

Ecological Assessment of Lot E1 at Northlake, Wānaka, for a Private Plan Change

Contract Report No. 7909

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May 2026

Project Team:

Anna Meban – Lizard fieldwork
Andrew Wells – Vegetation survey
DJ King – Report author (avifauna, invertebrates)
Jade Christiansen – Report author (lizards)
Sarah Wright – Report author (vegetation)
Della Bennet – Technical advice (avifauna)

Prepared for:

Northlake Investments Limited
Level 2, 11 Westhaven Drive,
Cracker Bay, Auckland 1010
PO Box 105526, Auckland 1143

Reviewed and approved for release by:

Justyna Giejsztowt
Principal Ecologist – Biodiversity and Modelling Specialist
Wildland Consultants Ltd
06/05/2026



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Christchurch Office

238 Annex Road, Middleton, PO Box 9276, Tower Junction, Ph 03-338-4005

Head Office

99 Sala Street, PO Box 7137, Te Ngae, Rotorua Ph 07-343-9017 Email: rotorua@wildlands.co.nz

www.wildlands.co.nz



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1.0 Introduction

Northlake Investments Limited is preparing a Private Plan Change Application for a parcel of land in their Northlake development in Wānaka. The proposed plan change would standardise the zones in the Northlake Special Zone with those in the current Queenstown Lakes District Proposed District Plan, and expand the land area available for urban residential development, and rezone some of the land to rural and vested recreation reserve. That land is currently activity Area E1 within the Northlake Special Zone structure plan and contains pockets of Activity Area C2 of the Northlake Special Zone Structure Plan.

The land was farmed grassland prior to the Northlake development, with patches of mature kānuka (*Kunzea serotina*) scrub. Much of the land has been more recently subjected to earthworks as part of the broader land modification works associated with the Northlake development. The land is nevertheless likely to contain ecological values associated with indigenous vegetation and habitat for indigenous lizards, invertebrates and birds, and an ecological assessment is therefore required to inform the plan change proposal.

Wildland Consultants Limited (Wildlands) has been asked to provide an ecological assessment of land parcel AA-E1 at Northlake to determine the ecological values present on the site, and to provide suggestions for maintaining the key ecological values of the land parcel should a plan proceed.

2.0 Scope

This report provides an ecological assessment that describes the ecological values present within land parcel AA-E1, their ecological significance, and recommendations for how to maintain the key ecological values of the land parcel, should a plan change be granted.

This report has been prepared to:

- Describe the existing vegetation and fauna values of the site.
- Assess the ecological significance and ecological values of the vegetation and habitats at the site.
- Make recommendations on maintaining key ecological values of the site.

Targeted surveys of fauna were not within the scope of this project.

3.0 Context

3.1 Site description

The Northlake site (Figure 1) is located approximately 250 metres south of the outlet of the Mata-Au/Clutha River from Lake Wānaka, within the developed Northlake subdivision in northwestern Otago. The site occurs on glacial moraine deposits overlain by loess soils. The topography is gently to moderately sloping, with small gullies and a predominantly south-facing aspect. Historically, the site was used for pastoral farming and has a long history of agricultural use. Stock have been excluded for several years, following the commencement of development of the Northlake subdivision. Current vegetation is dominated by exotic grassland, with areas of mature kānuka scrub. Large areas of the site have been subject to earthworks over the past few years as part of the wider Northlake development. Small amounts of indigenous planting have also been undertaken around the site by Northlake Investments Limited over the past few years.



No wetlands, creeks, or ephemeral streams are present on the site.

A plantation forest adjacent to the site is currently used for mountain biking. This forest is dominated by Douglas fir (*Pseudotsuga menziesii*) and radiata pine (*Pinus radiata*), and is indicated to be felled and developed to residential housing. To the north, a steep terrace scarp descends toward Lake Wānaka. Wilding conifers are common in this area.

3.2 Lindis and Pisa Ecological Districts

The Northlake site (Figure 1) lies across the boundary between the Lindis and Pisa ecological districts. As outlined in McEwen (1987), the Lindis Ecological District (ED) comprises the non-glaciated mountains surrounding the Lindis Valley, the Upper Clutha flats, and end moraine ridges on the southern shores of Lakes Wānaka and Hāwea. The climate is subcontinental with rainfall varying from 450-1,500 millimetres per annum. Forest remnants are present in the northwest of the district, including mountain beech (*Fuscospora cliffortioides*) forest (e.g. areas on Mt Maude, and near Breast Hill), and Hall's tōtara (*Podocarpus laetus*) stands with *Veronica cupressoides* at Hospital Creek near Hāwea Flat. Evidence from charcoal suggests that Hall's tōtara originally formed closed forest in places. Scrub includes matagouri (*Discaria toumatou*), *Carmichaelia* spp., sweet briar (*Rosa rubiginosa*) and kānuka/mānuka scrub (*Leptospermum scoparium*) scattered through lowlands and montane sunny faces. Scattered kōwhai (*Sophora microphylla*) trees are also present along the Hāwea River (McEwen 1987).

The Pisa ED comprises high-elevation glacially-influenced ground that receives a dry sub-continental climate, receiving 300-1200 mm of rain per year. Soils are much the same as those described from the Lindis ED. Vegetation was formerly dominated by tussocklands, with hard and silver tussocks dominating at low altitudes, and fescues (*Festuca* spp.), blue tussock (*Poa colensoi*) and snow tussocks (*Chionochloa* spp.) dominating higher altitudes. While indigenous vegetation is now greatly reduced, very small forest remnants are present, with tawhai/silver beech (*Lophozonia menziesii*) and Hall's tōtara (*Podocarpus laetus*) remnants (of a few tens of trees) and kānuka/mānuka scrub present on the Pisa Range. Rimu (*Dacrydium cupressinum*)-toatoa (*Phyllocladus alpinus*) forest remnants are present in high-altitude areas of the north of the district, and extensive cushion herbfields are present on the summit plateau. Green skinks (*Oligosoma chloronoton*, Threatened – Nationally Vulnerable) are known from Mt Pisa.

3.3 Potential natural ecosystems

Potential natural ecosystem mapping has mapped the site as CDF3 Mountain beech forest and CLF13 Matai, broadleaf forest (Wildland Consultants 2020a). CLF1 Hall's tōtara, mountain celery pine, and broadleaf forest was present at higher elevations on Mount Iron. Based on this mapping, mountain beech forest historically covered the southern and eastern shores of Lake Wānaka, and kānuka-dominated shrubland and treeland were represented mainly on leached or disturbed river terraces along the Clutha and Cardrona Rivers as T12 Kānuka and Olearia scrub treeland. This indicates that kānuka shrubland is unlikely to be the site's natural climax vegetation.

3.4 Important habitats

Kānuka shrubland adjacent to the site and on the site has been mapped as a significant habitat for indigenous forest birds (Wildland Consultants 2020b).

3.5 Threatened Environment Classification

The site is located on land environments that have less than 10% and 10-20% of their original indigenous vegetation cover remaining (Cieraad *et al.* 2015).

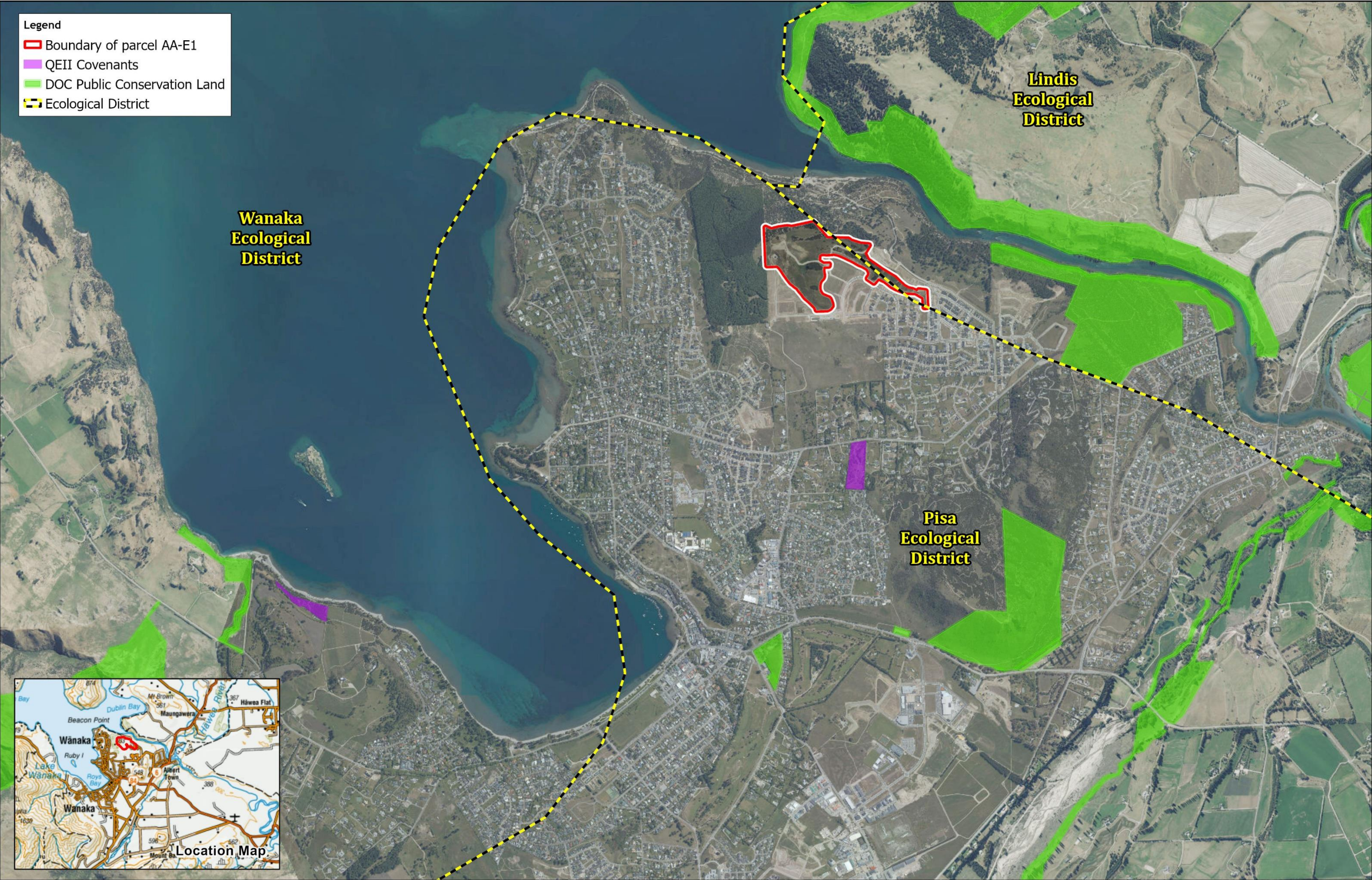


Figure 1. Location of the site at Northlake, Wānaka

Data Acknowledgment Contains data sourced from the LINZ Data Service Licensed for reuse under CC BY 4.0 Report: 7909 Ref: 12638 Client: Winton Name: Figure_Location - V2.aprx Path: E:\gis\NorthlakePlan_Q\mxd\	Wildlands Scale: 1:25,000 Date: 6/05/2026 Cartographer: QC Format: A3R
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3.6 Nearby protected areas

There are several protected areas within the vicinity of the site (Figure 1). These include:

- A QEII covenant about one kilometre to the south.
- Mount Iron Reserve approximately two kilometres to the southeast.
- Hikuwai Conservation Area approximately 300 metres north.
- Dublin Bay - Outlet - Albert Town Recreation Reserve.
- Marginal strips along the Cardrona and Clutha rivers.

3.7 Wildlife Act

All indigenous lizards, 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 Authority (WAA; also known as a wildlife permit) from DOC. A permit must be obtained from DOC before any protected wildlife (and/or their habitats) can be disturbed, handled, translocated or killed. Additionally, the submission of a species-specific management plan (for example, a Lizard Management Plan) would be required if protected indigenous fauna or their habitats were proposed to be disturbed.

4.0 Methods

4.1 Field survey

4.1.1 Vegetation assessment

A site visit to assess vegetation was undertaken on 16 March 2026 by a vegetation ecologist. The vegetation was assessed by a walk-through survey. All plant species observed were recorded, as well as any incidental observations of fauna. Representative site photos were taken.

4.1.2 Lizard habitat assessment

A preliminary lizard habitat assessment was undertaken on 19 February 2026 by a herpetologist, which comprised a site walkover to identify any lizard habitats and incidental searches for lizards. Lizards were handled under Wildlife Act Authority 96003-FAU. The lizard assessment was undertaken in fine weather conditions, suitable for lizard emergence.

4.2 Desktop assessments

4.2.1 Avifauna

A desktop assessment was undertaken by searching the online eBird database for records of avifauna within a five-kilometre radius of the site between January 2016 and December 2025.



4.2.2 Terrestrial invertebrates

The terrestrial invertebrate desktop survey involved searching the Global Biodiversity Information Facility (GBIF.org 2026¹) for species records. 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.

To filter the data, a polygon was drawn encompassing the area of interest plus the area surrounding the site within five kilometres from the site perimeter. The Scientific Name filter was also applied, using the terms Arachnida, Athoracophoridae, Rhytididae, Insecta, Chilopoda, Diplopoda, and Onychophora to represent spiders, leaf-veined slugs, indigenous giant land snails, insects, centipedes, millipedes, and velvet worms respectively.

From the records retrieved by the GBIF search, freshwater invertebrates were removed. This dataset was used to characterise the fauna based on the most commonly-represented orders. Observations that were not identified further than order, or were marked as doubtful, were then deleted. All remaining records were scanned for notable species. These were compared with vegetation and habitat on-site to judge the likelihood of each notable species occurring within the project area.

Notable invertebrates from the nearby area were classified on the basis of the following criteria, outlined in Wildlands (2025):

- Protected under the Wildlife Act.
- Threatened or At Risk, having been assessed under NZTCS (Townsend *et al.* 2008).
- Locally endemic.
- Naturally rare.
- Large-bodied AND reliant on a specific indigenous habitat type.
- Particularly vulnerable to habitat loss or predation by introduced species.
- Believed by experts to be declining.

4.2.3 Lizards

The Department of Conservation Bioweb Herpetofauna database (accessed December 2024) was searched for lizard records within a 20 kilometre radius of the site and within the last 25 years. This database search was undertaken to provide context for potential lizard habitats recorded within the site and inform an assessment of the likelihood of species present at the site.

¹ GBIF.org (4 March 2026) GBIF Occurrence Download <https://doi.org/10.15468/dl.7kahph>



5.0 Ecological Values

5.1 Vegetation and habitats

5.1.1 Overview

Eight vegetation and habitat types have been mapped at the site (Figure 2):

- Kānuka-matagouri shrubland on deeper soils and eastern aspects – 2.82 hectares.
- Kānuka-matagouri shrubland on shallow soils and northern aspects – 1.47 hectares.
- Matagouri-sweet briar shrubland – 0.12 hectares.
- Planted kānuka and tussocks – 1.59 hectares.
- Exotic grassland – 11.19 hectares.
- Recently cultivated land – 5.07 hectares.
- Water tanks – 0.30 hectares.
- Gravel pad and road – 0.82 hectares.

These vegetation and habitat types are described in detail below. Additional site photographs are included in Appendix 1.

5.1.2 Vegetation descriptions

1. Kānuka-matagouri shrubland on deeper soils and eastern aspects

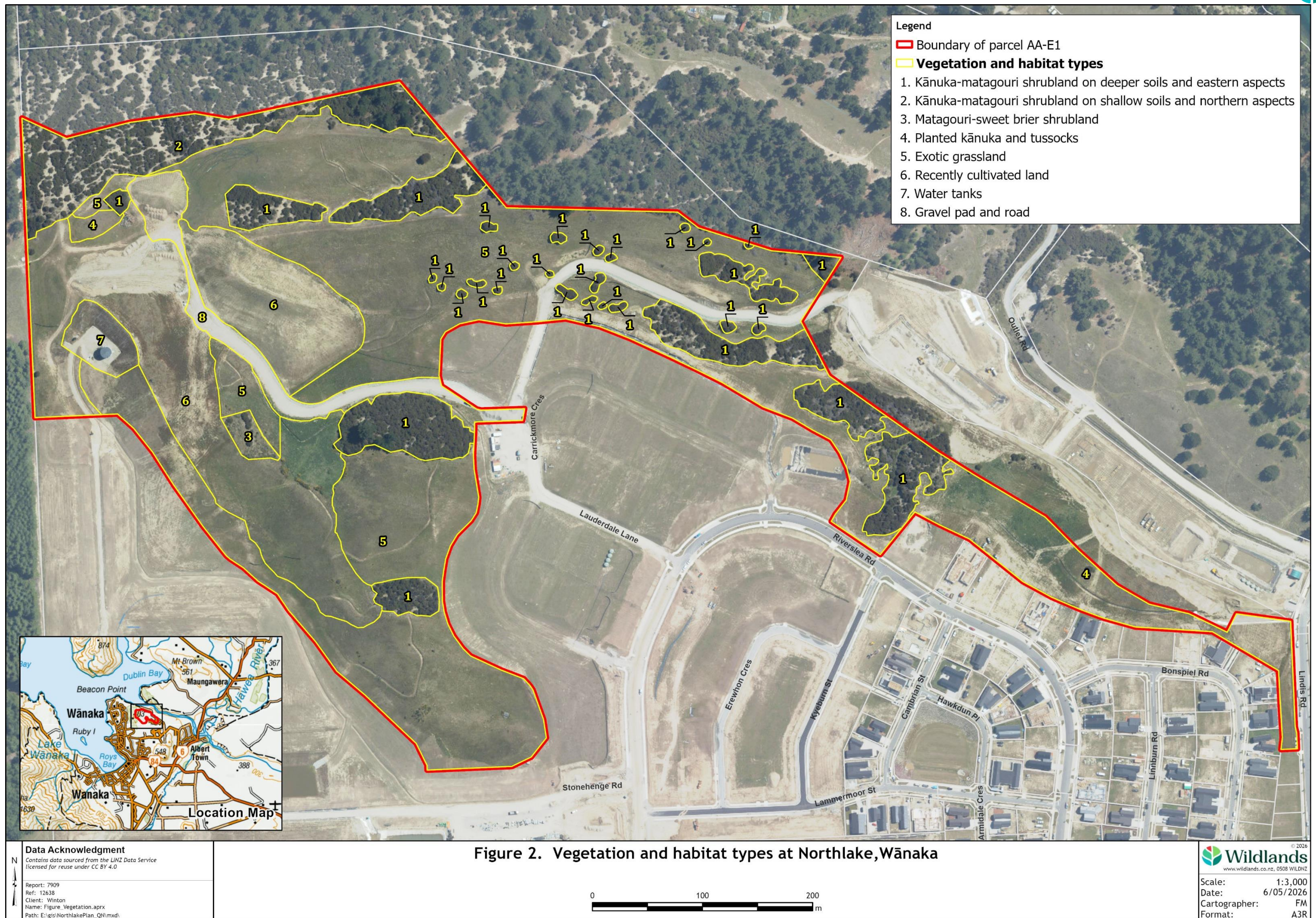
This shrubland (Plate 1) has a dense canopy (about four metres tall) dominated by kānuka. The subcanopy commonly includes tūmatakuru/matagouri, mikimiki (*Coprosma propinqua*), and sweet briar (*Rosa rubiginosa*), typically growing to 2–3 metres tall. Occasional patches of tātārāmoa/bush lawyer (*Rubus schmidelioides*) are also present.

Sweet briar is common throughout the shrubland, while Scotch broom (*Cytisus scoparius*), radiata pine, and Douglas fir occur occasionally. Scattered individuals of elder (*Sambucus nigra*), rowan (*Sorbus aucuparia*), and spindlewood (*Euonymus europaeus*) are also present.

Open patches have an understorey of exotic grasses and herbs – such as Scotch thistle (*Cirsium vulgare*), moth mullein (*Verbascum virgatum*), silvery hair grass (*Aira caryophyllea*), browntop (*Agrostis capillaris*), tussock hawkweed (*Hieracium lepidulum*), mouse ear hawkweed (*Pilosella officinarum*), and tall fescue (*Lolium arundinaceum*). Less commonly, there are indigenous species such as hard tussock (*Festuca novae-zelandiae*), rārahu/bracken (*Pteridium esculentum*), onion-leaved orchid (*Microtis unifolia*), resurrection lichen (*Xanthoparmelia semiviridis*; At Risk – Declining), and haircap moss (*Polystichum* sp.).



Plate 1 – The interior of kānuka-matagouri shrubland on deeper soils and eastern aspect.





2. Kānuka-matagouri shrubland on shallow soils and northern aspects

This shrubland occurs on very dry, stony soils on steep north-facing slopes at the north of the site (Plate 2). It comprises an open shrubland dominated by low kānuka, typically 2-3 metres tall with scattered matagouri and occasional mikimiki. Radiata pine and Douglas fir are scattered throughout, as a mix of trees, saplings and seedlings. Bare ground and stones are common between and beneath shrubs, with patches of moss and lichens present. Resurrection lichen is scattered throughout the shrubland.

Patches of exotic grasses and herbs occur, including scarlet pimpernel (*Lysimachia arvensis*) and bracken (*Pteridium esculentum*), particularly in areas with deeper or more developed soils.

The upper 10-15 metres of the slope supports frequent *Raoulia beauverdii* (At Risk – Declining) and pātōtara (*Leucopogon fraseri*), with some *Raoulia hookeri* also present, along with St John's wort (*Hypericum perforatum*) and sheep's sorrel (*Rumex acetosella*) (Plate 3). Mountain bike tracks intersect this sloped area.



Plate 2 – Kānuka-matagouri shrubland on the dry northern slopes.



Plate 3 – The upper part of the kānuka-matagouri shrubland on the dry northern slopes contains *Raoulia* spp. mats in places.

3. Matagouri-sweet briar shrubland

One patch of open shrubland near the centre of the site contains frequent matagouri and sweet briar to approximately two metres tall, with dense exotic grasses, dominated by browntop, as ground cover. Occasional individuals of mikimiki and kānuka (to four metres tall) are also present (Plate 4).



Plate 4 – Matagouri-sweet briar shrubland.

4. Planted kānuka and tussocks

These recently planted areas are dominated by kānuka, with silver tussock (*Poa cita*) and red tussock (*Chionochloa rubra*) present, particularly within the larger eastern planting area (Plate 5). These areas have been recently planted by Northlake Investments Limited in the past few years.



Plate 5 – Recent plantings at the site.



5. Exotic grassland

This grassland is dominated by dense browntop throughout. Other common species include Californian thistle (*Cirsium arvense*), Scotch thistle, haresfoot trefoil (*Trifolium arvense*), white clover (*T. repens*), and moth mullein, with patches of red fescue (*Festuca rubra*) and soft brome (*Bromus hordeaceus*) (Plate 6).



Plate 6 – Exotic grassland, here with frequent moth mullein flower heads visible. A patch of kānuka-matagouri shrubland is present beyond.

The ground layer includes sheep's sorrel, moth mullein, annual poa (*Poa annua*), couch (*Elytrigia repens*), and tussock hawkweed. Patches of viper's bugloss (*Echium vulgare*) are also present, and an area of bracken occurs along the northern boundary.

Indigenous vascular plants are largely absent, except for a single plant of desert broom (*Carmichaelia petriei*; At Risk – Declining), approximately 60 cm tall, located in the southern part of the site, and one matagouri. Occasional Scotch broom is present, and buddleia (*Buddleja davidii*) is rare.

The northernmost portion of this grassland, located between the band of kānuka shrubland and the site boundary, occurs on slightly poorer and drier soils. This area contains abundant centaury (*Centaurea erythraea*), catsear (*Hypochaeris radicata*), and St John's wort (*Hypericum perforatum*). Old irrigation channels also intersect this area.

6. Recently cultivated land

Some areas of the site have been recently cultivated, and contain bare soil and exotic herbs and grasses, including mulleins, viper's bugloss, and browntop (Plate 7). Note that the aerial imagery used in Figure 2 (from 2023 and the most recent publicly available imagery) does not show modifications over the past 2.5 years.



Plate 7 – Recently cultivated land, with the road and areas of exotic grassland. A patch of kānuka-matagouri shrubland is present in the centre left background.

7. Water tanks

Two large water tanks sit on a levelled platform. The tanks are surrounded by recently planted kānuka within exotic grassland.

8. Gravel pad and road

A gravel road leads to a large gravel pad with construction equipment and a storage area.

5.2 Flora

Fifty-eight vascular plant species, including 16 indigenous species and 42 exotics, were observed at the site (Appendix 2).

Of the indigenous vascular species recorded, two are Nationally At Risk – Declining: desert broom and *Raoulia beauverdii* (de Lange *et al.* 2024). One species, *Raoulia hookeri* is Regionally At Risk – Declining (Jarvie *et al.* 2024). Resurrection lichen (At Risk – Declining) is common at the site within open patches of kānuka-matagouri shrubland primarily on the steep northern scarp slopes.

Only a single young plant of desert broom was observed, within exotic grassland at the south of the site (Plate 8). *R. beauverdi* and *R. hookeri* are restricted to the upper 10-15 metres of kānuka-matagouri shrubland on the northern slope, where several patches are present in open ground (Plates 3 and 9).



Plate 8 – A single young plant of desert broom is present in exotic grassland at the south of the site.



Plate 9 – A *Raoulia beauverdii* mat with small pātōtara plants, within the upper area of the kānuka-matagouri shrubland at the north of the site.



5.3 Indigenous spring annual plants

Spring annuals are known to be present in areas of kānuka-dominant vegetation at nearby Mt Iron and Hikuwai Conservation Area. Species include *Myosotis brevis* (Threatened – Nationally Vulnerable), *Myosotis hikuwai* (Threatened-Nationally Endangered), and *Myosotis minimus* (At Risk – Declining). All three species favour bare soil on the dry fringes of kānuka where there is an absence of exotic grasses.

The timing of the Northlake site visit was outside of the spring annual season of September to November, and targeted searches were therefore not possible. However, almost all of the site provides very poor habitat for spring annuals and their likelihood of being present is considered low over almost all of the site. This reflects the predominance of dense exotic grasses within canopy gaps in shrubland, and along the margins of shrubland.

The only area of the site where spring annuals are considered likely to be present is within the kānuka-matagouri shrubland on the northern aspect scarp slopes with shallow soils – this dry, open habitat with few exotic grasses is similar to areas of Mt Iron and Hikuwai Conservation Area in which spring annuals are found. As this area of the site is proposed to be maintained in indigenous vegetation, no adverse effects on spring annual habitat are anticipated. If the abundant wilding conifers in this area were controlled, then an increase in the area of spring annual habitat is likely.

5.4 Pest plants

Three plant species observed at the site are listed in the Otago Regional Pest Management Plan (Otago Regional Council, 2019). Wilding radiata pine and Douglas fir are common at the site; both these species are listed in the progressive containment programme. Scotch broom is listed in the sustained control program. Other exotic woody plants present that threaten indigenous shrubland at the site are elder, spindlewood and rowan.

Almost all wilding conifers at the site are within areas of indigenous kānuka-matagouri shrubland, and are present as small seedlings through to mature trees. Left uncontrolled, wilding conifers are likely to gradually form a tree canopy in these areas of shrubland, displacing indigenous vegetation.

5.5 Fauna

5.5.1 Avifauna

One indigenous bird species, pīwakawaka/South Island fantail (*Rhipidura fuliginosa fuliginosa*, Not Threatened), was observed on the site during the vegetation survey.

Forty-four indigenous and 19 exotic bird species (Appendix 3) were recorded within five kilometres of the site during the desktop survey. Of the indigenous species, seven are Threatened and 11 are At Risk. Of these, two Threatened and three At Risk species may use habitats on site:

- Tarapirohe/black-fronted tern (*Chlidonias albobristatus*, Threatened – Nationally Endangered).
- Kārearea/eastern falcon (*Falco novaeseelandiae novaeseelandiae*, Threatened – Nationally Vulnerable).
- Pīhoihoi/New Zealand pipit (*Anthus novaeseelandiae novaeseelandiae* At Risk – Declining).
- Tarāpuka/black-billed gull (*Chroicocephalus bulleri*, At Risk – Declining).
- Tōrea/South Island pied oystercatcher (*Haematopus finschi*, At Risk – Declining).



Tarapirohe/black-fronted terns and tarāpuka/black-billed gulls may forage within the site after rain events, in soft ground and after cultivation or ground works.

Kārearea/eastern falcons hunt in both indigenous and exotic habitats, including dense forest and open grasslands. While kārearea/eastern falcons may forage within the site, they will not breed there due to the absence of rocky outcrops or cliffs. Their use of the site is expected to be transient.

Pīhoihoi/New Zealand pipits forage in open habitats, including rough grassland, stony areas, and clearings in forest and scrub. It is possible that pīhoihoi/New Zealand pipits may forage on site.

Tōrea/South Island pied oystercatcher forage on braided rivers, inland grasslands and gravelly areas. Tōrea/South Island pied oystercatcher may forage within the site after rain events, in soft ground and after cultivation or ground works. During the breeding season, grass and gravelly areas on site may also provide suitable nesting habitat for this species.

5.5.2 Terrestrial invertebrates

The GBIF search yielded 254 species of terrestrial invertebrates from within five kilometres of the site. Of these, twenty-two were not identified to a level that could be assessed. The site has an invertebrate fauna characterised by a diverse assortment of indigenous wasp species (families Ichneumonidae and Braconidae) and indigenous bees (*Lasioglossum* spp.). A wide assortment of true bugs (Order Hemiptera) are present, including cicadas (superfamily Cicadoidea), shield bugs (family Pentatomidae), and plant bugs (family Miridae). A high diversity of ground beetles (family Carabidae) are present, of which the only notable species are two members of the genus *Mecodema*, which have relatively small localised distributions. Fly species recorded in the area mostly include blow-flies (family Calliphoridae) and muscids (family Muscidae).

Notable terrestrial invertebrate species are presented in Table 1.

Table 1 – Notable invertebrate species recorded from within five kilometres of the site, or suspected to be present at the site.

Species	Common Name	Conservation Status	Notability Criteria	Ideal Habitat	Likelihood of Presence
<i>Mecodema costipenne</i>	Ground beetle	Not assessed	Locally endemic, large-bodied and dependent on specific habitat	Upland indigenous forest and scrub	Likely
<i>Mecodema tibiala</i>	Ground beetle	Not assessed	Locally endemic, large-bodied and dependent on specific habitat	Indigenous and exotic grassland, shrubland	Likely
<i>Asaphodes stinaria</i>	Inchworm moth	Threatened – Nationally Vulnerable (Hoare <i>et al.</i> 2017)	Conservation status	Grassland, grassy forest clearings forest margins, and wetlands.	Possible
<i>Orthodera novaezealandiae</i>	New Zealand mantis	At Risk – Declining (Buckley <i>et al.</i> 2012)	Threat status	Open shrubland, scrub, forest margins, gardens	Likely
<i>Hemiandrus focalis</i>	Ground wētā	Not assessed	Large-bodied and dependent on specific habitat	Stony upland habitats (grassland and forest)	Likely



Species	Common Name	Conservation Status	Notability Criteria	Ideal Habitat	Likelihood of Presence
<i>Neoramia otagoa</i>	Sheetweb spider	At Risk – Declining	Threat status; locally endemic	Rocks and shrubs	Possible
<i>Phaulacridium otagoense</i>	Otago short-horned grasshopper	At Risk – Declining	Threat status	Dry short-stature herbfield and indigenous grassland	Possible

Both indigenous and exotic scrub and shrubland habitats provide ideal habitat for New Zealand mantis, a species declining due to competition with the exotic South African mantis (*Miomantis caffra*).

Grassy areas and shrubland/scrub on the site are likely to provide habitat for the locally endemic large ground beetle *Mecodema tibiala*, which is reported by iNaturalist users from similar habitats also surrounded by human development at Lake Hāwea and Cromwell. Shrubland and scrub are also likely to support the related locally-endemic ground beetle *Mecodema costipenne*.

Grassland sedge (*Carex breviculmis*), which is present on the site, may be a host plant of *Asaphopes tinaria*, which has previously been documented having a strong association with narrow-leaved *Carex* species (Meyrick 1883).

Grassland areas containing indigenous sedges, short-stature herbs, and grasses are likely to provide important habitat for moths. Many Otago moth species are locally-endemic and habitat-specific, relying on one or two plant species as a larval food source. Spiders, grasshoppers and beetles may also be diverse on site, and At Risk species such as sheetweb spiders and Otago short-horned grasshoppers may be on site though they were not recorded in the GBIF search.

During the site visit, an incidental observation was made of one New Zealand mantis within kānuka-matagouri shrubland.

5.5.3 Lizards

The desktop assessment found eight lizard species within 20 kilometres of the site, listed in Table 2. Of these species, only McCann's skink (*Oligosoma maccanni*; Not Threatened) was confirmed on site during the lizard habitat assessment in February (see habitat assessment section below). Southern grass skink (*Oligosoma chionochoescens*; At Risk – Declining) and *Woodworthia* spp. may also be present within the site given the current knowledge of lizard distributions in the region and the habitats present within the site.

Southern grass skink are found in a variety of modified damp environments such as grassland and shrubland habitats, such suitable habitats are present throughout the site. In addition, both McCann's skink and southern grass skink are known to co-exist in modified sites in urban Wānaka (Lucian Funnell pers. comm. 2026). Therefore, southern grass skink are likely to be present within the site.

Kawarau gecko (*Woodworthia* "Cromwell"; at Risk – Declining) and Southern Alps gecko (*Woodworthia* "Southern Alps"; At Risk – Declining) are known to occur within the area, with overlapping distributions in the Wānaka region. Due to this overlap, there is potential for hybridisation between the two species, and they can be difficult to reliably distinguish based on morphological characteristics alone. *Woodworthia* spp. are commonly found in the Central Otago region and are known to occur in areas of scrub, taking refuge under loose bark and within tree cavities. Therefore, it is possible that one or both of these species are present within the scrub habitats present on site. To accurately identify the species present on site, capturing individuals to tail-tip for genetic analysis is recommended, in addition to analysis of morphometrics (body/head shape, size, patterns and scale counts).



It is highly unlikely that any other species of indigenous lizard typically found in Central Otago are present within the site. While there is some fragmented and isolated scrub present, most of these species are typically found at higher elevations and the historical clearance and modification of the area means it is highly unlikely that any of these species will be present.

A record of Waitaha gecko (*Woodworthia cf. brunnea*; At Risk – Declining) was identified in the desktop assessment (14.2km, 2023). However, we consider this record to be a misidentification, as the Wānaka area is well outside of this species' known distribution. Therefore, Waitaha gecko will not be considered further in this report.

During the lizard habitat assessment, one McCann's skink and one unidentified skink were detected (Figure 3). Where skinks were observed but could not be identified (e.g. skinks seen very briefly from a distance running into cover) they are considered likely to be McCann's skinks based on their size and the species' abundance in the surrounding area. Lizard sign (scat) was also detected throughout the site (Figure 3).

5.5.4 Pest animals

The European rabbit (*Oryctolagus cuniculus*) was frequently observed at the site during the site visit. Both domestic and wild cats (*Felis catus*) are also very likely to utilise the site.



Table 2 – Results of the Department of Conservation BioWeb Herpetofauna Database search, within a 20-kilometre radius of the site, and an assessment of the likelihood of the presence of these species at the site. Threat statuses as per Hitchmough *et al.* 2026 and Jarvie *et al.* 2023. The likelihood of occurrence at the project site has been assessed for each species based on their known habitat preferences and distribution in the area and surrounds.

Species	Common Name	National Conservation Status	Regional Conservation Status	Record Distance (km) and Year	Preferred Habitats	Likelihood of Occurrence
<i>Oligosoma maccanni</i>	McCann's skink	Not Threatened	Regionally Not Threatened	1.9 (2023)	Open habitats – dry, rocky environments such as rock outcrops, and montane grassland.	Presence confirmed (through site visit)
<i>Oligosoma chionocholescens</i>	Southern grass skink	At Risk – Declining	Regionally Declining	12.4 (2024)	Range of habitats including coastal dunes, wetlands, grassland, shrublands, rocky shrubland/herbfield, scree, tussock, stony river beds and even cities.	Likely
<i>Woodworthia</i> “Cromwell”	Kawarau gecko	At Risk – Declining	Regionally Declining	1.2 (2022)	Rocky scrub, talus, and creviced rock outcrops.	Possible
<i>Woodworthia</i> “Southern Alps”	Southern Alps gecko	At Risk – Declining	Regionally Declining	5.0 (2016)	Rocky scrub, talus, boulderfield, scree, stony river terraces and creviced rock outcrops (from lowland and montane valleys to alpine areas, <1,900m).	Possible
<i>Oligosoma</i> aff. <i>inconspicuum</i> “Central - Southern” ¹		At Risk – Declining		12.5 (2024)	Variety of habitats from the lowland right up to at least 1,825 metres, generally known from high elevations. Habitats include tussockland, shrubland, herbfield, wetlands, and rocky areas (e.g. scree).	Highly unlikely
<i>Oligosoma</i> aff. <i>chloronoton</i> “West Otago”	Lakes skink	Threatened – Nationally Vulnerable	Regionally Vulnerable	8.8 (2016)	Grassland, scrub, tussockland, rocky areas, scree, herbfield, fellfield, stony riverbeds, terraces and lake edges (from montane to alpine areas).	Highly unlikely
<i>Mokopirirakau</i> “Roys Peak”	Orange-spotted gecko	Threatened – Nationally Vulnerable	Regionally Declining	8.8 (2017)	Inhabits high-altitude (1,100-1,800m) alpine and subalpine creviced rock outcrops, rocky shrubland, boulderfield, talus, scree and rocky tussockland.	Highly unlikely

¹ Multiple pallid skink (*Oligosoma* aff. *inconspicuum* “pallid”; At Risk – Declining) records were identified during the desktop assessment. However, preliminary results of recent genomic studies suggests that all populations previously identified as ‘pallid skink’ are now recognised as a new species, *O. aff. inconspicuum* “Central – Southern” (Hitchmough *et al.* 2026). This species is yet to be assigned a regional conservation status.



Legend

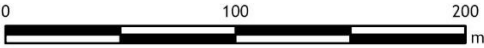
- Boundary of parcel AA-E1
- McCann's skink
- Unknown skink
- Lizard sign



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Figure 3. Lizard habitat assessment results at Northlake, Wānaka



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5.6 Summary of key ecological values

5.6.1 Vegetation, habitats and flora

The main ecological values are associated with the kanuka-matagouri shrublands (Vegetation Types 1 and 2), and especially the shrubland on shallow soils and northern aspects and the larger-denser patches of shrubland with higher ecological integrity on deeper soils and eastern aspects. The small, isolated clumps of one to a few trees (see Figure 2) are of much lower value. The shrubland in the northern area is connected to more extensive shrubland habitats in the surrounding landscape and has previously been identified as an important habitat for indigenous forest birds. The shrubland also contains *Raoulia beauverdii* (At Risk – Declining) and *Raoulia hookeri* (regionally At Risk – Declining). Together, these shrublands cover 4.29 hectares.

The patch of matagouri-sweet briar shrubland (Vegetation Type 3) has ecological value due to the presence of mature matagouri, but is much more modified than the kānuka-matagouri shrublands. The substantial areas of indigenous vegetation recently planted by Northlake Investments (Vegetation Type 4) would also develop into increasingly valuable areas of indigenous shrubland as they mature over the next few decades, if not removed.

A single individual of desert broom (At Risk – Declining) was also found within the exotic grassland at the site. This species is unlikely to successfully establish and increase its abundance at the site under the current management regime, due to its high palatability to rabbits and the high numbers of rabbits present.

5.6.2 Avifauna

The Northlake site provides foraging habitat for pīhoihoi/New Zealand pipit, tarapirohe/black-fronted tern, tarāpuka/black-billed gull and tōrea/South Island pied oystercatcher, particularly after rain events or earthworks. Grasslands and gravelly areas may also provide breeding habitat for tōrea/South Island pied oystercatchers. The open grassland and shrub areas will provide hunting habitat for kārearea/eastern falcon.

5.6.3 Terrestrial Invertebrates

Kānuka-matagouri shrublands at the site are likely to provide important habitat for notable terrestrial invertebrate species, including At Risk and Threatened species. The presence of grassland sedge in the open shrubland on northern slopes may also provide valuable habitat. However, only one incidental observation of a notable species was made during the site visit – New Zealand mantis.

5.6.4 Lizards

Vegetation within the site provides habitat for indigenous lizard species. Shrubland, and tussockland habitats support populations of McCann's skink and possibly southern grass skink and *Woodworthia* spp. Given the confirmed presence of lizards at the site, a Lizard Management Plan and Wildlife Act Authority will be required as part of a future development consent subsequent to a plan change being granted (see Section 7.4.1 below), and this may require targeted lizard surveys to confirm the species present and their abundances.



6.0 Statutory Assessments

6.1 Ecological significance criteria

No parts of the site are scheduled as Significant Natural Areas (SNA) in the QLDC Proposed District Plan, and the site is therefore required to be managed in accordance with clause 3.16 of the National Policy Statement for Indigenous Biodiversity (NPS-IB). This clause requires that significant adverse effects of new uses are managed by applying the effects management hierarchy, and all other effects are managed to give effect to the objective and policies of the NPS-IB.

The site was assessed for ecological significance against the criteria in the NPS-IB (see Appendix 4) and the criteria in the Queenstown Lakes Proposed District Plan (see Appendix 5). The site overall did not meet any criteria. However, the northern area of kānuka-matagouri shrubland (labelled 2 on Figure 4) and the larger patches of indigenous shrubland (with higher ecological integrity – labelled 1 on Figure 4) elsewhere have values that meet at least one significance criteria. This reflects the presence of At Risk plants and indigenous vegetation on a land environment with less than 20% of its original cover remaining. As noted in Section 7.1.1 below, the plan change proposal plans to enhance the shrubland values at the site by extending and connecting existing areas of significant indigenous vegetation as shown in green on Figure 4. Planted indigenous vegetation will itself develop into indigenous vegetation meeting these same significance criteria, thus notably increasing the area of significant indigenous vegetation at the site. Overall, the proposal will maintain indigenous biodiversity values for the site and result in no overall loss on this basis, as discussed in Section 7 below.

6.2 Vegetation clearance rules

The Queenstown Lakes District Plan contains information on vegetation clearance in Chapter 33, with clearance thresholds applying cumulatively over any period of five consecutive years.

Clause 33.3.4.1 provides a rules exemption of relevance to the Northlake plan change site:

Clearance of areas of voluntarily planted indigenous vegetation less than 15 years old, where the land was previously lawfully cleared of indigenous vegetation. Table 2 does not apply to this activity.

All indigenous vegetation at the site previously planted by Northlake Investments Limited (Vegetation Type 4 in Figure 2) can thus be cleared as a permitted activity.

All other indigenous vegetation at the site is not planted and is more than 15 years old. The following four clauses outlined in Rule 33.5.3 apply to clearance of this vegetation:

The clearance of indigenous vegetation (including cultivation or irrigation) in the following locations must not exceed a total of 50 m² in any continuous period of 5 years in the following locations:

- c. Shrubland containing emergent indigenous trees greater than 3 metres high; or*
- d. Matagouri (Discaria toumatou) shrubland that has a canopy of at least 1.5 metres high; or*
- e. Diverse indigenous shrubland, where 'diverse' means three or more species of indigenous shrub or vine; or*



- f. Indigenous vegetation containing any one of: matai (*Prumnopitys taxifolia*), kahikatea (*Dacrycarpus dacrydioides*), weeping mapou (*Myrsine divaricata*), *Melicope simplex*, *Hebe rakiaensis*, *Corokia cotoneaster*, mountain ribbonwood (*Hoheria glabrata*), bog pine (*Halocarpus bidwillii*), celery pine (*Phyllocladus alpinus*), Hall's tōtara (*Podocarpus laetus*), kōwhai (*Sophora microphylla*), kānuka (*Kunzea spp.*), *Hebe cupressoides*, native brooms (*Carmichaelia spp.*), fierce lancewood (*Pseudopanax ferox*), *Coprosma virescens*, *Coprosma crassifolia*, *Pimelea aridula*, snow totara (*Podocarpus nivalus*), southern rata (*Metrosideros umbellata*), *Coprosma intertexta*, or any species of *Olearia*.

Any clearance of indigenous shrubland at the site exceeding 50 m² in any continuous period of five years is therefore a Restricted Discretionary Activity.

7.0 Effects of Plan Change on Ecological Values, and Recommendations

7.1 Vegetation, habitats and flora

7.1.1 Increase in indigenous vegetation cover and connectivity

The Structure Plan provided by Northlake Investments Limited (attached in Appendix 6) outlines proposed vegetation management for the plan change. This involves retention of most areas of existing indigenous vegetation, removal of small areas of existing indigenous vegetation, and planting of new areas of indigenous vegetation. The locations of these three vegetation categories are mapped in Figure 4.

Overall, the plan change would result in an 82% increase in indigenous shrubland vegetation cover at the site, from the current 4.41 hectares to 8.01 hectares, as follows:

- Retention of 3.89 hectares of existing kānuka-matagouri shrubland (91% of this shrubland type currently on site).
- Removal of 0.51 hectares of existing indigenous vegetation, comprising 0.39 hectares of kānuka-matagouri shrubland (mainly small isolated patches of lower ecological value at the east of the site, plus a few small areas on the margins of larger patches at the east of the site), and 0.12 hectares of lower-value matagouri-sweet briar shrubland.
- Planting and permanent establishment of 4.12 hectares of kānuka-dominant shrubland.

Most of the indigenous vegetation removal is of lower-value vegetation, comprising small, disconnected patches of kānuka-matagouri shrubland and the one area of matagouri-sweet briar shrubland. Small areas on the margins of the eastern larger areas of higher-value kānuka-matagouri shrubland (Vegetation Type 3) will also be removed, but the proposed plantings will substantially increase the overall size of these areas. The entire area of especially high-value kānuka-matagouri shrubland along the northern boundary of the site will be retained in its entirety.

The proposed vegetation plan would also substantially reduce fragmentation of shrubland patches at the site, with plantings connecting existing patches together. The increased size and connectivity would reduce edge effects, increasing the resilience of the indigenous vegetation onsite.

Overall, then, the proposed plan change would lead to **positive effects** on indigenous vegetation and habitats at the site over the medium and long term.



7.1.2 Threatened plants

The proposed plan change avoids removal of vegetation containing threatened plants, except for the removal of one desert broom in exotic grassland. The loss of this species can be delt with by planting at least 10 individuals elsewhere on the site, (see Section 7.1.3 below), providing an overall positive outcome.

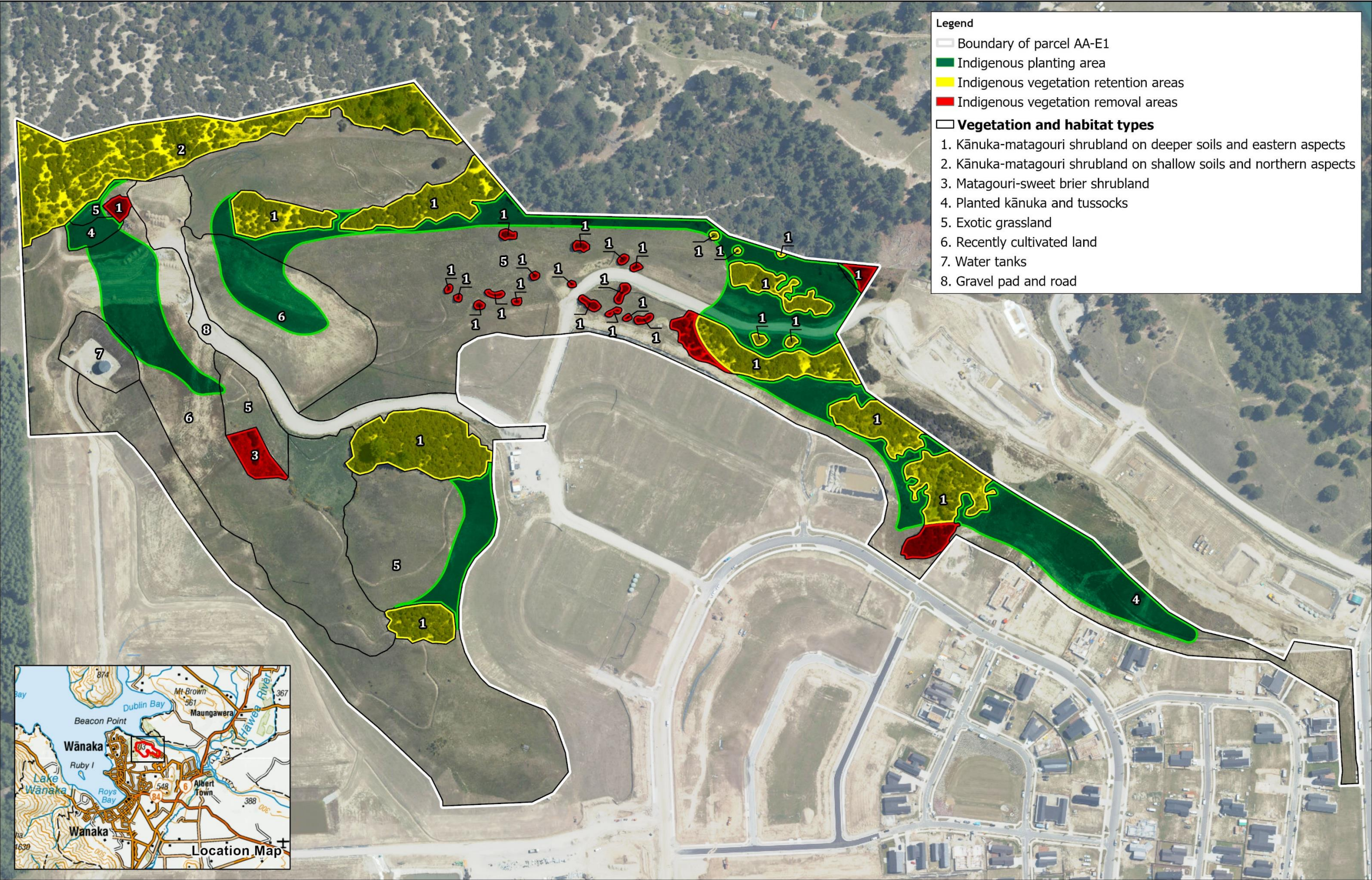


Figure 4. Indigenous vegetation retention, removal, and planting proposed under the Northlake plan change.

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7.1.3 Composition of indigenous plantings

The plan change proposes utilising kānuka for the new plantings at the site. This is appropriate and reflects the natural successional trends on the site.

The plantings also provide an opportunity to enhance the compositional and structural diversity of indigenous vegetation at the site. It is suggested that a selection of other species naturally occurring in the district are also included as a smaller component of the plantings. Suitable species that have high drought tolerance and moderate to low flammability that are naturally occurring in the district, include:

- *Coprosma propinqua* (mingimingi).
- *Coprosma crassifolia*.
- *Corokia cotoneaster* (korokio).
- *Melicytus alpinus* (porcupine shrub).
- *Carmichaelia petriei* (desert broom; At Risk – Declining)
- *Discaria toumatou* (matagouri).
- *Olearia* spp. (At Risk – Declining).

Inclusion of desert broom in the plantings would also ensure a positive outcome for this species, and account for the loss of the single plant observed on site.

Plants should be planted approximately 1.3 metres apart, to ensure the formation of a dense shrubland within a reasonable period while avoiding unnecessary competition between mature plants. The planted vegetation could reasonably be expected to form an indigenous shrubland canopy within 10 years, assuming satisfactory planting success and irrigation until plants are well established.

Other higher-value species listed in Table 3 could also be planted at lower densities, and preferably in microsites with deeper soils, and generally be planted at least five metres apart. Irrigation during the establishment period, along with the use of plant guards to protect young plants from rabbit browse, is recommended to facilitate establishment.

Table 3 – Higher value indigenous tree and shrub species suitable for planting at the Northlake site.

Species	Common Name	Notes
<i>Carpodetus serratus</i>	Piripiriwhata, marbleleaf	Moderate growth rate
<i>Fuscopora cliffortioides</i>	Mountain beech	Moderate height growth, a food source for indigenous birds
<i>Griselinia littoralis</i>	Kāpuka, broadleaf	Tall height growth, likely to be the natural cover at the site
<i>Myrsine australis</i>	Māpou	Hardy, exposure tolerant
<i>Olearia lineata</i>		Shade tolerant, slow growth
<i>Olearia odorata</i>		A small tree that prefers deep soils, often in riparian habitats, important for invertebrates
<i>Pittosporum tenuifolium</i>	Kōhūhū	Shrub that prefers fertile sites on toeslopes, important for invertebrates



Species	Common Name	Notes
<i>Plagianthus regius</i>	Lowland ribbonwood	Moderate height growth, hardy
<i>Podocarpus laetus</i>	Hall's tōtara	Fast growth on fertile soils, better planted in deeper soils
<i>Pseudopanax ferox</i>	Fierce lancewood	Slow growing, better planted on deep soils
<i>Sophora microphylla</i>	Kōwhai	Moderate growth rate, fruit source for indigenous birds when mature, best planted on deeper soils

Inclusion of desert broom (At Risk-Declining) in the plantings would also ensure a positive outcome for this species, and account for the loss of the single plant observed on site.

7.1.4 Control of wilding conifers and other woody weeds

Control of woody weeds within the planting area and within indigenous vegetation throughout the site would be a valuable addition to the plan change. This should include wilding conifers as well as other exotic weeds at the site including spindlewood, elder and rowan, all of which threaten to overtake indigenous shrubland. This would provide important additional ongoing ecological benefits.

7.2 Avifauna

The long-term impacts of a land use change to a mixture of residential, rural and vested recreation reserve cannot be determined based on the existing information. Typical effects on avifauna from similar plan changes include changes in habitat quantity or connectivity, increased traffic risk, or changing populations of predators. The increased area and connectivity of indigenous shrubland vegetation resulting from the plan change would, however, be of benefit to indigenous birds of these habitats. A considered assessment of effects and recommendations to mitigate these will be required once plans for the development are available. Field assessments may be required to identify areas of highest values within the property in order to inform targeted recommendations.

Any vegetation removal associated with future development following a plan change should ideally occur outside of the bird breeding season (August to March). If works are to occur during this time, a site survey must be conducted by a suitably qualified avifauna ecologist (SQAE) within eight days prior to works commencing to determine whether Threatened, At Risk, or protected birds are nesting on site within 100 metres of the works area. If work is to occur in a new area, or if work ceases in an area for more than eight days, an additional survey must be undertaken.

If breeding birds are present, the SQAE will determine a setback distance from the nest site, and an Avifauna Management Plan (AMP) may be required. Work must not occur within the setback area until (i) chicks have fledged and are independent of the nesting site, or (ii) the nest has been abandoned, as determined by a SQAE. Setback distances are typically 100 metres in open areas but may be reduced to smaller exclusion distances (e.g. 50-75 metres) for intermittent, short duration work if the nests or chicks are not visible from the source of disturbance (e.g. if they are screened by vegetation or topographic features). This adjustment would be determined by a SQAE and should be documented in writing.

If any nesting birds are discovered during vegetation clearance, the protocols outlined in the avifauna Incidental Discovery Protocol (IDP; Appendix 7) should be followed.



7.3 Invertebrates

Effects on invertebrates would predominantly be related to vegetation clearance and disturbance during construction work. Long-term effects could include habitat loss and impacts from development of the site into human dwellings, such as from lighting and domestic cats. However, these effects would depend on the design of the development.

Any future vegetation and habitat loss would be expected to result in direct mortality to invertebrates on the site, though this is expected to be limited in scale. The plan change would overall result in a much larger area of indigenous shrubland at the site, with greater connectivity between patches, representing a positive outcome for invertebrates. It would help support indigenous mantis and ground beetle populations, and care should be taken by the workforce to avoid crushing these species during work.

Stacking felled shrubs and leaving them in scrub areas would encourage any invertebrates present on these shrubs, particularly New Zealand mantis, to leave them and enter the adjacent habitat. To prevent vegetation stacks from creating habitat for small exotic mammals that threaten indigenous invertebrates, pest mammal control would be desirable in and around vegetation stacks.

The Threatened – Nationally Vulnerable inchworm moth *Asaphodes stinaria* is thought to use *Carex* or *Ranunculus* as host plants (Meyrick 1883, Department of Conservation 2005), but these plants were not observed during the site visit. If any plants are noted, works should take care to avoid these species as much as possible to avoid removing habitat for the moth.

7.4 Lizards

7.4.1 Surveys

Due to the confirmed presence of lizards on site, targeted lizard surveys are recommended at the time of future development consenting if a plan change is granted. These surveys would confirm the indigenous lizard values on site and determine how best to manage lizards and their habitats across the site. Targeted surveys would also help to inform an assessment of effects and any effects management that may be required by future development.

Lizard surveys should be undertaken on warm, sunny days (suitable for lizard emergence and activity) any time between October and April (the months when lizards are most active). If present, lizards will be visually active, captured in traps, basking in sunlit ground-level vegetation or present under the bark or within trunk cavities of shrubs.

It is recommended that if any geckos are detected during lizard surveys, genetic testing should be undertaken to determine which *Woodworthia* sp. is present within the site.

7.4.2 Lizard Management Plan and Wildlife Act Authority application

If lizards and their habitats cannot be avoided by future development, a Lizard Management Plan (LMP) and WAA application may be required in order to address and mitigate the potential adverse effects on lizards from any proposed works. This could be confirmed at the time of future development. A LMP should include the following:

- Survey methods used to assess relevant areas.
- Descriptions of the survey results and mapping of any lizard habitats and lizards found.



- Recommendations for avoiding lizards, or reducing impacts upon them, during proposed development. This may include the avoidance of high-quality lizard habitats, which can be determined through lizard surveys.
- Mitigation measures to ensure no net loss of lizards. These may include, but is not limited to, salvage and relocation if considered appropriate. If salvage and relocation are deemed necessary, a suitable on- or off-site release area will need to be identified. Additional lizard surveys may be required to confirm the suitability of the selected release area, and habitat enhancement may also be necessary to ensure the area is appropriate for lizard release.
- Any offset or compensation required to address residual effects on lizards.

The type and extent of management required will depend on the proposed development and the species, abundance, and distribution of lizards present on site, all of which can be determined through targeted lizard surveys prior to development. As lizards have been found on site during the site visit, it is likely that a LMP and WAA will be required.

8.0 Conclusions

Northlake Investments Limited is preparing a Private Plan Change Application for a parcel of land in their Northlake development in Wānaka. This plan change would involve rezoning a 20.12 hectare land parcel into a mixture of residential, rural and vested recreation reserve.

Most of the site is highly modified and covered in exotic grassland, and portions have been further modified by recent earthworks and roading. However, the presence of indigenous shrubland, At Risk flora, and habitat for indigenous fauna provide areas of important ecological values within the site.

The main ecological values at the site are associated with the the kānuka-matagouri shrubland, especially the northernmost area which supports At Risk plant species (*Raoulia beauverdii* and *R. hookeri*), and maintains connectivity with surrounding shrubland habitats. Additional ecological values include the presence of a single desert broom (At Risk – Declining) within the exotic grassland, and foraging and potential breeding habitat for a range of indigenous bird species. Indigenous lizards and their sign were also observed on the site. Kānuka-matagouri shrubland and associated grassland habitats are also likely to support notable terrestrial invertebrate communities, including At Risk and Threatened species.

Vegetation management proposed as part of the plan change would result in an 82% increase in indigenous shrubland vegetation cover at the site, from the current 4.41 hectares to 8.01 hectares. The proposed indigenous vegetation plantings would also greatly increase connectivity between existing shrubland patches. While small areas of indigenous vegetation clearance are proposed, these avoid the areas with highest ecological values. Overall, the plan change would result in positive outcomes for vegetation and habitats at the site. Additional important long-term positive effects could be realised if control of exotic woody vegetation was undertaken, and if plantings included a diverse array of indigenous shrubs and trees including At Risk species.

Due to the presence of lizards on site targeted lizard surveys are recommended at the time of any future development should the plan change be granted, to confirm the indigenous lizard values on site and determine how best to maintain those lizard values. Targeted surveys will help to inform an assessment of effects and any effects management that may be required by future development. If lizards are unable to be avoided by future development works, a LMP may be required to meet Wildlife Act requirements.



Potential adverse effects on avifauna of future development can be minimised by timing works outside the breeding season, undertaking pre-construction surveys, and implementing appropriate setbacks and management measures where nesting birds are present. Effects on terrestrial invertebrates are expected to be localised and minor, and can be reduced through careful site practices, and targeted measures such as vegetation stacking and pest control. The large increase in indigenous shrubland habitat resulting from the plan change will also have positive effects for these fauna groups.

Acknowledgments

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Appendix 1

Additional site photographs



Plate A1-1 – Wilding pines emerging above the kānuka-matagouri shrubland and exotic grassland.



Plate A1-2 – Recently cultivated areas.



Plate A1-3 – Exotic grassland and isolated patches of shrubs.



Appendix 2

Vascular plant species observed at the site

* Denotes exotic species

Species	Common Name	Plant Type
<i>Agrostis capillaris</i> *	Browntop	Graminoid
<i>Aira caryophyllea</i> *	Silvery hair grass	Graminoid
<i>Anthoxanthum odoratum</i> *	Sweet vernal	Graminoid
<i>Bromus hordeaceus</i> *	Soft brome	Graminoid
<i>Bromus species</i> *	Brome	Graminoid
<i>Buddleja davidii</i> *	Buddleia	Shrub
<i>Carex breviculmis</i>	Grassland sedge	Graminoid
<i>Carmichaelia petriei</i>	Desert broom	Shrub
<i>Centaurea erythraea</i> *	Centaury	Forb
<i>Cerastium fontanum</i> subsp. <i>vulgare</i> *	Mouse-ear chickweed	Forb
<i>Chionochloa rubra</i>	Red tussock	Graminoid
<i>Cirsium arvense</i> *	Californian thistle	Forb
<i>Cirsium vulgare</i> *	Scotch thistle	Forb
<i>Coprosma propinqua</i>	Mikimiki	Tree
<i>Cytisus scoparius</i> *	Scotch broom	Shrub
<i>Deschampsia flexuosa</i> *	Wavy hair grass	Graminoid
<i>Discaria toumatou</i>	Tūmatakuru, matagouri	Tree
<i>Echium vulgare</i> *	Vipers bugloss	Forb
<i>Elytrigia repens</i> *	Couch	Graminoid
<i>Erodium moschatum</i> *	Musky storksbill	Forb
<i>Euchiton audax</i>	Native cudweed	Forb
<i>Euonymus europaeus</i> *	Spindlewood	Shrub
<i>Festuca novae-zelandiae</i>	Hard tussock	Graminoid
<i>Festuca rubra</i> *	Red fescue	Graminoid
<i>Geranium molle</i> *	Dovesfoot cranesbill	Forb
<i>Griselinia littoralis</i>	Kāpuka	Tree
<i>Hieracium lepidulum</i> *	Tussock hawkweed	Forb
<i>Holcus lanatus</i> *	Yorkshire fog	Graminoid
<i>Hypericum perforatum</i> *	St Johns wort	Subshrub
<i>Hypochaeris radicata</i> *	Catsear	Forb
<i>Kunzea serotina</i>	Kānuka	Tree
<i>Leucopogon fraseri</i>	Pātōtara	Shrub
<i>Lolium arundinaceum</i> *	Tall fescue	Graminoid
<i>Lysimachia arvensis</i> *	Scarlet pimpernel	Forb
<i>Malva sylvestris</i> *	Large-flowered mallow	Forb
<i>Medicago lupulina</i> *	Black medick	Forb
<i>Microtis unifolia</i>	Māikaika, onion orchid	Forb
<i>Mycelis muralis</i> *	Wall lettuce	Forb
<i>Myosotis arvensis</i> *	Field forget-me-not	Forb



Species	Common Name	Plant Type
<i>Navarretia squarrosa</i> *	Californian stinkweed	Forb
<i>Pilosella officinarum</i> *	Mouse-ear hawkweed	Forb
<i>Pinus radiata</i> *	Radiata pine	Tree
<i>Poa annua</i> *	Annual poa	Graminoid
<i>Poa cita</i>	Silver tussock	Graminoid
<i>Pseudotsuga menziesii</i> *	Douglas fir	Tree
<i>Pteridium esculentum</i>	Rārahu, bracken	Fern
<i>Raoulia beauverdii</i>		Subshrub
<i>Raoulia hookeri</i>	Scabweed	Subshrub
<i>Rosa rubiginosa</i> *	Sweet briar	Shrub
<i>Rubus schmidelioides</i>	Tātārāmoa, white-leaved lawyer	Vine
<i>Rumex acetosella</i> *	Sheep's sorrel	Forb
<i>Sambucus nigra</i> *	Elder	Shrub
<i>Sorbus aucuparia</i> *	Rowan	Tree
<i>Trifolium arvense</i> *	Haresfoot trefoil	Forb
<i>Trifolium pratense</i> *	Red clover	Forb
<i>Trifolium repens</i> *	White clover	Forb
<i>Verbascum thapsus</i> *	Woolly mullein	Forb
<i>Verbascum virgatum</i> *	Moth mullein	Forb



Appendix 3

Avifauna species identified in desktop assessment

Avifauna species recorded in eBird within five kilometres of the site between 1 January 2015 and 31 December 2025, and likelihood of their presence on the site. Threat classifications as per Robertson *et al.* (2021).

Common Name(s)	Scientific Name	Threat Classification	Likelihood of Presence
Indigenous Species			
Kōtuku/white heron	<i>Ardea alba modesta</i>	Threatened – Nationally Critical	Highly unlikely
Kea	<i>Nestor notabilis</i>	Threatened – Nationally Endangered	Highly unlikely
Tarapirohe/black-fronted tern	<i>Chlidonias albostratus</i>	Threatened – Nationally Endangered	Possible
Kārearea/eastern falcon	<i>Falco novaeseelandiae novaeseelandiae</i>	Threatened – Nationally Vulnerable	Possible
Koekoeā/long-tailed cuckoo	<i>Eudynamys taitensis</i>	Threatened – Nationally Vulnerable	Highly unlikely
Pārera/grey duck	<i>Anas superciliosa</i>	Threatened – Nationally Vulnerable	Highly unlikely
Pūteketeke/Australasian crested grebe	<i>Podiceps cristatus australis</i>	Threatened – Nationally Vulnerable	Highly unlikely
Kakaruai/South Island robin	<i>Petroica australis australis</i>	At Risk – Declining	Highly unlikely
Kotoreke/marsh crake	<i>Zapornia pusilla affinis</i>	At Risk – Declining	Highly unlikely
Pīhoihoi/New Zealand pipit	<i>Anthus novaeseelandiae novaeseelandiae</i>	At Risk – Declining	Likely
Pohowera/banded dotterel	<i>Charadrius bicinctus bicinctus</i>	At Risk – Declining	Unlikely
Pūweto/spotless crake	<i>Zapornia tabuensis</i>	At Risk – Declining	Highly unlikely
Tarāpuka/black-billed gull	<i>Chroicocephalus bulleri</i>	At Risk – Declining	Possible
Tōrea/South Island pied oystercatcher	<i>Haematopus finschi</i>	At Risk – Declining	Possible
Kāruhiruhi/pied shag	<i>Phalacrocorax varius varius</i>	At Risk – Recovering	Highly unlikely
Kawaupaka/little shag	<i>Microcarbo melanoleucos brevirostris</i>	At Risk – Relict	Highly unlikely
Māpunga/black shag	<i>Phalacrocorax carbo novaehollandiae</i>	At Risk – Relict	Highly unlikely
Australian coot	<i>Fulica atra australis</i>	At Risk – Naturally Uncommon	Highly unlikely
Grey duck – mallard hybrid	<i>Anas superciliosa</i> × <i>platyrhynchos</i>	Not Threatened	Unlikely
Kāhu/swamp harrier	<i>Circus approximans</i>	Not Threatened	Highly likely
Kākānau/black swan	<i>Cygnus atratus</i>	Not Threatened	Highly unlikely
Karoro/southern black-backed gull	<i>Larus dominicanus dominicanus</i>	Not Threatened	Likely
Kererū/New Zealand pigeon	<i>Hemiphaga novaeseelandiae</i>	Not Threatened	Possible
Korimako/bellbird	<i>Anthornis melanura melanura</i>	Not Threatened	Possible
Kuruwhengi/Australasian shoveler	<i>Spatula rhynchotis</i>	Not Threatened	Highly unlikely
Matuku moana/white-faced heron	<i>Egretta novaehollandiae</i>	Not Threatened	Highly unlikely



Common Name(s)	Scientific Name	Threat Classification	Likelihood of Presence
New Zealand kingfisher/ kōtare	<i>Todiramphus sanctus vagans</i>	Not Threatened	Highly unlikely
Ngirungiru/South Island tomtit	<i>Petroica macrocephala macrocephala</i>	Not Threatened	Unlikely
Pāpango/New Zealand scaup	<i>Aythya novaeseelandiae</i>	Not Threatened	Highly unlikely
Pīpipi/brown creeper	<i>Mohoua novaeseelandiae</i>	Not Threatened	Unlikely
Pīpīwharau/roa/shining cuckoo	<i>Chrysococcyx lucidus lucidus</i>	Not Threatened	Possible
Pīwakawaka/South Island fantail	<i>Rhipidura fuliginosa fuliginosa</i>	Not Threatened	Highly likely
Poaka/pied stilt	<i>Himantopus himantopus leucocephalus</i>	Not Threatened	Possible
Pūkeko/pukeko	<i>Porphyrio melanotus melanotus</i>	Not Threatened	Possible
Pūtangitangi/paradise shelduck	<i>Tadorna variegata</i>	Not Threatened	Possible
Riroriro/grey warbler	<i>Gerygone igata</i>	Not Threatened	Highly likely
Ruru/morepork	<i>Ninox novaeseelandiae novaeseelandiae</i>	Not Threatened	Likely
Spur-winged plover	<i>Vanellus miles novaehollandiae</i>	Not Threatened	Highly likely
Tauhou/silvereye	<i>Zosterops lateralis lateralis</i>	Not Threatened	Highly likely
Tētē-moroiti/grey teal	<i>Anas gracilis</i>	Not Threatened	Highly unlikely
Titipounamu/South Island rifleman	<i>Acanthisitta chloris chloris</i>	Not Threatened	Highly unlikely
Tūi/tui	<i>Prosthemadera novaeseelandiae novaeseelandiae</i>	Not Threatened	Likely
Warou/welcome swallow	<i>Hirundo neoxena neoxena</i>	Not Threatened	Likely
Western weka	<i>Gallirallus australis australis</i>	Not Threatened	Unlikely
Exotic Species			
Australian magpie	<i>Gymnorhina tibicen</i>	Introduced and Naturalised	Highly likely
California quail	<i>Callipepla californica</i>	Introduced and Naturalised	Possible
Canada goose	<i>Branta canadensis</i>	Introduced and Naturalised	Possible
Chaffinch	<i>Fringilla coelebs</i>	Introduced and Naturalised	Highly likely
Common redpoll	<i>Acanthis flammea</i>	Introduced and Naturalised	Highly likely
Common starling	<i>Sturnus vulgaris</i>	Introduced and Naturalised	Highly likely
Dunnock	<i>Prunella modularis</i>	Introduced and Naturalised	Likely
Eurasian blackbird	<i>Turdus merula</i>	Introduced and Naturalised	Highly likely
Eurasian skylark	<i>Alauda arvensis</i>	Introduced and Naturalised	Highly likely
European goldfinch	<i>Carduelis carduelis britannica</i>	Introduced and Naturalised	Highly likely
European greenfinch	<i>Chloris chloris</i>	Introduced and Naturalised	Highly likely
Greylag goose	<i>Anser anser</i>	Introduced and Naturalised	Unlikely
House sparrow	<i>Passer domesticus</i>	Introduced and Naturalised	Highly likely
Little owl	<i>Athene noctua</i>	Introduced and Naturalised	Possible
Mallard	<i>Anas platyrhynchos</i>	Introduced and Naturalised	Possible
Muscovy duck	<i>Cairina moschata</i>	Introduced and Naturalised	Unlikely
Rock pigeon	<i>Columba livia</i>	Introduced and Naturalised	Likely
Song thrush	<i>Turdus philomelos</i>	Introduced and Naturalised	Highly likely
Yellowhammer	<i>Emberiza citrinella</i>	Introduced and Naturalised	Highly likely



Appendix 4

Significance assessment against NPS-IB criteria

NPS Indigenous Biodiversity 2023 Criteria (NPS-IB)	Assessment
Representativeness: <i>An area that qualifies as an SNA under this criterion has at least one of the following attributes:</i> (a) <i>indigenous vegetation that has ecological integrity that is typical of the character of the ecological district:</i> (b) <i>habitat that supports a typical suite of indigenous fauna that is characteristic of the habitat type in the ecological district and retains at least a moderate range of species expected for that habitat type in the ecological district.</i>	Criterion not met for the site as a whole, but is met for the area of kānuka-matagouri shrubland on the northern slope: (a) This patch of kānuka-matagouri shrubland has an open structure and species composition typical of very dry scarps in the Pisa/Lindis ecological districts. Wilding pines are common, but the shrubland retains typical ecological integrity. Other shrublands at the site have a lower ecological integrity than is typical of the district. (b) Not assessed. Full fauna surveys are not part of the scope for this assessment.
Rarity and Distinctiveness <i>An area that qualifies as an SNA under this criterion has at least one of the following attributes:</i> (a) <i>provides habitat for an indigenous species that is listed as Threatened or At Risk (declining) in the New Zealand Threat Classification System lists:</i> (b) <i>an indigenous vegetation type or an indigenous species that is uncommon within the region or ecological district:</i> (c) <i>an indigenous species or plant community at or near its natural distributional limit:</i> (d) <i>indigenous vegetation that has been reduced to less than 20 per cent of its prehuman extent in the ecological district, region, or land environment:</i> (e) <i>indigenous vegetation or habitat of indigenous fauna occurring on naturally uncommon ecosystems:</i> (f) <i>the type locality of an indigenous species:</i> (g) <i>the presence of a distinctive assemblage or community of indigenous species:</i> (h) <i>the presence of a special ecological or scientific feature.</i>	Criterion not met for the site as a whole, but is met for larger and denser areas of kānuka-matagouri shrubland: (a) The northern shrubland contains At Risk – Declining plant species <i>Raoulia beauverdii</i> and resurrection lichen. Larger patches of kānuka-matagouri shrubland at the east contain occasional resurrection lichen. Fauna has not been assessed, as full surveys are beyond scope. (b) No such vegetation types or species. (c) No such species or community. (d) Indigenous shrubland vegetation at this site has been reduced to less than 20% in its land environment. (e) No such vegetation or habitat. (f) No such species. (g) No distinct assemblages or community. (h) No special features.



NPS Indigenous Biodiversity 2023 Criteria (NPS-IB)	Assessment
Diversity and Pattern <i>An area that qualifies as a significant natural area under this criterion has at least one of the following attributes:</i> <i>(a) at least a moderate diversity of indigenous species, vegetation, habitats of indigenous fauna or communities in the context of the ecological district:</i> <i>(b) presence of indigenous ecotones, complete or partial gradients or sequences.</i>	Criterion not met. (a) The site contains low diversity of indigenous species. (b) The site contains no indigenous ecotones, complete or partial gradients or sequences.
Ecological Context <i>An area that qualifies as an SNA under this criterion has at least one of the following attributes:</i> <i>(a) at least moderate size and a compact shape, in the context of the relevant ecological district:</i> <i>(b) well-buffered relative to remaining habitats in the relevant ecological district:</i> <i>(c) provides an important full or partial buffer to, or link between, one or more important habitats of indigenous fauna or significant natural areas:</i> <i>(d) important for the natural functioning of an ecosystem relative to remaining habitats in the ecological district.</i>	Criterion not met for the site as a whole, but is met for the area of kānuka-matagouri shrubland on the northern slope met. (a) Indigenous shrubland is relatively small and fragmented across the site. (b) The northern shrubland provides moderate buffering values to adjacent indigenous vegetation, and meets this criterion. (c) Shrubland at the north of the site is contiguous with shrubland that has been mapped as important habitat for indigenous forest birds, and meets this criterion. (d) None of these features are present at the site.
Is vegetation/habitat significant?	The site overall is not significant. However, the northern area of kānuka-matagouri shrubland (labelled 2 on Figure 4) and the larger patches of indigenous shrubland (with higher ecological integrity - labelled 1 on Figure 4) elsewhere have values that meet at least one significance criteria. (As noted in the report, the plan change proposal plans to enhance the shrubland values by extending and connecting existing areas of indigenous vegetation as shown in green on Figure 4. Overall, the proposal will maintain indigenous biodiversity values for the site and result in no overall loss on this basis).



Appendix 5

Significance assessment (Queenstown Lakes proposed district plan)

Criteria	Evaluation
Representativeness: Whether the area is an example of an indigenous vegetation type or habitat that is representative of that which formerly covered the Ecological District, including degraded examples if they are some of the last examples remaining.	Criterion met only for the larger patches of kānuka-matagouri shrubland. The kānuka-matagouri shrubland is typical of shrubland that occurred in the Lindis and Pisa Ecological Districts.
Rarity – i: The area supports indigenous vegetation and habitats within originally rare ecosystems.	Criterion not met. No such vegetation or habitats at the site.
Rarity – ii: The area supports indigenous species that are threatened, at risk, uncommon, nationally or within the ecological district.	Criterion met only for larger and denser areas of kānuka-matagouri shrubland: the met. These shrublands contain At Risk – Declining plant species <i>Raoulia beauverdii</i> and Regionally At Risk – Declining <i>Raoulia hookeri</i> , and/or resurrection lichen. Fauna values have not been assessed through targeted surveys.
Rarity – iii: The area supports indigenous vegetation or habitats of indigenous fauna that has been reduced to less than 20% of its former extent, regionally or within a relevant Land Environment or Ecological District.	Criterion met only for larger patches of indigenous shrubland. Indigenous vegetation at the site falls within Land Environments that have been reduced to less than 20% nationally.
Diversity and Pattern: Whether the area supports a highly diverse assemblage of indigenous vegetation and habitat types, and whether these have a high indigenous biodiversity value including:	
Diversity and Pattern – i: indigenous taxa.	Criterion not met. Relatively low indigenous diversity.
Diversity and Pattern – ii: ecological changes over gradients.	Criterion not met. No such gradients.
Distinctiveness – i: Whether the area supports or provides habitats for indigenous species at their distributional limit within Otago or nationally.	Criterion not met. No such species.
Distinctiveness – ii: Whether the area supports or provides habitats for indigenous species that are endemic to the Otago Region.	Criterion not met. No such species.
Distinctiveness – iii: Whether the area supports or provides habitats for indigenous species that are distinctive, of restricted occurrence or have developed as a result of unique environmental factors.	Criterion not met. No such habitats.
Ecological Context: The relationship of the area with its surroundings, including whether the area proposed to be cleared:	
Ecological Context – i: has important connectivity value allowing dispersal of indigenous fauna between different areas.	Criterion not met. There will be only moderate values as stepping stone habitat in the landscape.

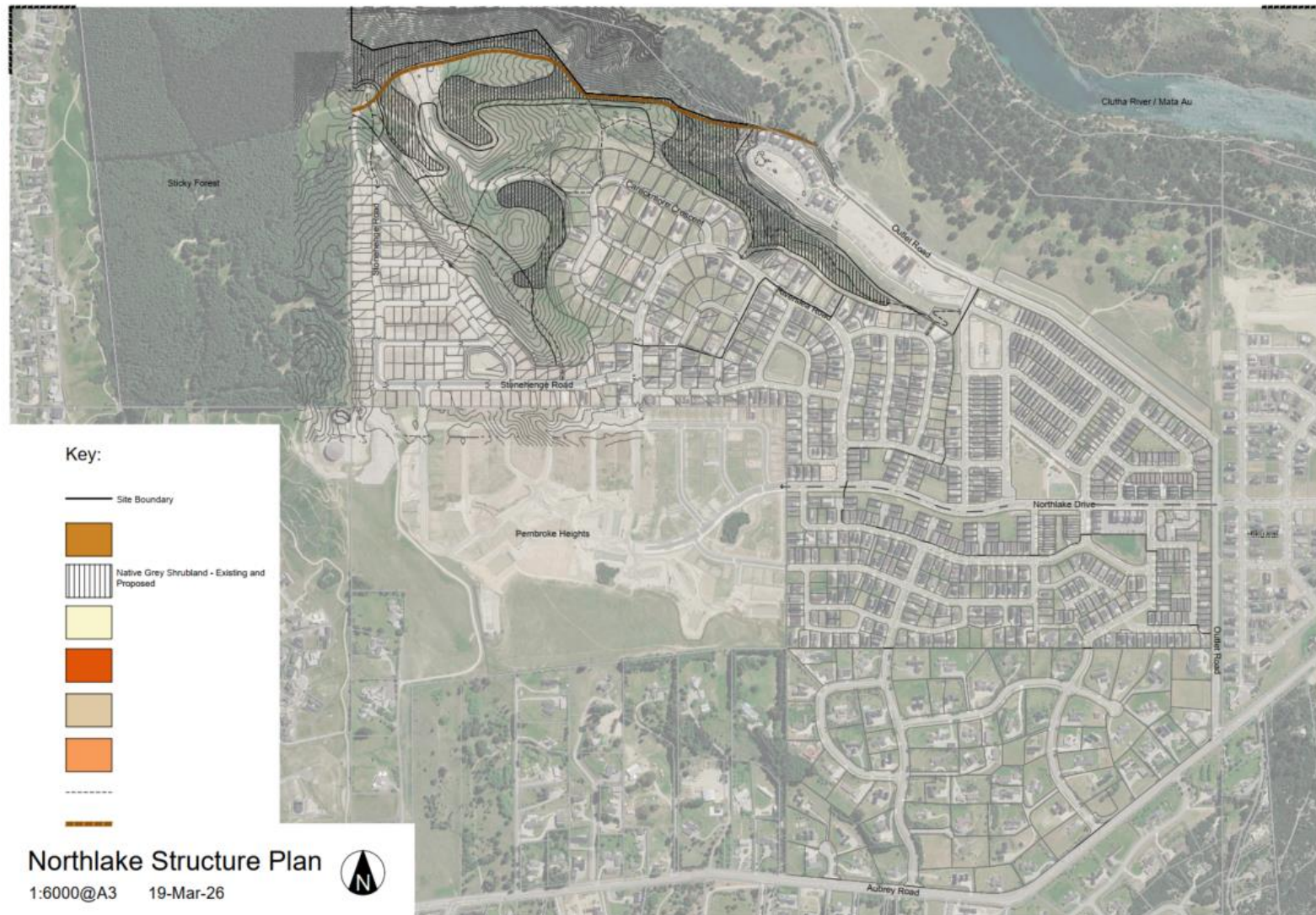


Criteria	Evaluation
Ecological Context – ii: has an important buffering function to protect values of an adjacent area or feature.	Criterion not met. Moderate buffering but likely not important.
Ecological Context – iii: is important for indigenous fauna during some part of their life cycle.	Criterion met only for larger patches of kānuka-matagouri shrubland. Such shrubland has been mapped as important habitat for indigenous forest birds.
Is vegetation and/or habitat significant?	The site overall is not significant. However, the northern area of kānuka-matagouri shrubland (labelled 2 on Figure 4) and the larger patches of indigenous shrubland (with higher ecological integrity - labelled 1 on Figure 4) elsewhere have values that meet at least one significance criteria. (As noted in the report, the plan change proposal plans to enhance the shrubland values by extending and connecting existing areas of indigenous vegetation as shown in green on Figure 4. Overall, the proposal will maintain indigenous biodiversity values for the site and result in no overall loss on this basis).



Appendix 6

Northlake structure plan (source: Northlake Investments Limited)





Appendix 7

Avifauna Incidental Discovery Protocol (IDP)

The following protocols outline the steps for incidental discoveries of nesting birds, nests, and injured birds during vegetation clearance and other works.

Incidental nest discovery

- If nests or nesting avifauna are discovered within the footprint of the site, all works within 100 metres should immediately stop and the discovery must be reported to the Site Manager.
- Record the following details:
 - Date and time of discovery.
 - Location (GPS coordinate marked).
 - Description of the finding (e.g. species identification, nest type, or remains).
 - Photos, if feasible, without disturbing the nest.
- No works shall resume within this area until a suitably qualified avifauna ecologist has viewed the photos and been to site to assess the nest and associated birds and determined whether the species is Threatened or At Risk, and the appropriate setback distance to avoid adverse effects.

Injured birds

- If an injured Threatened or At Risk indigenous bird is found within the site footprint, the injured bird should be placed in a cool, dark, material-lined box and taken to a vet immediately.
- The local DOC office or DOC hotline (if after hours) should be contacted no later than two hours after the injured bird is found. The DOC hotline is 0800 DOCHOTLINE (0800 362 468).



Call Free 0508 WILDNZ
Ph +64 7 343 9017
Fax +64 7 349018
ecology@wildlands.co.nz

99 Sala Street
PO Box 7137, Te Ngae
Rotorua 3042, New Zealand

Regional Offices located in Auckland; Christchurch;
Dunedin; Hamilton; Invercargill; Queenstown; Tauranga;
Wānaka; Wellington; Whangārei.

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