Ecological Assessment of the Proposed Corbridge Resort Private Plan Change and Development, Wānaka

Contract Report No. 7782

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Wildlands

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October 2026

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1.0 Introduction

Brown and Company, on behalf of SIO No. 12 Limited, are preparing an application for a private plan change on approximately 330 hectares of rural land at 707 Wānaka-Luggate Highway (known as Corbridge), to enable a resort development. The plan change seeks to rezone the land from Rural General Visitor to Visitor Resort zoning. The current proposal is for a comprehensive golf resort development, including an 18-hole championship level golf course, with a second 18-hole course, clubhouse and pro shop, hotel (including restaurants/cafes), recreational and leisure amenities and accommodation units, workers' accommodation, and ecological maintenance and enhancement. A draft masterplan for the resort was developed for a pre-application meeting with Council on 23 April 2026.

The site is currently farmland consisting primarily of exotic grassland and cultivated wheat paddocks, with numerous exotic shelterbelts and some patches of indigenous shrubland. Wetlands may also be present.

The plan-change application requires a full assessment of ecological values at the property, as well as an assessment of potential ecological effects that may be associated with the proposed development resulting from the plan change, and recommended mitigation actions. The proposal is likely to involve a Council hearing process, and participation in the hearing may also be required.

This report outlines the findings of an ecological survey and effects assessment undertaken at the site during October and November 2025.

2.0 Project Scope

Wildland Consultants Limited (Wildlands) were contracted to undertake the following:

- A site inspection of the proposed development area to describe vegetation and habitats present and the site's ecological values.
- Prepare an assessment of potential ecological effects of the land use change associated with the plan change, with options for effects management, to support a plan change and resource consent application.

3.0 Methods

3.1 Desktop assessments

Background ecological information on the site from a variety of sources was reviewed.

Otago-wide potential ecosystem and fauna habitat mapping (Wildland Consultants 2020a; 2020b) were reviewed to assess the natural vegetation of the area, and to determine whether any significant habitats of indigenous fauna had been mapped on the site. Other databases such as the Threatened Environment Classification (Cieraad *et al.* 2015) were also reviewed.

A desktop assessment for lizards was undertaken by assessing relevant literature and searching the Department of Conservation (DOC) BioWeb Herpetofauna Database (accessed December 2024) for records of lizards within 20 kilometres of the site, and within the last 25 years. This database search was undertaken to provide context for potential lizard habitats recorded within the site and inform an assessment of the likelihood of species present at the site.

The avifauna desktop survey involved searching the online database eBird, maintained by the Cornell University (accessed October 2025), for bird records within a 10 kilometre radius of the site between 1 January 2015 and 30 September 2025.

The Global Biodiversity Information Facility (GBIF.org 2025[1]) was searched for records of arachnids, centipedes, millipedes, leaf-veined slugs, indigenous giant land snails, insects, and velvet worms within five kilometres of the site. Freshwater invertebrates and observations that were not identified further than order, or were marked as doubtful, were removed from the records. This dataset was used to characterise the fauna based on the most commonly represented orders. Those records identified to a useful level (usually genus or species) were scanned for notable species[2]. Notable species records were compared with vegetation and habitat on-site to judge the likelihood of each notable species occurring within the project area.

3.2 Site visit

A field assessment of the site was undertaken on 14 and 15 October 2025 and 18 November 2025 by an ecologist. The entire extent of the site was visited using a 4WD vehicle for access, with all vegetation and habitat types being inspected thoroughly on foot. During this assessment, the vegetation and habitats at the site were described, a list of vascular plant species observed was compiled, and incidental observations of bird species were recorded. Habitats were assessed for their suitability for indigenous fauna species.

3.3 Ecological significance assessment

The significance of terrestrial communities and habitats was assessed against the criteria in the Proposed Otago Regional Policy Statement[3] (2021; PORPS). A site is significant if it meets at least one of the criteria.

A separate assessment under the National Policy Statement for Indigenous Biodiversity (NPS-IB) was not undertaken. Note that these criteria are the same as those contained in the NPS-IB, except that the PORPS includes sub-criterion (e) under the Ecological Context criterion, and that NPS-IB assessments do not consider freshwater values.

3.4 Assessment of ecological effects and effects management

Potential impacts of the proposal on ecological values (vegetation, avifauna, lizards, and invertebrates) were assessed separately. The potential effects of the project were also assessed against relevant indigenous vegetation clearance rules in the Queenstown Lakes District Plan. Potential measures for avoiding, minimising, and/or remediating adverse effects of the plan change proposal on ecological values were identified and evaluated, along with suggested effects management actions.

In quantifying the level of effects, the following framework has been used:

- Positive Effects
  An effect that will have a positive impact on the environment.
- Nil Effects
  No effects at all

[1]GBIF.org (03 November 2025) GBIF Occurrence Download https://doi.org/10.15468/dl.guwyu8

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

[3] Latest version following Environment Court mediation.

- Less than Minor Adverse Effects
  Adverse effects that are discernible day-to-day effects, but to which ecological values are resilient.

- Minor Adverse Effects
  Adverse effects that are noticeable but will not cause any significant adverse impacts.

- More than Minor Adverse Effects
  Adverse effects that are noticeable that may cause an adverse impact but could be potentially mitigated or remedied.

- Significant Adverse Effects that could be remedied or mitigated
  An effect that is noticeable and will have a serious adverse impact on ecological values but could potentially be mitigated or remedied.

- Unacceptable Adverse Effects
  Extensive adverse effects that cannot be avoided, remedied or mitigated.

4.0 Context

4.1 Site description and overview of the proposed development

The proposed Corbridge Resort site is located at 707 Wānaka Luggate Highway, just east of Wānaka township and Mt Iron and west of the Wānaka Airport (Figure 1). Most of the site occupies gently rolling glacial outwash gravels with relatively productive and well drained soils, with an annual rainfall of approximately 650 millimetres. The northernmost part of the site contains a steep terrace escarpment that drops down to a low terrace on outwash gravels adjoining the Mata Au/Clutha River. This lower terrace landform is classed as a naturally uncommon ecosystem – 'inland outwash gravel' - and is characterised by very dry and stony soils and dryland vegetation communities.

The site has been intensively farmed for many decades, and cultivated for cropping over the past decade. Small areas of uncultivated exotic grassland are also present, along with a few small patches of indigenous shrubland. The northern terrace scarp and terrace also contain uncultivated land with indigenous shrub and herbaceous species. One small constructed pond is present at the southeast of the site. An old irrigation scheme supplies water via ditches to the centre of the site, where a large irrigation reservoir is periodically utilised for water storage.

The proposed development of a comprehensive golf resort for which the plan change is sought includes the following key features:

- Two 18-hole golf courses.
- Clubhouse and pro shop.
- Hotel with restaurants and cafés.
- Accommodation units.
- Permanent instatement of the waterbody at the existing irrigation reservoir location.
- Revegetation areas.

A draft structure plan for the resort has been produced, and is included in Appendix 1 of this report. Of relevance to ecology are Activity Areas Ecology (EC) and Landscape Protection (LP-E), which aim to retain and enhance ecological values within these areas. The draft vegetation management plan is also reproduced in Appendix 1, and shows areas of existing woody vegetation to be retained and cleared. The structure plan and vegetation management plan were informed by the findings of this ecological assessment report, to ensure that high-value areas of indigenous vegetation and habitats were retained or enhanced where possible.

While the provisions for each zone are still being finalised, the following draft provisions are relevant to ecology:

- Clearance of indigenous vegetation within Activity Areas EC and LP is a non-complying activity.
- The construction of additional waterbodies in the zone (i.e. other than within Activity Area L) is a non-complying activity.
- The standards relating to the staging of the development require Stage 1 works to include the planting of 1.5 hectares of indigenous vegetation within Activity Areas EC and LP. Breach of this standard is a non-complying activity.

4.2 Ecological District

The site lies in the Pisa Ecological District, within the Central Otago Ecological Region. This district includes the northeast-southwest trending fault-block Pisa Range and glacial outwash gravels and river flats south of Wānaka, ranging from less than 300 to 1,963 metres above sea level. Pisa Ecological District has a generally dry sub-continental climate with prevailing northwest winds, and an annual rainfall of 380-1,500 millimetres that varies over a strong altitudinal gradient (McEwen 1987).

4.3 Protected areas

The Corbridge Resort site itself is not protected, and does not contain any Significant Natural Areas (SNAs) scheduled in the District Plan. A narrow marginal strip of the Clutha River lies at the northern boundary of the site (Figure 1). Other nearby areas of conservation-administered land along the Clutha and Hāwea Rivers include the Butterfields Wildlife Management Area, Reko Point Conservation Area, Albert Town Conservation Area, Newcastle Scenic Reserve, and Hikuwai Conservation Area. Mt Iron Scenic Reserve and Mt Iron Recreation Reserve are also nearby to the west, and larger areas of conservation land are present on the surrounding Criffel and Pisa Ranges and in the Roy's Peak area.

Several SNAs are present to the east of the site on low terraces of the Clutha River, and to the north of the site near Hāwea Flat. These contain a mix of indigenous vegetation including short tussock grassland, herbfields, cushionfields, and shrublands.

The Dunstan Upper Clutha River is a designated Important Bird Area (IBA) under the A1 criteria – *more than threshold numbers of one or more globally threatened species*, with black kakī/black stilt (*Himantopus novaezelandiae*, Threatened – Nationally Critical) and tarāpuka/black-billed gull (*Chroicocephalus bulleri*, At Risk – Declining) being the trigger species for this classification (Forest & Bird 2016).

4.4 Threatened Environment classification

Almost the entire site is located on a land environment on which less than 10% of the original indigenous cover remains on a national basis (Acutely Threatened, Cieraad *et al.* 2015). Most of the surrounding landscape of glacial outwash gravels and terraces in the Upper Clutha basin is also covered by land environments that have less than 10% of their original indigenous cover. A very small part of the site is on a 'Chronically Threatened' land environment on which 10–20% of the original indigenous cover remains on a national basis.

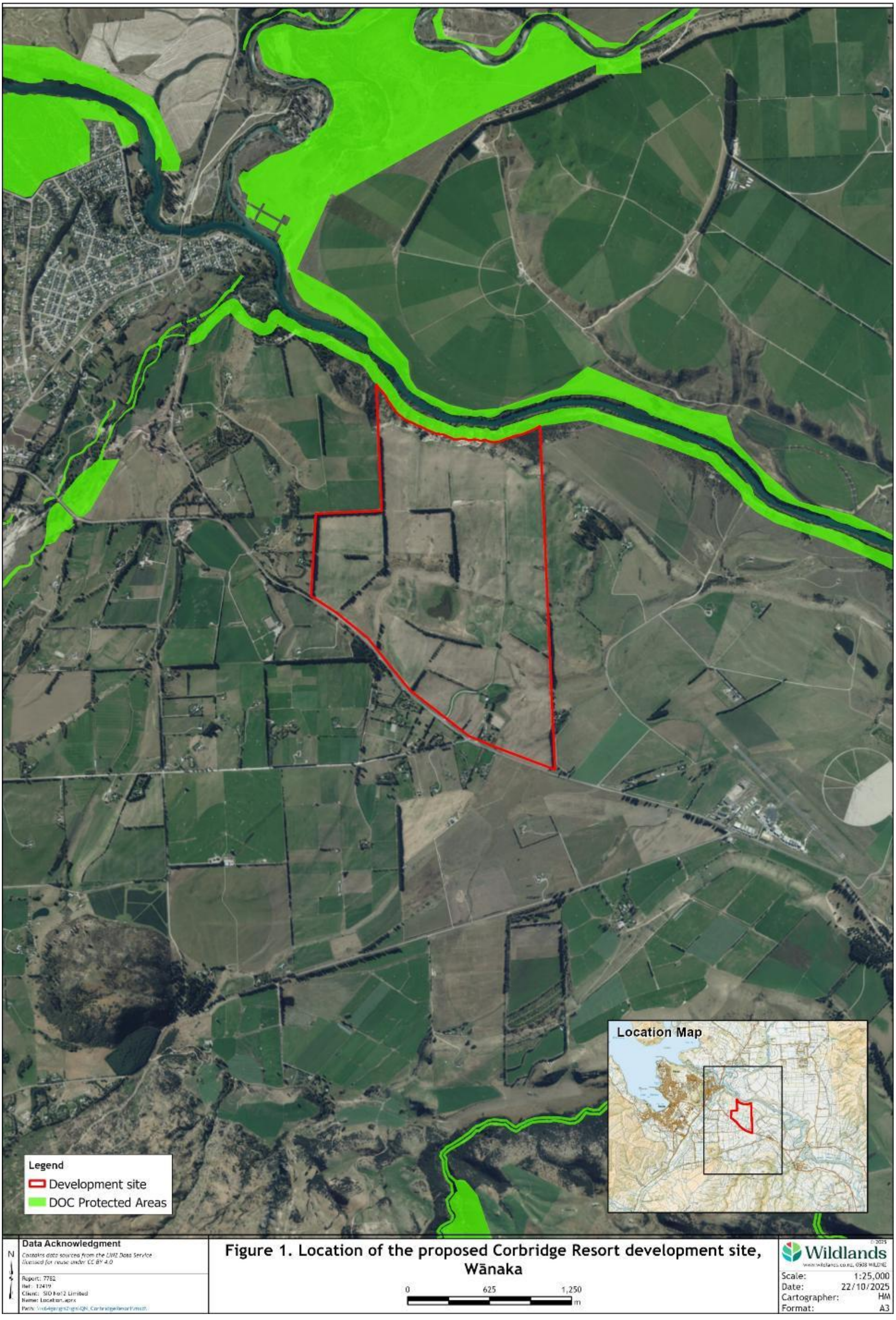


Figure 1. Location of the proposed Corbridge Resort development site, Wānaka

4.5 Potential natural ecosystems

The site and surrounding area of outwash gravels has been mapped as historically (pre-human) covered by CLF13 Mataī, broadleaf forest by Wildlands (2020a). Following human-induced fires it is likely that the vegetation communities comprised shrublands dominated by woody species such as kānuka (*Kunzea serotina*), *Coprosma* spp., tūmatakuru/matagouri (*Discaria toumatou*), *Olearia* spp., *Carmichaelia* spp, korokio (*Corokia cotoneaster*) and kōwhai (*Sophora microphylla*), and tussocks of silver tussock (*Poa cita*) and hard tussock (*Festuca novae-zelandiae*). Small remnants of vegetation containing conifers such as Hall's tōtara (*Podocarpus laetus*), celery pine (*Phyllocladus alpinus*), and bog pine (*Halocarpus bidwillii*) may also have persisted.

The river terrace scarp at the north of the site was mapped as historically CL8 *Helichrysum, Melicytus* shrubland/tussockland/rockland by Wildlands (2020a), reflecting its drier soils and high frequency of geomorphic disturbance.

4.6 Wildlife Act

All indigenous lizards, most indigenous birds, and some indigenous invertebrates are protected under the Wildlife Act (1953). It is an offence to disturb or destroy protected wildlife without a Wildlife Act Authorisation (WAA; also known as a wildlife permit) from DOC. A permit must be obtained from DOC before any protected wildlife (and/or their habitats) can be disturbed, handled, translocated or killed. Additionally, the submission of a species-specific management plan (for example, a Lizard Management Plan) would be required if protected indigenous fauna or their habitats were proposed to be disturbed.

5.0 Vegetation and Habitats

Most of the site has been heavily modified and cultivated, reflecting its current use as a pastoral farm. Exotic vegetation communities therefore dominate the site. However, small patches of indigenous vegetation are scattered across the site in areas that are either too steep or too difficult to access for cultivation.

Nine vegetation and habitat types were identified at the site (Table 1) and are mapped in Figure 2 and described below. Representative photographs are included in Appendix 2.

Table 1 – Vegetation and habitat types at the proposed Corbridge Resort plan change development site.

Vegetation and Habitat Type Name	Area (ha)
1. Kānuka scrub on northeast terrace	4.9
2. Indigenous shrubland patches on outwash gravels	3.1
3. Exotic shrubland in northwest gully	3.6
4. Fenceline indigenous hedgerows	0.6
5. Exotic treeland (shelterbelts)	11.8
6. River terrace escarpment vegetation	7.9
7. Low producing exotic grassland	10.7
8. Cultivated cropping paddocks	287.3
9. Constructed pond	0.5

5.1 Kānuka scrub on northeast terrace

A low alluvial terrace of the Clutha River at the northeast corner of the property contains kānuka up to six metres tall, with occasional matagouri and mingimingi (*Coprosma propinqua*) (Plates A3-1 and A3-2). Exotic sweet briar (*Rosa rubiginosa*) is frequently present. Ground cover in open areas between shrubs is a mix of bare soil, Saint John's wort (*Hypericum perforatum*), mosses, and exotic grasses. The indigenous resurrection lichen (*Xanthoparmelia semiviridis*) is also widespread and abundant.

This area lies outside of the proposed development footprint.

5.2 Indigenous shrubland patches on outwash gravels

Eight small areas of indigenous 'grey shrubland' are present within gullies and slopes on the outwash gravel landforms at the site. Matagouri is generally the dominant species, and is accompanied by several other indigenous and exotic species at varying abundances. A total of nine indigenous species were observed in these shrublands:

- Matagouri
- Mingimingi
- *Coprosma crassifolia*
- *Coprosma intertexta*
- Desert broom (*Carmichaelia petriei*)
- Porcupine shrub (*Melicytus alpinus*)
- Kānuka
- Scrub pōhuehue (*Muehlenbeckia complexa*)
- Tātarāmoa/white-leaved lawyer (*Rubus schmidelioides*)

A brief description of the shrubland patches is given below.

<u>Two patches along eastern edge of site</u>

These are dominated by matagouri with occasional mingimingi, often forming a dense canopy up to four metres tall (Plates A3-3 and A3-4). Saplings of exotic elder (*Sambucus nigra*) are scattered throughout, along with a few mature trees. Vines of scrub pōhuehue and white-leaved lawyer are common, especially in the northern patch. Sweet briar is occasionally present. Ground cover between shrubs is predominantly exotic grasses, with areas of cleavers (*Galium aparine*) and hemlock (*Conium maculatum*). The southern patch also contains several porcupine shrubs. These two patches show the greatest ecological integrity of shrublands on the site; this may reflect the fact that the patches are fenced, suggesting that stock were excluded during times when stock were grazed on site. Other shrubland patches at the site are not fenced.

<u>Terrace crest shrubland</u>

A small shrubland on the top of the steep northern terrace escarpment contains matagouri, mingimingi, kānuka, porcupine shrub, sweet briar, wild broom (*Cytisus scoparius*), and wilding radiata pine (*Pinus radiata*) saplings.

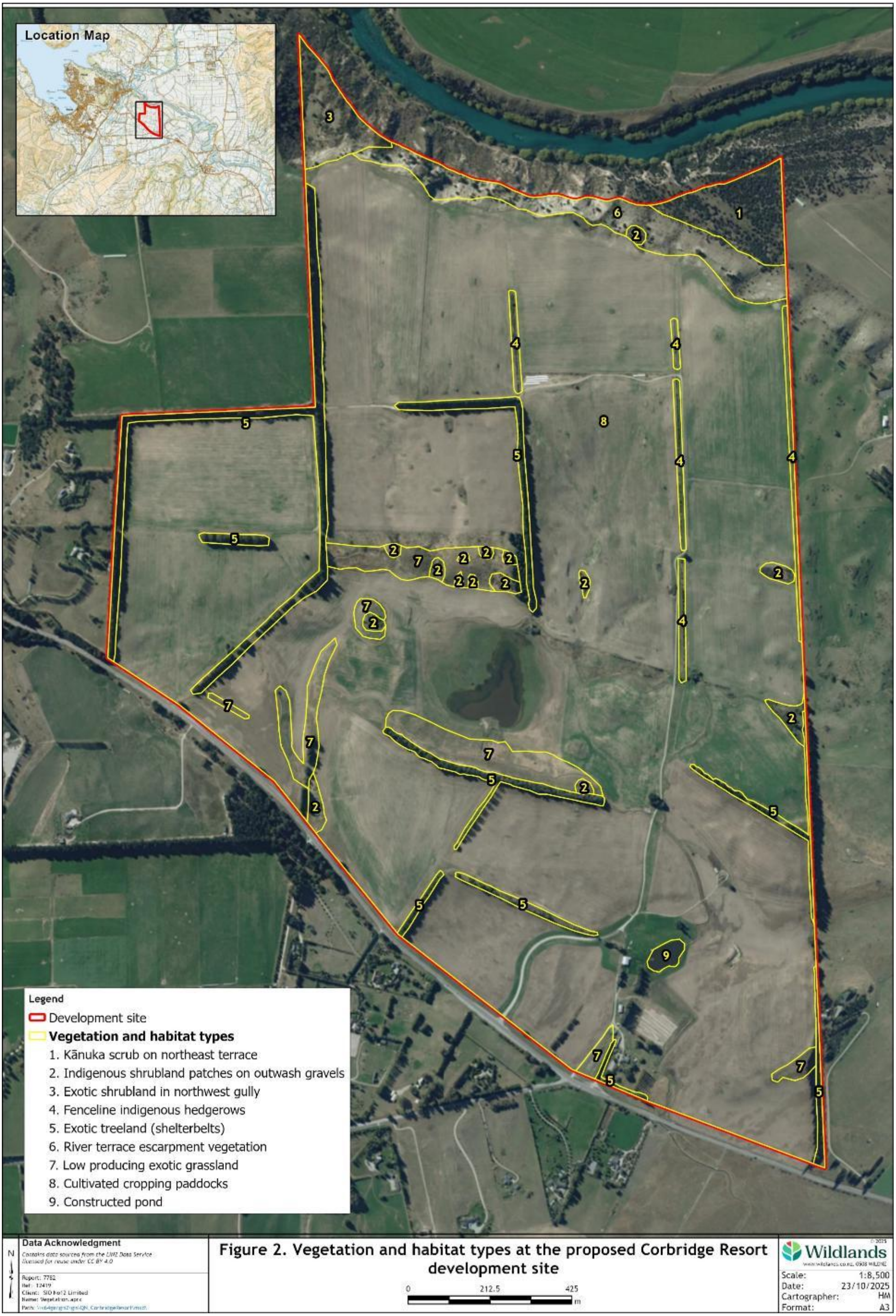


Figure 2. Vegetation and habitat types at the proposed Corbridge Resort development site

Southwestern gully shrubland

A shallow gully and its sides at the southwest of the site contains several large mingimingi and matagouri, one large *Coprosma intertexta*, and several desert broom and porcupine shrub. Fifteen desert broom were counted. Elder, sweet briar and wilding pine saplings are also present. Exotic grassland covers the area between shrubs. Small stone piles are present throughout (Plates A3–5 and A3–6).

Small shrubland in gully northeast of irrigation reservoir

This very small patch comprises mature matagouri, with ground cover of exotic grasses.

Knoll near irrigation reservoir

This small knoll contains a relatively diverse indigenous shrubland dominated by mingimingi, *Coprosma intertexta* (c.40 plants counted) and matagouri up to four metres tall (Plate A3-7). Desert broom and porcupine shrub also form a notable component of the shrubland, with over 20 individuals of each species noted. A few *Coprosma crassifolia* are also present. Elder saplings are occasionally present within shrubs, and two mature trees are present. Scrub pōhuehue forms cover on shrubs in places. Ground cover between shrubs is predominantly exotic grasses, moth mullein (*Verbascum virgatum*), and hemlock.

South and north facing hillslopes above irrigation reservoir

Patches of shrubland are scattered within small gullies and side slopes, dominated by matagouri with less abundant mingimingi and occasional desert broom and porcupine shrub (Plate A3-8). These patches occur within a wider area of uncultivated low producing exotic grassland (see Section 5.7).

5.3 Exotic shrubland in northwest gully

A gully at the northwest corner of the site contains a weedy shrubland of wild broom, hawthorn (*Crataegus monogyna*), tree lupin (*Lupinus arboreus*), wilding conifers, and exotic grasses (Plate A3-9). A few mingimingi are also present. A 4WD track descends the eastern side of the gully to the lower river terrace on the adjoining conservation-administered land (Plate A3-10).

This area lies outside of the proposed development footprint.

5.4 Fenceline indigenous hedgerows

Three distinct hedgerows adjoining the central access track, central loading area, and the eastern property boundary are dominated by matagouri, with occasional mingimingi, desert broom, porcupine shrub, sweet briar and elder (Plates A3-11, A3-12 and A3-13). Vines of scrub pōhuehue and white-leaved lawyer are present on some shrubs, especially at the north. The hedgerows are generally only one plant in width, and with a height of between 3-4 metres. The combined hedgerows span a length of approximately 2.1 kilometres.

5.5 Exotic shelterbelts

Tall shelterbelts of a variety of exotic tree species are present around the edges of paddocks. Common species include radiata pine, Corsican pine (*Pinus nigra*), Douglas fir (*Pseudotsuga menziesii*), eucalypts (*Eucalyptus* spp.), cypress (*Cupressus* spp.), cedar (*Cedrus* spp.), and poplar (*Populus* spp.). One large *Coprosma crassifolia* and porcupine shrub were observed in a shelterbelt near the southwest of the site (Plate A3-14). The shelterbelts have a ground cover of rank exotic grasses.

5.6 River terrace escarpment vegetation

A steep, dry terrace escarpment at the north of the property above the Clutha River contains a diverse vegetation dominated by exotic dryland species including pasture grasses, sheep's bur (*Acaena agnipila*), viper's bugloss (*Echium vulgare*), moth mullein, horehound (*Marrubium vulgare*), scarlet pimpernel (*Anagallis arvensis*), Saint John's wort, California thistle (*Cirsium arvense*), wild broom, sweet briar, and occasional wilding conifers and hawthorn (Plates A3-15 and A3-16). Several indigenous species are also present on the escarpment; these include three species of mat daisy (*Raoulia hookeri*, *R. australis, R. beauverdii*; all confined to the poorest soils near the crest), grassland sedge (*Carex breviculmis*), blue wheatgrass (*Anthosachne solandri*), pātōtara/dwarf mingimingi (*Leucopogon fraseri*), creeping pōhuehue (*Muehlenbeckia axillaris*), rock fern (*Cheilanthes sieberi*), kānuka, matagouri, and mingimingi. Frequent exposed rocks and bare soil are present on the scarp face.

This area lies outside of the proposed development footprint.

5.7 Low producing exotic grassland

Several uncultivated areas at the site contain unimproved exotic grassland dominated by tall fescue (*Lolium arundinaceum*), browntop (*Agrostis capillaris*), cocksfoot (*Dactylis glomerata*) and Yorkshire fog (*Holcus lanatus*) (Plates A3–17 to A3–21). Other species frequently present include moth mullein, woolly mullein (*Verbascum thapsus*), dandelion (*Taraxacum officinarum*), yarrow (*Achillea millefolium*), California thistle, sheep's sorrel (*Rumex acetosella*), and hawkweed (*Pilosella officinarum*).

The grassland on the south-facing slope above the irrigation reservoir also contains occasional indigenous hard tussock (over 100 plants counted), and indigenous blue wheatgrass (Plates A3–18 and A3–19). The grasslands on the north and south facing slopes above the irrigation reservoir also contain occasional shrubs of wild broom, elder, wilding conifers, matagouri, mingimingi, porcupine shrub and desert broom. Total numbers of indigenous shrubs recorded in these two areas of low producing grassland were 69 matagouri, 10 mingimingi, 24 desert broom, and 19 porcupine shrub. In all other areas of low producing grassland combined, three porcupine shrubs were the only indigenous plants observed.

5.8 Cultivated cropping paddocks

Most of the property is cultivated and managed for wheat and barley production (Plates A3–22 and A3–23). The farm contractors advised that a mix of barley and Triticale (a disease-resistant wheat/rye cultivar) have been sown annually over the past decade, with annual soil cultivation and fertiliser application to maintain yields. At the time of the site inspection, the crops were approximately 15–20 centimetres tall, and fertiliser was being applied across the property. A few exotic herbs were also present at low abundance within the crops, most notably storksbill (*Erodium cicutarium*).

5.9 Constructed pond

One small constructed pond is present on the property, just east of the woolshed (Plate A3-24). This is linked to the old water race. This is a not a natural inland wetland and not subject to the National Policy Statement on Freshwater Management (NPS-FM).

The irrigation reservoir that is usually present near the centre of the property (and visible in Figure 2 in a partially filled state) was not present at the time of the survey - this entire area had been cultivated and planted in crops. This reservoir is filled from the water race that runs through the site, and is not a naturally-occurring water body. Despite the wet spring and heavy rain event prior to the site

inspection, no surface ponding was observed anywhere on the property. Representative areas within the reservoir footprint were inspected for ephemeral wetland vegetation and possible indigenous plants, but none were found – the entire area contained dense crops with recently cultivated soil.

The irrigation reservoir is an artificial waterbody, and is not a natural inland wetland. Therefore, this feature is not subject to the NPS-FM.

As there is no surface water drainage towards the Clutha River, all natural water appears to be easily absorbed into the substrate onsite. However, the irrigation reservoir location, provides natural topographic features suitable for stable constructed water bodies.

6.0 Flora

Ninety four vascular plant species were recorded at the site, comprising 73 exotic and 21 indigenous species (Appendix 3).

6.1 Threatened, At Risk and notable species

Six vascular plant species and one lichen that are nationally or regionally listed in threatened plant classifications were recorded at the site (Table 2; Plates A3–25 to A3–29). Five of these species are only present outside of the development zone at the north of the site, either on the river terrace escarpment or within the kānuka scrub on the northeast terrace.

Two nationally At Risk–Declining shrubs are present in shrublands and/or grasslands within the development zone – desert broom and *Coprosma intertexta*. Desert broom is present in four of the shrubland patches, the hedgerows, and low producing grassland near the irrigation reservoir; 59 plants were counted, but additional individuals were almost certainly missed, and it is considered likely that up to 100 plants are present. Forty one plants of *Coprosma intertexta* were observed, all but one in the shrubland on the small knoll. Both species are commonly found in eastern South Island dry intermontane basins, where they often grow in grey scrub overlying old outwash gravels and in unimproved exotic grasslands on hillslopes. Resurrection lichen (*Xanthoparmelia semiviridis*; At Risk-Declining) is scattered within the kānuka scrub on the northeast terrace. This lichen is threatened by habitat loss and modification of the dryland habitats it occupies.

Table 2 – Threatened and At Risk plant species recorded at Corbridge Resort plan change site during the October 2025 site inspection. Threat statuses as per de Lange et al. (2018 and 2024) and Jarvie et al. (2024).

Scientific Name	National Status	Otago Regional Status	Comments
Carmichaelia petriei (Desert broom)	At Risk-Declining	At Risk – Regionally Declining	Found in four shrubland patches, hedgerows, and low producing grassland. Approximately 100 plants.
Cheilanthes sieberi (Rock fern)	Not Threatened	At Risk - Regionally Naturally Uncommon	A few individuals present in river terrace escarpment vegetation (outside of development zone).
Coprosma intertexta	At Risk-Declining	Threatened – Regionally Vulnerable	Found in two shrubland patches. 41 plants.
Myosurus minimus (New Zealand mousetail)	At Risk-Declining	Threatened – Regionally Endangered	Two plants observed in kānuka scrub on northeast terrace (outside of development zone).

Scientific Name	National Status	Otago Regional Status	Comments
Raoulia australis (Mat daisy)	At Risk-Declining	At Risk – Regionally Declining	A few plants present on upper portion of river terrace escarpment vegetation (outside of development zone).
Raoulia beauverdii	At Risk-Declining	Threatened – Regionally Vulnerable	A few plants present on upper portion of river terrace escarpment vegetation (outside of development zone).
Xanthoparmelia semiviridis	At Risk-Declining	Not assessed	Scattered occurrence within the kānuka scrub on the northeast terrace

6.2 Pest plants

Four exotic species listed as pest plants in the Otago Pest Management Plan (Otago Regional Council 2019) are naturalised at the site:

- Wild broom (*Cytisus scoparius*; Sustained Control) – this species is scattered across the site in shrublands.
- Radiata pine (*Pinus radiata*; Progressive Containment) – a few wilding seedlings and small trees are present in shrublands and grasslands.
- Corsican pine (*Pinus nigra*; Progressive Containment) – a few wilding seedlings are present in grasslands.
- Douglas fir (*Pseudotsuga menziesii*; Progressive Containment) – a few wilding seedlings are present in shrublands and grasslands.

Additional ecological weed species present within indigenous vegetation fragments at the site are:

- Elder (*Sambucus nigra*) – frequent seedlings and saplings are scattered within indigenous shrubland, and several mature trees.
- Hawthorn (*Crataegus monogyna*) – a few saplings and small trees are present in indigenous shrubland and hedgerows.
- Ornamental cherry (*Prunus* sp.) – a few small trees are present within indigenous shrubland.
- Sweet briar (*Rosa rubiginosa*) – frequently present amongst indigenous shrubland.

7.0 Fauna

7.1 Avifauna

The eBird desktop assessment found 41 indigenous and 20 exotic bird species within a 10 kilometre radius of the site between 1 January 2015 and 30 September 2025. These included six Threatened and nine At Risk species.

During the site visit on 14 and 15 October 2025, 19 bird species were observed. Two pairs of pūtangitangi/paradise shelduck (*Tadorna variegata*, Not Threatened) were seen, one pair on the constructed pond near the woolshed and another pair on the northwest crop paddock. Over 20 mallard (*Anas platyrhynchos*, Introduced and Naturalised) and numerous ducklings were also seen on the pond. Two tōrea/South Island pied oystercatcher (*Haematopus finschi*, At Risk – Declining) were briefly observed on 14 October in the crop paddock by the entrance road. Riroriro/grey warbler (*Gerygone igata*, Not Threatened) and makipai/Australian magpie (*Gymnorhina tibicen*, Introduced and Naturalised) were frequently observed across the site.

All bird species recorded in eBird and during the site visit are presented in Appendix 4. Of these, four Threatened and four At Risk species are likely to be present on-site at least occasionally (as noted in Table 3):

- Kārearea/eastern falcon (*Falco novaeseelandiae novaeseelandiae*, Threatened – Nationally Vulnerable) may hunt within open shrubland and grassland at the site. As no suitable rocky outcrops are present on site, kārearea/eastern falcon are unlikely to breed on site. The eBird desktop assessment noted 161 records of kārearea/eastern falcon, several of which were within three kilometres of the proposed development.
- Tarapirohe/black-fronted tern (*Chlidonias albostriatus*, Threatened – Nationally Endangered) can forage in open pasture after rain events in earthworms, grab grub larvae and skinks and may potentially forage at the site.
- Pūteketeke/Australasian crested grebe (*Podiceps cristatus australis*, Threatened – Nationally Vulnerable) may forage on the constructed pond and the irrigation reservoir when it contains sufficient water. Pūteketeke/Australasian crested grebe will not breed on site due to the lack of suitable vegetation surrounding the constructed pond.
- Pārera/grey duck (*Anas superciliosa*, Threatened – Nationally Vulnerable) have the potential to be on-site given the presence of the constructed pond.
- Pīhoihoi/New Zealand pipit (*Anthus novaeseelandiae*, At Risk – Declining) may forage within rough pastoral areas, tussock grasslands and open / low shrublands and scrub, and suburban gardens and parks. It is possible that pīhoihoi/New Zealand pipit will forage within open rough areas within the site.
- Tarāpuka/black-billed gull (*Chroicocephalus bulleri*, At Risk – Declining) tend to breed on braided riverbeds, inland ponds and lakes and arable farmland, and thus have the potential to be present on-site.
- Tōrea/South Island pied oystercatcher (At Risk – Declining) were observed on-site and are highly likely to regularly use the site given the habitats present.
- Australian coot (*Fulica atra australis*, At Risk – Naturally Uncommon) may use the constructed pond for foraging and may use the irrigation reservoir when it contains sufficient water. But they are unlikely to nest onsite due to the lack of vegetation.

Several species identified in the desktop assessment and recorded during the site visit are classified as highly mobile fauna under the NPS-IB (see Table 3). The NPS-IB includes specific provisions to maintain the viability of populations across their natural range. This policy applies to areas that may not be permanent habitats but are critical for key life stages, such as feeding, breeding, and serving as stopover sites.

7.2 Lizards

The desktop assessment found 12 species within 20 kilometres of the site, which are listed in Table **4**. These included four Threatened and seven At Risk species. No incidental observations of lizards were made during the site visit.

Of the lizard species recorded in the desktop assessment, only three species are likely or possibly on-site, including one Not Threatened and two At Risk species:

- McCann's skink (*Oligosoma maccanni*; Not Threatened) is highly likely to be present within the site. This species is often found in modified dry, open environments where there is a complex of rocky outcrops, tussock and scrub.

Table 3 – Threatened and At Risk bird species recorded on eBird between 1 January 2015 and 30 September 2025 within 10 kilometres of the proposed plan change site. * indicates species observed during the October 2025 site visit, ⁺ indicates specified highly mobile fauna under the National Policy Statement for Indigenous Biodiversity (NPS–IB). Threat classifications as per Robertson et al. (2021). The likelihood of occurrence at the project site has been assessed for each species based on their known habitat preferences and distribution in the area and surrounds. The level of protection under the Wildlife Act 1953 is also noted.

Common Name(s)	Scientific Name	Threat Status	Preferred Habitat	Likelihood of Occurrence	Protected
Kārearea/eastern falcon⁺	*Falco novaeseelandiae novaeseelandiae*	Threatened – Nationally Endangered	Hilly dry tussockland, farmland, open country, native and exotic forest edges.	Possible	Protected
Kea⁺	*Nestor notabilis*	Threatened – Nationally Endangered	High altitude forest, mountains, high alpine basins, steep valleys, occasionally come down to lowland flats.	Highly unlikely	Protected
Tarapirohe/black-fronted tern⁺	*Chlidonias albostriatus*	Threatened – Nationally Endangered	Riverbeds, waterways, riverflats and farmlands by rivers during breeding. More coastal habitats, including coastal pasture, during autumn and winter.	Possible	Protected
Pārera/grey duck⁺	*Anas superciliosa*	Threatened – Nationally Vulnerable	Wetlands, small lakes, ponds, slow-flowing rivers and tidal waters surrounded by forest. Rare on urban lakes.	Possible	Protected (can be hunted)
Pūteketeke/Australasian crested grebe⁺	*Podiceps cristatus australis*	Threatened – Nationally Vulnerable	Clear shallow freshwater lakes and ponds with mud, clay or sandy bottoms with emergent vegetation. Breed on lowland lakes west of Southern Alps, subalpine and alpine lakes within and east of main divide. Wintering sites include coastal lakes and estuaries.	Likely	Protected
Pīhoihoi/New Zealand pipit⁺	*Anthus novaeseelandiae novaeseelandiae*	At Risk – Declining	Beaches, riverbeds, high-country riverflats, gravel roads and verges, rough pasture, tussockland, cleared areas of exotic forests.	Possible	Protected
Pohowera/banded dotterel⁺	*Charadrius bicinctus bicinctus*	At Risk – Declining	Fresh water or brackish estuaries, on gravel riverbeds, and the muddy edges of inland and coastal lakes and ponds, including sewerage ponds.	Unlikely	Protected
Pūweto/spotless crake	*Zapornia tabuensis*	At Risk – Declining	Freshwater wetlands with dense emergent vegetation like raupō, and also inhabit grassy forest clearings, particularly near streams.	Unlikely	Protected
Tarāpuka/black-billed gull	*Chroicocephalus bulleri*	At Risk – Declining	Breed on braided riverbeds and inland lakes. Arable farmland. During winter, coastal estuaries, harbours, open coastlines and urban centres.	Possible	Protected
Tōrea/South Island pied oystercatcher*⁺	*Haematopus finschi*	At Risk – Declining	Breed on braided riverbeds, farmland, fringes of lakes, subalpine bogs. Estuaries and sandy beaches outside of breeding.	Highly likely	Protected

Common Name(s)	Scientific Name	Threat Status	Preferred Habitat	Likelihood of Occurrence	Protected
Australian coot	*Fulica atra australis*	At Risk – Naturally Uncommon	Shallow, sheltered bays in freshwater fringed with submerged vegetation, reeds and raupō beds.	Possible	Protected
Kakaruai/South Island robin	*Petroica australis australis*	At Risk – Relict	Mature beech forests, mixed podocarp forests, older stands of exotic plantations and scrub.	Highly unlikely	Protected
Kawaupaka/little shag	*Microcarbo melanoleucos brevirostris*	At Risk – Relict	Breed in sheltered coastal waters, estuaries, harbours, rivers, dams and lakes up to the subalpine zone. Commonly in willows or silver poplars overhanging fresh water or estuaries, but sometimes on maimai or river gorge ledges or sea cliffs.	Unlikely	Protected
Māpunga/black shag	*Phalacrocorax carbo novaehollandiae*	At Risk – Relict	Sheltered coastal waters, estuaries, harbours, rivers, streams, dams and lakes up to subalpine zone.	Unlikely	Protected

Table 4 – Results of the Department of Conservation BioWeb Herpetofauna Database search, within a 20-kilometre radius of the plan change site, and an assessment of the likelihood of the presence of these species at the site. Threat statuses as per Hitchmough *et al.* 2026 and Jarvie *et al.* 2023. The likelihood of occurrence at the project site has been assessed for each species based on their known habitat preferences and distribution in the area and surrounds.

Species	Common Name	National Threat Status	Regional Threat Status	Record Distance (km) and Year	Preferred Habitats	Likelihood of Occurrence
Oligosoma maccanni	McCann's skink	Not Threatened	Not Threatened	1.92 (2023)	Open, dry rocky environments such as rock outcrops, and montane grassland.	Highly likely
Woodworthia "Cromwell"	Kawarau gecko	At Risk – Declining	At Risk – Regionally Declining	2.93 (2024)	Rocky scrub, talus, and creviced rock outcrops.	Highly likely
Oligosoma chionochloescens	Southern grass skink	At Risk – Declining	At Risk – Regionally Declining	7.41 (2024)	Damp or well vegetated habitats such as rank grasslands, wetlands, stream/river edges, and gullies.	Likely
Woodworthia "Southern Alps"	Southern Alps gecko	At Risk – Declining	At Risk – Regionally Declining	10.15 (2016)	Rocky scrub, talus, boulderfield, scree, stony river terraces and creviced rock outcrops.	Possible

Species	Common Name	National Threat Status	Regional Threat Status	Record Distance (km) and Year	Preferred Habitats	Likelihood of Occurrence
Oligosoma inconspicuum	Cryptic skink	At Risk – Declining	At Risk – Regionally Declining	No records	Prefers tussock grasslands, wetlands and rocky areas such as rocky screes.	Possible
Oligosoma toka	Nevis skink	At Risk – Declining	At Risk – Regionally Declining	9.73 (2019)	Rocky scrub, talus, rocky tussockland, rocky river terraces.	Unlikely
Naultinus gemmeus	Jewelled gecko	At Risk – Declining	At Risk – Regionally Declining	No records	Scrub, forest and tussockland.	Highly unlikely
Oligosoma aff. *inconspicuum* "Central – Southern)[1]		At Risk – Declining	Threatened – Regionally Vulnerable	7.70 (2024)	Tussockland, grassland, scrub, herbfield, wetlands and rocky areas.	Highly unlikely
Mokopirirakau "Roys Peak"	Orange-spotted gecko	Threatened – Nationally Vulnerable	At Risk – Regionally Declining	11.78 (2017)	High-altitude (1,100-1,800m) alpine and subalpine rocky habitats.	Highly unlikely
Oligosoma aff. *chloronoton* "West Otago"	Lakes skink	Threatened – Nationally Vulnerable	Threatened – Regionally Vulnerable	11.78 (2016)	Grassland, scrub, tussockland, rocky areas, scree, herbfield, fellfield, stony riverbeds, terraces and lake edges.	Highly unlikely
Oligosoma grande	Grand skink	Threatened – Nationally Increasing	Threatened – Regionally Endangered	18.2 (2024)	Schist rock tor systems and rocky shrubland or tussockland (from lowland to subalpine areas).	Highly unlikely
Oligosoma otagense	Otago skink	Threatened – Nationally Increasing	Threatened - Regionally Endangered	12.23 (1998)	Schist rock tor systems (from lowland to subalpine areas).	Highly unlikely

[1] Multiple pallid skink (*Oligosoma* aff. *inconspicuum* "pallid"; At Risk – Declining) records were identified during the desktop assessment. However, preliminary results of recent genomic studies suggests that all populations previously identified as 'pallid skink' are now recognised as a new species, *O.* aff. *inconspicuum* "Central – Southern (Hitchmough et al. 2026).

- Kawarau gecko (*Woodworthia* "Cromwell"; At Risk – Declining) is likely to be present within the site. However, the site is in a known contact zone between Kawarau and Southern Alps gecko (*Woodworthia* "Southern Alps", At Risk – Declining); and the specific distribution of each species in this zone is still not well understood. It is highly likely that if *Woodworthia* are present, the species is most likely to be Kawarau gecko as they are more abundant south of the Clutha River. The site contains areas of rocky habitat and scrub which is suitable for both species.
- Cryptic skink (*Oligosoma inconspicuum*; At Risk – Declining) may be present within the site. This species occupies a variety of habitats, including rocky areas and vegetated environments. Although cryptic skinks were originally thought to occur further south, from the Lake Wakatipu area to Southland, recent observations near Luggate, less than 10 kilometres from the site (Cameron Thorp pers. comm. 2026), suggest their range extends further north. It is also possible that southern grass skink (Oligosoma *chionochloescens*; At Risk - Declining) may be present, at low densities in damper areas of the site.

It is highly unlikely that jewelled gecko (*Naultinus gemmeus*; At Risk – Declining) and Nevis skink (*Oligosoma toka*; At Risk – Declining) are present within the site. While there are a few small and isolated patches of scrub habitat; and small areas of river terrace present (suitable for jewelled gecko and Nevis skink, respectively), the historical clearance and modification of the area mean it is unlikely that any jewelled gecko or Nevis skink populations to be present.

It is highly unlikely that any other species of indigenous lizard typically found within the region are present within the site. Although there is suitable habitat present for *Oligosoma* aff. *inconspicuum* "Southern – Central" (At Risk – Declining), the site is at a lower elevation than where this species is typically found (>700 metres). Similarly, orange-spotted gecko (*Mokopirirakau* "Roys Peak", Threatened – Nationally Vulnerable) are also usually found at higher elevations in alpine habitat (1,100-1,800 metres). In addition, other species such as Lakes (*Oligosoma* aff. *chloronoton* "West Otago", Threatened - Nationally Vulnerable), grand (*Oligosoma grande*, Threatened – Nationally Increasing) and Otago skinks (*Oligosoma otagense*, Threatened – Nationally Increasing) are rare in the region (classified as Threatened) and are highly affected by disturbance and modification.

Lizard habitat assessment

Most of the site is managed as cultivated cropping paddocks (comprising c.87% of the site, Table 1), and provides poor lizard habitat. While it is possible that McCann's skink may recolonise the paddocks during the growing season from adjoining strips of suitable habitat, it is very unlikely that there are permanent populations in these areas.

Lizard habitat is thus largely restricted to within the uncultivated portions of the site where there is exotic grassland, indigenous vegetation, and occasional rocks. This includes the following vegetation and habitats:

- Kānuka scrub on northeast terrace
- Indigenous shrubland patches on outwash gravels
- Exotic shrubland in northwest gully
- Fenceline indigenous hedgerows
- Exotic treeland (shelterbelts)
- River terrace escarpment vegetation
- Low producing grassland

The highest-quality lizard habitat is found within the northern area of the site (incorporating the terrace scarp and lower outwash terrace), due to its combination of grasses, shrubs, and rocky features. All three species mentioned above are likely to have at least small populations in these areas.

Indigenous shrubland patches throughout the site also provide good quality habitat for McCann's skink, due to the characteristic predominance of divaricating small leaved shrubs and open patches of grasses. Low producing grassland and ground cover beneath exotic shelterbelts provide reasonable habitat for McCann's skink. Other species are considered unlikely to be present in these areas, however.

7.3 Terrestrial invertebrates

The GBIF search retrieved records of 111 terrestrial invertebrates that met the search terms. The invertebrate fauna was characterised mainly by beetles and moths. One hundred and four had been identified to a level at which they could be assessed. The invertebrate fauna was predominantly indigenous, with several exotic species recorded.

Four notable species were identified in the desktop survey and are likely to be present on site:

- Dunedin tiger beetle (*Neocicindela dunedinensis*, not assessed) are most likely to be found on the river terrace escarpment at the northern border of the site, but may also be present elsewhere, such as in the low producing exotic grassland and the indigenous shrubland patches.
- Otago tunnelweb spider (*Hexathele petriei*, Not Threatened Sirvid et al., 2020) may be in any of the uncultivated habitats on site, including in exotic vegetation.
- New Zealand blue butterfly (*Zizina oxleyi*, Not Threatened Hoare et al., 2017) are most likely to be on the river terrace escarpment at the northern border of the site, but may be anywhere on site. Their larvae require leguminous vegetation such as broom (*Carmichaelia* spp.) or clover, so patches of desert broom may be particularly important for local populations of New Zealand blue butterfly.
- New Zealand mantis (*Orthodera novaezealandiae*, At Risk – Declining Buckley et al., 2012) are most likely to be restricted to the kānuka scrub, indigenous shrubland patches, exotic shrubland in the northwest gully, fenceline indigenous hedgerows, and possibly the river terrace vegetation. They require open shrub or scrubland, but may also use low tree branches as perches.

A summary of notable species and the likelihood of them being on site is presented in Table 5.

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

Species name	Common name	Threat Classification	Notability	Likelihood of Being Onsite
Neocicindela dunedinensis	Dunedin tiger beetle	Not assessed	Particularly sensitive to habitat loss, as they require dry riverbed habitat in Otago and Canterbury.	High
Hexathele petriei	Otago tunnelweb spider	Not Threatened (Sirvid et al., 2020)	Endemic to inland dry areas of Otago and South Canterbury.	High
Zizina oxleyi	New Zealand blue butterfly	Not Threatened (Hoare et al., 2017)	Declining throughout its range.	High

Species name	Common name	Threat Classification	Notability	Likelihood of Being Onsite
Orthodera novaezealandiae	New Zealand mantis	At Risk – Declining (Buckley et al., 2012)	At Risk.	High

All other species found in the desktop assessment are considered to have a 'possible' likelihood of being onsite, including spiders, weevils, grasshoppers, beetles, and moths. The key areas of the site where these species could possibly be found are within indigenous vegetation, and especially the dry, open habitats with bare ground and rocks at the north of the site which is good habitat for beetles and moths.

An additional one At Risk and one Threatened species not found in the desktop assessment are considered to also have an 'unlikely' likelihood of being present at the site. The fungus weevil *Cerius otagensis* (Threatened - Nationally Critical Leschen et al., 2012) could be present feeding on desert broom (its host plant) on site; however, it is noted that *C. otagensis* has not been seen anywhere since 1981 and only four specimens have ever been found. The Otago short-horned grasshopper *Phaulacridium otagoense* (At Risk - Declining Trewick et al., 2022) may be sunbathing on the open surface of the bare ground or gravel patches at the north of the site.

7.4 Introduced mammals

Many rabbits (*Oryctolagus cuniculus*) were observed on the northern escarpment and alluvial terrace. Rabbit sign (borrowing and scats) was also widely observed in all uncultivated areas of the site – hedgerows, shelterbelts, shrublands, and low producing grasslands. No other animals or their sign were observed during the site visit. However, European hare (*Lepus europaeus*), feral cats (*Felis cattus*), mustelids (*Mustela* spp.), rats (*Rattus* spp.), mice (*Mus musculus*), brushtailed possums (*Trichosurus vulpecula*) and hedgehogs (*Erinaceus europaeus*) are all highly likely to use the site.

8.0 Summary of Ecological Values and Their Significance

8.1 Ecological values

The key ecological values of the site are summarised below.

- Small fragments of indigenous vegetation typical of the Pisa Ecological District are scattered through the site. These patches contain populations of three At Risk-Declining plant species (desert broom, *Coprosma intertexta* and resurrection lichen).
- The population of approximately 40 *C. Intertexta* on the small knoll is notable within the Pisa Ecological District, because few other populations of this species of this size are known.
- The northern terrace escarpment and river terrace contain a moderate-sized contiguous area of mixed indigenous-exotic vegetation over a landform gradient that connects with conservation-administered marginal strip along the Clutha River. Four At Risk-Declining plant species were found in this area of the site. This area is also likely to provide important habitat for indigenous lizards and invertebrates.
- The site is used by At Risk – Declining South Island pied oystercatcher, and may also be used by five avifauna species classified as Threatened and five At Risk species. The site forms part of the very large area of suitable habitat for these species in the surrounding wider landscape.

- Vegetation such as indigenous and exotic shrubland, scrub, hedgerows, shelterbelts, river terraces and low producing exotic grassland may provide potential habitat for indigenous At Risk lizards. Surveys are recommended to confirm whether lizards are present on site (see section below).
- Lizard and invertebrate values are also likely to be present on-site, but surveys would be required to characterise them.

8.2 Ecological significance criteria and evaluation

The assessment of the site against the PORPS criteria is summarized in Appendix 5. The site meets criteria for representativeness, diversity and pattern, and rarity and distinctiveness, as follows:

- Some patches of indigenous shrubland at the site have ecological integrity typical of the Pisa Ecological District (Representativeness criterion).
- Areas of indigenous shrubland and hedgerows at the site comprise indigenous vegetation on land environments that retain less than 20% of their original indigenous cover (Representativeness criterion).
- The northern escarpment and lower terrace are a naturally uncommon ecosystem type – "inland outwash gravel", characterised by dry stony soils with distinctive dryland plant communities (Rarity and distinctiveness criterion). The rest of the site does not meet this definition.
- Several At Risk plant, avifauna and lizard species, and possibly one At Risk insect species, are present or likely to be present at the site (Rarity and distinctiveness criterion).
- Two plant species that are naturally uncommon in the Otago region are present at the site (Rarity and distinctiveness criterion).
- Vegetation such as indigenous and exotic shrubland, scrub, hedgerows, shelterbelts, river terraces and low producing exotic grassland may provide potential habitat for indigenous At Risk lizards (Rarity and distinctiveness criterion).
- The population of c.40 *Coprosma intertexta* on the small knoll is distinctive because it is one of the largest known populations in the district (Rarity and distinctiveness criterion).
- The site includes a gradient at the north of the site from moraine landforms to steep terrace scarp to river terrace by the Clutha River (Diversity and pattern criterion).

Areas of the site containing ecological values that are considered significant under the NPS-IB are located at the north of the site, and within indigenous vegetation remnants scattered across the rest of the site (Figure 3). These significant areas are restricted to the following vegetation and habitats at the site:

- Kānuka scrub on northeast terrace
- Indigenous shrubland patches on outwash gravels
- Fenceline indigenous hedgerows
- River terrace escarpment vegetation

It is also noted that the two patches of low producing grassland near the centre of the site contain a few indigenous plants within them.

The most ecologically valuable part of the site is the northern terrace escarpment and river terrace by the Clutha River, which is outside of the proposed development zone. Vegetation and habitats in this

area have the highest ecological integrity on the site, contain the most At Risk or Threatened species, and encompass a partial gradient.

Outside of this area of the site, the ecological significance is largely due to the presence of indigenous vegetation on a land environment that retains less than 10% of its original indigenous cover, and the provision of habitat for indigenous species listed as At Risk. Factors that detract from significance of these areas are the highly fragmented nature of remnant indigenous vegetation, and the relatively small size, low ecological integrity, and low diversity of the indigenous shrubland patches. Overall, therefore, the site is considered to have lower ecological value, with higher value in the northern portion of the site outside of the development zone.

8.3 Vegetation clearance rules

Permitted standards for indigenous vegetation clearance are set out in Rule 33.5 of the Queenstown Lakes District Plan. The relevant standards for the various areas of indigenous vegetation at this site are set out in Rules 33.5.2 and 33.5.3 (clauses a, c–f):

33.5.2. The clearance of indigenous vegetation must not exceed 500m2 in any continuous period of five years in Land environments with less than 20% remaining indigenous vegetation cover as defined by Threatened Environment Classification (TEC) version 2012.

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

a. On land that has not been cultivated or irrigated in the previous 20 years on plains, terraces and valley floors, including short tussock grassland, cushionfields or shrublands; or

c. Shrubland containing emergent indigenous trees greater than 3 metres high; or

d. Matagouri (Discaria toumatou) shrubland that has a canopy of at least 1.5 metres high; or

e. Diverse indigenous shrubland, where 'diverse' means three or more species of indigenous shrub or vine; or

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

These standards variously apply to different patches of the indigenous vegetation at the site. Any clearance beyond the relevant thresholds would therefore be a Restricted Discretionary activity.

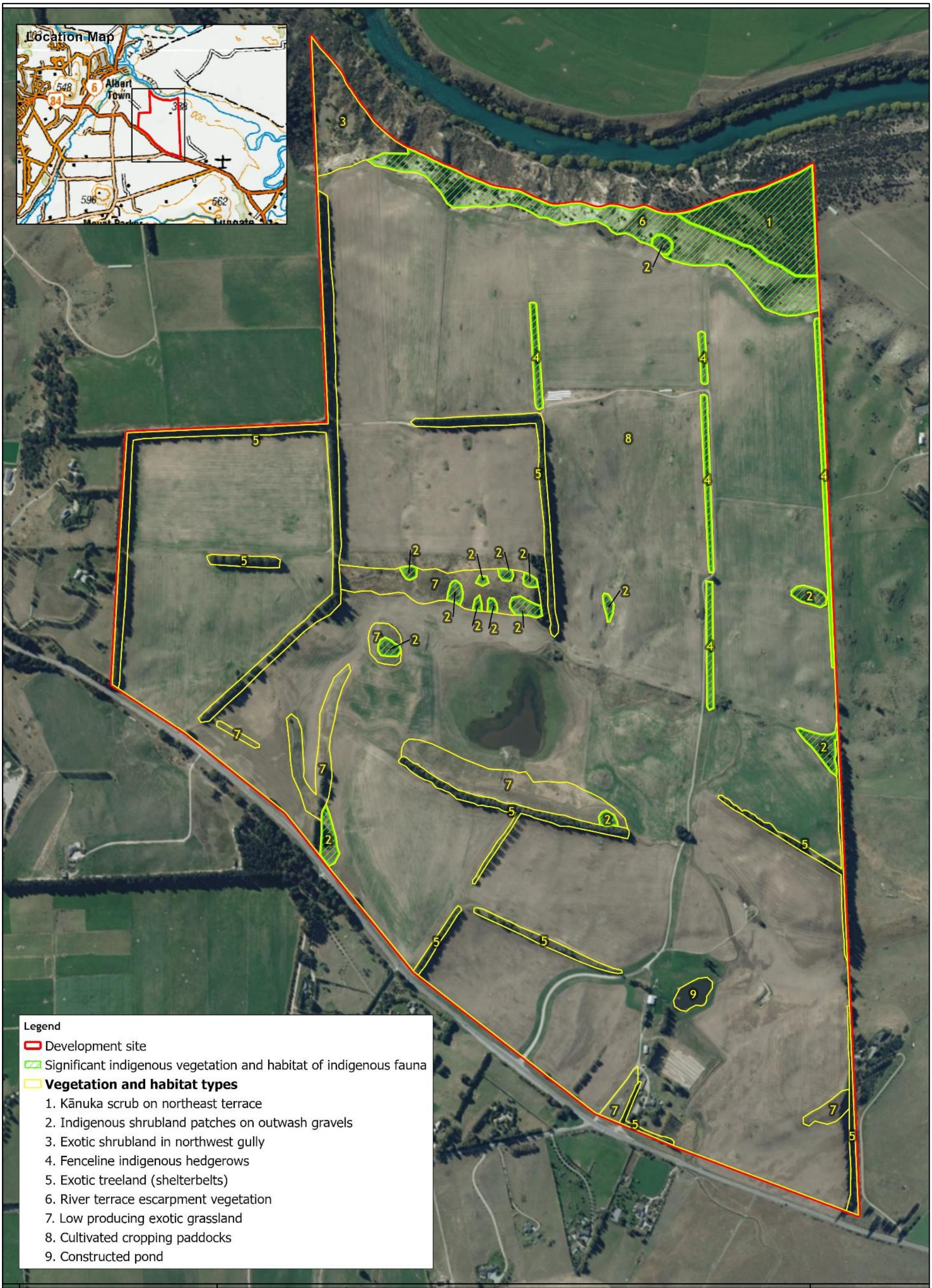


Figure 3. Areas of the proposed Corbridge Resort development site that have ecological values assessed as significant under the NPS-IB

9.0 Effects of the Proposed Plan Change and Development of the Site

While some provisions of the proposed plan change are still being finalised, the current plans provide for the retention of indigenous vegetation in Activity Areas EC and LP, no contruction of additional waterbodies beyond the instatement of the existing irrigation reservoir, removal of most exotic shelterbelts, and planting of 1.5 hectares of indigenous vegetation within Activity Areas EC and LP prior to Stage 1 works (see Section 4.1). These measures are assumed in the following effects assessment.

9.1 Vegetation and flora

Indigenous Vegetation Cover

The draft development plans (see Appendix 1) ensure the retention of almost all indigenous vegetation though careful design. The highest-value vegetation at the north of the site and all shrubland patches with high ecological integrity and/or populations of At Risk species are entirely avoided in design plans, and fall within Activity Areas EC and LP-E. Most areas of lower-value indigenous vegetation are also avoided. This demonstrates that development resulting from the plan change can be shaped to retain the existing key ecological values at the site; this should be a key consideration in any future iterations of development plans.

The only indigenous vegetation clearance proposed is:

- One small patch of indigenous shrubland with low ecological integrity on the hillslope south of the irrigation reservoir (0.1 hectares).
- The central fenceline indigenous hedgerows, which also have low ecological integrity (approximately 0.4 hectares).
- Scattered indigenous shrubs within low producing exotic grassland to the south of the irrigation reservoir, and in exotic shelterbelts – counts during the site visit were 29 matagouri, 10 mingimingi, 14 desert broom, and nine porcupine shrub.

Based on the heights and diameters of shrubs, most of the affected individuals are relatively young; it is considered likely that the largest individuals are around 30 years old.

The proposed 1.5 hectares of plantings of indigenous vegetation prior to Stage 1 works will remediate for the loss of indigenous vegetation and At Risk plants, resulting from any development that occurs following the plan change. Based on the current development layout, there will be a loss of approximately 0.5 hectares of indigenous shrubland and hedgerow, as well as individual indigenous plants within exotic grasslands. Three times the area of removed vegetation is a typical offsetting ratio used in these types of circumstances. The plantings will need to be retained as indigenous vegetation in the long term.

The plantings should focus on establishing one to a few large patches of woody indigenous vegetation. Suggested planting locations are within Activity Area LP immediately south of VAR14 on the eastern boundary, with LP around the existing shrubland patch adjoining the highway, and within EC to the north of the lake.

Species well adapted to the local environment should form the backbone of the plantings. Appendix 6 provides a suggested list of indigenous species that are appropriate for including in these plantings, although any other indigenous species known to naturally occur in the Pisa Ecological District could also be included. This list includes the key shrub species already present at the site, as well as additional

species that would have been naturally occurring in this part of the Pisa Ecological District. Backbone species should include those already present within the development footprint, as well as *Coprosma* spp., *Olearia* spp., and kānuka; it is suggested that these species form around 75% of the plants. Other species in Appendix 6 can be added where microsites favour their success.

The plantings should also include at least double the numbers of At Risk desert broom plants lost through vegetation clearance, with monitoring to ensure their successful establishment. Desert broom is easily established in the soils and climatic conditions found on site, and very high establishment success rates can be expected. Plantings should also include a notable component of the other six Threatened or At Risk species listed in Appendix 6, to ensure an overall net positive outcome for Threatened/At Risk species at the site. All indigenous plants should be eco-sourced.

These plantings would:

- Ensure the loss of indigenous vegetation is adequately remediated, providing a substantial long term increase in the total area of indigenous vegetation at the site. This would represent an important local gain for indigenous vegetation and habitats within the 'Chronically Threatened' land environment in which the site sits.
- Ensure that there is a net increase in the populations of At Risk plant species currently present at the site.
- Increase the overall diversity of indigenous plants at the site by introducing a wide range of species not currently present at the site, including several Threatened or At Risk species.
- Increase indigenous vegetation structural and compositional diversity over the long term, providing more diverse habitats for indigenous invertebrates, lizards and avifauna.
- Increase overall habitat for indigenous lizard and invertebrate species that may be present on site.
- Increase the overall connectivity of indigenous vegetation and habitats.

The effect of the plan change on indigenous vegetation is considered p**ositive/net gain** without effects management.

Loss of At Risk Plant Species

The plan change and development plans ensure the retention of all important populations of At Risk plants. This includes the populations of At Risk plants at the north of the site, and at the centre of the site on the small knoll. Other occurrences of At Risk plants are restricted to scattered desert broom, and most of these lie within Activity Areas EC or LP-E and will thus also be retained.

Loss of approximately 14 scattered individuals of desert broom would occur, representing a small proportion of the population on site. The proposed 1.5 hectares of plantings of indigenous vegetation prior to Stage 1 works will remediate for the loss of 14 desert broom plants, as noted above under 'indegenous vegetation clearance. This effect is considered **less than minor** without effects management, but is likely to be positive with appropriate species selection for the proposed replanting. Effects can easily be managed to provide a net positive outcome (see Section 10).

Removal of exotic treeland (shelterbelt) vegetation

Almost all exotic shelterbelts within the interior of the site will be removed (see Appendix 1). Small sections of shelterbelt on the southwestern boundary will be retained. These shelterbelts have low ecological values, and are largely comprised of three species classified as pest plants in the Otago Pest Management Plan – radiata pine, Corsican pine, and Douglas fir. Their removal would reduce the

likelihood of wilding tree spread within the site and possibly in the surrounding area (although there are still many exotic trees in the wider area), and is considered to have a **positive** effect.

The retention of existing shelterbelts is considered to have a **nil** effect, as they are already existing and will not introduce any new adverse effects. The retained shelterbelts are also adjacent to existing shelterbelts on adjoining properties, so their removal would not remove these species from these locations. Exotic trees are a well-established feature of the district, and do not have adverse ecological effects at the scale of the existing shelterbelts.

Introduction of Pest Plants from Resort Planting

Pest plants from resort gardens at the site could spread into indigenous vegetation. This effect is likely to be **minor** without effects management, as long as pest plants outlined in the Otago Regional Pest Management Plan are not planted.

Introduction of Pest Plants via Construction Equipment

Pest plant species may be introduced and widely spread through the introduction of seeds on machinery and other equipment as well as on an ongoing basis on the footwear of golf players. This effect is likely to be **more than minor** without effects management. In particular, construction machinery can be a major vector for weed spread, including pest plants outlined in the Otago Regional Pest Management Plan.

Formation and permanent instatement of the central lake

The plan change proposal includes the formation and permanent instatement of a small lake/waterbody near the centre of the site, in the footprint of the historic irrigation reservoir (Appendix 1). Currently the entire footprint of this lake is within cultivated cropping paddocks, and no indigenous plants were found in this location during the field survey. Earthworks required to excavate and shape this feature will therefore not impact indigenous vegetation and habitats. However, the installation of the lake provides opportunities to establish indigenous riparian vegetation and habitats on the margins, with associated positive effects for indigenous flora and water-based avifauna. Details of such measures could be determined at the time of consenting of any future development resulting from the plan change. The formation of the lake is therefore expected to have **nil to positive** effects.

Ongoing maintenance of the lake will be required to keep water levels stable and to ensure water quality is maintained. This will presumably be straightforward to manage through use of the existing irrigation water system to the lake location, although these matters are beyond the expertise of Wildlands to comment on.

Modification of Indigenous Vegetation Through Ongoing Operation of the Golf Course, including Irrigation, Fertiliser Application, Herbicide Use, and Human Traffic

Increased water and nutrient inputs through irrigation could result in alteration of water balance in areas of indigenous vegetation at the site. Spray drift from fertiliser use could damage or kill indigenous vegetation. Human foot traffic could cause damage to indigenous vegetation, especially in areas close to fairways (for example retrieval of golf balls).

These could result in compositional shifts and loss of habitats for dryland vegetation. The effects on the indigenous vegetation at the site could be **more than minor** without effects management.

9.2 Avifauna

Accidental Injury/Death/Displacement

The proposed development of the site will require earthworks and vegetation removal which could result in injury to breeding birds and injury or death chicks and eggs within the development footprint.

Several areas within the project area contain habitat that may be used by avifauna for breeding. The river terrace escarpment to the north of the property may contain habitat suitable for nesting kārearea/eastern falcon. The kānuka shrubland may provide foraging and nesting habitat for indigenous species, such as riroriro/grey warbler, tahou/silvereye (*Zosterops lateralis lateralis*, Not Threatened), pīwakawaka/South Island fantail (*Rhipidura fuliginosa fuliginosa,* Not Threatened), and tūī (*Prosthemadera novaeseelandiae novaeseelandiae*, Not Threatened). The fenceline indigenous hedgerows also provide nesting habitat for the smaller indigenous passerines. The rough exotic grasslands could provide nesting habitat for pīhoihoi/New Zealand pipit. There is the potential that tōrea/South Island pied oystercatcher may nest within the open pasture areas. There may also be suitable clumps of vegetation around the constructed pond that mallards or pūtangitangi/paradise shelduck may breed within.

The draft development design avoids earthworks and vegetation clearance within most areas of indigenous vegetation and exotic grassland, greatly reducing potential for these effects. Cultivated areas of the site are already subject to these effects annually. Nevertheless, clearance of exotic trees, central hedgerows, and exotic grassland on the hillslope south of the irrigation reservoir will be disturbed. This effect in avifauna is likely to be **more than minor** without effects management.

Disturbance to Avifauna

If birds are nesting within or adjacent to the works footprint during vegetation removal or earthworks, the disturbance caused by the works may reduce nesting success or cause birds to abandon nests altogether.

Currently, much of the site is disturbed by annual crop sowing and harvesting, soil cultivation and fertiliser application. This involves very regular heavy machinery operation over the entire site. However, the increase in disturbance from earthworks and vegetation removal will likely exceed current levels experienced by avifauna and persist over an extended period. There may be some change in patterns of human disturbance through golf activity and residents.

This effect of disturbance on avifauna is likely to be **more than minor** without effects management.

Habitat Loss and Fragmentation

While the proposed works will result in the loss of vegetation, which could provide habitat for a range of indigenous birds, only a small amount of the vegetation present at the site will be removed and a much larger area of indigenous vegetation will be replanted (Section 9.1). The vegetation being removed is also unlikely to result in a significant loss of avifauna habitat, given the abundance of similar vegetation in surrounding areas.

The modification of the grasslands and cultivated crop areas into a golf course will provide additional habitat for various bird species for foraging and is likely to provide a net **positive effect**.

The permanent instatement of the existing irrigation reservoir and associated planting will likely serve to provide more suitable foraging and breeding habitat for waterfowl. Adverse effects on water quality would only occur if there were extremely high numbers of waterfowl attracted to the lake, which is

considered very unlikely in this location. The permanent instatement of the existing irrigation reservoir is likely to provide a net **nil or positive effect.**

Overall, the plan change proposal with its modification and enhancement of areas is likely to have a **nil to positive effect**.

Bird Strike Risk

Due to the proximity of the project area to the Wānaka Airport, there is a potential risk that the proposed permanent instatement of the existing irrigation reservoir dam may increase the risk of bird strike with aircraft, by attracting waterfowl to the site year-round and potentially providing habitat for more species to breed on site. However, it is noted that this waterbody is an existing feature of the site that has generally been present annually for many decades, and generally has its highest levels during the breeding season. Given its long-standing presence at the site, increases to the existing bird strike risk are considered unlikely to be significant.

Overall, the effect of increased bird strike risk is likely to be **minor** without effects management, assuming no construction of any additional ponds.

9.3 Lizards

Possible lizard habitat occurs across the site, but with the exception of the northernmost area of the site this habitat is sparse, fragmented, and highly modified. Key possible habitats are exotic grasslands, rocks and indigenous vegetation. Cultivated areas are likely to be poor habitat. Although no lizards were detected during the field survey, a targeted lizard survey has not yet been undertaken at the site. Therefore, the effects below are conservative with the assumption that indigenous lizards are present in the suitable habitats.

Accidental Injury/Death/Displacement

It is unlikely that works will be able to avoid all possible lizard habitats on site, and the proposed development could therefore result in the permanent displacement, injury and death of individual lizards present within the development footprint. The draft development includes clearance of potentially good lizard habitat in the central hedgerows and low producing exotic grassland south of the irrigation reservoir. Due to the high likelihood of lizards present on site this effect is likely to be **more than minor** without effects management.

Disturbance to Lizards During Earthworks

Disturbance during construction to lizards could include 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. This may include increased stress, leading to reduced population functionality, such as poor breeding and low population recruitment. Due to the high likelihood of lizards being present on some of the areas proposed for clearance, this effect is likely to be **more than minor** without effects management.

Habitat Loss and Fragmentation

Possible lizard habitat occurs across the site but is sparse, fragmented, and highly modified. Some temporary small-scale habitat loss during the construction phase of the development is likely unavoidable, but the proposed 1.5 hectares of plantings of indigenous vegetation prior to Stage 1 works will more than counter this. A much larger area of habitat will result overall, due to the proposed indigenous plantings and the substantial new areas of landscape protection land that will provide

suitable lizard habitat. Therefore, the overall effect is likely to be **nil to positive** without effects management.

9.4 Terrestrial invertebrates

A field survey has not been undertaken to fully explore invertebrate values on site. Invertebrate diversity, abundance, and notable species are not known, though the desktop survey provides an insight into what is likely to be present. Therefore, the effects listed below are conservative, with the assumptions that notable invertebrates from the desktop survey within five kilometres of the site such as New Zealand mantis are present. It is also possible that other notable species such *Cerius otagensis* could be present.

Accidental Injury/Death

The proposed development could result in the permanent injury and death of terrestrial invertebrates within the footprint during vegetation clearance. Avoidance of key invertebrate habitat such as indigenous vegetation and the area at the north of the site reduces the potential effect. Nevertheless, this effect could be **more than minor** without effects management, because if indigenous desert broom plants are removed *C. otagensis* may be killed.

Disturbance to Terrestrial Invertebrates During Construction

Construction processes following a plan change are likely to increase human and vehicle traffic through the site. Dust and vibration are likely to affect invertebrate movements and behaviour, and may increase incidence of disease and mortality over the short term. Current usage for farming is likely to be causing periodic limited dust and vibration effects on site, but these will be exacerbated by the proposed development during construction. However, long-term, dust and vibration are likely to be reduced due to use of the site as a golf course rather than for farming. This effect could be **less than minor** without effects management.

Habitat Loss and Fragmentation

Important invertebrate habitat is present on site, especially at the north of the site outside of the current impacted area, and shrublands also contain valuable habitat. Importantly, the development design avoids the most important habitat types for invertebrates (Section 5, Figure 2):

- Kānuka scrub on the northeast terrace.
- Indigenous shrubland patches containing desert broom.
- Fenceline indigenous hedgerows containing desert broom.
- River terrace escarpment vegetation.

The current draft development design avoids all of these.

Clearance of shrubs (particularly desert broom which is the only known host of *Cerius otagensis*) will result in loss of invertebrate habitat. However, the replanting of 1.5 hectares of indigenous shrubland will provide an overall increase in suitable habitat. The land is currently likely to be irrigated as part of farming activities, but irrigation is expected to increase for a golf course development. Loss of habitat on site will cause localised fragmentation, especially for short range endemics and species with low dispersal ability, but the replanting areas will likely increazse overall connectivity. Overall, this effect could be **nil to positive** without effects management.

9.5 Other effects related to visitor accommodation

The plan change would lead to other ongoing changes in the use of the site related to visitor accommodation and buildings. This would include new acitivities and potential effects relating to aspects such as operation of vehicles at nighttime and nighttime light spill. These changes could result in effects to indigenous vegetation, avifauna and invertebrates that could be **more than minor** without effects management.

9.6 Overall level of effect

The potential level of adverse effects resulting from the plan change and proposed resort development as currently drafted before any effects management or additional ecological enhancement, is summarised in Table 6.

Table 6 – Potential effects of the plan change and proposed Corbridge Resort development on ecological features and values **before any effects management or additional ecological enhancement**.

Effect	Level of Effect
Indigenous vegetation clearance and replanting	Positive
Loss of At Risk plants	Less than minor
Removal of most exotic shelterbelts within site interior	Positive
Retention of some shelterbelts at southwest of site	Nil
Introduction of pest plants from resort planting	Minor
Introduction of pest plants via construction equipment	More than minor
Formation and permanent instatement of the central lake	Nil to positive
Modification of indigenous vegetation through ongoing operation of the golf course, including irrigation, fertiliser application, herbicide use, and human traffic	More than minor
Accidental injury/death/displacement of avifauna	More than minor
Disturbance of avifauna during earthworks	More than minor
Avifauna habitat loss and fragmentation	Nil to positive
Avifauna breeding pond/lake habitat enhancement	Less than minor to positive
Avifauna potential bird strike risk	Minor
Avifauna habitat loss	Nil to positive
Accidental injury/death/displacement of lizards	More than minor
Disturbance to lizards during earthworks	More than minor
Lizard habitat loss and fragmentation	Nil to positive
Lizard breeding failure/behavioural effects	Minor
Accidental injury/death of invertebrates	More than minor
Disturbance to terrestrial invertebrates during construction	Less than minor
Invertebrate habitat loss and fragmentation	Nil to positive
Other effects related to visitor accommodation	More than minor

10.0 Ecological Effects Management Approach

10.1 Indigenous vegetation

Permanent Protection of Higher-Value Vegetation

The indigenous vegetation at the north of the site and on the small knoll have high ecological values that are noteworthy in the district. The proposed Activity Area (Ecology) in which they sit will ensure their ongoing security under the plan change and the permanent protection of the important ecological values of these areas.

Pest Plant Management

Ongoing removal of exotic woody plants from areas of indigenous vegetation and new plantings should be undertaken, to prevent their spread and to maintain and enhance the naturalness of the indigenous vegetation. Species currently present in low to moderate abundance that require control are elder, wilding conifers, hawthorn, sweet briar, wild broom and tree lupin. Woody weed control is also suggested within the high-value areas of river terrace escarpment and kānuka scrub outside of the development zone at the north of the site. Removal of planted conifers is also suggested.

Mechanical removal of plants and/or cutting and pasting of stumps are the preferred means of control, to avoid harm to indigenous invertebrates. Sprays can be highly detrimental to grasshoppers, and could compromise populations of Otago short-horned grasshopper if present.

In addition to the control of existing weeds present at the site, it is also recommended that measures are implemented to minimise the risk of new weeds establishing at the site during development. Appropriate actions include cleaning and inspection of construction vehicles/machinery before they arrive on-site.

Additional Plantings of Indigenous Vegetation

The current Structure Plan has identified large areas designated for 'Ecology' and 'Landscape Protection'. These areas provide appropriate locations for future plantings beyond the 1.5 hectares stipulated in the plans. This demonstrates that there is plenty of scope for further plantings at the site. This provides the opportunity for even greater long-term positive outcomes for indigenous vegetation well beyond the values of the vegetation removed by the development.

Planting of indigenous species could also be considered within amenity plantings throughout the site, where appropriate to the setting, to provide further ecological benefits. However, all exotic conifer species that are known to be invasive should be prohibited to avoid possible issues with wilding spread beyond the site.

Implementation of these measures following a plan change would result in a strong **positive effect** for indigenous vegetation and At Risk species at the site.

Avoidance of Irrigation, Fertiliser Application, Herbicide Use, and Human Traffic Within Indigenous Vegetation Remnants

Measures should be taken to ensure that existing indigenous vegetation areas remain free of activities and inputs that may threaten their ecological integrity and viability. This includes ensuring no irrigation or fertiliser inputs reach these areas, and that herbicides are not used in these areas. Barriers to human foot traffic may be required in sensitive vegetation such as the central knoll and northern areas. These

aspects could be adequately dealt with through any consent application following the plan change and would ensure that any effects were **less than minor** or **nil**.

Progressive replacement of pest plant species in exotic shelterbelts

The small sections of retained exotic shelterbelts at the site contain individual of three pest plant species listed in the Otago Regional Pest Management Plan – radiata pine, Corsican pine, and Douglas fir. It is suggested that these individuals are progressively replaced with non-pest species when they reach the end of their lifespan due to death, disease or safety issues. These trees could be replaced by either exotic species that are not pests, or by indigenous species. This measure would ensure the long-term removal of all pest plants from the site, representing a positive effect.

10.2 Fauna habitat

Establishment of the suggested plantings in Sections 9.1 and 10.1 would result in a much greater area of indigenous fauna habitat, and more patches of suitable habitat, than presently exist at the site. Adverse effects of habitat loss and fragmentation resulting from vegetation removal during the development phase would therefore be temporary, with positive outcomes in the medium and long term.

10.3 Avifauna

Habitat Loss and Fragmentation

If the recommendations for retention of habitat, pest plant control and indigenous planting are undertaken as presented in Section 10.1, a net **positive** effect is likely for avifauna by increasing the extent and quality of suitable breeding and feeding habitats. The creation of a large lake will provide additional habitat for waterbirds and will greatly increase the available habitat for foraging and breeding.

Effects on the habitat values of the lake resulting from poor water quality (due to high numbers of waterfowl) are not anticipated, and no effects management is considered necessary. If such adverse effects did occur, aeration and filtration measures would need to be considered to manage water quality.

Disturbance to Avifauna During Earthworks

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

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

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

If the above mitigation measures are implemented, the final level effect on avifauna from temporary disturbance should be **less than minor.**

10.4 Lizards

As described in Sections 9.1 and 10.1, areas of possible high ecological value will be avoided through the implementation of ecology and landscape protection areas. There will also likely be substantial remediation in the LP-E Activity Areas on site, which could result in positive effects to lizards by increasing the amount and quality of lizard habitat post-development works. The suggested plantings would lead to the introduction of many plant species that are favoured habitat for lizards, including porcupine shrub, *Carmichaelia* spp. and *Coprosma* spp.

However, if lizards are detected during recommended surveys (see below) a Lizard Management Plan (LMP) may still be required to meet Wildlife Act requirements.

Lizard Management Plan and Wildlife Act Authority application

Due to the presence of potential lizard habitats on site, and high likelihood of lizard presence, lizard surveys will be required prior to any development being undertaken following a plan change, to determine indigenous lizard values on site and further inform the need for a Wildlife Act Authority (WAA). The site has large areas of land within LP and EC areas that would be suitable for lizard management, should a WAA be required. Lizard surveys can be undertaken on warm, sunny days (suitable for lizard emergence and activity) any time between October and April (the months when lizards are most active). If present, lizards will be visually active, captured in traps or basking in sunlit ground-level vegetation or on and around rocks (where these are able to be lifted).

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

If lizards are present on site, and their habitat cannot be avoided, an LMP and WAA application will be required as part of the development process to address potential adverse effects on lizards from the proposed development. The LMP will include the following:

- Survey methods used to assess relevant areas.
- Descriptions of the survey results and mapping of any lizard habitats and lizards found.
- Suggestions for avoiding lizards, or reducing impacts upon them, during development or construction.
- Potential avoidance or mitigation measures to ensure no-net-loss of lizards i.e. remediation of the site through supplementing the above proposed indigenous vegetation planting with additional lizard friendly plantings or lizard habitat units to improve suitability for lizards.
- Any offset or compensation required to address residual effects on lizards.

10.5 Terrestrial invertebrates

If the actions and recommendations in Sections 9.1 and 10.1, for substantial remediation on site are undertaken, this would result in positive effects for invertebrates by increasing the amount and quality of invertebrate habitat post-development works. The suggested plantings include many species that are favoured invertebrate habitat, including *Olearia* spp., *Coprosma* spp., and desert broom.

Dust and Vibration Management

Increases in dust during construction phase should be managed on site using water and speed limits. Vibration should be managed by limiting the use of vibrating machinery as much as possible, or using low-vibration settings where available. Using vibrating equipment on cooler days or at dawn and dusk may reduce its impact on invertebrates.

During operational phase of the development, dust levels will be lower than under the farming regime.

Stacking Cleared Vegetation

Where possible, cleared woody vegetation such as shrubs and trees should be stacked near healthy vegetation of similar character as part of habitat creation in the revegetation areas. This may allow invertebrates, such as New Zealand mantis and *Cerius otaoensis* if present, to move to the new growth rather than being killed as part of vegetation disposal. Only non-weedy species that cannot propagate vegetatively should be stacked when cleared.

Habitat Enhancement

Desert broom and other indigenous shrubs should be planted in the revegetation areas, as outlined in Sections 9.1 and 10.1. The plantings should ensure that the population of desert broom at the site is at the very least more than doubled, increasing potential habitat for *Cerius otagensis* in the long term. Areas of open grassland and tussockland should also be created, with rocks or gravel so that butterflies and grasshoppers can bask. Control of introduced predators (particularly hedgehogs and rodents) would provide further benefits, and could be considered as part of the overall resort development proposal.

Terrestrial Invertebrate Surveys and Management Plan

If removal of existing desert broom cannot be avoided, or any part of the river terrace escarpment or scrub on the northeast terrace is included for development in future iterations of the development plan (areas likely to have high invertebrate values), then a terrestrial invertebrate survey is recommended, to determine if a Terrestrial Invertebrate Management Plan outlining protocols for managing risks to populations of Threatened, At Risk or notable invertebrates is required.

Surveys at the time of consenting are considered appropriate for the following reasons:

- High value habitats for notable invertebrates are retained and/or enhanced under the current plan change proposal, except for possibly a few scattered desert broom plants in one area of grassland. Generic surveys are therefore not important for effects management at the plan change stage, and would only be required if high-value habitats we proposed to be affected during consenting.
- *C. otagensis* is only associated with desert broom and likely to be highly cryptic and hard to find and recognise. Therefore, assuming it is present at the plan change stage and then managing as appropriate during consenting is safer than relying on a survey at the plan change stage.

These aspects could be included in the plan change provisions, as well as the appropriate protocols for survey and removal of desrt broom plants if any plants are affected. Survey methods will include a walkover survey by day and night, live-capture pitfall trapping (including by desert broom plants), beating broom plants by day and night, and light trapping at night for moths.

10.6 Other effects related to visitor accommodation

Potential effects of a future development relating to lighting and traffic management would need to be worked through once a development consent was lodged. These aspects will require design and management conditions to ensure any ecological effects are approriately addressed. For example, this could inlcude conditions around aspects of outdoor lighting and vehicle speed limits to minimise adverse effects on fauna. It will be possible to approriately address these aspects during detailed design phase of the development so that the effects are **nil** to **less than minor**.

10.7 Assessment of potential effects with avoidance and mitigation

The potential level of ecological effects has been assessed on indigenous vegetation, avifauna, lizards, and invertebrates with avoidance, mitigation, and enhancement measures, as outlined in Table 7. This gives an indication of how adverse effects resulting from a plan change could be greatly reduced with the proposed effects management measures in place and positive outcomes very likely achieved in the medium and long term.

For indigenous vegetation and flora, the net effect of the plan change will be positive, with benefits continuing to accrue as plantings establish. This is because the highest value areas of the site have been avoided. Further, the replanting of indigenous flora will lead to the long-term increase in area of indigenous dryland plant communities on landforms with very little indigenous vegetation cover.

For avifauna, less than minor to potentially positive effects are likely, as the proposed habitat enhancement through weed control and planting indigenous vegetation will provide alternative habitats for birds to forage and breed. The permanent instatement of the lake and riparian planting would provide foraging and breeding habitat for waterbirds. Implementing surveys and setback areas during the breeding season for nesting birds will reduce disturbance and potential loss of adults, eggs and chicks. The IDP provides guidelines of incidental discoveries of nesting birds, nests, and injured birds during vegetation clearance and other works. These management measures would ensure that the effects are less than minor or a positive gain.

For lizards, a targeted survey followed by implementation of a Lizard Management Plan (both undertaken following a plan change and at the time of development consenting) would ensure effects are less than minor, or positive if the proposed habitat enhancements occur.

Effects on invertebrates cannot be determined precisely without a survey, but it is likely that increased habitat area, diversity and connectivity will result in a positive outcome over the medium and long term.

Overall, it is expected that the plan change and development enabled at the site will initially have less than minor, neutral, or net-positive ecological outcomes, with positive outcomes for indigenous biodiversity resulting over the medium term from increased areas of indigenous vegetation and habitats, greater habitat diversity, increased connectivty between habitat areas, and woody weed control. The level of positive outcome achieved will depend on the amount and composition of indigenous plantings undertaken beyond the presently stipulated 1.5 hectares, and any residual less than minor efects can be dealt with through increased levels of planting.

Table 7 – Potential level of ecological effects resulting from the proposed Corbridge Resort plan change and development if proposed effects management measures are implemented effectively.

Effect	Effects Management Measures	Level of Effect
Indigenous vegetation clearance and replanting	Avoid highest value vegetation at north, and as many patches of indigenous shrubland as practicable. Consider legal protection. New plantings of indigenous flora throughout the site, including establishment of populations of many plant species not currently present. Woody weed removal and ongoing control in all areas of indigenous vegetation, including the northern river terrace.	Positive, net gain
Loss of At Risk plants	Planting of populations of desert broom and *Coprosma intertexta* that are at least two times as large as those lost. Establishment of new populations of several other At Risk indigenous plants that are not currently at the site.	Positive, net gain
Introduction of pest plants from resort planting	Woody weed removal and ongoing control. Appropriate planting plan. Progressive replacement of pest plant species in exotic shelterbelts	Positive effect through control of existing weeds
Introduction of pest plants via construction equipment	Woody weed removal and ongoing control. Development of biosecurity plan.	Nil
Formation and permanent instatement of the central lake	Indigenous riparian vegetation plantings around margins Water quality monitoring, and implementation of aeration/filtration measures if adverse effects on avifauna noted	Positive effect through habitat creation and maintenance
Modification of indigenous vegetation through ongoing operation of the golf course, including irrigation, fertiliser application, herbicide use and human traffic	Avoidance of irrigation, fertiliser application, herbicide use, and human traffic within indigenous vegetation remnants.	Less than minor to nil
Accidental injury/death/displacement of avifauna	Survey for nesting indigenous birds prior to works, setbacks around any active nests, and Incidental Discovery Protocol. A Bird Management Plan may be required	Less than minor
Disturbance of avifauna during earthworks	Survey for nesting indigenous birds prior to works, setbacks around any active nests, and Incidental Discovery Protocol. A Bird Management Plan may be required	Less than minor
Avifauna habitat loss and fragmentation	Avoid indigenous vegetation at north of site. New plantings of indigenous flora and ecological enhancement throughout the site. The construction of a large lake.	Positive, net gain
Accidental injury/death/displacement of lizards	Lizard survey, and If lizards present, Lizard Management Plan to be prepared and associated lizard management implemented.	Less than minor
Disturbance to lizards during earthworks	Lizard survey, and if lizards present, Lizard Management Plan to be prepared and associated lizard management implemented.	Less than minor
Lizard habitat loss and fragmentation	Establishment of new plantings of indigenous flora and ecological enhancement plantings throughout the site.	Positive, net gain
Lizard breeding failure/behavioural effects	If lizards present, Lizard Management Plan to be prepared and associated lizard management implemented.	Less than minor

Effect	Effects Management Measures	Level of Effect
Accidental injury/death of invertebrates	Avoiding the highest value habitat where practicable, especially at the north of the site. Survey and development of Invertebrate Management Plan if required.	Unknown without a survey, but likely less than minor
Disturbance to terrestrial invertebrates during construction	Dust management. Avoiding particularly important invertebrate habitat wherever possible.	Unknown without a survey, but likely less than minor
Invertebrate habitat loss and fragmentation	Avoiding particularly important invertebrate habitat wherever possible. New indigenous vegetation planting and ecological enhancement plantings, including invertebrate food and shelter plants.	Unknown, but likely positive, net gain
Other effects related to visitor accommodation	Implementation of design and management conditions during the detailed design phase to ensure any ecological effects are identified and appropriately addressed.	Nil to less than minor

11.0 Summary and Recommendations

While the Corbridge Resort plan change site contains predominantly cultivated agricultural land, it nevertheless contains areas with important ecological values. Small fragments of indigenous vegetation typical of the Pisa Ecological District are scattered through the current proposed impact zone, and support populations of two At Risk-Declining plant species (desert broom and *Coprosma intertexta*). The northern terrace escarpment (outside of the current proposed impact zone) has the highest ecological values, supporting five At Risk-Declining plants and likely providing important habitat for indigenous lizards and invertebrates. The wider site is used by At Risk – Declining South Island pied oystercatcher, and may also be used by five avifauna species classified as Threatened and five At Risk species.

Granting of a plan change is likely to result in a range of temporary effects during earthworks and construction associated with development, although many of these already occur on an ongoing basis from the present agricultural land use (e.g. vgetation removal, earthworks, dust creation, heavy machinery activity). Adverse ecological effects likely to result from earthworks and construction include loss of indigenous vegetation and At Risk plants, harm to indigenous fauna, and fauna habitat loss and fragmentation. Increased risk of bird strike from aircraft due to construction of a permanent pond where the irrigation reservoir is located is also a possible potential effect, although given this is an existing feature this is unlikely to b e significant.

Avoidance of key areas of indigenous vegetation and habitat is possible, and has been achieved in the current draft plans. This is the key action to avoid adverse effects from the plan change, and should be maintained in future iterations of plans. The plan change would also result in the planting of 1.5 hectares of indigenous vegetation, which should comprise indigenous species naturally found in the region including several Threatened or At Risk species. These plantings would include many species that are favoured habitat for indigenous lizards and invertebrates. The plantings would provide a long-term increase in indigenous vegetation cover within a land environment with less than 10% of its original indigenous vegetation remaining – an important ecological outcome. There is also great potential within the current project design to increase the area of indigenous plantings well beyond what is required for effects management, providing additional long-term ecological enhancement of the site with notable benefits for indigenous biodiversity and connectivity of habitats.

Given the high ecological values for avifauna at the site, and the potential for more than minor impacts on avifauna from the works, further surveys are recommended to determine whether the site is used

for breeding and whether a Bird Management Plan (BMP) would be required to address potential adverse effects associated with a future development.

Due to the presence of potential lizard habitats on site, and high likelihood of lizard presence, lizard surveys should accompany any development consenting process following a plan change, to further inform an assessment of effects and any effects management required for a future development. The substantial habitat remediation suggested on site is likely to result in positive effects to lizards by increasing the amount and quality of lizard habitat post-development works. However, if lizards are detected during recommended surveys, a Lizard Management Plan may still be required to meet Wildlife Act requirements.

Management of effects for invertebrates primarily consists of avoidance and remediation regarding important invertebrate habitat. No further surveys are needed for invertebrates if important invertebrate habitat is avoided, as achieved in the current plans. However, if important habitat is to be impacted, further invertebrate surveys should be undertaken, to determine what invertebrates are present and whether a Terrestrial Invertebrate Management Plan is needed.

Overall, if the plan change occurs and measures and recommendations in this report are implemented if development of the site occurs, it is expected that the development at the site will initially have less than minor ecological effects associated with earthworks and construction, with positive outcomes for indigenous biodiversity in the medium and long term due to increased areas of indigenous vegetation and habitats, greater habitat diversity, increased connectivty between habitat areas, and woody weed control. Potentially large ecological gains could be achieved, depending on how much indigenous revegetation was undertaken.

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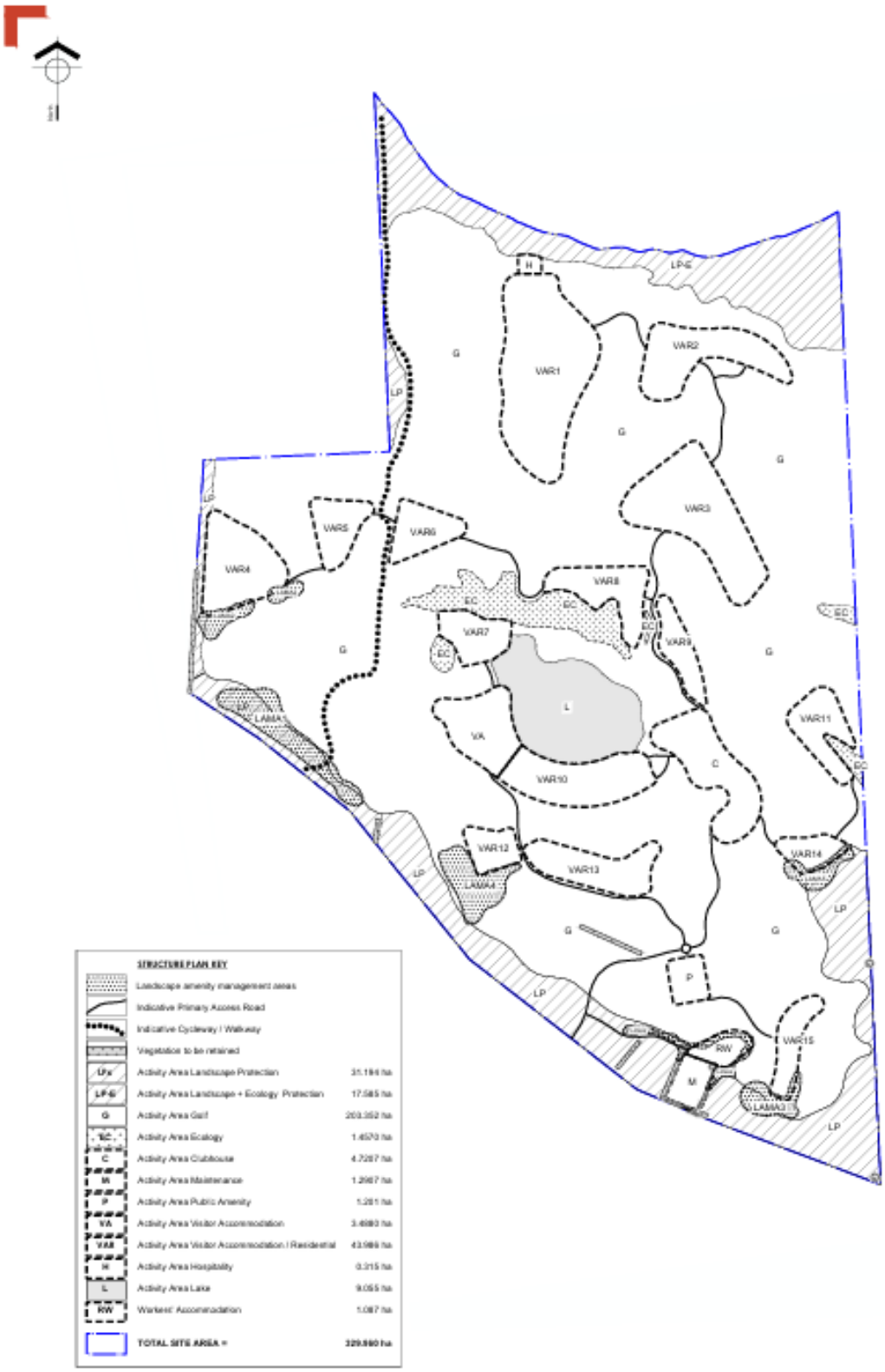
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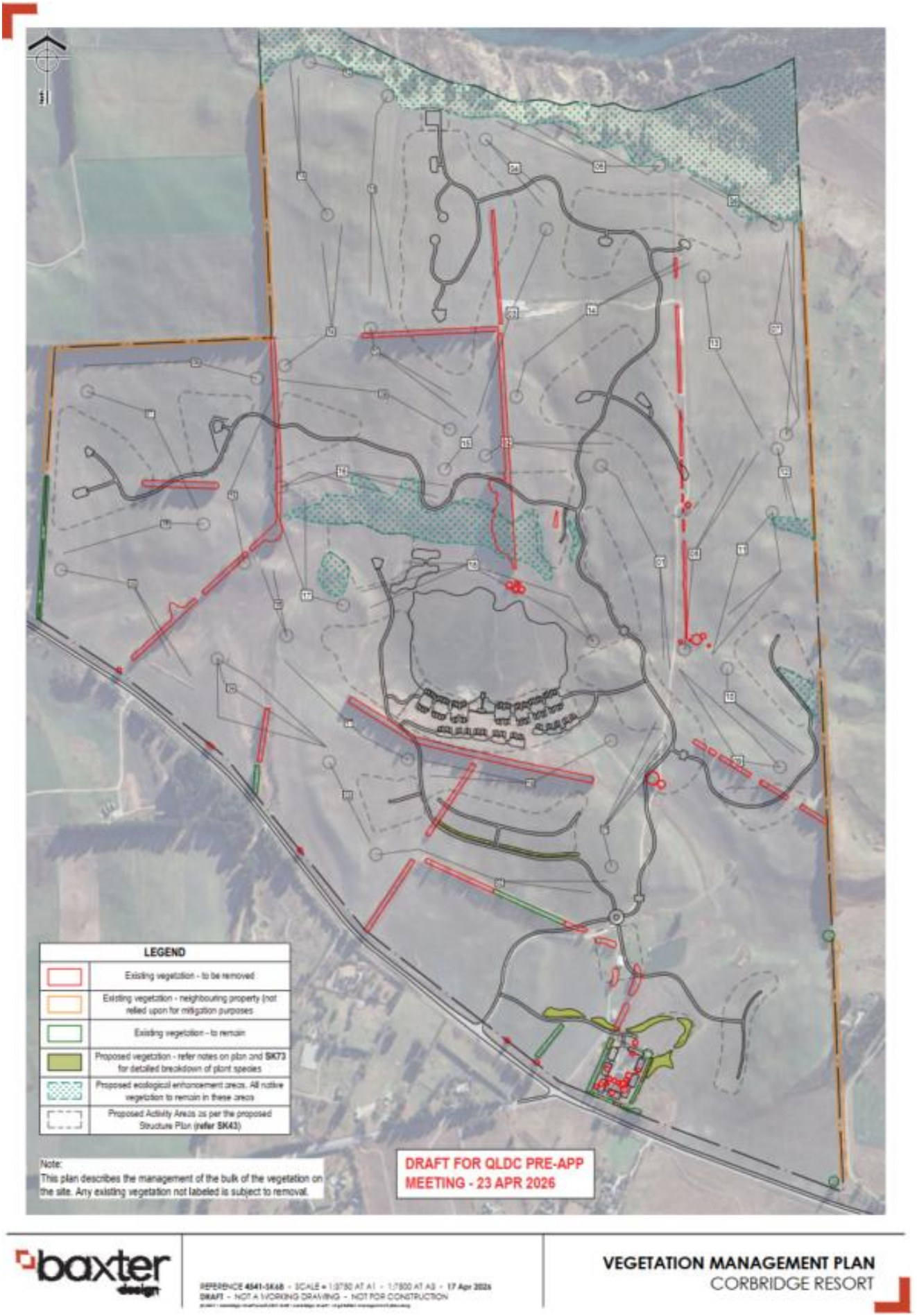
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Appendix 1

Draft Corbridge Resort Development Structure Plan (Source: SIO No 12 Ltd)




LEGEND
Existing vegetation - to be removed
Existing vegetation - neighbouring property (not relied upon for mitigation purposes
Existing vegetation - to remain
Proposed vegetation - refer notes on plan and SK73 for detailed breakdown of plant species
Proposed ecological enhancement areas. All native vegetation to remain in these areas
Proposed Activity Areas as per the proposed Structure Plan (refer SK43)
Note:
This plan describes the management of the bulk of the vegetation on the site. Any existing vegetation not labeled is subject to removal.
DRAFT FOR QLDC PRE-APP MEETING - 23 APR 2026
baxter design
VEGETATION MANAGEMENT PLAN
CORBRIDGE RESORT

Appendix 2

Vascular plant species recorded at the proposed Corbridge Resort plan change site

Indigenous vascular species

Scientific Name	Common Name	Plant Type
Anthosachne solandri	Blue wheatgrass	Graminoid
Austroderia richardii	Toetoe	Graminoid
Carex breviculmis	Grassland sedge	Graminoid
Carmichaelia petriei	Desert broom	Shrub
Cheilanthes sieberi	Rock fern	Fern
Chionochloa rubra	Red tussock	Graminoid
Coprosma crassifolia		Shrub
Coprosma intertexta		Shrub
Coprosma propinqua	Mingimingi	Tree
Discaria toumatou	Tūmatakuru, matagouri	Tree
Festuca novae-zelandiae	Hard tussock	Graminoid
Kunzea serotina	Kānuka	Tree
Leucopogon fraseri	Pātōtara, dwarf mingimingi	Shrub
Melicytus alpinus	Porcupine shrub	Shrub
Muehlenbeckia axillaris	Creeping pōhuehue	Vine
Muehlenbeckia complexa	Scrub pōhuehue	Vine
Myosurus minimus subsp. *novae-zelandiae*	New Zealand mousetail	Forb
Raoulia apicinigra	Mat daisy	Forb
Raoulia australis	Common mat daisy	Forb
Raoulia hookeri	Scabweed	Forb
Rubus schmidelioides	Tātarāmoa, white-leaved lawyer	Vine

Naturalised and exotic vascular species

Scientific Name	Common Name	Plant Type
Abies spp.	Fir species	Tree
Acaena agnipila	Australian sheep's bur	Forb
Achillea millefolium	Yarrow	Forb
Agrostis capillaris	Browntop	Graminoid
Agrostis stolonifera	Creeping bent	Graminoid
Anagallis arvensis	Scarlet pimpernel	Forb
Anthoxanthum odoratum	Sweet vernal	Graminoid
Aphanes australis	Slender parsley piert	Forb
Aphanes arvensis	Parsley piert	Forb
Betula pendula	Silver birch	Tree
Bromus diandrus	Ripgut brome	Graminoid
Cedrus spp.	Cedar species	Tree
Cerastium fontanum	Mouse-ear chickweed	Forb
Chamaecyparis lawsoniana	Lawson cypress	Tree
Cirsium arvense	Californian thistle	Forb
Cirsium vulgare	Scotch thistle	Forb
Conium maculatum	Hemlock	Forb
Crataegus monogyna	Hawthorn	Tree
Cytisus scoparius	Broom	Shrub
Dactylis glomerata	Cocksfoot	Graminoid

Scientific Name	Common Name	Plant Type
Echium vulgare	Viper's bugloss	Forb
Erodium cicutarium	Storksbill	Forb
Eucalyptus regnans	Blue gum	Tree
Eucalyptus sp.	Eucalypt species	Tree
Festuca rubra	Red fescue	Graminoid
Galium aparine	Cleavers	Forb
Holcus lanatus	Yorkshire fog	Graminoid
Hordeum murinum	Barley grass	Graminoid
Hypericum perforatum	St John's wort	SubShrub
Juncus effusus	Soft rush	Graminoid
Lactuca virosa	Acrid lettuce;	Forb
Larix decidua	European larch	Tree
Laurus nobilis	Bay tree	Tree
Lavandula angustifolia	English lavender	Shrub
Lolium arundinaceum	Tall fescue	Graminoid
Lupinus arboreus	Tree lupin	Shrub
Malva sp.	Mallow	Forb
Marrubium vulgare	Horehound	Forb
Picea spp.	Spruce species	Tree
Pilosella officinarum	Mouse-ear hawkweed	Forb
Pinus nigra	Corsican pine	Tree
Pinus radiata	Radiata pine	Tree
Pinus spp.	Pine species	Tree
Plantago coronopus	Bucks horn plantain	Forb
Plantago lanceolata	Narrow-leaved plantain	Forb
Plantago major	Broad-leaved plantain	Forb
Poa annua	Annual poa	Graminoid
Populus spp.	Poplar species	Tree
Prunus lusitanica	Portugese laurel	Shrub
Prunus sp.	Ornamental cherry	Tree
Pseudotsuga menziesii	Douglas fir	Tree
Reseda luteola	Wild mignonette	Forb
Ribes sanguineum	Flowering currant	Shrub
Ribes uva-crispa	Gooseberry	Shrub
Rosa rubiginosa	Sweet briar	Shrub
Rumex acetosella	Sheep's sorrel	Forb
Rumex crispus	Curled dock	Forb
Rumex obtusifolius	Broad-leaved dock	Forb
Sagina procumbens	Pearlwort	Forb
Salix alba	Silver willow, golden willow	Tree
Salix × *fragilis*	Crack willow	Tree
Salix spp.	Willow species	Tree
Sambucus nigra	Elder	Shrub
Sedum acre	Stonecrop	Forb
Sonchus arvensis	Perennial sow thistle	Forb
Stellaria media	Chickweed	Forb
Taraxacum officinale	Dandelion	Forb
Trifolium dubium	Suckling clover	Forb
Trifolium repens	White clover	Forb
Urtica urens	Nettle	Forb
Verbascum thapsus	Woolly mullein	Forb
Verbascum virgatum	Moth mullein	Forb
(unknown cultivar)	Triticale – wheat-ryecorn cross	Forb

Appendix 3

Representative site photographs of vegetation and habitats



Plate A3-1 – Looking down the eastern river terrace escarpment to the patch of kānuka scrub on northeast terrace. The property boundary with conservation-administered land adjoining the Clutha River lies just in front of the willows at the top of the image.



Plate A3-2 – Kānuka scrub on northeast terrace, looking south to the river terrace erscarpment, with several wilding pines visible on the skyline.



Plate A3-3 – Fenced indigenous shrubland dominated by matagouri at the eastern margin of the site.



Plate A3-4 – Fenced indigenous shrubland dominated by matagouri and mingimingi at the eastern margin of the site.



Plate A3-5 – Indigenous shrubland in the small gully at the southwest of the site, showing desert broom, matagouri, *Coprosma intertexta*, and elder amongst exotic grassland.



Plate A3-6 – Indigenous shrubland in the small gully at the southwest of the site, here showing desert broom, mingimingi and matagouri amongst exotic grassland.



Plate A3-7 – Indigenous shrubland patch on the small knoll near the irrigation reservoir surrounded by low producing grassland, within cultivated cropping paddocks.



Plate A3-8 – Indigenous shrubland dominated by matagouri on the slopes to the north of the irrigation reservoir, within a matrix of low producing grassland.



Plate A3-9 – The northwestern corner of the site contains exotic shrubland in the northwestern gully. Note that the indigenous shrubland on the terrace escarpment in centre image is outside of the site.



Plate A3-10 – A vehicle track at the northwest of the site provides access down the terrace escarpment to the low terrace adjoining the Clutha River.



Plate A3-11 – The fenceline indigenous hedgrow adjoining the access track near the centre of the site, dominated by matagouri and mingimingi.



Plate A3-12 – A view of the centre of the site, showing cultivated cropping paddock, fenceline indigenous hedgrow adjoining the access track, and exotic treeland (shelterbelt).



Plate A3-13 – Fenceline indigenous hedgerow along the eastern site boudary.



Plate A3-14 – A lone *Coprosma crassifolia* and porcupine shrub on the margins of an exotic shelterbelt at the southwest of the site.



Plate A3-15 – A view of the eastern end of the river terrace erscarpment.



Plate A3-16 – A view looking west over the river terrace erscarpment and Clutha River below.



Plate A3-17 – Low producing exotic grassland on hillslopes to the south of the irrigation reservoir, with scattered indigenous and exotic shrubs.



Plate A3-18 – Low producing exotic grassland on hillslopes to the north of the irrigation reservoir, with scattered hard tussock,indigenous shrubs and blue wheatgrass.



Plate A3-19 – Low producing exotic grassland on hillslopes to the north of the irrigation reservoir, here showing scattered hard tussock, indigenous shrubs, and rocks.



Plate A3-20 – Low producing grassland at the southeastern margin of the site, with a wilding pine and porcupine shrub (centre right) visible.



Plate A3-21 – A rock pile on the edge of low producing exotic grassland near the centre of the site.



Plate A3-22 – A view looking northwest from near the southeastern corner of the site.



Plate A3-23 – A view looking north along the eastern site boudary. The two easternmost indigenous shrubland patches are visible amongst thecultivated cropping paddocks.



Plate A3-24 – The constructed pond near the woolshed at the south of the site.

Threatened and notable plants



Plate A3-25 – *Coprosma intertexta* in the southwestern gully.



Plate A3-26 – Desert broom (*Carmichaelia petriei*) on the small central knoll.



Plate A3-27 – Common mat daisy (*Raoulia australis*) on the upper river terrace escarpment.



Plate A3-28 – Rock fern (*Cheilanthes sieberi*) on the lower river terrace escarpment.



Plate A3-29 – *Raoulia beauverdii* on the upper river terrace escarpment.\



Plate A3-30 – Creeping pōhuehue (*Muehlenbeckia axillaris*) on the mid river terrace escarpment.

Appendix 4

Bird species recorded on eBird between 1 January 2015 and 30 September 2025 within 10 kilometres of the proposed site, and their likelihood of presence on-site.

* Indicates species observed during the October 2025 site visit. Threat classifications as per Robertson et al. (2021) and level of protection under the Wildlife Act 1953.

Common Name(s)	Scientific Name	Threat Classification	Protection	Likelihood of presence
Indigenous				
Kārearea/eastern falcon	*Falco novaeseelandiae novaeseelandiae*	Threatened – Nationally Endangered	Protected	Possible
Kea	*Nestor notabilis*	Threatened – Nationally Endangered	Protected	Highly unlikely
Tarapirohe/black-fronted tern	*Chlidonias albostriatus*	Threatened – Nationally Endangered	Protected	Possible
Pārera/grey duck	*Anas superciliosa*	Threatened – Nationally Vulnerable	Protected (can be hunted)	Possible
Pūteketeke/Australasian crested grebe	*Podiceps cristatus australis*	Threatened – Nationally Vulnerable	Protected	Likely
Pīhoihoi/New Zealand pipit	*Anthus novaeseelandiae novaeseelandiae*	At Risk – Declining	Protected	Possible
Pohowera/banded dotterel	*Charadrius bicinctus bicinctus*	At Risk – Declining	Protected	Unlikely
Pūweto/spotless crake	*Zapornia tabuensis*	At Risk – Declining	Protected	Unlikely
Tarāpuka/black-billed gull	*Chroicocephalus bulleri*	At Risk – Declining	Protected	Possible
Tōrea/South Island pied oystercatcher*	*Haematopus finschi*	At Risk – Declining	Protected	Highly likely
Australian coot	*Fulica atra australis*	At Risk – Naturally Uncommon	Protected	Possible
Kakaruai/South Island robin	*Petroica australis australis*	At Risk – Relict	Protected	Highly unlikely
Kawaupaka/little shag	*Microcarbo melanoleucos brevirostris*	At Risk – Relict	Protected	Unlikely
Māpunga/black shag	*Phalacrocorax carbo novaehollandiae*	At Risk – Relict	Protected	Unlikely
Grey duck – mallard hybrid	*Anas superciliosa × platyrhynchos*	Not Threatened	Protected (can be hunted)	Highly likely
Kāhu/swamp harrier*	*Circus approximans*	Not Threatened	Protected	Highly likely
Kakīānau/black swan	*Cygnus atratus*	Not Threatened	Protected (can be hunted)	Possible
Karoro/southern black-backed gull	*Larus dominicanus dominicanus*	Not Threatened	Not protected	Likely
Kererū/New Zealand pigeon	*Hemiphaga novaeseelandiae*	Not Threatened	Protected	Unlikely
Korimako/bellbird*	*Anthornis melanura melanura*	Not Threatened	Protected	Possible
Kōtare/New Zealand kingfisher	*Todiramphus sanctus vagans*	Not Threatened	Protected	Possible

Common Name(s)	Scientific Name	Threat Classification	Protection	Likelihood of presence
Kuruwhengi/Australasian shoveler	*Spatula rhynchotis*	Not Threatened	Protected (can be hunted)	Possible
Matuku moana/white-faced heron	*Egretta novaehollandiae*	Not Threatened	Protected	Possible
Ngirungiru/tomtit	*Petroica macrocephala macrocephala*	Not Threatened	Protected	Unlikely
Pāpango/New Zealand scaup	*Aythya novaeseelandiae*	Not Threatened	Protected	Likely
Pipipi/brown creeper	*Mohoua novaeseelandiae*	Not Threatened	Protected	Unlikely
Pīpīwharauroa/shining cuckoo	*Chrysococcyx lucidus lucidus*	Not Threatened	Protected	Possible
Pīwakawaka/South Island fantail	*Rhipidura fuliginosa fuliginosa*	Not Threatened	Protected	Highly likely
Poaka/pied stilt	*Himantopus himantopus leucocephalus*	Not Threatened	Protected	Likely
Pūkeko	*Porphyrio melanotus melanotus*	Not Threatened	Protected (can be hunted)	Likely
Pūtangitangi/paradise shelduck*	*Tadorna variegata*	Not Threatened	Protected (can be hunted)	Highly likely
Riroriro/grey warbler *	*Gerygone igata*	Not Threatened	Protected	Highly likely
Ruru/morepork	*Ninox novaeseelandiae novaeseelandiae*	Not Threatened	Protected	Unlikely
Spur-winged plover	*Vanellus miles novaehollandiae*	Not Threatened	Not protected	Highly likely
Tauhou/silvereye*	*Zosterops lateralis lateralis*	Not Threatened	Partially protection	Highly likely
Tētē-moroiti/grey teal	*Anas gracilis*	Not Threatened	Protected	Possible
Tītitipounamu/rifleman	*Acanthisitta chloris chloris*	Not Threatened	Protected	Highly unlikely
Tūī/tui	*Prosthemadera novaeseelandiae novaeseelandiae*	Not Threatened	Protected	Possible
Warou/welcome swallow	*Hirundo neoxena neoxena*	Not Threatened	Protected	Highly likely
Western Weka	*Gallirallus australis australis*	Not Threatened	Protected	Highly unlikely
Exotic			Protected	
Australian magpie *	*Gymnorhina tibicen*	Introduced and Naturalised	Not protected	Highly likely
California quail *	*Callipepla californica*	Introduced and Naturalised	Protected (can be hunted)	Highly likely
Canada goose	*Branta canadensis*	Introduced and Naturalised	Not protected	Possible
Chaffinch *	*Fringilla coelebs*	Introduced and Naturalised	Not protected	Highly likely
Common redpoll *	*Acanthis flammea*	Introduced and Naturalised	Not protected	Highly likely
Common starling *	*Sturnus vulgaris*	Introduced and Naturalised	Not protected	Highly likely
Dunnock *	*Prunella modularis*	Introduced and Naturalised	Not protected	Highly likely
Eurasian blackbird *	*Turdus merula*	Introduced and Naturalised	Not protected	Highly likely
Eurasian skylark *	*Alauda arvensis*	Introduced and Naturalised	Not protected	Highly likely

Common Name(s)	Scientific Name	Threat Classification	Protection	Likelihood of presence
European goldfinch *	*Carduelis carduelis britannica*	Introduced and Naturalised	Not protected	Highly likely
European greenfinch *	*Chloris chloris*	Introduced and Naturalised	Not protected	Highly likely
Feral (greylag) goose	*Anser anser*	Introduced and Naturalised	Not protected	Possible
House sparrow	*Passer domesticus*	Introduced and Naturalised	Not protected	Highly likely
Little owl	*Athene noctua*	Introduced and Naturalised	Partially protected	Possible
Mallard *	*Anas platyrhynchos*	Introduced and Naturalised	Protected (can be hunted)	Highly likely
Rock pigeon	*Columba livia*	Introduced and Naturalised	Not protected	Likely
Song thrush *	*Turdus philomelos*	Introduced and Naturalised	Not protected	Highly likely
Wild turkey	*Meleagris gallopavo*	Introduced and Naturalised	Not protected	Unlikely
Yellowhammer *	*Emberiza citrinella*	Introduced and Naturalised	Not protected	Highly likely
Muscovy duck	*Cairina moschata*	Introduced not established	Not protected	Unlikely

Appendix 5

Ecological significance assessment against proposed Otago Regional Policy Statement criteria.

Proposed Otago RPS Assessment Criteria	Assessment for Corbridge Resort Plan Change Site
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:	Small patches of indigenous shrubland at the site contain a mix of several canopy shrub species that are typical of shrubland communities in the Pisa ED, but are generally highly modified in the understorey and ground cover; generally, typical compositions and structure of indigenous shrublands in the district would be expected to have greater integrity. However, the shrubland patches at the east of the site and to the south of the irrigation lake would meet this criterion. The kānuka shrubland at the northeast of the site has greater ecological integrity that is typical of such vegetation in the ED, and would also meet this criterion. The rest of the site is highly modified by farming and cropping.
(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.	While the habitat at the site supports several indigenous bird species of the district, only a relatively low range of species is expected at the site, given the low vegetation stature, low indigenous plant species diversity, and fragmented state. The shrubland patches and low producing grassland provide lizard habitat, but diversity is likely to be low. This criterion is not met.
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. Species and habitat diversity is relatively low, reflecting fragmented patches of indigenous shrubland developed following historic human disturbance.
(b) presence of indigenous ecotones, complete or partial gradients or sequences.	The site includes a gradient at the north of the site from moraine landforms to steep terrace scarp to river terrace by the Clutha River; this criterion is met.
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.	Several At Risk plant species are present at the site, scattered over several different areas of the site including shrublands, hedgerows and terrace escarpment. South Island pied oystercatcher was also observed utilising the site, and the site provides potential habitat for other avifauna. Vegetation present, such as indigenous and exotic shrubland, scrub, hedgerows, shelterbelts,

Proposed Otago RPS Assessment Criteria	Assessment for Corbridge Resort Plan Change Site
	river terraces and low producing exotic grassland may provide potential habitat for indigenous At Risk lizards. This criterion is met.
(b) an indigenous vegetation type or an indigenous species that is uncommon within the region or ecological district:	Mat daisy and rock fern are considered naturally uncommon in the Otago region. These two species were only found on the terrace escarpment. This criterion is met. Otherwise, the indigenous shrubland communities at the site are relatively widespread in the Pisa ED, with notable areas on Mount Iron, along the Clutha River terraces, and on the lower slopes of the Pisa Range.
(c) an indigenous species or plant community at or near its natural distributional limit	Criterion not met. No such species or vegetation are present.
(d) indigenous vegetation that has been reduced to less than 20% of its pre-human extent in the ecological district, region, or land environment	Indigenous shrubland at the site comprises indigenous vegetation on land environments that retain less than 20% of their original indigenous cover. This criterion is met.
(e) indigenous vegetation or habitat of indigenous fauna occurring on naturally uncommon ecosystems	Criterion met only for the northern escarpment and lower terrace. These areas meet the definition of “inland outwash gravel” surfaces, characterised by dry stony soils with distinctive dryland plant communit.es The rest of the site does not meet this definition.
(f) the type locality of an indigenous species	Criterion not met.
(g) the presence of a distinctive assemblage or community of indigenous species	Criterion met only for the large population of *Coprosma intertexta* on the small knoll. This is distinctive because it is one of the largest known populations in the district.
(h) the presence of a special ecological or scientific feature.	Criterion not met. No such features are present.
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	While the site is relatively large at 320ha, indigenous vegetation is restricted to small, fragmented patches. This criterion is not met.
(b) well-buffered relative to remaining habitats in the relevant ecological district	Criterion not met. The site has adjoining roads and farmlands along three sides.
(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. On its own, the site does not provide such a buffer. However, the site is a small part of the wider surrounding area terrace escarpment and river terrace landforms with indigenous vegetation adjoining the Clutha River, which as a whole provides an important partial buffer to the Clutha River and its associated fringe of indigenous vegetation.
(d) important for the natural functioning of an ecosystem relative to remaining habitats in the ecological district	Criterion not met. The small, fragmented areas of indigenous shrubland at the site are not important for the functioning of the wider ecosystem.
(e) an area that is important for maintaining a population of indigenous fauna during a critical part of their life cycle (seasonally or permanently)	Fauna surveys were not undertaken, so it is not possible to fully assess subcriterion (e). It is possible that areas of indigenous vegetation at the site fulfil this role.

Proposed Otago RPS Assessment Criteria	Assessment for Corbridge Resort Plan Change Site
Is vegetation and/or habitat Significant?	Yes, because criteria for representatives, diversity and pattern, and rarity and distinctiveness are met as follows: • Some patches of indigenous shrubland at the site have ecological integrity typical of the Pisa ED. • Areas of indigenous shrubland and hedgerows at the site comprise indigenous vegetation on land environments that retain less than 20% of their original indigenous cover. • The lower northern terrace is on inland outwash gravel, a naturally uncommon ecosystem. • Several At Risk plant and avifauna species are present at the site. • The population of c.40 *Coprosma intertexta* on the small knoll is distinctive because it is one of the largest known populations in the district • Vegetation present may provide potential habitat for indigenous At Risk lizards. • Two plant species that are naturally uncommon in the Otago region are present at the site. • The site includes a gradient at the north of the site from moraine landforms to steep terrace scarp to river terrace by the Clutha River.

Appendix 6

Suggested indigenous species suitable for inclusion within ecological enhancement plantings at the proposed Corbridge Resort plan change site

Species	Common Name	Conservation Status	Comments
Trees, shrubs and vines			
Aristotelia fruticosa	Shrubby wineberry		Benefits for skinks, geckos, invertebrates
Carmichaelia crassicaulis	Coral broom	Threatened – Nationally Vulnerable	Benefits for skinks, invertebrates
Carmichaelia petriei	Desert broom	At Risk – Declining	Benefits for skinks, invertebrates
Coprosma crassifolia			Benefits for skinks, geckos, invertebrates
Coprosma intertexta		At Risk – Declining	Benefits for skinks, geckos, invertebrates
Coprosma propinqua	Mingimingi		Benefits for skinks, geckos, invertebrates
Coprosma rigida			Benefits for skinks, geckos, invertebrates
Coprosma rugosa			Benefits for skinks, geckos, invertebrates
Coprosma virescens		At Risk – Declining	Benefits for skinks, geckos, invertebrates
Cordyline australis	Tī kōuka, cabbage tree		Benefits for skinks and geckos
Corokia cotoneaster	Korokio		Benefits for skinks, geckos, invertebrates
Discaria toumatou	Tūmatakuru, matagouri		Benefits for skinks, geckos, invertebrates
Fuscospora cliffortioides	Mountain beech		Tall height growth Benefits for geckos
Griselinia littoralis	Kāpuka, broadleaf		Hardy, exposure tolerant Benefits for geckos
Halocarpus bidwillii	Bog pine		Benefits for geckos
Kunzea serotina	Kānuka		Benefits for geckos
Leptospermum scoparium	Mānuka		Benefits for geckos
Lophozonia menziesii	Tawhai, silver beech		Benefits for geckos
Melicope simplex	Poataniwha		Benefits for skinks, geckos, invertebrates
Melicytus alpinus	Porcupine shrub		Benefits for skinks, geckos, invertebrates
Muehlenbeckia complexa	Scrub pōhuehue		Benefits for skinks, geckos, invertebrates
Myrsine australis	Māpou		Shade tolerant, slow growth
Myrsine divaricata	Weeping māpou		Benefits for skinks and geckos
Olearia avicenniifolia	Mountain akeake		Benefits for geckos
Olearia bullata			Shrub that prefers damp sites, important for invertebrates
Olearia hectorii	Hector's tree daisy	Threatened – Nationally Endangered	Important for invertebrates
Olearia lineata		At Risk – Declining	Small tree that prefers deep soils, often in riparian habitats, important for invertebrates
Olearia odorata	Scented tree daisy	At Risk – Declining	Shrub that prefers fertile sites on toeslopes, important for invertebrates Benefits for skinks and geckos
Ozothamnus vauvilliersii	Mountain tauhinu		Benefits for skinks
Phyllocladus alpinus	Mountain toatoa, celery pine		

Species	Common Name	Conservation Status	Comments
Pittosporum tenuifolium	Kōhūhū		Moderate height growth, hardy
Plagianthus regius	Mānatu, lowland ribbonwood		Fast growth on fertile soils, better planted in deeper soils
Podocarpus laetus	Mountain tōtara		Slow growing, better planted on deep soils Benefits for geckos
Pseudopanax ferox	Fierce lancewood	At Risk-Naturally Uncommon	Moderate growth rate, fruit source for indigenous birds when mature, best planted on deeper soils
Rubus schmidelioides	Tātarāmoa, white-leaved lawyer		Benefits for skinks and geckos
Sophora microphylla	Kōwhai		Slow growth, can grow in deep soils or in rocky habitats, important food source for indigenous birds. Benefits for geckos
Veronica salicifolia	Koromiko		Benefits for skinks and geckos
Grasses, sedges and rushes:			
Anthosachne solandri	Blue wheatgrass		Benefits for skinks
Austroderia richardii	Toetoe		Benefits for skinks
Carex secta	Pūkio		Benefits for skinks
Carex testacea			Benefits for skinks
Carex virgata	Pūrei, swamp sedge		Benefits for skinks
Chionochloa rigida	Narrow-leaved snow tussock		Benefits for skinks
Chionochloa rubra	Red tussock		Benefits for skinks
Festuca novae-zelandiae	Hard tussock		Benefits for skinks
Juncus australis	Wīwī		Benefits for skinks
Juncus edgariae	Wi, wīwī		Benefits for skinks
Phormium cookianum	Whararikī, mountain flax		Benefits for skinks and geckos
Phormium tenax	Harakeke/lowland flax		Benefits for skinks and geckos
Poa cita	Silver tussock		Benefits for skinks
Poa colensoi	Blue tussock		Benefits for skinks

Appendix 7

Avifauna Incidental Discovery Protocol (IDP)

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

Incidental nest discovery

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

Injured birds

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

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