Assessment of Ecological Effects for Pound Road Industrial Development, Christchurch

Contract Report No. 7316c

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Wildlands

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Contract Report No. 7316c
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1.0 Introduction

NTP Development Holdings Limited are seeking to develop land on Pound Road, Templeton, Christchurch for industrial activities. The land is located on the corner of Pound Road and Waterloo Road, south of Templeton Golf Course and is west of the Waterloo Business Park. It comprises of *c.*64.4 hectares over six properties on the corner of Pound Road and Waterloo Road: 173 Pound Road, 86 Barters Road, 64 Barters Road, 38 Barters Road, 570 Waterloo Road. The proposal will seek to subdivide the application site to create 74 industrial lots, 3 lots to vest as Reserve, and associated road network and infrastructure. It is intended that the sites will be used for general industrial activities.

Wildlands has undertaken previous works at this site, which assessed the ecological effects of rezoning of the site from Rural Urban Fringe zone to Industrial General zone under a private plan change (Wildland Consultants, 2024). The Pound Rd Industrial Development application is now being made under the Fast Track Approvals Act. It is considered that the development will have significant regional benefits.

NTP Development Holdings Ltd have engaged Wildland Consultants Ltd (Wildlands) to provide revisions to the original ecological assessment. This report therefore represents content that was previously provided in Wildland Consultants (2024) but amends it for the updated intended consent processing and additional field survey information collected since that report. Further, the report includes an assessment of ecological effects (AEE) for the proposed development.

2.0 Objectives and scope

The area surveyed was taken from the site plan, developed for the industrial development site by Novo Group Ltd, which includes all of the properties to the south of Templeton Golf Course, between Hasketts Road/ Barters Road and Pound Road (Figure 1, **the site**). However, not all of these properties were accessible for surveying and therefore not included in this assessment (Figure 1, **the study area**).

The scope of the assessment was to:

- Undertake a desktop assessment of terrestrial ecological values for vegetation, avifauna, lizards and invertebrates.
- Undertake site visit to map and describe the current vegetation and habitats within the study area, to inform the desktop assessments and determine any significant ecological values at the site.
- Undertake required lizard surveys in lizard habitat identified by the ecological assessment previously prepared by Wildland Consultants (2024).
- Prepare an ecological assessment of the proposed industrial development, which describes the vegetation and habitat within the study area and evaluates ecological values against significance against criteria in the Canterbury Regional Policy Statement (CRPS) and the National Policy Statement for Indigenous Biodiversity (NPS-IB).
- Provide a full assessment for the industrial development proposal including an assessment of effects, and effects management recommendations that follow the mitigation hierarchy.
- Provide a statement regarding the authors professional expertise and experience. This is provided in Appendix 4.

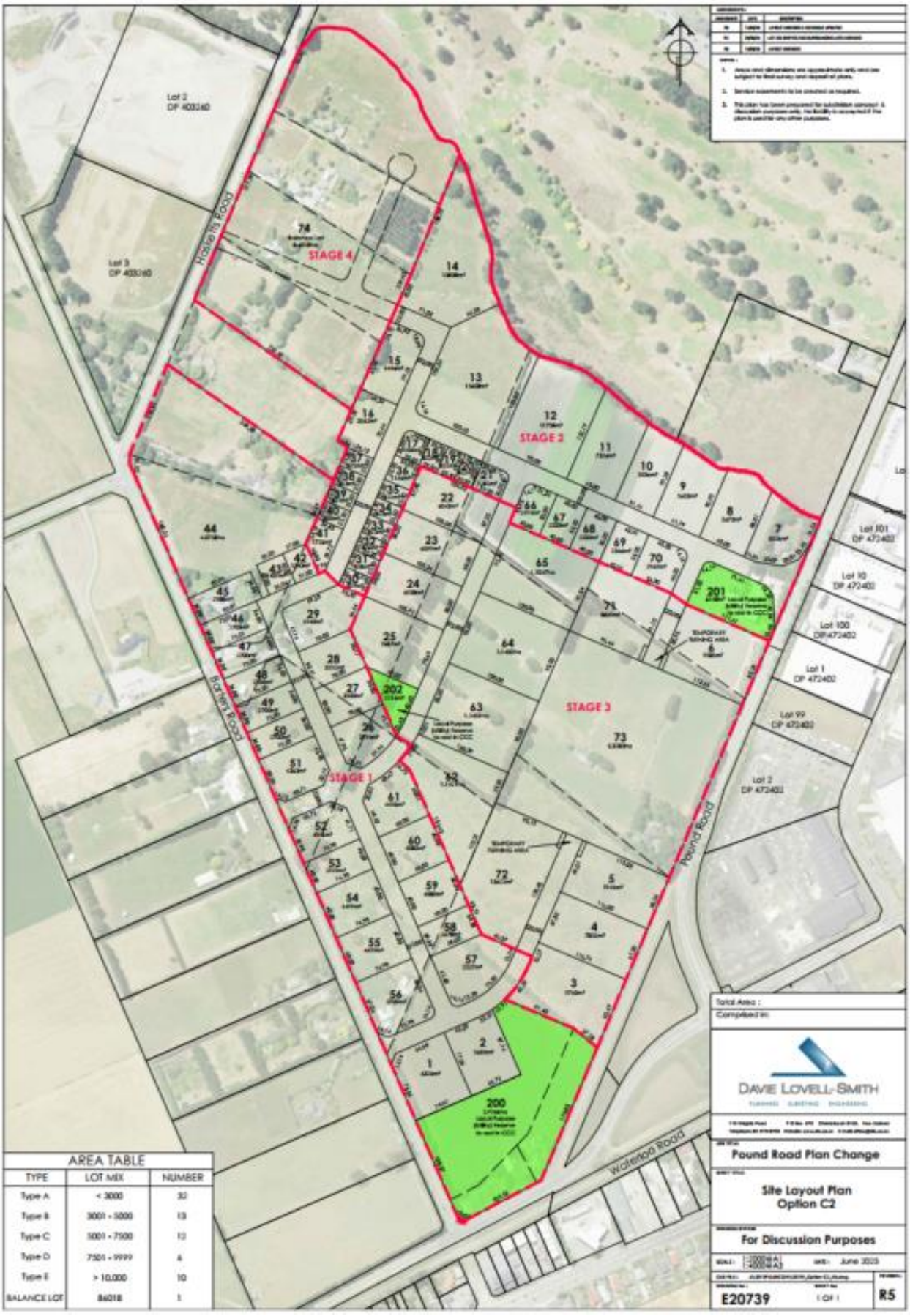

Figure 1 - Proposed industrial development plan for Pound Road, Templeton, Christchurch. Figure provided by Davie Lovell-Smith, 2025

3.0 Context

3.1 Low Plains Ecological District (ED)

The property is located within the Low Plains Ecological District (ED), that covers the eastern part of the Canterbury Plains. The Low Plains ED stretches from Waipara in the north to Timaru in the south. The following description is adapted from Harding (Harding, 2009).

The ED covers a sloping plain formed by the deposition of glacial outwash and recent river gravels. It extends from sea level to approximately 300 metres asl, and has no significant hills. Older surfaces are covered with loess; younger surfaces comprise recent river gravel (the site being on the latter). The long coastline of the district comprises sand and sand/gravel beaches with low dunes, dune lakes, and lagoons north of Banks Peninsula.

Droughts, wind, and occasional natural fires would have strongly influenced the pre-human vegetation of Low Plains ED. The presence of only a few small remnants of indigenous vegetation in the district makes interpretation of the pre-human vegetation difficult. Early European surveyors noted the presence of areas of forest at a number of locations on the coastal plain north of Christchurch, presumably remnants of previously more-extensive forests. Intervening areas supported raupō (*Typha orientalis*) swamp, flax (*Phormium tenax*) swamp, swamp forest, or grassland.

It is likely that the severity of the climate on the open plains, including the desiccating effect of frequent strong northwest winds, unevenly distributed rainfall (<750 mm per annum), and the frequency of natural fires, together with the presence of free-draining gravels, prevented the development of extensive forests. More extensive areas of podocarp forest and wetland would have been present at well-watered sites nearer the coast, such as north of Christchurch. Freshwater wetlands were relatively extensive on eastern parts of the plains, and saline wetlands present along the coast.

The original vegetation of Low Plains ED has been substantially depleted by human-induced fire, and land clearance for agriculture and settlement. Nearly all parts of the ED outside of Christchurch and surrounding towns are intensively farmed. Most soils have been cultivated and many areas are irrigated. Remnants of wetland and coastal vegetation are present north of Christchurch. Only a very small part (*c.* 1%) of Low Plains ED is protected. There appear to be few opportunities for further protection.

3.2 Site and environs

The site is located on the western rural fringe of Christchurch just north of State Highway One, between Templeton and Islington. Surrounding land use is mix of agricultural, residential, light industry, and recreational (Ruapuna Speedway and Templeton Golf Club, which are both sites of ecological significance; SES; Shadbolt 2015). The surrounding vegetation is nearly all exotic and what indigenous vegetation cover exists is mostly planted garden varieties. The site itself is almost completely flat except for two small undulations (running west-east), associated with historic river channels that once traversed this area of the plains. The underlaying geology of the site and environs is comprised of recent (Holocene) river gravel deposits from the Waimakariri River.

Based on the Black Map historical survey data from 1848-1870, the site and surrounding area was covered by grass and ferns (likely to be bracken), and was mapped as open plains. An old river bed is shown on the northern site boundary in the area is now occupied by the golf course.

3.3 Statutory context

3.3.1 The Fast Track Approvals Act

The Fast-track Approvals Act 2024 (**FTAA**) streamlines the consenting process for nationally and regionally significant development and infrastructure projects. The purpose of the FTAA 2024 is to *"facilitate the delivery of infrastructure and development projects with significant regional or national benefits".*

Under section 85 of the FTAA, the Panel may only decline an approval if, the panel formed the view that those adverse impacts are sufficiently significant to be out of proportion to the projects regional or national benefits, even after taking into account: any conditions that the panel may set in relation to those adverse impacts; and any conditions or modifications that the applicant may agree to or propose to avoid, remedy or mitigate offset, or compensate for those adverse impacts.

3.3.2 Resource Management Act

The Resource Management Act 1991 (RMA) is the principal legislation governing the use, development, and protection of natural and physical resources in Aotearoa New Zealand. The purpose of the RMA is to promote the sustainable management of natural and physical resources in a way that enables people and communities to provide for their social, economic, and cultural wellbeing while safeguarding the life-supporting capacity of air, water, soil, and ecosystems.

Under the RMA, territorial and regional authorities are required to identify and protect significant indigenous vegetation and significant habitats of indigenous fauna (section 6(c)), as matters of national importance. This is implemented through regional and district plans, which set rules and policies for the management of biodiversity and ecosystems. Section 31 of RMA requires territorial authorities to maintain indigenous biological diversity within their district. This provision mandates that territorial authorities must take an active role in protecting and preserving the diversity of indigenous species and ecosystems, ensuring that land use and development activities do not result in a net loss of biodiversity. It further compels authorities to consider biodiversity values when preparing and implementing district plans and consenting processes.

3.3.3 National Policy Statement for Indigenous Biodiversity

The objective of the National Policy Statement for Indigenous Biodiversity (NPS-IB, 2023) is to maintain indigenous terrestrial biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity.

Appendix 1 sets out the criteria for identifying significant indigenous vegetation or significant habitats of indigenous fauna that qualify a specific area as an SNA.

3.3.4 Canterbury Regional Policy Statement

The Canterbury Regional Policy Statement (CRPS, Chapter 9) sets out objectives and policies to halt the decline of, and restore or enhance Canterbury's ecosystems and indigenous biodiversity, as well as the protection of significant indigenous vegetation and habitats.

Areas of ecological significance in Canterbury are areas or habitats that meet one or more of the criteria listed in Appendix 3 of the CRPS. Areas identified as significant are to be protected to ensure no net loss of indigenous biodiversity or indigenous biodiversity values as a result of land use activities.

3.3.5 Wildlife Act

All indigenous lizards, most 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 Authorisation (WAA; also known as a wildlife permit) from the Department of Conservation (DOC). A permit must be obtained from the Department 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 were found to be at risk of disturbance and/or harm on-site.

4.0 Methods

4.1 Vegetation and habitats

Desktop survey

A desktop survey was undertaken to review historic survey maps (Canterbury black maps[1]), and historic and contemporary aerial images[2] to identify the historic and present landforms and vegetation cover on the site including those outside the study area. Other features of note on the site and surrounding area were also searched, including any SES's, waterways, wetlands and springs.

Site survey

A terrestrial vegetation survey of the study area was undertaken on 21 August 2024. Where possible observations were also made of properties within the site, but outside the study area. Binoculars were used for some observations to avoid electric fences, disturbance of livestock, and intrusion of property. All vegetation and associated habitat types were mapped and described broadly following the structural classes in (Atkinson, 1985). Field mapping was digitised onto aerial imagery using ArcGIS. All vascular plant species observed are listed in Appendix 1.

4.2 Lizards

Desktop survey

The Bioweb Herpetofauna database (Department of Conservation; accessed November 2024) was searched for lizard records within the last 20 years within a 20-kilometre radius of the site.

Site survey

Targeted lizard surveys have been undertaken across the proposed industrial development site. The following properties were included within the survey:

- 173 Pound Road.
- 38 Barters/570 Waterloo Road.
- 64,86, 94 Barters Road.
- 4, 22, 30 & 48 Hasketts Road.

[1] Canterbury Black maps (Trigonometrical and topographical survey of the districts of Mandeville and Christchurch 1850): https://mapviewer.canterburymaps.govt.nz/?webmap=0db87348adef4595a91994a3dc85cefe

[2] Canterbury Historic Aerial Imagery: https://apps.canterburymaps.govt.nz/CanterburyHistoricAerialImagery/

A total of 396 Artificial Cover Objects (ACOs) were placed in selected representative habitats across the site on 17 and 18 March 2025. These ACOs were left in place for a period of six weeks before the initial inspection, allowing for an appropriate 'settling in period' as recommended by Lettink and Monks (2012). This period enables lizards to become familiar with the ACOs and begin utilising them as part of their natural environment, thereby improving the likelihood of detection during subsequent checks.

4.3 Avifauna

A desktop assessment of avifauna within a two-kilometre radius of the proposed Pound Road industrial development footprint was conducted by searching the online database eBird. Records of indigenous and exotic bird species from January 2019 to March 2024 were collated.

4.4 Terrestrial invertebrates

The Global Biodiversity Information Facility (GBIF.org 2024[1]) was searched for 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, Athoracophoridae, and Insecta, to represent spiders, leaf-veined slugs, and insects 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. These were compared with vegetation and habitat on-site to judge the likelihood of each notable species occurring within the project area.

Notable species are locally endemic, known or suspected to be declining, particularly sensitive to habitat loss or predation by introduced mammals, or listed as nationally Threatened or At Risk in the New Zealand Threat Classification System (NZTCS). A notable species may or may not be protected under the Wildlife Act 1953 (less than 0.2% of indigenous invertebrate species are protected under the Wildlife Act).

5.0 Results

5.1 Vegetation and habitats

The study area is predominately covered in pasture and cropland, which is intersected and bordered by shelter belts and hedgerows (Figure 2). In total, six terrestrial vegetation habitat types and one aquatic habitat were identified in the study area. Desktop assessment also determined the same habitats were likely present in the wider site (outside of the study area). Terrestrial habitats were:

1. Exotic shelterbelt forest.
2. Indigenous hedgerow forest.
3. Ornamental plantings, gardens and dwellings.
4. Cocksfoot pasture grassland.
5. Farm buildings and debris.

[1] GBIF.org (26 September 2024) GBIF Occurrence Download https://doi.org/10.15468/dl.2yqtbe

6. Cultivated cropland.

The study area was also found to have one induced aquatic habitat which was assessed for vegetation and terrestrial fauna values (but not freshwater).

7. Pond and stock water race.

There may also be one additional habitat on-site. Access to this part of the site was unavailable at time of survey, but the presence of this habitat requires a field visit to confirm.

8. Induced wetland.

5.1.1 Exotic shelterbelt forest

Exotic shelterbelts are present around much of the study area boundary and some paddock margins. These shelterbelts are mostly formed by densely planted rows of single tree species including pine (*Pinus radiata*), macrocarpa (*Cupressus macrocarpa*.), eucalyptus species, Lebanese cypress (*Cedrus libani*) and poplars (*Populus nigra*), (Plate 1). The understorey beneath these shelterbelts varies considerably. Under dense 'box trimmed' pine and macrocarpa trees there is little but bare ground and needle duff, but under large un-trimmed trees there is a subcanopy of shrubs and scattered patches of ground cover vegetation (Plate 1). Subcanopy tree and shrubs include, tree lucerne (*Chamaecytisus palmensis*), elder (*Sambucus nigra*), and cherry (*Prunus* species) along with Ivy (*Hedera helix*). While common ground cover species include cocksfoot (*Dactylis glomerata*), couch (*Elytrigia repens*) and hedge mustard (*Sisymbrium officinale*).

Plate 1 – Exotic shelterbelt forest, box trimmed pines (left), and large uncut eucalyptus trees with subcanopy and understorey present (right).

Data Acknowledgment

Contains data sourced from the LINZ Data Service licensed for reuse under CC BY 4.0

Report: 7316
Ref: 11589
Client: NTP Development Holdings Limited
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Figure 2. Vegetation and habitats, Pound Road industrial development Templeton, Christchurch

0 100 200 m

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Scale:	1:4,250
Date:	12/05/2025
Cartographer:	FM
Format:	A3

5.1.2 Indigenous hedgerow forest

There are few small hedgerows scattered across the study area which are predominately formed by indigenous trees planted in rows. Tarata/lemonwood (*Pittosporum eugenioides*) is the most common tree planted in these hedgerows, but kohuhu (*Pittosporum tenuifolium*), akiraho (*Olearia paniculata*) and kāpuka (*Griselinia littoralis*) were also observed (Plate 2). Understorey vegetation (if present) consists of exotic grass and herb species.

5.1.3 Ornamental plantings, gardens and dwellings

There are five existing dwellings on the study area with associated gardens, ornamental plantings and hedges. These areas where not extensively investigated, but trees and shrubs observed included the exotic species camellia (*Camellia japonica*), rhododendron (*Rhododendron* species), ornamental cherry (*Prunus* species), silver birch (*Betula pendula*), and olive (*Olea europaea*). These areas were also where the highest diversity of indigenous species is found (although all planted), with trees including tawhairaunui/red beech (*Fuscospora fusca*), puahou/five finger (*Pseudopanax arboreus*), tī kōuka/cabbage tree (*Cordyline australis*), horoeka/lancewood (*Pseudopanax crassifolius*), kāpuka, kohuhu and tarata all common (Plate 3). Other commonly observed indigenous species include korokio (*Corokia cotoneaster*), kakaha (*Astelia fragrans*), karamu (*Coprosma lucida*) and harakeke (*Phormium tenax*). There were also two species with a national threat classification (de Lange *et al.*, 2018): wind grass (*Anemanthele lessoniana,* At Risk – Relict) and hakapiri/Chatham Island akeake (*Olearia traversiorum,* Threatened – Nationally Vulnerable).

Plate 2 – Indigenous hedgerow forest, with mature tarata/lemonwood trees.

Plate 3 – Ornamental plantings, gardens and dwellings habitat, with mature pepper tree (*Schinus molle*), foreground and indigenous border in background.

5.1.4 Cocksfoot pasture grassland

Grazed pasture covers a large part of the study area, with cocksfoot the most widespread and dominant pasture grass. In places pasture is grazed hard with exposed soil (Plate 4). Other exotic grasses and herbs commonly observed included couch, browntop (*Agrostis capillaris*), clovers (*Trifolium* species), dandelion (*Taraxacum officinale*), creeping butter cup, dock (*Rumex* species) and plantains (Plantago *species*). The winter timing of the survey made grass identification difficult and a number of common annual pasture weeds that would normally be expected were not observed.

Plate 4 – Cocksfoot pasture grassland, grazed hard with exposed soil (left) and longer ungrazed grass (right).

5.1.5 Farm buildings and debris

This habitat is associated with farm building and waste areas of the study area where old machinery and materials are stored and left to decay. Around the building themselves the habitat is largely made up of impermeable surfaces, but rank grass and weeds are still present on the margins and grow in abundance around the debris (Plate 5).

5.1.6 Cultivated cropland

The property 173 Pound Road (Lot 3 DP 33334), is currently market garden farmland. At the time of the survey most of the property was freshly cultivated cropland, with exotic grass around the margins being the only vegetation present (Plate 6).

Plate 5 – Farm buildings and debris habitat, with rank grass and weeds growing through old machinery

Plate 6 – Freshly cultivated cropland, 173 Pound Road.

5.1.7 Pond and stock water race

A Selwyn District Council (SDC) stock water race, which is part of the 'Paparua Water Race scheme' enters the site at 94 Barters Road and flows north along the boundary of 4 and 14 Hasketts Road[1] before flowing east through the middle of the property at 86 Barters Rd (Lot 1 DP 38418) and along the southern boundary of 173 Pound Road. The reach within 94 Barters Road is mapped as 'in service'[2], and was holding water during site visits (although length of wetted channel varied). The race within this reach has also been incorporated into an ornamental pond and waterway feature (Plate 7). The eastern section of the race (within 86 Barters Rd and 173 Pound Road) was dry during site visits and appears to be disused (Plate 7). The area of wetted channel (from the pond to the road) was the only section with any aquatic associated vegetation present, this included water forget-me-not (*Myosotis laxa*), blue sweet grass (*Glyceria* species), and celery-leaved buttercup (*Ranunculus sceleratus*). Indigenous pūkio (*Carex secta*) and harakeke were also present but most likely planted.

Plate 7 – Dry swale channel cutting through the middle of the property at 86 Barters Rd.

Plate 8 – Ornamental pond (left) and stock water race flowing into site on property at 94 Barters Road (right).

[1] These properties are within the site, but were not surveyed, due to access restrictions.

[2] Refer: https://ecanmaps.ecan.govt.nz/portal/home/webmap/viewer.html?layers=3b13357a5cb443dba38ec9fb88e88270

5.1.8 Induced wetland

No natural wetland habitat (as defined in the National Policy Statement for Freshwater Management, NPS-FM; 2020) was observed within the surveyed areas of the site. Some hydrological indicators of potential wetland habitat (i.e. surface water, soil saturation, and sparsely vegetated depressions) were identified on arial imagery within the property at 111 Pound Road, but they have not been investigated due to access being constrained.

There is no history of wetlands or springs on this site and no obvious signs of wetlands in early aerial imagery (that dates from 1940s). Therefore, these hydrological indictors are likely the result of livestock soil compaction and farm irrigation and/or spill from the stock water race. With this scenario, there is still the potential that induced wetland habitat could have developed given that these hydrological indicators have been occurring for at least 20 years.

A site visit is required before this habitat can be confirmed.

5.2 Flora

Twenty indigenous and 70 exotic vascular plants species were recorded during the survey (Appendix 1). However, only one of the 20 indigenous species was naturally occurring (fireweed, *Senecio glomeratus*), the rest were observed within planted gardens and borders. However, several of these species were observed to be self-seeding or naturalising on the site.

5.2.1 Threatened or At-Risk species

Chatham Island akeake (*Olearia traversiorum* Threatened – Nationally Vulnerable) and wind grass (*Anemanthele lessoniana,* At Risk – Relict), were both observed planted in gardens or associated hedges and borders. These were not naturally occurring and as planted species they are not considered 'Threatened' in the in the context of this site. Additionally, the Chatham Island akeake may have been a cultivar, bred for ornamental planting. No other Threatened or At-Risk indigenous plant species were recorded in the study area and based on observations and desktop assessments it is considered highly likely this would be same for the wider site.

5.2.2 Taonga plants

Ornamental plantings and gardens in the study area contain species listed as taonga (Schedule 97 of the Ngāi Tahu Claims Settlement Act 1998), but there are no naturally occurring taonga plants in the study area, and very likely the site.

5.2.3 Pest plants

Four plant species recorded in the study area are identified as either 'Pest' or Organisms of Interest (OoI) under the Environment Canterbury Regional Pest Management Plan (RPMP; 2018-2038), shown in Table 1. The conifers recorded in the study area were planted and did not appear to be wilding, therefore not considered pest plants under the RPMP. Silver birch (*Betula pendula*; OoI), and holly (*Ilex aquifolium*; OoI), both planted within gardens in the study area, were not observed to be spreading and have not been included in Table 1. Gardens in the study area were not extensively surveyed and other pest plants could be present, in these area as well as the wider site.

Table 1 – Environment Canterbury RPMP (Pest) and Organisms of Interest (OoI), observed to be naturalised and spreading in the study area.

Species	Common Name	Pest Classification from RPMP
Chamaecytisus palmensis	tree lucerne	OoI
Conium maculatum	hemlock	OoI
Marrubium vulgare	horehound	OoI
Rubus fruticosus	blackberry	OoI
Ulex europaeus	gorse	Pest

5.3 Lizards

5.3.1 Desktop assessment

A desktop assessment found six lizard species within 20 kilometres of the site, including southern grass skink (*Oligosoma* aff. *polychroma* Clade 5; At Risk – Declining; Conservation status as per (Hitchmough *et al.* 2021), McCann's skink (*Oligosoma maccanni*; Not Threatened), Waitaha gecko (*Woodworthia* cf. *brunnea*; At Risk – Declining), jewelled gecko (*Naultinus gemmeus*; At Risk – Declining), Canterbury grass skink (*Oligosoma* aff. *polychroma* Clade 4; At Risk – Declining) and Canterbury spotted skink (*Oligosoma lineoocellatum*; Threatened - Nationally Critical) (Table 3).

5.3.2 Site survey results

Targeted lizard surveys were completed across the industrial development site between 24 April and 8 May 2025 (Table 2). Southern grass skink and their sign were detected in habitats described above at the following addresses:

Table 2 – Lizard survey results, effort and weather conditions across the industrial development site

Date	Weather on Survey Date	Activity & effort	Properties surveyed	Species detected
24-Apr-25	Sunny, cool, 59.6% r.h., 14.9°C, light SE wind, 7/8 cloud cover - sunny, warm, 63.7% r.h., 16.9°C, no cloud cover	259 ACO checks	[redacted]	Nothing detected
				9 southern grass skink sighted 1 southern grass skink caught
				Nothing detected
				1 southern grass skink caught Skink scat detected on an ACO
				Skink scat detected on an ACO
28-Apr-25	Sunny, warm, 63.3% r.h., 20.3°C, still/calm - 63.7% r.h., 23.2°C, 2/8 cloud cover	286 ACO checks		1 southern grass skink sighted
				10 southern grass skink sighted 1 southern grass skink caught
				Nothing detected
				Nothing detected
				Nothing detected
5-May-25	Sunny, warm, 55.3% r.h., 15.4°C, light NE breeze, no cloud cover - 77,5% r.h., 15.2°C, cloud cover	293 ACO checks		Nothing detected
				Nothing detected
				Nothing detected
				Nothing detected
				Mouse under an ACO
				Nothing detected
				Nothing detected
				1 southern grass skink sighted

Date	Weather on Survey Date	Activity & effort	Properties surveyed	Species detected
6-May-25	Overcast, 2/8 cloud cover, 16.6°C, 67.7% r.h., light NE breeze - Sunny, warm, 1/8 cloud cover, 16.0°C, 70.4% r.h.	394 ACO checks	173 Pound Road (Including crop paddock)	1 southern grass skink sighted
			38 Barters/570 Waterloo Road	3 southern grass skink sighted 1 southern grass skink caught
			64 Barters Road	Nothing detected
			86 Barters Road	3 southern grass skink sighted
			94 Barters Road	Nothing detected
			4 Hasketts Road	1 southern grass skink sighted
			22 Hasketts Road	Nothing detected
			30 Hasketts Road	Nothing detected
			48 Hasketts Road	1 southern grass skink sighted 1 southern grass skink caught
7-May-25	Sunny, warm, 47.4% r.h., 21.4°C, no cloud, still/calm - 23.0°C, 52.8% r.h., still/calm, no cloud	293 ACO checks, 185 ACOs removed	173 Pound Road (Including crop paddock)	Nothing detected
			64 Barters Road	Nothing detected
			86 Barters Road	Nothing detected
			94 Barters Road	Nothing detected
			4 Hasketts Road	Nothing detected
			22 Hasketts Road	Nothing detected
			30 Hasketts Road	Nothing detected
			48 Hasketts Road	2 southern grass skink sighted
8-May-25	Sunny, warm, 71.0% r.h., 20.6°C, 4/8 cloud cover, still/calm - 22°C, 44.8% r.h., 2/8 cloud cover, NE breeze.	209 ACO checks, 209 ACOs removed	4 Hasketts Road	Nothing detected
			22 Hasketts Road	Nothing detected
			30 Hasketts Road	1 southern grass skink caught
			48 Hasketts Road	1 southern grass skink sighted
			38 Barters Road/570 Waterloo Road	3 southern grass skink caught 4 southern grass skink sighted Skink scat on an ACO,
	Temperature range: 14.9°C - 23.2°C	**1, 734 ACO checks**		**8 southern grass skink caught** **37 southern grass skink sightings**

5.3.3 Lizard values

Of the species recorded in the desktop assessment, only southern grass skink were detected at the site (Table 3). This species typically inhabits modified environments, including agricultural areas, where there is a complex of rank grass, fence lines, unmanaged hedgerows and woody or anthropogenic debris. Further details, including mapping of lizard habitat will be provided in the Lizard Management Plan (LMP).

Table 3 - 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 within that area. Records older than 20 years were excluded from the database search. Conservation status as per (Hitchmough *et al*. 2021).The likelihood of occurrence for each species is given based on their known habitat preferences and distribution in the area and surrounds.

Scientific name	Common name	Conservation status	Record distance (km)	Year of record	Preferred habitats	Likelihood of occurrence
Oligosoma aff. *polychroma* Clade 5	Southern grass skink	At Risk-Declining	1.1	2020	Prefers damp or well vegetated habitats such as rank grasslands, wetlands, stream/river edges, and gullies.	**Presence confirmed** (through site surveys)
Oligosoma maccanni	McCann's skink	Not Threatened	14.4	2017	Open habitats- dry rocky environments such as rock outcrops, and montane grassland.	Unlikely
Woodworthia cf. *brunnea*	Waitaha gecko	At Risk - Declining	14.1	2020	Scrub, forest, creviced rock outcrops, rocky scrub, boulder beaches, river terraces, scree, talus, and boulderfield.	Highly unlikely
Naultinus gemmeus	Jewelled gecko	At Risk - Declining	14.4	2020	Scrub, forest and tussockland. Often trees and shrubs like beech, mānuka, kānuka, mingimingi, matagouri, snow tussock and other dense vegetation.	Highly unlikely
Oligosoma aff. *polychroma* Clade 4	Canterbury grass skink	At Risk – Declining	12.0	2018	Lowland/montane shrublands grasslands, screes, talus slopes and rocky or boulder areas.	Highly unlikely
Oligosoma lineoocellatum	Canterbury spotted skink	Threatened - Nationally Critical	9.0	2005	Grassland, duneland, boulder beaches, scrub, tussockland, flaxland, edges of forest, rocky areas, scree, herbfield, fellfield, stony riverbeds and terraces.	Highly unlikely

The remaining lizard species identified in the desktop assessment were not detected on site, and are considered unlikely to occur. McCann's skink commonly inhabit highly modified areas; but they are infrequently encountered on the low plains. Therefore, McCann's skink are unlikely to be present within the site.

Due to the habitat quality and extent of modification within the site, Waitaha gecko, jewelled gecko and Canterbury spotted skink are highly unlikely to be present. Waitaha gecko typically inhabit river terraces and areas with rocky outcrops; and jewelled gecko typically inhabit areas of indigenous scrub, shrubland and forest. Given these habitat types are not present within the site, it is highly unlikely they will be present. Canterbury spotted skink occupy a wide range of habitats, some of which are present within the site. However, given their threat status and the extent of modification within the site, it is highly unlikely that this species will be present.

Canterbury grass skink observations are from north of the Waimakariri River and are therefore highly unlikely to be present within the site given its range does not extend south of the Waimakariri River. All species considered unlikely to be present will not be considered further in this report.

5.4 Avifauna

The eBird desktop assessment identified 29 bird species within a two-kilometre radius of the proposed Pound Road footprint, including 14 indigenous and 15 exotic bird species (Table 4). This radius included agricultural and urban land.

Two indigenous species in the eBird desktop assessment are classified as At Risk, including Nationally Declining pohowera/banded dotterel (*Charadrius bicinctus bicinctus*) and tarāpunga/red-billed gull (*Chroicocephalus novaehollandiae scopulinus*). Tōrea/South Island pied oystercatcher (*Haematopus finschi*, At Risk – Declining) was not identified in the eBird assessment. It is likely that this species could be present within the site footprint.

During the site survey, thirteen species were observed within the site, including three Not Threatened species, pūtangitangi/paradise shelduck (*Tadorna variegata*), spur-winged plover (*Vanellus miles novaehollandiae*), and an overflying matuku moana/white-faced heron (*Egretta novaehollandiae*) (Table 4). Other noteworthy species observed were pūkeko (*Porphyrio melanotus melanotus*) and grey warbler (riroriro*; Gerygone igata*)

Table 4 – Desktop observations recorded on the eBird website within two-kilometre radius of the proposed Pound Road re-zone footprint, between January 2019 to March 2024. Threat classifications follow (Robertson *et al*. 2021).

Common Name(s)	Scientific Name	Threat Classification	Likelihood of presence
Indigenous			
Pohowera/banded dotterel	*Charadrius bicinctus bicinctus*	At Risk – Declining	Unlikely
Tarāpunga/red-billed gull/	*Chroicocephalus novaehollandiae scopulinus*	At Risk – Declining	Unlikely
Tōrea/South Island pied oystercatcher	*Haematopus finschi*	At Risk – Declining	Likely
Grey duck – mallard hybrid	*Anas superciliosa × platyrhynchos*	Not Threatened	Likely
Kāhu/swamp harrier	*Circus approximans*	Not Threatened	Likely
Karoro/Southern black-backed gull	*Larus dominicanus dominicanus*	Not Threatened	Highly likely
Kōtare/New Zealand kingfisher	*Todiramphus sanctus vagans*	Not Threatened	Possible
Matuku moana/white-faced heron	*Egretta novaehollandiae*	Not Threatened	Seen
Pīwakawaka/South Island fantail	*Rhipidura fuliginosa fuliginosa*	Not Threatened	Likely
Pūkeko	*Porphyrio melanotus melanotus*	Not Threatened	Seen
Pūtangitangi/paradise shelduck	*Tadorna variegata*	Not Threatened	Seen
Riroriro/grey warbler	*Gerygone igata*	Not Threatened	Seen
Spur-winged plover	*Vanellus miles novaehollandiae*	Not Threatened	Seen
Tauhou/silvereye	*Zosterops lateralis lateralis*	Not Threatened	Likely
Warou/welcome swallow	*Hirundo neoxena neoxena*	Not Threatened	Likely

Common Name(s)	Scientific Name	Threat Classification	Likelihood of presence
Exotic			
Australian magpie	*Gymnorhina tibicen*	Introduced and Naturalised	Seen
California quail	*Callipepla californica*	Introduced and Naturalised	Possible
Chaffinch	*Fringilla coelebs*	Introduced and Naturalised	Seen
Common pheasant	*Phasianus colchicus*	Introduced and Naturalised	Seen
Common redpoll	*Acanthis flammea*	Introduced and Naturalised	Likely
Dunnock	*Prunella modularis*	Introduced and Naturalised	Seen
Eurasian blackbird	*Turdus merula*	Introduced and Naturalised	Seen
Goldfinch	*Carduelis carduelis*	Introduced and Naturalised	Highly likely
Greenfinch	*Chloris chloris*	Introduced and Naturalised	Highly likely
House sparrow	*Passer domesticus*	Introduced and Naturalised	Seen
Rock pigeon	*Columba livia*	Introduced and Naturalised	Highly likely
Skylark	*Alauda arvensis*	Introduced and Naturalised	Seen
Song thrush	*Turdus philomelos*	Introduced and Naturalised	Seen
Starling	*Sturnus vulgaris*	Introduced and Naturalised	Seen
Yellowhammer	*Emberiza citrinella*	Introduced and Naturalised	Highly likely

A single observation of two pohowera/banded dotterel has been recorded during an eBird survey within 700 metres from the site. However, the location of the observation is not in typical habitat of pohowera/banded dotterel. Pohowera/banded dotterel presence within the site is unlikely.

Although not recorded in the desktop assessment, tōrea/South Island pied oystercatcher (*Haematopus finschi*, At Risk – Declining) may forage within damp or ploughed ground and breed within the short pasture grass on the site. It is possible that tarāpunga/red-billed gull may also may forage within ploughed ground within the short pasture grass on the site. However, they will not breed on site.

5.5 Terrestrial invertebrates

5.5.1 Desktop assessment

The GBIF search retrieved records of 178 terrestrial invertebrates that met the search terms. The invertebrate fauna was characterised mainly by spiders, butterflies and moths. Of the 178, 166 had been identified to a level at which they could be assessed. The invertebrate fauna was a mixture of indigenous and exotic species. Notable species are presented in Table 5.

Table 5 – Notable invertebrates recorded within five kilometres of the site.

Species name	Common name	Threat Classification	Notability	Likelihood of being on-site
Orthodera novaezealandiae	New Zealand praying mantis	At Risk – Declining (Buckley *et al.* 2012)	Declining due to competition from an introduced mantis species	Highly likely
Megadromus antarcticus	Ground beetle	Not assessed	Short-range endemic, may be vulnerable to predation	Highly likely
Zizina oxleyi	New Zealand blue butterfly	Not Threatened (Hoare *et al.* 2017)	Believed to be declining (Patrick *et al.* 2012)	Possible

Species name	Common name	Threat Classification	Notability	Likelihood of being on-site
Mecodema moniliferum	Ground beetle	Not assessed	Short-range endemic, may be vulnerable to predation	Unlikely
Vanessa gonerilla	Kahukura/New Zealand red admiral butterfly	Not assessed	Believed to be declining (Sanger, 2023)	Possible
Cantuaria sp.	Trapdoor spider	Unknown	Local endemics, vulnerable to habitat loss.	Highly likely

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.

5.5.2 Invertebrate habitat values

The habitat available on-site, which is highly-modified, is generally of low quality for invertebrates. Available habitat is also common and widespread throughout suburban areas and lifestyle blocks of Canterbury. Three habitat factors are present which may support notable invertebrates:

1. **Medium-stature vegetation**. Shrubs and bushes, including weedy and garden species such as blackberry, provide habitat for New Zealand praying mantis.
2. **Rocks and leaf litter.** Ground beetles shelter under rocks and in leaf litter, and hunt on the surface of these habitats.
3. **Leguminous plants**. Clover and other legumes provide food for New Zealand blue butterfly. However, indigenous species are preferred.
4. **Sunny open stony areas**. New Zealand blue butterfly likes to bask in open stony areas. Other invertebrates also bask in stony areas, and predatory species use the stones as hides for ambush.
5. **Nettles.** All nettle species provide a larval food source for indigenous admiral butterflies (*Vanessa* spp.). Indigenous nettle species are more valuable to kahukura/New Zealand red admiral butterfly, but exotic nettles may also be used.
6. **Clay banks.** Clay banks provide habitat for trapdoor spiders.

5.6 Sites of ecological significance

Two sites of ecological significance were found in the desktop assessment. These are:

- Templeton Golf Course
- Ruapuna Speedway

These sites are significant because they contain degraded vegetation representative of the Low Plains Ecological District including Threatened and/or locally uncommon plant (*Carmichaelia corrugata* and *Geranium retrorsum*; both Threatened – Nationally Vulnerable) as well as locally uncommon invertebrate species. Remnant dryland grassland communities exist on the Templeton Golf Course and the south east corner of the Ruapuna Speedway, together with kowhai (*Sophora microphylla*) and prostrate kowhai (*S. prostrata*). These species are isolated and scattered across the golf course and support a range of insects that are solely hosted by the plants.

None of these species were detected at the project site during the site assessment, nor were habitats for these species present within the proposed industrial development. It is not expected that the industrial development will have an adverse effect on these sites.

6.0 Ecological values

6.1 Site and study area values

Vegetation on the site is highly modified, the land has been cleared of any remnant indigenous vegetation and planted/over sown with exotic pasture grasses, crops and trees. The one naturally occurring indigenous plant species (fireweed) recorded in the study area is common throughout Canterbury and throughout New Zealand, including the major off shore islands, and is found in Australia. It has been described 'as a weedy species of disturbed ground' (de Lange, 2024) and is considered to be of low ecological value. Apart from two hedgerows planted with indigenous tree and shrub species, the vegetation and habitats are completely dominated by exotic species and all have low ecological value as vegetation.

Exotic vegetation in the study area nevertheless provides habitat for indigenous fauna, including bird species and a significant population of At Risk lizards. These habitat values are unlikely to be high, given these are all highly modified habitats dominated by exotic species.

Visual observations and desktop analysis found that similar vegetation and habitat values are (or highly likely to be) present in the wider site, outside of the study area (refer Figure 1).

6.2 Ecological significance assessment

An assessment of the ecological significance of the site has been made based on the results of the study area field investigations and desktop surveys, which covered the whole site.

We consider the site is significant under ecological significance criteria in both the Canterbury Regional Policy Statement (CRPS, Appendix 2) and the National Policy Statement for Indigenous Biodiversity (NPS-IB, Appendix 3). This is driven by three species: southern grass skink (confirmed on site), New Zealand praying mantis (considered highly likely to occur on site although surveys have not been undertaken) and tōrea/South Island pied oystercatcher (considered likely to occur on site), all of which are nationally classified as At Risk.

- The site is significant under both the CRPS and NPS-IB due to the confirmed presence of southern grass skink. An exclusion is made for At-Risk species that are widespread in three other regions. However, southern grass skink has a more restricted range. We provide additional detailing regarding the distribution of values amongst habitats within the site in the appendices. We additionally note:
- At Risk southern grass skink are present in most habitats. However, particular areas of these habitats have higher values, which will be detailed in the LMP. For example, while the cocksfoot pasture grassland is indicated as habitat for the species, the majority is very well grazed and thus not good habitat. Instead, lizard populations will be densest in rank grass along fence lines and adjacent to hedgerows.
- The indigenous hedgerow forest, ornamental plantings, gardens and dwellings, farm buildings and debris, and (dry upper section) of drainage channel are potential habitats for At Risk New Zealand praying mantis. Similarly to lizards, these populations will be concentrated in complex habitat.
- The cocksfoot pasture grassland and cultivated cropland habitat may intermittently provide habitat for At Risk tōrea/South Island pied oystercatcher to forage and breed, although the latter is unlikely with current ongoing high rotation cropping and cultivation of the land. These habitats are common in the surrounding landscape and thus the removal of paddocks at this site does not require particular consideration. However, while tōrea are on-site, they require protection,

particularly if breeding. Tōrea/South Island pied oystercatcher are specified highly mobile fauna under Appendix 2 of the NPS-IB. The NPS-IB explicitly considers that the adverse effects of new subdivision, use, and development on highly mobile fauna areas must be managed in order to maintain viable populations of specified highly mobile fauna across their natural range (Policy 15), and this includes areas that are used by the species intermittently.

7.0 Assessment of potential adverse effects

7.1 Overview

The proposed industrial development and associated works may affect the ecology of the site due to requirements for the following activities:

- Earthworks.
- Shading from buildings.
- Introduction of new surfaces.
- Machinery and vehicle movement around site – both during development and ongoing.
- Construction, such as buildings, poles, service roads or fences.
- Ongoing disturbance.

The site is currently subject to grazing, crop farming, and residential activity. Potential ecological effects resulting from the change in land use could include:

Vegetation and flora:

- Microclimatic changes, resulting in changes to vegetation.
- Loss of At Risk or Threatened plants.
- Modifications of wetland habitat (if confirmed present).
- Potential introduction of novel pest plants.

Avifauna:

- Loss of avifauna habitat.
- Disturbance to indigenous breeding avifauna during construction.
- Death or injury to indigenous breeding avifauna during construction.

Lizards:

- Accidental injury/death/displacement.
- Disturbance during earthworks.
- Habitat loss and fragmentation.
- Breeding Failure/Behavioural effects.

Invertebrates:

- Loss of invertebrate habitat.
- Fragmentation of invertebrate habitat.
- Mortality and disturbance of invertebrates.

- Reduction in invertebrate habitat quality due to shading.

7.2 Vegetation and flora

Microclimatic changes

The site is currently dominated by low-stature vegetation with sparse hedgerows. Industrial development will likely result in large building construction, which will impose shading on undeveloped parts of the site. Additionally, the introduction of large concreted areas results in increased daytime temperatures, particularly in the summer. Both changes to microclimate will have an impact on the floristic composition of the site and adjacent properties. However, as the site is dominated by pasture species with only one naturally occurring indigenous species, microclimatic changes will likely result in **negligible adverse effects.** Nevertheless, this effect is discussed as changes to vegetation can affect fauna.

Loss of At Risk or Threatened plants

The At Risk and Threatened plants present on the site are found in ornamental gardens, where they have been planted by the property owners. Therefore, they are not considered Threatened or At Risk in this context and loss of these individuals would result in **no adverse effects.**

Loss of potential induced wetland habitat

The potential induced wetland at the site (at 111 Pound Road), if present, is protected under the NPS-FM and of ecological value. As the habitat has not yet been assessed, the level of effect cannot be ascertained.

Potential introduction of novel pest plants

The development of the site into an industrial zone will require transport of roading aggregate, soil or fill for construction. There is the potential that these materials will be contaminated with seeds of pest plants and ecological weeds which are not already present at the site, particularly if roading materials are brought in from outside the area. This, combined with clearance of existing vegetation, would accelerate the estblishment of undesired species, on nearby propperties, or areas of the site that are not actively managed. However, the majority of pest plants that could thrive at the site are already present on the Canterbury Plains, particularly around Ōtautahi/Christchurch where opportunities for garden escapees is high. We consider that this effect could have **a minor adverse effect**, although the level iof effect could be lower depending on the species introduced.

7.3 Avifauna

Habitat modification or loss

The development of the site may affect various indigenous species including tōrea/South Island pied oystercatcher. However, the overall effect will be **minor** as more suitable habitat is available within the surrounding area.

Displacement of breeding avifauna

Disturbance from construction activities includes noise, vibration, machinery and human activity. This disturbance is likely to cause birds the change their behaviour and abandon or temporarily avoid the site (and surrounding area) during the breeding season. This leads to behavioural and physiological responses which are presumed to be costly, and can lead to changes in habitat use,

parental care, reproductive failure and may have long-lasting effects on populations (McVeagh and John, 2020). Without mitigation, this effect is likely to be **more than minor**.

Death or injury during construction

If birds are breeding within the site during development, these birds will not only be subject to construction disturbance but also adults, chicks or eggs maybe injured or killed by ground clearance and machinery. Without mitigation, this effect is likely to be **more than minor**.

7.4 Lizards

Accidental injury/death/displacement

The proposed industrial development will result in the permanent displacement, injury and death of lizards within the construction footprint. This effect is likely to be **more than minor** without mitigation.

Disturbance during earthworks

Disturbance during construction to lizards includes dust, vibration, and noise. This disturbance is likely to disrupt normal behaviour, including social dynamics in lizard populations adjacent to the construction footprint as a result of construction activity. Across the whole site, this effect is likely to be **more than minor** without mitigation.

Habitat loss and fragmentation

Lizard habitat is found throughout the site and loss of habitat at this site cannot be avoided. This will result in permanent, and cumulative ongoing habitat loss for indigenous lizards at this site and fragmentation of lizard habitats within the local landscape. Fragmentation results in a disruption of metapopulation dynamics, as well as reducing local genetic diversity. Both effects can lead to more vulnerable local lizard populations. This effect is particularly notable when considering the cumulative effect of numerous developments within the Canterbury region. This effect is likely to be **minor** without mitigation.

Breeding Failure/Behavioural effects

The proposed indistrial development and associated earthworks may lead to temporary effects on behaviour of lizards and/or social interactions, such as increased stress, leading to reduced population functionality, such as poor breeding and low population recruitment. This effect is likely to be **less than minor** without mitigation.

7.5 Invertebrates

Loss of invertebrate habitat

Habitat for notable invertebrates has been identified within the site. The proposed development will remove a small amount of habitat that may support notable invertebrates at this site. Without mitigation this effect would be **minor** if the New Zealand praying mantis is present.

Fragmentation of invertebrate habitat

Removing invertebrate habitat reduces the ability of dispersal-limited species such as ground beetles and trapdoor spiders to move between habitat patches and expand their populations,

effectively reducing the range of these species and increasing the isolation of their populations. Without mitigation, this effect would potentially be **minor.**

Mortality and disturbance of invertebrates

All earthworks will cause the removal and destruction of any notable invertebrates present on the surface of the ground during works. Vehicle strikes will also cause the death of invertebrates. Dust and vibrations associated with earthworks are likely to disturb insects and affect their behaviour. Little has been published on the effects of dust on invertebrates, but dust may cause injury from abrasion and/or blocking of external breathing apparatus.

Vehicle strikes, vibration, and dust from ongoing maintenance works may affect invertebrate populations near newly-formed roads and vehicle accessways. Without mitigation, this effect would potentially be **minor**.

Reduction of habitat quality due to shading

High quality habitats within the site could be shaded out due to site development or affected by increased temperatures. Shading has the double-edged effect of both reducing habitat quality through a gradual shift in vegetation composition and structure, and reducing sunlight availability for basking species. The creation of shaded areas is likely to benefit the New Zealand blue butterfly., by providing opportunities for thermal regulation, and supporting healthier and longer-lasting host plants, particularly during dry periods. This effect is likely to have **less than minor** adverse effects.

8.0 Measures to avoid, remedy, and/or mitigate potential effects

8.1 Vegetation

Biosecurity protocols

During site development, ensure all equipment and PPE is cleaned thoroughly before entering or leaving the site, to minimise the introduction of novel pest plant species. Additionally, source building materials locally where possible, to avoid introducing pest plants that have not yet established in the area.

Potential wetland avoidance

The potential induced ephemeral wetland at 111 Pound Road requires investigation and potential delineation. This assessment will both confirm whether the area qualifies as a wetland, and if so, map its extent. If the wetland is confirmed absent, then no mitigation is required. If present, advice should be provided by a suitably qualified ecologist regarding the management of effects on this habitat in line with the effects management hierarchy.

Until this investigation is undertaken, the 111 Pound Road property should not be developed. Site investigation of surrounding properties and analysis of current and historic aerial imagery indicates that the area is not hydrologically connected with the remainder of the site. Therefore, no adverse effects on any potential wetland habitat are expected from developments occurring on other properties within the site.

Buffering

A three-metre building setback is proposed for the lots within the industrial development adjoining the boundary of the Templeton Golf Course, in order to buffer the SES from the development. One tree will be planted for every ten metres of boundary. We recommend that the trees selected are sourced from the Low Plains Ecological District (including kōwhai), which require minimal maintenance and provide visual aesthetic. Eco-sourced trees will provide additional habitat for locally uncommon invertebrates, and provide buffering and connectivity to the SES. Native trees from outside of the ED should not be considered, as they may have genetic influence over the SES.

8.2 Avifauna

Avoidance of breeding season or breeding individuals

The proposed development footprint is to be developed mostly in grassland of various types. Although readily available in the surrounding areas, the disturbance will affect any breeding birds on site if construction work occurs during the breeding season. Construction activities, including earthworks, noise, vibration, machinery and human activity, will disturb breeding birds on site.

Construction activities during the breeding season (August – February) are likely to injure breeding birds or kill chicks and eggs. Ideally, as much construction work as possible should occur outside the bird breeding season. However, given the size of the site, it is inevitable that some of the construction will occur during the breeding season, and therefore a preconstruction survey by a suitably qualified ecologist is required (typically undertaken 8 days or less prior to the commencement of works). If breeding birds are identified, then an avifauna management plan will need to be prepared. This will include setback details and any mitigation measures.

8.3 Lizards

Avoid high and moderate-quality lizard habitats

Avoidance of high and moderate-quality habitats should be the most important measure considered for the mitigation of effects on lizards at the site. High and moderate-quality habitat areas could provide the basis for protected areas and ongoing enhancement.

Project design that includes corridors

Corridors of lizard friendly habitat could also be created within the site to provide connectivity for species across the wider site, and to link habitats, both of high and low quality. Some habitat enhancement within lizard corridors could also be undertaken.

Lizard Management Plan (LMP)

A LMP is currently being prepared for the site, in order to address potential adverse effects on lizards from subsequent site development. The LMP will include the following measures to manage adverse effects:

- Avoidance of habitats.
- Remediation of areas within the development site including:
  - A site habitat plan.
  - Lizard appropriate indigenous plant species to include in amenity plantings and habitat areas.
  - Additional beneficial features such as wood or rock stacks.
- Salvage and relocation (within site or offsite).

- Enhancement at the release site (including pest control, planting and/or habitat enrichment).
- Ongoing monitoring.

8.4 Terrestrial invertebrates

Avoid high and moderate-quality invertebrate habitat

Areas of high habitat quality such as hedgerows and shelterbelts should be avoided by works where possible. Even small patches of high-quality habitat are valuable to invertebrates. These areas are likely to also be valuable to other taxa, such as vegetation and lizards.

Habitat restoration

Areas of invertebrate habitat that are avoided by works should be enhanced by planting indigenous vegetation, creating stacks of rocks and/or logs or twigs, and protecting the areas from further development.

Vegetation planted as part of landscaping and aesthetic improvement of the site should be indigenous. Shrubs, sedges and grasses all provide good quality habitat for invertebrates. Any other areas of the site that are not being directly developed should also be enhanced by planting and creating log or rock stacks.

Habitat restoration for invertebrates can be carried out in conjunction with habitat restoration for vegetation and lizards, as many aspects of restoration are likely to benefit several taxa.

Project design that includes corridors

Areas that are to be avoided and/or enhanced and restored for invertebrates should preferably be connected physically with each other, or form connections with larger areas of habitat. This will provide connectivity for invertebrates across the wider site. Preference should be for habitats of similar types to be adjacent to each other, as different species assemblages will inhabit each habitat type. Improving habitat connectivity for invertebrates will also benefit other taxa, such as lizards, and can be undertaken in conjunction with creating lizard habitat corridors.

Dust management

Managing dust will avoid its impact on indigenous invertebrates. Management measures could include:

- Using water trucks to dampen dusty tracks before and during use.
- Implementing and enforcing speed limits. The speed limits should be decided based on dust levels caused by vehicles moving at different speeds. Speed limits will also reduce death from vehicle strikes.
- Avoiding work during particularly dry weather if work sites cannot manage dust using other methods.

Predator control

Predator control throughout the site, through implementation of a pest mammal management plan designed by a suitably-qualified ecologist, would provide benefits for terrestrial invertebrates by reducing the risk of predators eating invertebrates and their habitat. Mouse, rat and hedgehog control would be most beneficial, particularly mouse control in enhanced habitat patches. This would also benefit lizards.

Retaining and stacking removed vegetation on-site

Any shrubs that are removed from the site during vegetation clearance should be stacked. Trees should be cut into log sections approximately 50 cm long and stacked in areas set aside for restoration or enhancement. Vegetation stacks should be placed in areas that are being enhanced for invertebrates. This will not only convert cleared vegetation into invertebrate habitat, but also give invertebrates that were in cleared vegetation a chance to move into suitable enhanced nearby habitat where otherwise they would likely have died.

9.0 Summary of ecological effects

The types and levels of ecological effects on indigenous biodiversity if the mitigation measures provided in this report are appropriately implemented is presented in Table 6. None of these effects are expected to occur at either SES found nearby to the proposed industrial development. A setback between the industrial development and the SES may provide a net-gain. Accurate prediction of the level of effects with mitigation in place is difficult. Table 6 gives an indication of how effects can be reduced significantly with appropriate and effective mitigation.

Table 6 – Ecological effects following implementation of appropriate and effective mitigation.

Effect	Level of Adverse Effect Without Mitigation	Level of Adverse Effect With Mitigation
Microclimatic changes	Negligible	Negligible
Loss of At Risk or Threatened plants	None	None
Setback planting	None	Net-gain
Loss of potential induced wetland habitat	*Not assessed*	
Risk of introduction of pest plants	Minor	Less than minor
Avifauna habitat modification or loss	Minor	Minor
Displacement of breeding fauna	More than minor	Less than minor
Death or injury to avifauna during construction	More than minor	Less than minor
Injury/death/displacement of lizards	More than minor	Minor
Habitat loss and fragmentation	Minor	Less than minor
Disturbance to lizards during earthworks	More than minor	Minor
Breeding failure/displacement of lizards	Less than minor	Less than minor
Loss of invertebrate habitat	Minor	Less than minor
Fragmentation of invertebrate habitat	Minor	Less than minor
Mortality and disturbance of invertebrates	Minor	Negligible
Reduction in invertebrate habitat quality due to shading	Less than minor	Less than minor

10.0 Summary

The proposed industrial development site is predominately actively grazed and cultivated farmland, with associated farm buildings, dwellings and gardens. The site is nearly completely flat, but has a couple of undulations which are associated with old river channel patterns including along the northern boundary with the Templeton Golf Course.

Vegetation on the site is highly modified and dominated by exotic pasture grasses, crops and trees and considered to be of low ecological value. What indigenous vegetation is present has been planted, except for the indigenous fireweed, pukatea, which grows in disturbed ground is found throughout New Zealand and present in Australia.

However, exotic vegetation on the site provides habitat for indigenous fauna, including At Risk lizard, invertebrate and bird species. At Risk southern grass skink are present, and therefore the site are considered ecologically significant under both CRPS and NPS-IB criteria. Only some habitats on the site provide habitat for these species.

Numerous effects of the proposed development have been identified, including disturbance during earthworks and construction, and ongoing effects such as habitat loss and fragmentation. We

acknowledge that avoidance is not always possible, due to subdivision design and engineering constraints. However additional mitigation recommendations of these effects is outlined, especially planted and enhanced corridors through the site to benefit skinks and invertebrates. If mitigation is appropriately implemented, there will be no adverse effects that reach the threshold of a "sufficiently significant adverse impact" such that they need to be taken into account in terms of an assessment under s 85 of the FTAA2024.

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Appendix 1

Vascular plant species observed during the survey.

Species	Common name	Plant type	Status
Acacia melanoxylon	Blackwood	Tree	Exotic
Achillea millefolium	Yarrow	Forb	Exotic
Agrostis capillaris	Browntop	Graminoid	Exotic
Agrostis stolonifera	Creeping bent	Graminoid	Exotic
Anagallis arvensis	Scarlet pimpernel	Forb	Exotic
Anemanthele lessoniana	Wind grass	Graminoid	Indigenous endemic
Astelia fragrans	Kakaha	Graminoid	Indigenous endemic
Azara microphylla	Vanilla tree	Tree	Exotic
Betula pendula	Silver birch	Tree	Exotic
Bromus hordeaceus	Soft brome	Graminoid	Exotic
Camellia japonica	Camellia	Tree	Exotic
Cardamine hirsuta	Bitter cress	Forb	Exotic
Carduus nutans	Nodding thistle	Forb	Exotic
Carex secta	Pūkio	Graminoid	Indigenous endemic
Cedrus libani	Lebanese cypress	Tree	Exotic
Cedrus species	Cedar	Tree	Exotic
Chamaecytisus palmensis	Tree lucerne	Tree	Exotic
Citrus species	Lemon	Unknown	Exotic
Conium maculatum	Hemlock	Forb	Exotic
Coprosma lucida	Karamu	Tree	Indigenous endemic
Cordyline australis	Tī kōuka, cabbage tree	Grasstree	Indigenous endemic
Corokia cotoneaster	Korokio	Shrub	Indigenous endemic
Cortaderia selloana	Pampas grass	Graminoid	Exotic
Crepis capillaris	Hawksbeard	Forb	Exotic
Cupressus macrocarpa	Macrocarpa	Tree	Exotic
Dactylis glomerata	Cocksfoot	Graminoid	Exotic
Dimorphotheca jucunda	Freeway daisy	Forb	Exotic
Elytrigia repens	Couch	Graminoid	Exotic
Eriocapitella ×hybrida	Japanese anemone	Forb	Exotic
Eucalyptus species	Eucalyptus	Tree	Exotic
Eucalyptus globulus	Blue gum	Tree	Exotic
Fuscospora fusca	Tawhairaunui, red beech	Tree	Indigenous endemic
Galium aparine	Cleavers	Forb	Exotic
Galium divaricatum	Slender bedstraw;	Forb	Exotic
Geranium molle	Dovesfoot cranesbill	Forb	Exotic
Glyceria declinata	Blue sweet grass	Graminoid	Exotic
Griselinia littoralis	Kāpuka	Tree	Indigenous endemic
Hedera helix	Ivy	Forb	Exotic
Helleborus species	Hellebores	Forb	Exotic
Ilex aquifolium	Holly	Tree	Exotic

Species	Common name	Plant type	Status
Lapsana communis	Nipplewort	Forb	Exotic
Lepidium bonariense	Argentine cress	Forb	Exotic
Lolium perenne	Ryegrass	Graminoid	Exotic
Malva species	Mallow	Forb	Exotic
Marrubium vulgare	Horehound	Forb	Exotic
Myosotis laxa	Water forget-me-not	Forb	Exotic
Narcissus jonquilla	Jonquil	Forb	Exotic
Nematolepis squamea	Satinwood	Tree	Exotic
Olea europaea	Olive	Tree	Exotic
Olearia paniculata	Akiraho	Tree	Indigenous endemic
Olearia traversiorum	Hakapiri, Chatham Island akeake,	Tree	Indigenous endemic
Photinia bodinieri	Photinia	Tree	Exotic
Phormium tenax	Harakeke	Graminoid	Indigenous endemic
Pinus radiata	Radiata pine	Tree	Exotic
Pittosporum eugenioides	Tarata, lemonwood	Tree	Indigenous endemic
Pittosporum tenuifolium	Kōhūhū	Tree	Indigenous endemic
Plantago lanceolata	Narrow-leaved plantain	Forb	Exotic
Plantago major	Broad-leaved plantain	Forb	Exotic
Plantago species	Plantain	Forb	Indigenous non-endemic
Poa species	Poa	Graminoid	Exotic
Poa pratensis	Kentucky blue grass	Graminoid	Exotic
Populus nigra	Lombardy poplar	Tree	Exotic
Populus species	Poplar	Tree	Exotic
Prunus species	Ornamental cherry	Tree	Exotic
Pseudopanax arboreus	Whauwhaupaku, puahou, five finger	Tree	Indigenous endemic
Pseudopanax crassifolius	Horoeka, lancewood	Tree	Indigenous endemic
Ranunculus repens	Creeping buttercup	Forb	Exotic
Ranunculus sceleratus	Celery-leaved buttercup	Forb	Exotic
Rhododendron species	Rhododendron	Shrub	Exotic
Rosa species	Climbing rose	Shrub	Exotic
Rubus fruticosus	Blackberry	Subshrub	Exotic
Rumex species	Dock	Forb	Indigenous non-endemic
Rumex obtusifolius	Broad-leaved dock	Forb	Exotic
Salix babylonica	Weeping willow	Tree	Exotic
Salix species	Willow	Tree	Exotic
Sambucus nigra	Elder	Shrub	Exotic
Schinus molle	Pepper tree	Tree	Exotic
Senecio glomeratus	Fireweed	Forb	Indigenous non-endemic
Sisymbrium officinale	Wild mustard, hedge mustard	Forb	Exotic
Solanum chenopodioides	Velvety nightshade	Subshrub	Exotic
Stellaria media	Chickweed	Forb	Exotic
Taraxacum officinale	Dandelion	Forb	Exotic
Trifolium species	Clover	Forb	Exotic

Species	Common name	Plant type	Status
Trifolium repens	White clover	Forb	Exotic
Ulex europaeus	Gorse	Shrub	Exotic
Urtica urens	Nettle	Forb	Exotic
Veronica persica	Scrambling speedwell	Forb	Exotic
Zantedeschia aethiopica	Arum lily	Forb	Exotic

Appendix 2

Ecological Significance Assessment: Appendix 3 of the Canterbury Regional Policy Statement.

Assessments are based on historical and desktop information, and values and significant assessments need to be confirmed by surveys
*This refers to the wet (freshwater) section of the drainage channel and pond (not the upper dry section), and has not been assessed in this survey.

Criteria	1. Exotic shelterbelt forest	2. Indigenous hedgerow forest	3. Ornamental plantings, gardens and dwellings	4. Cocksfoot pasture grassland	5. Farm buildings and debris	6. Cultivated cropland	7. Pond and drainage channel (waterway)*
Representativeness							
1. Indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity of the relevant ecological district. This can include degraded examples where they are some of the best remaining examples of their type, or represent all that remains of indigenous biodiversity in some areas.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
2. Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the relevant ecological district.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
Rarity/Distinctiveness							
3. Indigenous vegetation or habitat of indigenous fauna that has been reduced to less than 20% of its former extent in the region, or relevant land environment, ecological district, or freshwater environment.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
4. Indigenous vegetation or habitat of indigenous fauna that supports an indigenous species that is threatened, at risk, or uncommon, nationally or within the relevant ecological district.	Provides habitat for At Risk indigenous lizard (southern grass skink).	Provides habitat for At Risk indigenous lizard (southern grass skink), and At Risk New Zealand praying mantis	Provides habitat for At Risk indigenous lizard (southern grass skink), and At Risk New Zealand praying mantis	Provides habitat for At Risk indigenous lizard (Southern grass skink). Tōrea/South Island pied oystercatcher (At Risk – Declining) may forage and breed in this habitat.	Potential habitat for At Risk indigenous lizard (southern grass skink), and At Risk New Zealand praying mantis	Tōrea/South Island pied oystercatcher (At Risk – Declining) ***may*** forage and breed in this habitat.	Not assessed
5. The site contains indigenous vegetation or an indigenous species at its distribution limit within Canterbury Region or nationally.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
6. Indigenous vegetation or an association of indigenous species that is distinctive, of restricted occurrence, occurs within an originally rare ecosystem, or has developed as a result of an unusual environmental factor or combinations of factors.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
Diversity/Pattern							
7. Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types, indigenous taxa, or has changes in species composition reflecting the existence of diverse natural features or ecological gradients.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
Ecological Context							
8. Vegetation or habitat of indigenous fauna that provides or contributes to an important ecological linkage or network, or provides an important buffering function.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
9. A wetland which plays an important hydrological, biological or ecological role in the natural functioning of a river or coastal system.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
10. Indigenous vegetation or habitat of indigenous fauna that provides important habitat (including refuges from predation, or key habitat for feeding, breeding, or resting) for indigenous species, either seasonally or permanently.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
Do any ecological values meet the significance criteria outlined in the Canterbury Regional Policy Statement?				**Yes**			

Appendix 3

Ecological Significance Assessment: National Policy Statement – Indigenous Biodiversity (NPS-IB)

Assessments are based on historical and desktop information, and values and significant assessments need to be confirmed by site visits.
*Not assessed as the NPS IB does not apply to freshwater (outside of wetlands)
**An exclusion is made for At-Risk species that are widespread in three other regions. The exclusion does not apply if two (or more) Threatened or At Risk fauna species were found at the site.

Criteria	1. Exotic shelterbelt forest	2. Indigenous hedgerow forest	3. Ornamental plantings, gardens and dwellings	4. Cocksfoot pasture grassland	5. Farm buildings and debris	6. Cultivated cropland	7. Pond and drainage channel (waterway)*
Representativeness is the extent to which the indigenous vegetation or habitat of indigenous fauna in an area is typical or characteristic of the indigenous biodiversity of the relevant ecological district.							
(a) Indigenous vegetation that has ecological integrity that is typical of the character of the ecological district:	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(b) 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.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
Diversity and pattern is the extent to which the expected range of diversity and pattern of biological and physical components within the relevant ecological district is present in an area.							
(a) at least a moderate diversity of indigenous species, vegetation, habitats of indigenous fauna or communities in the context of the ecological district.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(b) presence of indigenous ecotones, complete or partial gradients or sequences.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
Rarity and distinctiveness is the presence of rare or distinctive indigenous taxa, habitats of indigenous fauna, indigenous vegetation or ecosystems.							
(a) provides habitat for an indigenous species that is listed as Threatened or At Risk (declining) in the New Zealand Threat Classification System lists.	Provides habitat for At Risk indigenous lizard (southern grass skink).	Provides habitat for At Risk indigenous lizard (southern grass skink) and invertebrate (New Zealand praying mantis).	Provides habitat for At Risk indigenous lizard (southern grass skink) and invertebrate (New Zealand praying mantis).	Provides habitat for At Risk indigenous lizard (southern grass skink). Tōrea/South Island pied oystercatcher (At Risk – Declining) may forage and breed in this habitat.	Provides I habitat for At Risk indigenous lizard (southern grass skink) and invertebrate (New Zealand praying mantis).	Tōrea/South Island pied oystercatcher (At Risk – Declining) may forage and breed in this habitat.	Not assessed
(b) an indigenous vegetation type or an indigenous species that is uncommon within the region or ecological district:	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(c) an indigenous species or plant community at or near its natural distributional limit	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(d) indigenous vegetation that has been reduced to less than 20% of its pre-human extent in the ecological district, region, or land environment	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(e) indigenous vegetation or habitat of indigenous fauna occurring on naturally uncommon ecosystems	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(f) the type locality of an indigenous species	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(g) the presence of a distinctive assemblage or community of indigenous species	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(h) the presence of a special ecological or scientific feature.	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
Ecological context is the extent to which the size, shape, and configuration of an area within the wider surrounding landscape contributes to its ability to maintain indigenous biodiversity or affects the ability of the surrounding landscape to maintain its indigenous biodiversity.							
(a) at least moderate size and a compact shape, in the context of the relevant ecological district	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(b) well-buffered relative to remaining habitats in the relevant ecological district	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(c) provides an important full or partial buffer to, or link between, one or more important habitats of indigenous fauna or significant natural areas	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
(d) important for the natural functioning of an ecosystem relative to remaining habitats in the ecological district	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Criterion not met	Not assessed
Is vegetation and/or habitat significant?	**Yes**						
Criteria met for significance	**Criteria met for Rarity and distinctiveness**						

Appendix 4

Professional expertise and experience

Roland Payne

Senior Vegetation Ecologist - Christchurch

Roland is a botanist and terrestrial ecologist with more than 12-years professional experience. He has an extensive knowledge of New Zealand's flora and fauna and conducting assessments of ecological significance in a wide range of habitats, including wetlands, shrublands, forest, alpine and coastal environments.

Roland has a Master of Science Communication with distinction, from the University of Otago and a Bachelor of Science from the University of Canterbury. After graduating from university Roland worked as a field botanist and team leader for New Zealand Forest Surveys and then as a terrestrial ecologist for Kingett Mitchell and Golder Associates NZ before joining Wildlands as a Senior Ecologist in 2020.

As a field botanist Roland has undertaken the measurement of more than two hundred 20 x 20 m vegetation monitoring plots, throughout New Zealand, including over one hundred Land Use and Carbon Analysis System (LUCAS) scrub plots. The vegetation measured in these plots covered nearly every land environment in New Zealand from coastal bluffs and wetlands to sub-alpine tussock and shrubland communities.

As an ecologist, Roland's comprehensive knowledge is evidenced in the extensive range of projects he has worked on. These include environmental assessments and monitoring for wind farms, power stations, housing and construction developments, as well as, mine, quarry and dam sites. He has also worked extensively with iwi, trusts, landowners and councils in the management of parks, reserves and recreation areas, to restore, enhance and protect their ecological values.

In his work for Wildlands, he has provided assessments of ecological effects for numerous development projects in natural areas and when required expert evidence in respect of those assessments in council hearings. He has also undertaken numerous ecological significance assessments and wetland assessments for landholders and councils and been an author on more than 60 contract reports. Roland has also frequently provided technical advice to clients in relation to vegetation clearance and development plans, including providing solutions for achieving no net loss of biodiversity and/or net gains.

Anna Meban

Ecologist - Christchurch

Anna has a Master's of Science in Conservation and Ecology (2024) from Lincoln University investigating bait preferences in rabbits in the Mackenzie and Otago districts. During this time Anna formulated and tested a variety of non-toxic bait types to determine their effectiveness and potential as future control options. During her studies Anna has also been involved with a range of ecological work as a student intern at the Department of Conservation and Wildlands casual employee. Anna's field experience includes, mammalian pest trapping and monitoring, invasive weed control, fish salvage and release, lizard surveying and monitoring as well as lizard salvage and release.

Anna has worked for Wildlands since 2022, beginning as a student intern and as of 2024 starting as a fulltime Ecologist. During this time developing her skills in the capture, handling and translocation of lizards as well as being involved with a number of projects including lizard surveys, implementation of lizard management plans and undertaking desktop assessments of lizard values.

Samantha King

Senior Herpetologist and Ecologist - Christchurch

Samantha has over 13 years' experience in conservation and ecology in New Zealand. Sam has been working for Wildlands as a Senior Ecologist and Herpetologist since September 2021. In her role at Wildlands, Sam manages the South Island lizard team, and oversees project management of lizard related work in the South Island. This work involves preparation of assessment of ecological effects, lizard management plans and undertaking fauna surveys, as well as any implementation. Since starting at Wildlands, Sam has completed important conservation work surveying for Nationally Threatened species, such as broad-cheeked gecko, Alborn skink and Southland green skink.

Prior to joining Wildlands, Sam worked in Auckland as a consultant ecologist. The work there included contributing to assessment of ecological effects, undertaking herpetofauna management, including frog surveys, management and lizard salvage and preparing lizard management plans. Sam also contributed to many botanical surveys and wetland assessments. Sam also undertook specialist green gecko work, contributing to the conservation management of starred and rough gecko (both Threatened species) for councils and Department of Conservation.

Sam completed an MSc investigating genetic and phenotypic methods to determine species of threatened green gecko (*Naultinus*) on the Denniston Plateau and throughout sites in the top of the South Island in 2018. During this time she determined whether previously observed populations were still extant and discovered two new populations of West Coast green gecko.

Samantha completed a Bachelor of Science in Environmental Studies in 2011, and from there, began her career in ecology by working for an environmental contractor on the West Coast as a field ecologist, working with *Powelliphanta*, Roroa and undertaking rapid ecological assessments, and undertaking vegetation surveys including carbon monitoring plots, before developing skills surveying for rare lizards on Denniston Plateau.

Dr Della Bennet

Senior Avifauna Ecologist - Christchurch

Della has worked for Wildlands since early 2020 and has assessed the ecological effects and recommended measures which should be implemented to mitigate potential adverse effects before, during and after construction. These reports include a proposed mussel farm extension on a king shag colony (*Leucocarbo carunculatus*, Threatened-Nationally Endangered), a port development on little blue penguins (*Eudyptula minor*, At Risk-Declining) and red-billed gulls (*Chroicocephalus novaehollandiae scopulinus*, At Risk-Declining), an open ocean salmon farm on coastal and oceanic birds, a new multilane motorway development on river, forest and wetland birds, and residential developments on braided river birds. Della has provided expert evidence for mussel, spat and salmon farms consents, a port development, a wind farm and disturbance to wildlife through a proposed footbridge bridge construction in hearings in Council and Environment Court. Della has also been working on a solar farm and port development consent proposals for Environment Court hearings.

Della has completed numerous bird strike risk assessments for temporary stormwater basins, first flush basins, retention basins, and wetlands located close to an international airport. Other recent work of Della's includes analysing and reporting on a forest bird population where predator control and non-treatment sites were surveyed over three years and undertaking a desktop assessment of the likelihood of occurrence of bird species within fifteen exotic forest plantations. Della has undertaken braided river and wetland bird surveys throughout the South Island and lower North Island. Della is also a level 3 bird bander for passerines, mist-netting and drop-trap bird capture, especially with South Island robin (*Petroica australis*, At Risk-Declining). Della is very familiar with bird identification (oceanic and coastal birds, forest, wetland and braided river birds) and has undertaken numerous five-minute bird counts, walking transect counts, and playback call surveys.

Della has a PhD in Biological Sciences, PGDipSci (distinction) and BSc (ecology endorsement) from the University of Canterbury. Della's PhD investigated the diving behaviour, diet and foraging locations of the Hutton's shearwater (*Puffinus huttoni*, Threatened-Nationally Vulnerable) using a variety of methods, including stable isotope analysis, time-depth recorders (TDRs) and GPS trackers. She has also undertaken research on seabirds, which included detecting plastic metabolites in preen wax.

Della has previously worked at the Christchurch Airport as a Wildlife Control Officer, where she undertook active management to manipulate bird behaviour away from the airport. This included airfield bird strike hazard identification and mitigation processes, and ensuring compliance with legislation. Della is very familiar with bird identification of bird strike hazard species, and has undertaken numerous bird counts. During her employment, Della undertook weekly bird counts over five years to assess population levels of waterfowl on water bodies (e.g. Lake Roto Kohatu, Groynes,

Clearwater) and wetlands (Styx Mill and Travis Wetlands) in the Christchurch region. Species surveyed included New Zealand scaup, Australasian coot, Canada geese, black swan, paradise shelduck, mallard/hybrid and pūkeko. Della has also undertaken quarterly aerial surveys for potential bird strike species including Canada geese, black-backed gulls and black-billed gulls in the Canterbury region, including the Waimakariri River, Kaiapoi Sewerage ponds, Brooklands lagoon, Ihutai/Avon-Heathcote Estuary, Lyttleton Harbour, Te Waihora/Lake Ellesmere and smaller water bodies and wetlands around Christchurch.

Della has experience with statistics and linear mixed-effects modelling using R-studio. She has been the recipient of numerous awards and prizes, including an Australasian Seabird Group Student Grant, and the Birds New Zealand Research Fund. Della is a member of the Ornithological Society of New Zealand and The Royal Society of New Zealand.

Dr Vikki Smith

Senior Invertebrate Ecologist - Christchurch

Vikki has a PhD in Ecology from Lincoln University (NZ) and a Masters in Zoology from the University of Glasgow (UK). Vikki's technical skills include invertebrate collection and field surveying, and species identification.

Vikki has managed and contributed to various Assessments of Ecological Effects, including for wind farms, solar farms, housing subdivisions, ecotourism ventures in West Coast rainforest, large hydropower projects, quarries, and walking tracks. These projects have involved desktop assessments, field surveys, constraints analyses, and Wildlife Act Authority applications for handling and disturbing protected invertebrates, as well as unique and innovative effects management packages tailored to each situation.

Vikki presented evidence and appeared in court on behalf of invertebrates for the high-profile Te Kuha coal mining case. She has also written and reviewed invertebrate evidence for a geothermal power station, a wind farm, and several solar farms, housing developments, and quarries. These projects took place all over Aotearoa New Zealand, from Southland and the West Coast up to Rotorua.

Vikki has conducted invertebrate-based fieldwork in various locations throughout mainland New Zealand including braided river beds, high country stations, military training grounds, rugged offshore islands, disused landfill sites, urban brownfield sites, remote rainforest, public bush tracks, and mountains. Key invertebrate surveys include a survey for Raumai Air Weapons Range including night work, a grasshopper survey for a large proposed solar farm in the Mackenzie country, a survey for a critically endangered butterfly at a disused landfill site in Fiordland, a set of three invertebrate inventory surveys along with pest management plans for a gold mine in Central Otago, and using tracking tunnels to survey endangered wētā near Twizel. She has mostly worked alone, often in harsh weather conditions and at night. She is a competent off-road driver and has training in off-road vehicle driving including Light Utility Vehicles/side-by-side buggies.

Vikki has created several species management plans for various clients, including protected species and other notable species including ngaokeoke/peripatus, pūpū/snails, endangered grasshoppers and wētā, and Helms' stag beetles.

Before joining Wildlands, Vikki collected, organised, and catalogued invertebrate material for Canterbury Museum, focusing on the arachnid collection. She also undertook several taxonomy and molecular biology contracts at Lincoln University, and worked as Senior Tutor of Mathematics, Statistics and Computing. Vikki's research has been published in international journals, and she has given numerous presentations at national and international conferences, seminars, schools, universities, and societies.

Vikki has travelled around New Zealand from Whanganui to Codfish Island, collecting specimens for her research, ecological surveys, threat classification work, or museum collections. For her PhD she used spatial mapping software to analyse soil, climate, and vegetation parameters to find which habitat characteristics were most important for populations to thrive, applying climate change forecast models to indicate how distributions might change in the future.

For her MSci, Vikki studied the endemic katipō spider (*Latrodectus katipo*), focusing on how introduced plant species affect katipō population abundance and dynamics. While carrying out her MSci research, Vikki helped to conduct research on the ecology and captive management of critically endangered Canterbury knobbled weevil (*Hadramphus tuberculatus*).

Dr Justyna Giejsztowt

Senior Ecologist and Technical Specialist - Christchurch

Justyna has a PhD in Ecology and Biodiversity from the Victoria University of Wellington, a MSc in Applied Ecology from the University of Poitiers (France) and Christian-Albrechts University (Germany), and a BSc in Biology and Geography

from the University of Canterbury. She is an experienced terrestrial ecologist with more than 15 years' professional experience working across government, commercial and academic sectors. Justyna has primarily worked in alpine and subalpine plant communities, but has broad experience in a variety of terrestrial and freshwater habitats including in managed forests and agricultural systems.

Justyna has been working at Wildlands since 2021. She has been involved on a variety of projects, including developing Tier Two braided river habitat monitoring methods in collaboration with Environment Canterbury (ECan) and project managing this monitoring campaign for two field seasons. Much of her work has included bringing together diverse experts to complete complex reporting for large projects. For example, Justyna played a critical role providing ecological mitigation measures for the ambitious Onslow hydropower project. Justyna has undertaken modelling of several large datasets. Notably, Justyna developed and implemented novel methodologies for modelling biological connectivity at landscape scales in the Nelson Region and provided nationwide modelling of rabbit proneness. She has presented expert evidence, taken part in expert conferencing and appeared at hearings. Justyna has a proven track record of effective work with diverse parties, including tangata whenua.

Justyna's PhD research combined field surveys and experiments with spatial statistical models to understand the future of the unique alpine plant communities in Tongariro National Park. Her doctoral work investigated the impact of concurrent climate change and weed invasion on both biodiversity and ecosystem function. Before joining Wildlands, Justyna was a postdoctoral researcher and international fellow at the University of Bayreuth, Germany. There, she established a new state-of-the-art research programme focussed on the impact of extreme weather events on European forests, as well as conducting other research and lecturing and supervising postgraduate students. Justyna is the author of seven peer-reviewed scientific publications and her work provided key contributions to the Department of Conservation climate change adaptation action plan.

Justyna has wide-ranging field experience, including field experimental design and implementation. Her expertise spans terrestrial and freshwater survey and monitoring methods such as establishing and surveying plots and transects, estimation of vegetative composition, the use of environmental monitoring equipment, aquatic macroinvertebrate sampling, tracking mustelid behaviour, and plant and invertebrate collections and identification. Justyna's skills include complex factorial survey design and analysis, data wrangling, database management, species distribution modelling and multivariate statistical analyses. She has experience with several programming languages and a high level of coding proficiency in R.

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