. This disturbance is likely to temporarily disrupt normal behaviour and may cause stress, disease and death due to breathing apparatus becoming blocked by dust as a result of construction activity. This may lead to reduced population functionality, such as poor breeding and low population recruitment.

Based on the desktop assessment, notable indigenous invertebrates and high invertebrate diversity are likely to be present on site. A terrestrial invertebrate habitat assessment and survey are recommended to better understand the type and distribution of invertebrate values that may be affected by the proposed development and to refine the suggested management actions to avoid, remedy and/or mitigate adverse effects on terrestrial invertebrates.

A terrestrial invertebrate habitat assessment should include a walkover site visit of the specific development footprint, including areas where spoil heaps may be placed. The habitat assessment will inform survey design. Survey techniques should include live-capture pitfall trapping, light trapping, walkthrough transects by day and night, and pan trapping. Invertebrate surveys should only be undertaken during the warmer months (October-March) when invertebrates are most active, during appropriate weather conditions (usually warm, sunny days depending on survey techniques used).

Avoid building towers in important invertebrate habitats where possible. Important invertebrate habitats, such as the wetlands and rocky areas, and any other areas identified during the survey, should be retained and preserved where possible. The design of the cable car towers and cable layout should be refined to avoid these important habitat areas as much as practicable.

When invertebrate habitat has been removed, it should be remedied by enhancing that particular habitat. This could be done by replacing and planting indigenous plants lost, and/or undertaking weed control. Depending on the species affected other habitat enhancement actions such as rock or litter piles could be created.

# 8.0 Conclusion

A cable car is proposed to be installed over Te Tapunui/Queenstown hill, providing a transport link from the town centre to Frankton and the airport. The cable car will go over urban development, farmland, exotic conifer forests, exotic shrublands, braided river and subalpine tussock grasslands. The majority of the ecological values will be present in the subalpine tussock grasslands, rock outcrops and shrublands. Various At Risk and Threatened plant species are likely present around all these habitats.

Indigenous lizards are likely to be present on site, and may be adversely affected by the proposed cable car. A lizard habitat assessment and lizard survey are required to better understand the lizard values on site and determine appropriate management options to address anticipated potential adverse effects on lizards. Depending on the results of a lizard survey, a WAA and associated Lizard Management Plan describing lizard management actions to be undertaken are likely to be required for the project.

Avifauna are most at risk from disturbance during the construction phase, particularly if works are carried out during breeding seasons (August to March). It will be important to undertake the works between April and August, when there is no breeding activity. However, any tree removal adjacent to or overhanging water will need to be surveyed before felling as māpunga/black shag can breed from April to January and kāruhiruhi/pied shag can breed all year round.

High indigenous invertebrate biodiversity, and notable invertebrates, are likely to be present on-site. They will likely be affected by the development, particularly due to habitat loss and fragmentation. A terrestrial invertebrate survey is necessary to assess areas of habitat that are particularly important for invertebrates, and to find out what invertebrate values are most likely to be on-site. Effects management for invertebrates will include habitat restoration, and avoiding important habitat.

Each survey required for specialist fauna groups is limited to a particular time of year, due to seasonal activity. Because of this, timing of fauna surveys, and any effects management required could constrain the timing of the construction works.

Mitigation measures to manage effects include:

- Increasing extent and diversity of present indigenous vegetation and habitats through restoration actions such as planting, ecological weed control and/or pest animal control.
- Avoid wetlands. Set up monitoring in nearby potentially affected wetlands. Develop and implement wetland restoration wetland plan if monitoring results in any possible change in hydrology.
- Avoid tree-felling and clearance of subalpine tussock grassland and shrubland in the avifauna breeding season. If earthworks need to be undertaken in the avifauna breeding season, an Incidental Discovery Plan will need to developed before works begin.
- Continue grazing exotic pasture grasslands until construction works begin.
- Preparation and implementation of a lizard management plan for the site.
- Sediment control plan and spill response plan for construction near any waterways.

If the above mitigation measures are appropriately implemented, then the overall level of ecological effect of the proposed QCC project will be very low.

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# Appendix 1

## Vascular plant species list

Records of vascular plant species on and nearby the project area sourced from iNaturalist. Nationally threat status taken from de Lange *et al.* 2024. Otago regional threat status taken from Jarvie *et al.* 2024.

***Taonga species denoted with a '*'.***

| Species | Common Name | Status | National Threat Status | Regional Threat Status |
|---|---|---|---|---|
| *Acacia baileyana* | | Exotic | | |
| *Acaena anserinifolia* | Piripiri | Indigenous | | |
| *Acaena inermis* | Bidibidi | Indigenous | | Regionally Declining |
| *Acaena novae-zelandiae* | Bidibidi | Indigenous | | |
| *Acer pseudoplatanus* | Sycamore | Exotic | | |
| *Achillea millefolium* | Yarrow | Exotic | | |
| *Aciphylla aurea** | Golden spaniard | Indigenous | | |
| *Acrothamnus colensoi* | Colenso's mingimingi | Indigenous | | |
| *Adiantum cunninghamii* | Puhinui, maidenhair fern | Indigenous | | |
| *Aesculus hippocastanum* | Horse chesnut | Exotic | | |
| *Agrostis capillaris* | Browntop | Exotic | | |
| *Aira caryophyllea* | Silvery hair grass | Exotic | | |
| *Alcea rosea* | Hollyhock | Exotic | | |
| *Alepis flavida* | Pirita | Indigenous | At Risk-Declining | Regionally Vulnerable |
| *Anaphalioides bellidioides* | Hells bells | Indigenous | | |
| *Anemanthele lessoniana* | Wind grass | Indigenous | At Risk-Declining | Regionally Critical |
| *Anogramma leptophylla* | Jersey fern, annual fern | Indigenous | At Risk-Declining | Regionally Critical |
| *Anthoxanthum odoratum* | Sweet vernal | Exotic | | |
| *Arabidopsis thaliana* | Wall cress | Exotic | | |
| *Arbutus unedo* | Strawberry tree | Exotic | | |
| *Argyranthemum frutescens* | Marguerite | Exotic | | |
| *Aristotelia fruticosa* | Shrubby wineberry | Indigenous | | |
| *Aristotelia serrata* | Makomako, wineberry | Indigenous | | |
| *Arrhenatherum elatius* | Tall oat grass | Exotic | | |
| *Asplenium appendiculatum* | Ground spleenwort | Indigenous | | |
| *Asplenium flabellifolium* | Necklace fern | Indigenous | | |
| *Asplenium richardii* | Matua-kaponga | Indigenous | | |
| *Asplenium trichomanes* | | Indigenous | | |
| *Astelia fragrans* | Kakaha | Indigenous | | |
| *Astelia nervosa* | | Indigenous | | |
| *Austroderia richardii** | Toetoe | Indigenous | | |
| *Azolla rubra* | | Indigenous | | |
| *Bellis perennis* | Lawn daisy | Exotic | | |
| *Bellardia viscosa* | Tarweed | Exotic | | |
| *Berberis aquifolium* | | Exotic | | |
| *Berberis glaucocarpa* | Barberry | Exotic | | |
| *Berberis wilsoniae* | Mrs. Wilson's Barberry | Exotic | | |
| *Betula pendula* | Silver birch | Exotic | | |
| *Blechnum chambersii* | Rereti, lance fern | Indigenous | | |
| *Blechnum discolor* | Piupiu, crown fern | Indigenous | | |
| *Blechnum membranaceum* | | Indigenous | | |
| *Blechnum montanum* | Mountain kiokio | Indigenous | | |
| *Blechnum novae-zelandiae* | Kiokio | Indigenous | | |
| *Blechnum penna-marina* | Little hard fern | Indigenous | | |
| *Blechnum vulcanicum* | Korokio | Exotic | | |
| *Borago officinalis* | Borage | Exotic | | |
| *Brassica rapa* | | Exotic | | |
| *Bromus diandrus* | Ripgut brome | Exotic | | |
| *Buddleja davidii* | Buddleia | Exotic | | |

| Species | Common Name | Status | National Threat Status | Regional Threat Status |
|---|---|---|---|---|
| *Calystegia silvatica* | Great bindweed | Exotic | | |
| *Carmichaelia australis* | Mākaka, maukoro, tainoka, taunoka, New Zealand broom | Indigenous | At Risk-Declining | |
| *Carex breviculmis* | Hooked sedge | Indigenous | | |
| *Carex secta* | Pūkio | Indigenous | | |
| *Carduus tenuiflorus* | Winged thistle | Exotic | | |
| *Castanea sativa* | Sweet chestnut | Exotic | | |
| *Cedronella canariensis* | Balm of gilead | Exotic | | |
| *Celmisia gracilenta* | Pekapeka, slender mountain daisy | Indigenous | | |
| *Centaurium erythraea* | Centaury | Exotic | | |
| *Cerastium glomeratum* | Chickweed | Exotic | | |
| *Chamaecyparis lawsoniana* | Lawson cypress | Exotic | | |
| *Chamaecytisus proliferus* | Tree lucerne | Exotic | | |
| *Chenopodium album* | Fathen | Exotic | | |
| *Chionochloa rubra* | Red tussock | Indigenous | | |
| *Cichorium intybus* | Chicory | Exotic | | |
| *Cirsium arvense* | Californian thistle | Exotic | | |
| *Cirsium vulgare* | Scotch thistle | Exotic | | |
| *Claytonia perfoliata* | Miners lettuce | Exotic | | |
| *Clematis montana* | Anemone clematis | Exotic | | |
| *Clematis paniculata* | Puawānanga | Indigenous | | |
| *Clematis tangutica* | | Exotic | | |
| *Clematis vitalba* | Old man's beard | Exotic | | |
| *Conium maculatum* | Hemlock | Exotic | | |
| *Coprosma lucida** | Karamu | Indigenous | | |
| *Coprosma petriei* | Turfy coprosma | Indigenous | | |
| *Coprosma propinqua* | Mikimiki | Indigenous | | |
| *Coprosma robusta** | Karamū | Indigenous | | |
| *Coprosma rugosa* | | Indigenous | | |
| *Coprosma virescens* | | Indigenous | At Risk-Declining | Regionally Vulnerable |
| *Coriaria arborea* | Tree tutu | Indigenous | | |
| *Cordyline australis** | Tī kōuka, cabbage tree | Indigenous | | |
| *Cornus capitata* | Strawberry dogwood | Exotic | | |
| *Corokia cotoneaster** | Korokio | Indigenous | | |
| *Coriaria sarmentosa** | Tutu | Indigenous | | |
| *Cortaderia selloana* | Pampas grass | Exotic | | |
| *Cotula coronopifolia* | Bachelor's buttons | Indigenous | | |
| *Cotoneaster franchetii* | | Exotic | | |
| *Cotoneaster horizontalis* | Wall cotoneaster | Exotic | | |
| *Cotoneaster simonsii* | Khasia berry | Exotic | | |
| *Crataegus monogyna* | Hawthorn | Exotic | | |
| *Crepis capillaris* | Hawksbeard | Exotic | | |
| *Crocosmia x crocmiiflora* | Montbretia | Exotic | | |
| *Cyathea smithii* | Kātote, soft tree fern | Indigenous | | |
| *Cyperus eragrostis* | Umbrella sedge | Exotic | | |
| *Cytisus scoparius* | Scotch broom | Exotic | | |
| *Dactylis glomerata* | Cocksfoot | Exotic | | |
| *Daphne laureola* | Spurge laurel | Exotic | | |
| *Descurainia sophia* | Flixweed | Exotic | | |
| *Digitalis purpurea* | Foxglove | Exotic | | |
| *Discaria toumatou* | Tūmatakuru, matagouri | Indigenous | | |
| *Dodonaea viscosa* | Akeake | Indigenous | | |
| *Dracophyllum pronum* | | Indigenous | | |
| *Dracophyllum rosmarinifolium* | | Indigenous | | |
| *Dryopteris filix-mas* | Male fern | Exotic | | |
| *Echium vulgare* | Vipers bugloss | Exotic | | |
| *Epilobium komarovianum* | Creeping willow herb | Indigenous | | |
| *Epilobium pubens* | | Indigenous | | |

| Species | Common Name | Status | National Threat Status | Regional Threat Status |
|---|---|---|---|---|
| *Erigeron karvinskianus* | Mexican daisy | Exotic | | |
| *Erodium cicutarium* | Storksbill | Exotic | | |
| *Erodium moschatum* | Musky storksbill | Exotic | | |
| *Erythranthe moschata* | | Exotic | | |
| *Eschscholzia californica* | Californian poppy | Exotic | | |
| *Euchiton audax* | Native cudweed | Indigenous | | |
| *Eucalyptus gunnii* | | Exotic | | |
| *Euonymus europaeus* | | Exotic | | |
| *Euphorbia characias* | Mediterranean spurge | Exotic | | |
| *Euphorbia lathyris* | Caper spurge | Exotic | | |
| *Fagus sylvatica* | European beech | Exotic | | |
| *Forysthia x intermedia* | Border Forsythia | Exotic | | |
| *Fraxinus angustifolia* | Narrow-leaved ash | Exotic | | |
| *Fuchsia excorticata* | Kōtukutuku, tree fuchsia | Indigenous | | |
| *Fumaria muralis* | Scrambling fumitory | Exotic | | |
| *Fuscospora cliffortioides** | Mountain beech | Indigenous | | |
| *Fuscospora fusca** | Tawhairaunui, red beech | Indigenous | | |
| *Fuscospora solandri** | Black beech | Indigenous | | |
| *Galium aparine* | Cleavers | Exotic | | |
| *Gaultheria crassa* | | Indigenous | | |
| *Gaultheria depressa* | Snowberry | Indigenous | | |
| *Geranium molle* | Dovesfoot cranesbill | Exotic | | |
| *Grevillea rosmarinifolia* | Rosemary grevillea | Exotic | | |
| *Griselinia littoralis* | Kāpuka | Indigenous | | |
| *Gunnera tinctoria* | Chilean rhubarb | Exotic | | |
| *Halocarpus bidwillii* | Bog pine | Indigenous | | |
| *Hedera canariensis* | Canary Islands ivy | Exotic | | |
| *Hedera helix* | Ivy | Exotic | | |
| *Helichrysum lanceolatum* | Niniao | Indigenous | | |
| *Heracleum mantegazzianum* | Giant hogweed | Exotic | | |
| *Hesperocyparis lusitanica* | Mexican cypress | Exotic | | |
| *Hesperocyparis macrocarpa* | Monterey Cypress | Exotic | | |
| *Hieracium lepidulum* | Tussock hawkweed | Exotic | | |
| *Hoheria sexstylosa* | Houhere, lacebark | Indigenous | | |
| *Holcus lanatus* | Yorkshire fog | Exotic | | |
| *Hordeum murinum* | Barley grass | Exotic | | |
| *Humulus lupulus* | Hops | Exotic | | |
| *Hypericum androsaemum* | Tutsan | Exotic | | |
| *Hypericum humifusum* | Trailing Saint John's wort; | Exotic | | |
| *Hypericum perforatum* | St Johns wort | Exotic | | |
| *Hypochaeris radicata* | Catsear | Exotic | | |
| *Ilex aquifolium* | Holly | Exotic | | |
| *Iris foetidissima* | Stinking iris | Exotic | | |
| *Iris pseudacorus* | Yellow flag | Exotic | | |
| *Isolepis cernua* | | Indigenous | | |
| *Isolepis setacea* | Bristle clubrush | Exotic | | |
| *Juncus australis** | Wīwī | Indigenous | | |
| *Juncus bufonius* | Toad rush | Exotic | | |
| *Juncus effusus* | Soft rush | Exotic | | |
| *Kelleria dieffenbachii* | | Indigenous | | |
| *Laburnum anagyroides* | Common laburnum | Exotic | | |
| *Lamium galeobdolon* | | Exotic | | |
| *Lamium maculatum* | Spotted dead | Exotic | | |
| *Lapsana communis* | Nipplewort | Exotic | | |
| *Larix decidua* | European larch | Exotic | | |
| *Lathyrus latifolius* | Everlasting pea | Exotic | | |
| *Leptospermum scoparium** | Mānuka | Indigenous | | |
| *Leucopogon fasciculatus* | Mingimingi | Indigenous | | |
| *Leucanthemum vulgare* | Oxeye daisy | Exotic | | |
| *Leycesteria formosa* | Himalayan honeysuckle | Exotic | | |

| Species | Common Name | Status | National Threat Status | Regional Threat Status |
|---|---|---|---|---|
| *Linaria purpurea* | Purple linaria | Exotic | | |
| *Liquidambar styraciflua* | Liquidambar | Exotic | | |
| *Lolium perenne* | Ryegrass | Exotic | | |
| *Lonicera japonica* | Japanese honeysuckle | Exotic | | |
| *Lonicera periclymenum* | Common honeysuckle | Exotic | | |
| *Lophozonia menziesii** | Tawhai, silver beech | Indigenous | | |
| *Lotus pedunculatus* | Lotus | Exotic | | |
| *Lunaria annua* | Honesty | Exotic | | |
| *Lunularia cruciata* | | Exotic | | |
| *Lupinus arboreus* | Tree lupin | Exotic | | |
| *Lupinus polyphyllus* | Russell lupin | Exotic | | |
| *Lysimachia arvensis* | | Exotic | | |
| *Malus domestica* | Apple | Exotic | | |
| *Malva neglecta* | Dwarf mallow | Exotic | | |
| *Malva sylvestris* | Large-flowered mallow | Exotic | | |
| *Matricaria discoidea* | Rayless chamomile | Exotic | | |
| *Melilotus albus* | Sweet clover | Exotic | | |
| *Melicytus alpinus* | | Indigenous | | |
| *Melicytus ramiflorus* | Māhoe | Indigenous | | |
| *Mentha spicata* | Spearmint | Exotic | | |
| *Lecanopteris pustulata* | Kōwaowao, pāraharaha, hound's tongue fern | Indigenous | | |
| *Microtis unifolia* | Māikaika, onion orchid | Indigenous | | |
| *Miscanthus sinensis* | Chinese fairy grass | Exotic | | |
| *Muehlenbeckia australis* | Puka | Indigenous | | |
| *Muehlenbeckia axillaris* | Pōhuehue | Indigenous | | |
| *Muehlenbeckia complexa* | Pōhuehue | Indigenous | | |
| *Muscari armeniacum* | Grape hyacinth | Exotic | | |
| *Mycelis muralis* | Wall lettuce | Exotic | | |
| *Myosotis laxa* | Water forget-me-not | Exotic | | |
| *Myosotis sylvatica* | Garden forget-me-not | Exotic | | |
| *Myriophyllum propinquum* | Common water milfoil | Indigenous | | |
| *Myriophyllum triphyllum* | Water milfoil | Indigenous | | |
| *Navarretia squarrosa* | Californian stinkweed | Exotic | | |
| *Olearia arborescens* | Tree daisy | Indigenous | | |
| *Olearia avicenniifolia* | Akeake | Indigenous | | |
| *Olearia hectorii* | | Indigenous | Threatened-Nationally Endangered | Regionally Critical |
| *Olearia lineata* | | Indigenous | At Risk-Declining | Regionally Declining |
| *Olearia odorata* | Scented tree daisy | Indigenous | At Risk-Declining | |
| *Onopordum acanthium* | | Exotic | | |
| *Origanum vulgare* | | Exotic | | |
| *Oxalis corniculata* | Horned oxalis | Exotic | | |
| *Ozothamnus leptophyllus* | | Indigenous | | |
| *Papaver dubium* | Long-headed poppy | Exotic | | |
| *Papaver rhoeas* | Field poppy | Exotic | | |
| *Pellaea calidirupium* | | Indigenous | At Risk-Naturally Uncommon | Regionally Naturally Uncommon |
| *Pennantia corymbosa* | Kaikōmako | Indigenous | | |
| *Pentachondra pumila* | | Indigenous | | |
| *Peraxilla tetrapetala* | Red mistletoe, pirirangi | Indigenous | At Risk-Declining | Regionally Vulnerable |
| *Phleum pratense* | Timothy | Exotic | | |
| *Photinia x fraseri* | Red tip photinia | Exotic | | |
| *Phormium tenax** | Harakeke | Indigenous | | |
| *Pieris formosa* | Mountain pieris | Exotic | | |
| *Pilosella aurantiaca* | | Exotic | | |
| *Pilosella officinarum* | Mouse-ear hawkweed | Exotic | | |
| *Pinus mugo* | | Exotic | | |
| *Pinus radiata* | Radiata pine | Exotic | | |

| Species | Common Name | Status | National Threat Status | Regional Threat Status |
|---|---|---|---|---|
| *Pittosporum colensoi* | Rautāwhiri, rautāhiri | Indigenous | | |
| *Pittosporum eugenioides** | Tarata, lemonwood | Indigenous | | |
| *Pittosporum tenuifolium** | Kōhūhū | Indigenous | | |
| *Plantago lanceolata* | Narrow-leaved plantain | Exotic | | |
| *Plagianthus regius* | Mānatu, lowland ribbonwood | Indigenous | | |
| *Plantago triandra* | Glossy plantain | Indigenous | | |
| *Poa annua* | Annual poa | Exotic | | |
| *Poa cita** | Wī, silver tussock | Indigenous | | |
| *Poa colensoi* | Blue tussock | Indigenous | | |
| *Podocarpus nivalis* | Tauhinu, snow tōtara, | Indigenous | | |
| *Polystichum neozelandicum* | Shield fern | Indigenous | | |
| *Polystichum vestitum* | Pūniu, prickly shield fern | Indigenous | | |
| *Populus nigra* | Lombardy poplar | Exotic | | |
| *Portulaca oleracea* | Wild portulaca | Exotic | | |
| *Prunus avium* | Sweet cherry | Exotic | | |
| *Prunus domestica* | Plum | Exotic | | |
| *Prunus laurocerasus* | Cherry laurel | Exotic | | |
| *Prunus serrulata* | Japanese hill cherry | Exotic | | |
| *Prunella vulgaris* | Selfheal | Exotic | | |
| *Pseudopanax arboreus* | Whauwhaupaku, puahou, five finger | Indigenous | | |
| *Pseudowintera colorata* | Horopito | Indigenous | | |
| *Pseudopanax crassifolius* | Horoeka, lancewood | Indigenous | | |
| *Pseudopanax ferox* | Fierce lancewood | Indigenous | At Risk-Naturally Uncommon | Regionally Vulnerable |
| *Pseudosasa japonica* | Arrow bamboo | Exotic | | |
| *Pseudopanax laetus* | | Indigenous | At Risk-Declining | |
| *Pseudotsuga menziesii* | Douglas fir | Exotic | | |
| *Pteridium esculentum** | Rārahu, rarauhe, bracken | Indigenous | | |
| *Pyracantha crenatoserrata* | Firethorn | Exotic | | |
| *Quercus palustris* | Pin oak | Exotic | | |
| *Quercus robur* | English oak | Exotic | | |
| *Ranunculus acris* | Giant buttercup | Exotic | | |
| *Ranunculus flammula* | Spearwort | Exotic | | |
| *Ranunculus multiscapus* | | Indigenous | | |
| *Ranunculus repens* | Creeping buttercup | Exotic | | |
| *Raoulia australis* | Common mat daisy | Indigenous | At Risk-Declining | Regionally Declining |
| *Raoulia beauverdii* | | Indigenous | At Risk-Declining | Regionally Vulnerable |
| *Raoulia subsericea* | | Indigenous | | |
| *Raphanus raphanistrum* | | Exotic | | |
| *Reseda luteola* | Wild mignonette | Exotic | | |
| *Ribes sanguineum* | Flowering currant | Exotic | | |
| *Ribes uva-crispa* | Gooseberry | Exotic | | |
| *Rosa rubiginosa* | | Exotic | | |
| *Rubus laciniatus* | Cut-leaved blackberry | Exotic | | |
| *Rubus phoenicolasius* | Japanese wineberry | Exotic | | |
| *Rubus schmidelioides* | | Indigenous | | |
| *Rubus vestitus* | European blackberry | Exotic | | |
| *Rumex acetosella* | Sheep's sorrel | Exotic | | |
| *Rumex crispus* | Curled dock | Exotic | | |
| *Rumex obtusifolius* | Broad-leaved dock | Exotic | | |
| *Rytidosperma buchananii* | | Indigenous | At Risk-Declining | Regionally Declining |
| *Rytidosperma merum* | | Indigenous | At Risk-Declining | Regionally Vulnerable |
| *Sagina procumbens* | Pearlwort | Exotic | | |
| *Salix babylonica* | Weeping willow | Exotic | | |
| *Salix cinerea* | Grey willow | Exotic | | |
| *Salix fragilis* | Crack willow | Exotic | | |
| *Salix x pendulina* | Weeping crack willow | Exotic | | |
| *Salvia rosmarinus* | Rosemary | Exotic | | |
| *Sambucus nigra* | Elder | Exotic | | |

| Species | Common Name | Status | National Threat Status | Regional Threat Status |
|---|---|---|---|---|
| *Schefflera digitata* | Patē, seven finger | Indigenous | | |
| *Sedum acre* | Stonecrop | Exotic | | |
| *Senecio quadridentatus* | | Indigenous | | |
| *Senecio vulgaris* | Groundsel | Exotic | | |
| *Silene dioica* | | Exotic | | |
| *Silene gallica* | Catchfly | Exotic | | |
| *Silene latifolia* | White campion | Exotic | | |
| *Sisymbrium officinale* | Wild mustard, hedge mustard | Exotic | | |
| *Solanum dulcamara* | Bittersweet | Exotic | | |
| *Sonchus asper* | Prickly puha | Exotic | | |
| *Sonchus novae-zelandiae* | | Indigenous | Threatened-Nationally Vulnerable | Regionally Vulnerable |
| *Sonchus oleraceus* | Puha / sow thistle | Exotic | | |
| *Sophora microphylla** | Kōwhai | Indigenous | | |
| *Sorbus aucuparia* | Rowan | Exotic | | |
| *Spergularia rubra* | Sand spurrey | Exotic | | |
| *Stellaria gracilenta* | Chickweed | Indigenous | | |
| *Stellaria media* | Chickweed | Exotic | | |
| *Stellaria parviflora* | Native chickweed | Indigenous | | |
| *Styphelia nesophila** | Pātōtara | Indigenous | | |
| *Tanacetum parthenium* | | Exotic | | |
| *Taraxacum officinale* | Dandelion | Exotic | | |
| *Tradescanthia virginiana* | Virginia spiderwort | Exotic | | |
| *Trifolium arvense* | Haresfoot trefoil | Exotic | | |
| *Tripleurospermum inodorum* | Scentless chamomile | Exotic | | |
| *Trifolium pratense* | Red clover | Exotic | | |
| *Trifolium repens* | White clover | Exotic | | |
| *Trifolium subterraneum* | Subterranean clover | Exotic | | |
| *Tropaeolum majus* | Garden nasturtium | Exotic | | |
| *Ulex europaeus* | Gorse | Exotic | | |
| *Veronica arvensis* | Field speedwell | Exotic | | |
| *Veronica colensoi* | | Indigenous | | |
| *Veronica cupressoides* | | Indigenous | Threatened-Nationally Endangered | Regionally Endangered |
| *Veronica odora* | | Indigenous | | |
| *Verbena officinalis* | Vervain | Exotic | | |
| *Veronica pauciramosa* | | Indigenous | | |
| *Veronica pimeleoides* | | Indigenous | | |
| *Veronica salicifolia** | Koromiko, kōkōmuka | Indigenous | | |
| *Verbascum thapsus* | Woolly mullein | Exotic | | |
| *Verbascum virgatum* | Moth mullein | Exotic | | |
| *Viburnum tinus* | Laurustinus | Exotic | | |
| *Vicia sativa* | Vetch | Exotic | | |
| *Vinca major* | Periwinkle | Exotic | | |
| *Wahlenbergia albomarginata* | New Zealand harebel | Indigenous | | |

# Appendix 2

## Avifauna species list

**The search area covered a radius of five kilometres. Data was sourced from eBird. Threat classification taken from Robertson *et al.* 2021.**

***Taonga species denoted with '*'.***

| Scientific Name | Common Name | Threat Classification |
|---|---|---|
| **Indigenous** | | |
| *Chlidonias albostriatus** | Tarapirohe, black-fronted tern | Threatened – Nationally Endangered |
| *Falco novaeseelandiae novaeseelandiae** | Kārearea, eastern falcon | Threatened – Nationally Vulnerable |
| *Nestor meridionalis meridionalis** | Kākā/South Island kaka | Threatened – Nationally Vulnerable |
| *Podiceps cristatus australis** | Pūteketeke, Australasian crested grebe | Threatened – Nationally Vulnerable |
| *Anthus novaeseelandiae novaeseelandiae** | Pīhoihoi, New Zealand pipit | At Risk – Declining |
| *Charadrius bicinctus bicinctus* | Pohowera/banded dotterel | At Risk – Declining |
| *Chroicocephalus bulleri* | Tarāpuka, black-billed gull | At Risk – Declining |
| *Haematopus finschi* | Tōrea, South Island pied oystercatcher | At Risk – Declining |
| *Zapornia pusilla affinis* | Kotoreke/marsh crake | At Risk – Declining |
| *Phalacrocorax varius varius** | Kāruhiruhi/pied shag | At Risk – Recovering |
| *Fulica atra australis* | Australian coot | At Risk – Naturally Uncommon |
| *Microcarbo melanoleucos brevirostris** | Kawaupaka/little shag | At Risk – Relict |
| *Phalacrocorax carbo novaehollandiae** | Māpunga, black shag | At Risk – Relict |
| *Microcarbo melanoleucos melanoleucos* | Kawaupaka, little pied shag | Non-resident Native – Vagrant |
| *Anthornis melanura melanura** | Korimako, bellbird | Not Threatened |
| *Aythya novaeseelandiae* | Pāpango, New Zealand scaup | Not Threatened |
| *Chrysococcyx lucidus lucidus** | Pīpīwharauroa, Shining cuckoo | Not Threatened |
| *Circus approximans** | kāhu, swamp harrier | Not Threatened |
| *Cygnus atratus* | Kakīānau, black swan | Not Threatened |
| *Gerygone igata** | Riroriro, grey warbler | Not Threatened |
| *Hirundo neoxena neoxena* | Warou, welcome swallow | Not Threatened |
| *Larus dominicanus dominicanus** | Karoro, southern black-backed gull | Not Threatened |
| *Mohoua novaeseelandiae* | Pīpipi, brown creeper | Not Threatened |
| *Petroica macrocephala macrocephala* | Ngirungiru, South Island tomtit | Not Threatened |
| *Prosthemadera novaeseelandiae novaeseelandiae** | Tūī, tui | Not Threatened |
| *Rhipidura fuliginosa fuliginosa** | South Island fantail/pīwakawaka | Not Threatened |
| *Tadorna variegata* | Paradise shelduck/pūtangitangi | Not Threatened |
| *Todiramphus sanctus vagans** | Kōtare, New Zealand kingfisher | Not Threatened |
| *Vanellus miles novaehollandiae* | Spur-winged plover | Not Threatened |
| *Zosterops lateralis lateralis* | Tauhou, silvereye | Not Threatened |
| **Introduced and Naturalised** | | |
| *Acanthis flammea* | Common redpoll | Introduced and Naturalised |
| *Alauda arvensis* | Kairaka, Eurasian skylark | Introduced and Naturalised |
| *Anas platyrhynchos* | Rakiraki, mallard | Introduced and Naturalised |
| *Anser anser* | Kuihi, greylag goose | Introduced and Naturalised |
| *Branta canadensis* | Kuihi, Canada goose | Introduced and Naturalised |
| *Callipepla californica bunnescens* | Tikaokao, California quail | Introduced and Naturalised |
| *Carduelis carduelis britannica* | Kōurarini, European goldfinch | Introduced and Naturalised |
| *Carduelis chloris* | European greenfinch | Introduced and Naturalised |
| *Emberiza citrinella* | Hurukōwhai, yellowhammer | Introduced and Naturalised |
| *Fringilla coelebs* | Pahirini, chaffinch | Introduced and Naturalised |
| *Gymnorhina tibicen* | Makipai, Australian magpie | Introduced and Naturalised |
| *Meleagris gallopavo* | Korokoru, wild turkey | Introduced and Naturalised |
| *Passer domesticus* | Tiu, house sparrow | Introduced and Naturalised |

| Scientific Name | Common Name | Threat Classification |
|---|---|---|
| *Prunella modularis* | Dunnock | Introduced and Naturalised |
| *Sturnus vulgaris vulgaris* | Tāringi, common starling | Introduced and Naturalised |
| *Turdus merula* | Manu pango, Eurasian blackbird | Introduced and Naturalised |
| *Turdus philomelos clarkei* | Manu-kai-huakrakau, song thrush | Introduced and Naturalised |

# Appendix 3

## Lizard database search results

**Results of the Department of Conservation BioWeb Herpetofauna Database search within a 30-kilometre radius of the proposed Te Tapunui/Queenstown Hill cable car development footprint, Otago, and an assessment of the likelihood of the presence of these species at the site. Records older than 50 years have been omitted from the assessment. Threat statuses as per Hitchmough *et al.* (2021) and Jarvie *et al.* (2023). The likelihood of occurrence for each species is given based on their known habitat preferences and distribution in the region. Database updated in December 2024.**

| Species | Common Name | National Threat Status | Regional Threat Status | Record Distance | Habitats | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Oligosoma maccanni* | McCann's skink | Not Threatened | Regionally Not Threatened | <1 km (2024) | Inhabits open habitats such as grassland and tussockland, and particularly associated with dry, rocky areas. | **Highly likely** – suitable grassland habitat present. In grassland and other open habitats, potentially including rocky areas near the Shotover River. |
| *Oligosoma* aff. *polychroma* Clade 5 | Southern grass skink | At Risk – Declining | Regionally Declining | *c.*9.5 km (2024) | Prefers damp or well vegetated habitats such as rank grassland and tussockland, wetlands, gullies and stream/river edges. | **Highly likely** – suitable grassland habitat present. In dense rank grassland or other dense, damp ground cover vegetation (e.g. in gullies and around wetlands). |
| *Oligosoma inconspicuum* | Cryptic skink | At Risk – Declining | Regionally Declining | <1 km (2024) | Inhabits rocky tussockland and grassland, other rocky areas (e.g. scree), and also associated with damp vegetated areas (e.g. wetland edges). | **Highly likely** – recently recorded from Te Tapunui/Queenstown Hill. Likely to be found in tussock grassland or other dense ground cover vegetation and areas with loose rocks. |
| *Woodworthia* "south-western large" | South-western large gecko | At Risk – Declining | Regionally Declining | <1 km (1993) | Generally associated with rocky areas such as scree, boulderfields and creviced tors and outcrops within tussockland, but can also be found in mature indigenous forest (especially beech) and scrub (from lowland to alpine areas, <1,300 metres). | **Highly likely** – suitable rocky habitat present. In rock outcrops, rocky grassland/shrubland and potentially under tree bark on the edge of forest (including exotic conifer forest) and in rocky areas near the Shotover River. |
| *Oligosoma toka* | Nevis skink | At Risk – Declining | Regionally Declining | *c.*9.5 km (2024) | Inhabits rocky shrubland (particularly with *Dracophyllum*) and tussockland, scree, rocky river terraces and gold-mine tailings, from subalpine to alpine areas (600-1,900 metres). | **Unlikely** – some potentially suitable subalpine tussock grassland present, but this species is usually found at higher elevations. |

| Species | Common Name | National Threat Status | Regional Threat Status | Record Distance | Habitats | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Oligosoma pluvialis* | Te Wāhipounamu skink (pallid skink)[1] | At Risk – Declining | Regionally Vulnerable | *c.*6.5 km (2024) | Inhabits a variety of habitats from the lowland right up to at least 1,825 metres, with the "pallid skink" form known from high elevation subalpine and alpine areas down to possibly around 700 metres. Habitats include tussockland, grassland, shrubland, herbfield, wetlands, and rocky areas (e.g. scree). | **Unlikely** – some potentially suitable subalpine tussock grassland present, but this species is usually found at higher elevations. |
| *Oligosoma* aff. *chloronoton* "West Otago" | Lakes skink | Threatened – Nationally Vulnerable | Regionally Vulnerable | *c.*12.5 km (2018) | Tussockland, shrubland and herbfield with dense indigenous ground cover vegetation, as well as rocky areas such as scree, rocky river terraces and lake edges (from lowland to alpine areas). | **Unlikely** – some potentially suitable subalpine tussock grassland present, but likely to be suboptimal for this species (lacking complex rock piles/scree slopes). |
| *Woodworthia* "southern mini" | Short-toed gecko | At Risk – Declining | Regionally Declining | *c.*3 km (2023) | Subalpine and alpine areas (600-1,700 metres) in scree, boulderfields, creviced rock outcrops and occasionally rocky scrubland or pasture grassland. | **Unlikely** – some potentially suitable rocky habitat present, but the site may be outside the range of this species. |
| *Woodworthia* "Cromwell" | Kawarau gecko | At Risk – Declining | Regionally Declining | *c.*13.5 km (2019) | Rocky areas such as scree, boulderfields and creviced tors and outcrops within tussockland (from lowland to alpine areas, <1,300 metres). | **Unlikely** – suitable rocky habitat present, but considered to be outside the range of this species. |
| *Mokopirirakau* "Roys Peak" | Orange-spotted gecko | At Risk – Declining | Regionally Declining | *c.*11.5 km (2020) | Inhabits high-altitude (1,100-1,800 metres) alpine and subalpine creviced rock outcrops, rocky shrubland and tussockland, boulderfields, talus and scree. | **Highly unlikely** – some potentially suitable rocky tussock grassland/rock outcrop habitat present but likely to be suboptimal for this species (lacking complex rock piles/scree slopes), and the site is considered to be outside the elevational range for this species. |

[1] Te Wāhipounamu skink (*O. pluvialis*) has been described since the current national threat status assessment for reptiles (Hitchmough *et al.* 2021; Jewell 2022) and includes the pallid skink (*O.* aff. *inconspicuum* "pallid") listed in Hitchmough *et al.* (2021). National qualifiers and trends for Te Wāhipounamu skink can be considered the same as for the pallid skink.

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