Memo

To:	**Mary Askey; Matakanui Gold Ltd**	**Job No:**	**2352.7**
From:	**Duncan Nicol; RMA Ecology Ltd**	**Date:**	**2026 August 17**
cc:	**Graham Ussher; RMA Ecology Ltd**		
Subject:	**Ardgour Rise Road realignment ecological assessment.**		

Dear Mary,

1 Purpose and scope

This report provides a desktop ecological assessment of the final designed construction footprint for the Ardgour Rise Road, prepared to support the Bendigo-Ophir Gold Project (**BOGP**) Fast-Track Act application[1] (**FTAA**). The assessment addresses the ecological implications of the current engineered road design and is intended to clarify how that design relates to the terrestrial ecology assessments and effects-management framework already provided for the BOGP.

Ardgour Rise Road (ARR) refers to the proposed replacement road alignment required to maintain public access through to the Manuherikia Valley in the context of the BOGP (**Figure 1**). Earlier project material identified an indicative ARR corridor within the BOGP Direct Disturbance Footprint (**DDF**). An initial engineered road design was subsequently developed within that broader assessment context and formed the basis for road-design review associated with the FTAA application. Following further engineering review, parts of that design were realigned to address road-grade and construction requirements. The current footprint assessed in this report is that revised engineered design. Although the initial and realigned construction footprints overlap only in part, both follow the same general Ardgour Rise route through similar valley, slope and dryland habitat settings.

The assessed road construction footprint is approximately 12.48 ha (**Figure 2**). The assessment addresses whether the realigned construction footprint materially changes the ecological values or classes of effect associated with the initial ARR design and whether those effects remain within the terrestrial ecological effects context already assessed for the wider BOGP. It does not independently reassess the quantitative adequacy of the BOGP-wide residual-effects, offsetting or compensation package. Reliance on that package is therefore conditional on the final 12.48 ha construction footprint being incorporated into the relevant BOGP impact quanta, management-plan trigger areas and residual-effects accounting.

The final ARR footprint is intended to be managed through the existing BOGP ecological management framework, including the Assessment of Ecological Effects: Terrestrial Ecology[2], the Vegetation Values Assessment[3], the Lizard Values Assessment[4], the Habitat Impact Management Plan[5], the Lizard Management Plan[6], the terrestrial offset and compensation material as described in

[1] New Zealand Government, *Fast-Track Approvals Act 2024* (New Zealand Government, 2024).
[2] Alliance Ecology Ltd., *Bendigo-Ophir Gold Project: Assessment of Ecological Effects* (Alliance Ecology Ltd., 2025).
[3] RMA Ecology Ltd., *Bendigo-Ophir Gold Project: Vegetation Values Assessment* (RMA Ecology Ltd., 2025).
[4] RMA Ecology Ltd., *Bendigo-Ophir Gold Project: Lizard Values Assessment* (RMA Ecology Ltd., 2025).
[5] M. Baber, *Bendigo-Ophir Gold Mine Project: Habitat Impact Management Plan*, Revision V2 (Alliance Ecology Ltd., 2025).
[6] M. Baber, *Bendigo-Ophir Gold Mine Project: Lizard Management Plan*, Revision V1 (Alliance Ecology Ltd., 2025).

the assessment of effects, and the Cushionfield Applied Research Plan[7] (**Cushionfield ARP**). The Habitat Impact Management Plan[8] (**HIMP**) and Lizard Management Plan[9] (**LMP**) are particularly relevant to construction-stage terrestrial habitat clearance and lizard effects within the Direct Disturbance Footprint.

The scope of this memorandum is confined to a desktop assessment of the final ARR construction footprint (**Table 1**) The assessment is based on the supplied construction footprint, mapped vegetation communities, previously detailed surveys, known ecological constraints, and the existing ecological reports and management plans prepared for the BOGP. No new botanical, lizard or terrestrial invertebrate survey, wetland delineation, freshwater assessment, or biodiversity offset/compensation accounting was undertaken.

The final designed construction footprint is planned within the Ecological Assessment Area (ESA) of the BOGP. The previous indicative corridor was considered already within the DDF. The final road design avoids mapped wetlands, and avoids the 250 m buffer around the known airstrip moth *(Sporophyla oenospora)* locality. On that basis, the assessment focuses on terrestrial ecological values, including mapped dryland vegetation communities, spring annual herb habitat, lizard habitat, terrestrial invertebrate habitat, and construction-related indirect effects such as sediment, dust, side-cast, edge effects and weed incursion.

2 Background, terminology, and decision context

The Bendigo-Ophir Gold Project (**BOGP**) requires changes to existing access arrangements in the Thomson Gorge Road area. Ardgour Rise will provide a realigned route for part of Thomson Gorge Road, via Ardgour Station, to maintain public access through to the Manuherikia Valley. For clarity, this memorandum uses the term ARR to refer to that replacement road route. The term 'final designed construction footprint' is used to describe the current engineered road footprint assessed in this memorandum.

The BOGP ecological assessment included an indicative ARR corridor within the Direct Disturbance Footprint. That corridor provided the broader spatial context for assessment of the road realignment but was not itself a defined construction-disturbance footprint.

An initial engineered road design was subsequently developed and provided with the FTAA application. That design had a defined construction footprint of approximately 12.08 ha. Following further road-design review, sections of the alignment were revised to address road-grade and construction requirements (**Figure 3**, **Figure 4**). The resulting realigned construction footprint is approximately 12.48 ha and is the footprint assessed in this memorandum. The current footprint should therefore be understood as a refinement of an existing engineered road design, rather than as the first detailed construction footprint developed from the indicative corridor.

The indicative corridor and the engineered construction footprints are not equivalent spatial products and should not be compared directly as disturbance areas. The appropriate like-for-like comparison is between the initial and realigned construction footprints. Those footprints overlap by approximately 4.28 ha, equivalent to about 34 % of the realigned 12.48 ha footprint. The comparison therefore concerns two related engineered alignments rather than substantially coincident disturbance polygons.

The realigned design was developed following further road-design review of the initial engineered alignment. Parts of the initial design were identified as too steep to achieve the required road grades, and sections of the alignment were repositioned to produce a feasible road design. The

[7] R. Simcock and G. Brownstein, *Applied Research Plan for Conservation Management, Rehabilitation and Expansion of Cushionfield*, Manaaki Whenua Contract Report (Manaaki Whenua – Landcare Research, 2025).
[8] Baber, *Bendigo-Ophir Gold Mine Project: Habitat Impact Management Plan*.
[9] Baber, *Bendigo-Ophir Gold Mine Project: Lizard Management Plan*.

initial and realigned footprints retain the same general route function and traverse broadly comparable dryland landscape and habitat settings, although their precise construction footprints differ substantially in places. The redesign was also informed by known ecological constraints, including the 250 m buffer around the airstrip moth locality, known spring annual herb records, rocky outcrops and mapped wetlands.

A route-specific botanical assessment[10] of Ardgour Rise was previously undertaken by Central Environmental Services in March–April 2025. That assessment described the route as traversing a dry unnamed creek bed, sunny slopes, existing farm tracks, ridgeline and higher-elevation areas before rejoining the existing Thomson Gorge Road network. It also recorded mixed depleted grassland and herbfield, open tussock grassland, scattered scrub, taramea herbfield, rocky outcrop-associated species, and some nationally At Risk or regionally Threatened plant records along or near the assessed route. That earlier route-specific information is considered alongside botanical surveys across the ESA and surveys of specific functional groups.

The purpose of this supplementary assessment is to assist the Panel by clarifying how the final ARR construction footprint relates to the ecological values, effects and management measures already assessed for the BOGP.

3 Information sources and desktop method

Existing ecological information for the BOGP was reviewed alongside a GIS overlay of the final ARR construction footprint. The review tested whether the final designed construction footprint introduces ecological values or classes of effect that differ materially from those already assessed for ARR within the BOGP DDF.

Information sources included the existing FTAA ecological assessment material, other relevant surveys and reports, the supplied final construction footprint, and mapped ecological constraints (**Table 1**). Spatial overlap between the initial and realigned construction footprints was also reviewed to distinguish changes in the location of disturbance from changes in the overall ecological character of the affected footprint.

Table 1. Information sources used in this assessment.

Information source	Relevance to this memorandum
Assessment of Ecological Effects: Terrestrial Ecology	Provides the overall assessment of terrestrial ecological values, effects, residual effects, and the proposed ecological management, offsetting, compensation and monitoring framework for the BOGP.
Vegetation Values Assessment	Provides mapped vegetation communities, ecological value context, and information on Threatened and At Risk plant species within the DDF and surrounding ESA.
Lizard Values Assessment	Provides the existing assessment of lizard species, habitat values, ecological significance and effects context within the DDF and surrounding ESA.
Ardgour Rise vegetation and botanical biodiversity assessment	Provides route-specific botanical observations for the earlier Ardgour Rise corridor, including vegetation communities, species observations and localised avoidance recommendations.

[10] B. J. Wills, *Matakanui Gold Ltd, Ardgour Rise Re-Alignment Vegetation Survey & Botanical Biodiversity, Thomson's Gorge, Ardgour Station, April/May 2025* (Central Environmental Services, 2025).

Information source	Relevance to this memorandum
Assessment of Ecological Effects: Terrestrial Ecology	Provides the existing terrestrial offset and compensation context, including values included in offset modelling and values addressed through compensation where offsetting is unsuitable or unavailable.
Applied Research Plan for cushionfield and spring annual herbs	Provides the existing research and management framework for cushionfield ecosystems and associated spring annual herbs.
Habitat Impact Management Plan	Provides the construction-stage habitat impact protocols relevant to vegetation and habitat clearance.
Lizard Management Plan	Provides the lizard salvage, relocation, monitoring and accidental discovery protocols relevant to habitat clearance within the DDF.
Supplied GIS layers	Provides the initial and realigned ARR construction footprints, vegetation-community overlay, mapped ecological constraints and mapped wetlands.

The initial and realigned ARR construction footprints were intersected with the mapped vegetation-community layer to quantify and compare the vegetation communities affected by each design (**Table 2**). The initial design footprint is approximately 12.08 ha and the realigned footprint approximately 12.48 ha.

Spring annual plant survey data from 2024 and 2025 were also considered. Within the final construction footprint, approximately 1.03 ha was surveyed for spring annual herbs in 2024 and approximately 1.18 ha was surveyed in 2025. These data were used to inform the assessment of known spring annual plant occurrence, but were not treated as defining the full extent of suitable habitat or dormant seed-bank potential.

The final construction footprint was also reviewed against wetlands, the airstrip moth buffer, and known spring annual herb records. Wetlands, the 250 m buffer from the airstrip moth locality, and individual localities of surveyed spring annual herbs are avoided by the final design. Known spring annual records informed the assessment of observed occurrence but were not used to define the full extent of spring annual habitat, population extent, or dormant seed-bank potential.

Ecological values potentially impacted by the final construction footprint were identified from the mapped vegetation communities and existing project assessments. Direct and indirect effects were then considered, including vegetation clearance, loss of spring annual herb habitat or seed-bank areas, lizard habitat loss and mortality risk, terrestrial invertebrate habitat loss, edge effects, weed incursion, sediment, dust, and side-cast risk. Those effects were then compared with the effects already assessed for ARR and the wider BOGP.

No new full EIANZ[11] effects matrix has been applied for this supplementary assessment. The existing effects-assessment logic has instead been used to identify the ecological values and effect mechanisms associated with the final construction footprint and to compare them with those already assessed for the BOGP.

[11] J. Roper-Lindsay et al., *Ecological Impact Assessment: EIANZ Guidelines for Use in New Zealand: Terrestrial and Freshwater Ecosystems*, nos. 978-0-9805878-3–8, 2nd edition (Environment Institute of Australia and New Zealand, 2018).

No new field survey or specialist taxonomic assessment was undertaken for this memorandum. Desktop review was considered sufficient because the final construction footprint remains within the BOGP ecological assessment context, the broad ecological values are already described in the FTAA material, and mapped wetlands and the airstrip moth buffer are avoided.

The supplied 12.48 ha footprint is assumed to represent the full construction footprint; the mapped vegetation-community layer and ecological constraints are assumed to be current; and the final footprint is assumed to be incorporated into the disturbance areas and ecological management trigger areas used for BOGP implementation. Subject to those assumptions, the final ARR construction footprint has been assessed as part of the existing BOGP terrestrial ecological effects context.

4 Final Ardgour Rise Road footprint

Earlier ARR material considered an indicative road corridor. That corridor was approximately 50 m wide and functioned as a design envelope within which the final road design was to be developed. It was not a final road construction footprint and did not define the precise extent of road formation, cut and fill, batters, drainage, side-cast management, or temporary construction disturbance.

An initial engineered road design was subsequently developed, with a construction footprint of approximately 12.08 ha. That footprint provided a defined road alignment for subsequent road-design review.

Further review identified sections where the initial alignment did not achieve the required road grades. Localised realignment produced the current approximately 12.48 ha construction footprint assessed here. The current design is therefore a revised engineered alignment derived from the same ARR route and design objective as the initial footprint. The two footprints overlap by approximately 4.28 ha, or about 34 % of the realigned footprint. Their precise disturbance polygons therefore differ materially in places, even though they follow broadly similar trajectories through the same general valley and dryland habitat system.

The final footprint has been developed following detailed road design and has a variable width that reflects topography, road formation requirements, cut and fill, and other construction constraints. The final construction footprint is approximately 12.48 ha, comprising the road construction footprint and a small viewing platform**.** This reflects the progression from corridor-level assessment through engineering review to final road design.

The previous indicative corridor and the final construction footprint are not equivalent spatial products. The former was a broad corridor for design and assessment purposes, while the latter is the area within which road construction disturbance is now expected to occur. A direct comparison of vegetation loss between the earlier indicative corridor and the final design would therefore not compare equivalent spatial products.

The redesign should therefore be distinguished in three ways. Spatially, the initial and realigned construction footprints are only partly coincident. Ecologically, however, they affect a broadly similar mix of mapped vegetation communities and the same principal terrestrial receptor types. At the constraint level, the realigned design improves avoidance of some known features, including surveyed spring annual herb locations that were intersected by the initial design.

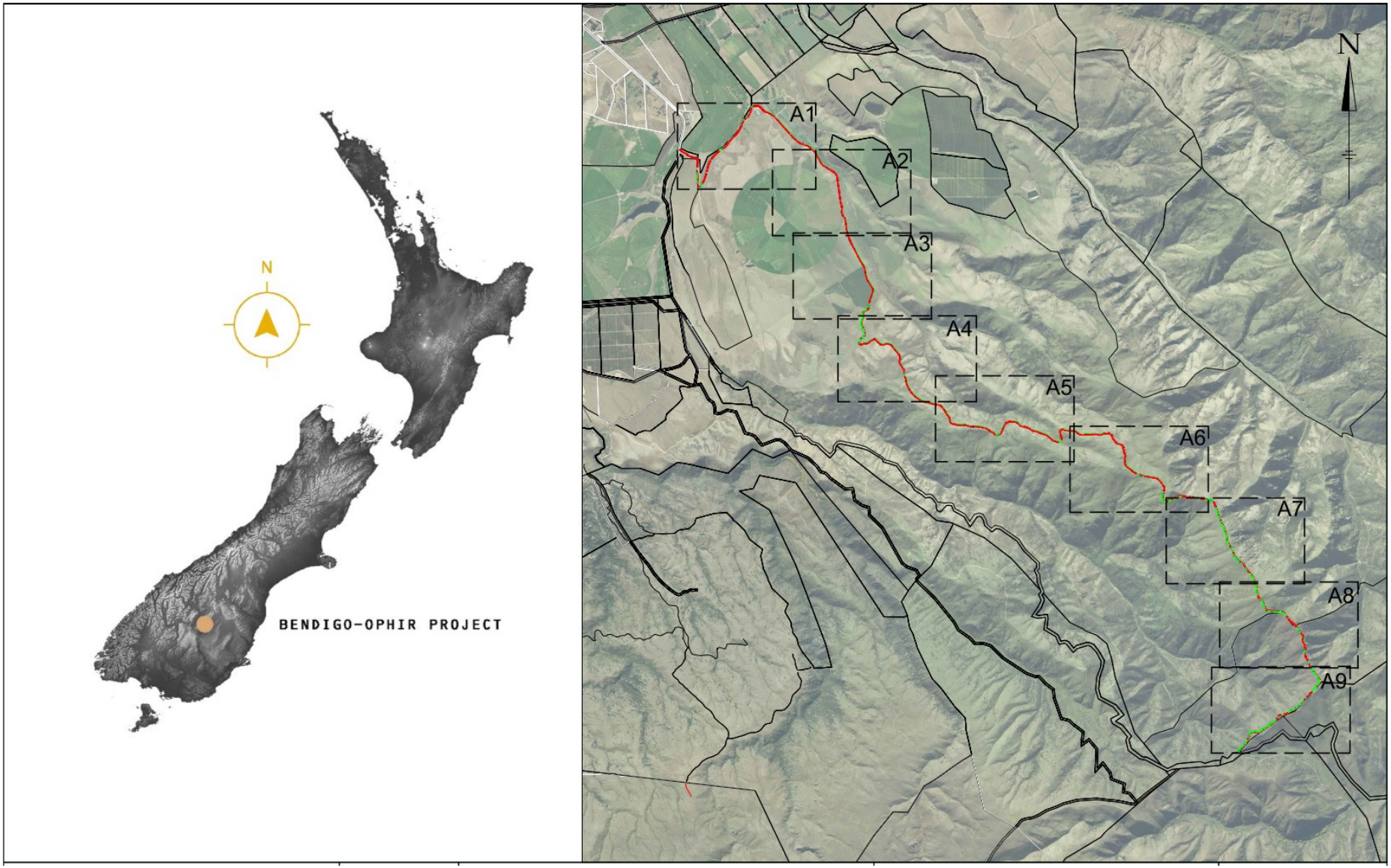

Figure 1. Location of the Bendigo-Ophir Gold Project (BOGP) and the realigned Ardgour Rise Road. Earthworks cuts (red) and infilling (green).

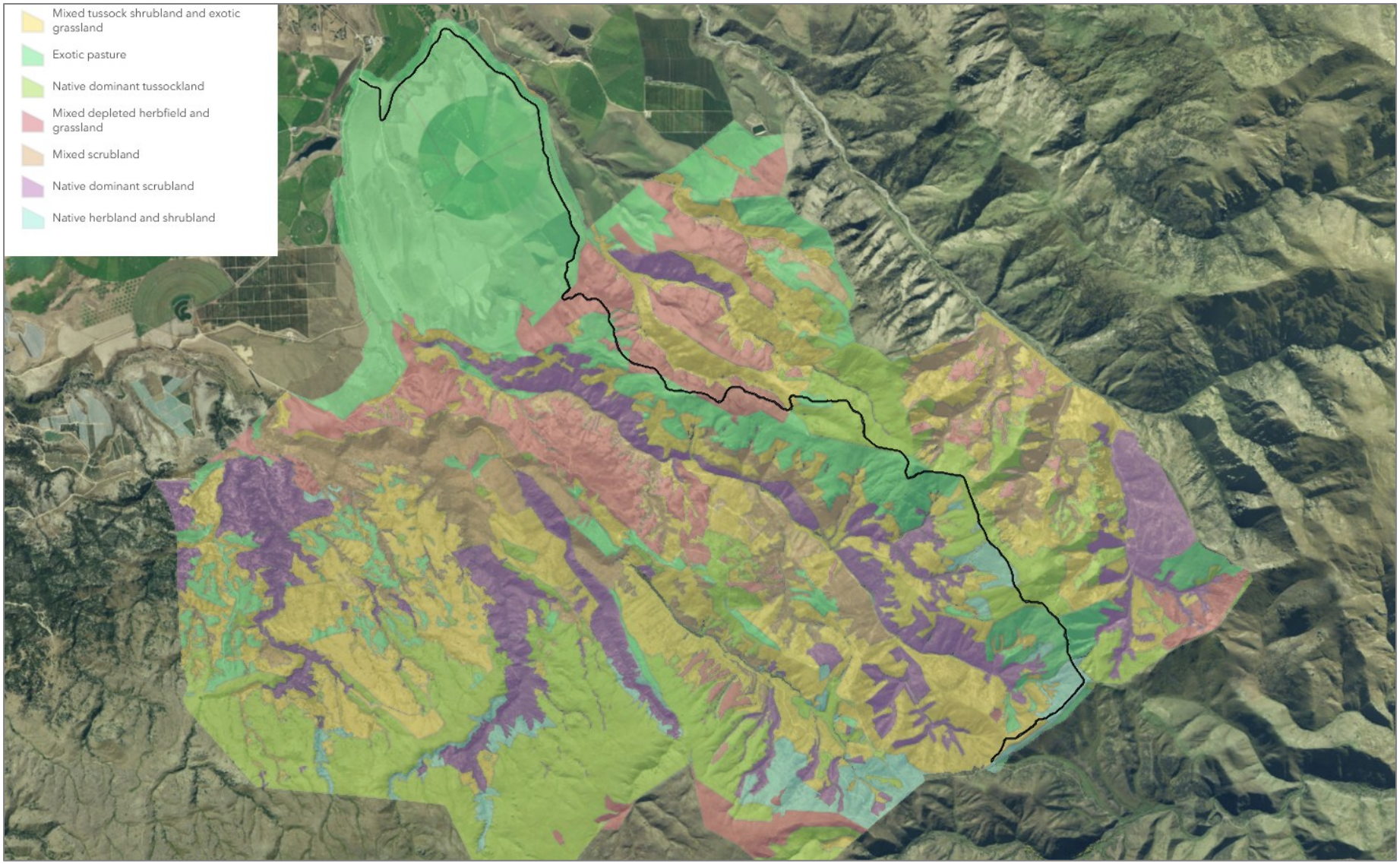

Figure 2. Realigned Ardgour Rise Road (black line) overlapping with identified vegetation communities.

Figure 3. Revised Ardgour Rise Road realignment (orange) and the previous realignment design (white).

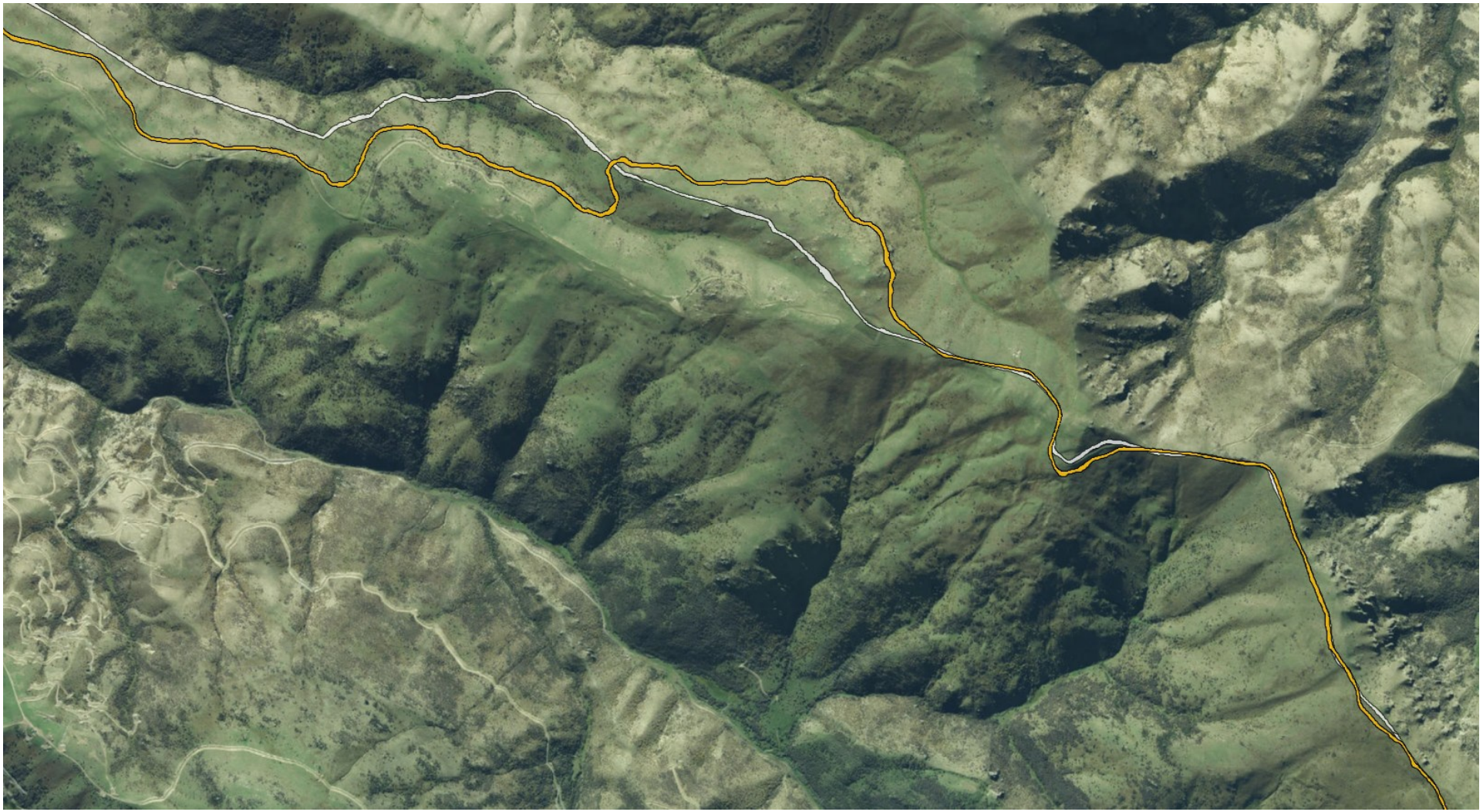

Figure 4. Revised Ardgour Rise Road realignment (orange) and the previous realignment design (white).

5 Ecological values

5.1 Overview

The final ARR footprint crosses a dryland vegetation mosaic supporting terrestrial vegetation, spring annual herb habitat, native lizards and terrestrial invertebrates. Ecological values were characterised using the existing BOGP assessments, mapped vegetation communities, survey information and GIS overlay of the final footprint.

5.2 Vegetation communities and dryland habitat values

The final construction footprint does not intersect a uniform habitat type. It crosses a mosaic of exotic pasture, mixed depleted herbfield–cushionfield, tussockland, shrubland and native herbfield communities. This is consistent with the broader vegetation pattern described for the BOGP, where the vegetation communities across the ESA occur as an intergrading mosaic shaped by environmental conditions and land management history. Moreover, gradients between vegetation communities are usually gradual and elements of one vegetation community often occur within another.

Approximately 5.88 ha of the final footprint, including the viewing platform, is within exotic pasture. The remaining approximately 6.60 ha intersects native or mixed indigenous vegetation communities. These include approximately 2.14 ha of mixed depleted herbfield–cushionfield, 2.27 ha of native dominant tussockland, 1.14 ha of native herbfield and shrubland, and 1.06 ha of mixed tussock shrubland (**Table 2**).

Table 2. Mapped vegetation communities intersected by the final Ardgour Rise Road construction footprint

Vegetation community	Initial design footprint (ha)	Realigned footprint (ha)	Realigned Footprint coverage (%)
Exotic pasture	c. 5.42	c. 5.88	47.1
Mixed depleted herbfield–cushionfield	c. 2.02	c. 2.14	17.2
Mixed tussock shrubland	c. 1.33	c. 1.06	8.5
Native dominant tussockland	c. 2.18	c. 2.27	18.2
Native herbfield and shrubland	c. 1.13	c. 1.14	9.1
Total	**c. 12.08**	**c. 12.48**	**100**

At the mapped vegetation-community level, the realigned footprint remains broadly similar in composition to the initial design, despite the limited direct spatial overlap between the two construction footprints. Total construction footprint increases from approximately 12.08 ha to 12.48 ha, while the combined area of native and mixed indigenous vegetation changes only slightly overall. The principal mapped changes are an increase of approximately 0.46 ha in exotic pasture and a reduction of approximately 0.27 ha in mixed tussock shrubland, with smaller changes in the remaining vegetation communities.

The realignment therefore redistributes disturbance spatially while leaving the overall mix of mapped vegetation communities broadly similar.

The ecological value intersecting with the final footprint is variable. The mapped communities span low to very high ecological value. Exotic pasture is low value, mixed depleted herbfield–cushionfield

and grassland are very high value, and mixed tussock shrubland, native dominant tussockland, and native herbfield and shrubland are high value. In particular, the Vegetation Values Assessment[12] identifies mixed depleted herbfield–cushionfield and grassland as very high ecological value, and mixed tussock shrubland, native dominant tussockland, and native herbfield and shrubland as high ecological value.

Across this modified landscape, the ESA supports high native plant diversity, including 176 native species, at least 58 Nationally or Regionally Threatened or At Risk plant species across the ESA (and at least 48 within the DDF). The hilly landscape unit is very high overall ecological value, because mosaic communities support nodes of Threatened and At Risk plant species across wide areas and because gradual ecotones provide for higher diversity and long-term community interactions.

On that basis, the final construction footprint traverses a modified but ecologically important dryland mosaic, comprising an ecologically heterogeneous dryland mosaic ranging from low-value modified pasture to high and very high value indigenous vegetation assemblages already identified in the FTAA assessment material.

5.3 Spring annual herbs and cushionfield habitat

Spring annual herb values are particularly relevant to the mixed depleted herbfield–cushionfield component of the final footprint. The Applied Research Plan[13] (ARP) for conservation management, rehabilitation and expansion of cushionfield identifies cushionfield as the highest-value ecosystem in the project area because it contains patches of native spring annual herbs and supports a suite of other Threatened and At Risk plant species. Several Threatened and At Risk spring annual herbs associated with cushionfield were identified, including *Ceratocephala pungens*, *Myosotis brevis* and *Myosurus minimus* subsp. *novae-zelandiae*. The ARP states that further work is required to better understand cushionfield extent and the viability of management interventions.

Spring annual herbs have been specifically surveyed across the wider ESA over multiple seasons, including 700 ha of potential habitat. The final ARR construction footprint intersects with approximately 1.03 ha of surveyed area in 2024 and approximately 1.18 ha of surveyed area in 2025.

The initial engineered design intersected several known spring annual herb record locations. The realigned footprint avoids those surveyed point records, representing an improvement in avoidance of known occurrences.

Survey records provide evidence of observed occurrence; they do not define the full extent of suitable habitat, population extent, or dormant seed-bank potential, because detectability may vary between years with germination conditions. Avoidance of known spring annual point records therefore does not establish avoidance of all suitable spring annual habitat. Suitable dryland herbfield–cushionfield habitat and potential seed-bank areas are the relevant ecological units for this effects assessment.

5.4 Lizards

The final construction footprint also intersects habitat suitable for native lizards. Three native lizard species occur within the ESA and DDF: McCann's skink, Kawarau gecko and grass skink. McCann's skink is abundant, Kawarau gecko common, and grass skink sparse. Lizard values within the site were assessed as high for Kawarau gecko and grass skink, and low for McCann's skink. The presence of Kawarau gecko and grass skink qualifies the DDF as significant habitat of indigenous fauna under the operative and proposed Otago Regional Policy Statements.

[12] RMA Ecology Ltd., *Bendigo-Ophir Gold Project: Vegetation Values Assessment*.
[13] Simcock and Brownstein, *Applied Research Plan for Conservation Management, Rehabilitation and Expansion of Cushionfield*.

Lizards occur across a range of vegetation communities and habitat structures. Kawarau gecko is widely distributed within the DDF and occupies all vegetation communities, with locally high abundance where rock piles, tors or suitable crevice habitat are present. Grass skink is recorded from most vegetation types within the DDF, but at lower abundance, and is more associated with valley bottoms and areas where ground cover and moisture persist. McCann's skink was recorded across all vegetation types and was abundant in most of those, although lower in habitats lacking complex structure.

Based on the existing lizard assessment, the final construction footprint should be treated as occupied native lizard habitat for effects-management purposes. Habitat quality will vary within the footprint depending on vegetation structure, rock, refuges, moisture, aspect and grazing history. Mapped pasture may still provide lizard habitat where rock, edge habitat or structurally complex vegetation occurs.

5.5 Terrestrial invertebrates

This memorandum does not provide a specialist terrestrial invertebrate reassessment. Terrestrial invertebrate values are considered at the habitat and effects level, relying on the existing FTAA terrestrial ecology material.

Invertebrate surveys were undertaken across the ESA over two field seasons using a range of methods, including light trapping, pitfall traps, foliage beating, systematic manual searches, ad hoc manual searches and installed wooden discs. Those surveys were designed to assess species presence, richness, diversity and community composition across representative, targeted and ad hoc sites. The surveys recorded 18 notable invertebrate species, including 14 nationally Threatened, At Risk or Data Deficient species, four nationally Threatened moth species, and four newly identified species.

The known airstrip moth value has been specifically considered in road design. The alignment of the ARR will bypass the Ardgour airstrip as a measure to avoid identified habitat for the Threatened Nationally Critical moth *Sporophyla oenospora*. The final ARR design avoids the 250 m buffer around the known airstrip moth locality.

Cushionfields support At Risk invertebrates, taramea herbfields support Threatened invertebrates, and native ecosystem mosaic of rocks and tors creates diverse habitat conditions. Terrestrial invertebrate values are therefore treated as present across the relevant dryland habitat mosaic, while the known airstrip moth locality and its 250 m buffer are avoided.

5.6 Wetland values

The final construction footprint does not intersect mapped wetlands, so no direct loss of mapped wetland habitat is identified. Although direct mapped wetland loss is avoided, indirect construction pathways remain relevant**, i**ncluding sediment movement, dust, side-cast materials, changes to local drainage and weed spread. Construction controls are therefore required to protect downslope habitats and receiving environments.

All effects on freshwater streams are addressed in the separate Assessment of Freshwater Ecological Effects and sit outside the scope of the terrestrial ecology report.

5.7 Other terrestrial fauna values

Other terrestrial fauna values, including avifauna and bats, have been considered in the broader FTAA ecological assessment. For the final ARR footprint, the most relevant additional fauna effect is likely to be general habitat disturbance and potential nesting bird risk during vegetation clearance, rather than a road-specific value not already considered in the FTAA material. The Assessment of

Ecology Effects report[14] (AEcE) identifies potential risks associated with vegetation clearance, including nest destruction and loss of eggs and chicks.

No separate avifauna value has been identified for the final road footprint through this desktop review. Those values should continue to be managed through the existing BOGP-wide ecological management framework where relevant. Bats have been surveyed across the BOGP site and none were found.

6 Effects

6.1 Overview

Construction of the final ARR will result in direct terrestrial vegetation and habitat loss and a range of construction-related indirect effects (**Table 3**). The sections below assess the effect mechanisms associated with the ecological values described in Section 5.

6.2 Direct vegetation and habitat loss

The primary effect is the removal or long-term modification of terrestrial vegetation and habitat within the construction footprint. This will include vegetation clearance, earthworks, cut and fill, road formation, batters, drainage works, stabilisation areas, maintained road margins, and associated construction disturbance.

Construction will remove or substantially modify the quantified vegetation communities (**Table 2**). For the formed road, batters, drainage infrastructure and maintained margins, vegetation loss should be treated as permanent or long-term. Some disturbed areas may be stabilised, rehabilitated or subject to weed control. These measures do not reverse the initial loss of existing vegetation and habitat values. The effect is therefore direct habitat loss and modification, rather than temporary disturbance only.

This is the same broad vegetation-clearance and habitat-loss already assessed for the BOGP DDF, which includes Ardgour Rise as part of the BOGP disturbance context.

6.3 Spring annual herb habitat and seed-bank effects

The final construction footprint intersects approximately 2.14 ha of mapped mixed depleted herbfield–cushionfield. This community is a key value for spring annual herb values. Relative to the initial design, the realignment avoids the known spring annual herb point records previously intersected by the road footprint. Residual effects remain because suitable herbfield–cushionfield habitat and potential dormant seed-bank areas extend beyond known point records.

Potential effects on spring annual herbs and their habitat include:

- direct removal of suitable herbfield–cushionfield habitat;
- disturbance, burial or mixing of seed-bank areas;
- changes to microtopography, surface crust, drainage and moisture conditions;
- weed establishment along disturbed margins; and
- edge effects associated with the formed road and maintained road corridor.

Because observed spring-annual records do not define the full extent of suitable habitat or dormant seed-bank potential (Section 5.3), effects should be assessed at the habitat and seed-bank level rather than by reference to mapped plant records alone.

[14] Alliance Ecology Ltd., *Bendigo-Ophir Gold Project: Assessment of Ecological Effects*.

6.4 Lizard effects

Because the footprint is treated as occupied native lizard habitat (Section 5.4), vegetation clearance and earthworks may result in:

- direct loss of lizard habitat;
- injury or mortality during vegetation clearance and earthworks;
- displacement from occupied habitat;
- loss of refuges, including rock, crevices, tussock cover, shrub cover and ground structure;
- fragmentation or isolation of remaining habitat patches; and
- edge effects associated with road formation, maintenance and increased disturbance.

Avoidance of rocky outcrops where practicable reduces exposure of some higher-quality lizard refuges, particularly for species associated with rock and crevice habitat. Mapped rocky outcrops are only one component of lizard habitat; tussockland, shrubland, cushionfield, pasture margins, rock fragments and structurally complex ground cover may also be occupied. Lizard effects therefore remain across the final construction footprint and should be managed through the existing lizard management framework.

6.5 Terrestrial invertebrate effects

Invertebrate effects are considered at the habitat and effects level, relying on the existing FTAA terrestrial ecology material.

Construction may remove or modify dryland invertebrate habitat through loss of vegetation and host plants, soil disturbance, mortality during clearance, dust deposition, weed incursion and altered edge conditions. The final design avoids the 250 m airstrip moth locality buffer, reducing exposure of that known locality. Broader habitat-level effects on dryland invertebrates remain.

Those broader effects comprise the same general dryland invertebrate habitat-loss and habitat-modification mechanisms already considered in the FTAA material.

6.6 Construction-related indirect effects

Construction-related indirect effects may arise through sediment mobilisation from exposed soils, side-cast or spoil deposition outside the footprint, dust deposition on adjacent vegetation, erosion of batters or fill areas, localised drainage concentration, accidental machinery incursion beyond the footprint, and weed spread along disturbed margins.

These effects are construction-management issues. These effects can be managed through the existing construction and ecological controls, provided erosion and sediment controls, construction-footprint controls, habitat-clearance protocols, stabilisation methods and biosecurity measures are strictly implemented.

6.7 Weed, pest and road-edge effects

Road construction will create disturbed ground and new habitat edges. Disturbed road margins can facilitate weed spread and alter soil conditions. These effects are particularly relevant where the road margin adjoins cushionfield, herbfield, tussockland or shrubland communities.

Road-edge effects are expected to be localised. Their ecological relevance is greatest where disturbance, weed pressure, dust, soil exposure or drainage changes affect adjoining intergrading dryland communities. These are not unique to the final design and are consistent with the broader construction and habitat-impact already considered for the BOGP.

6.8 Summary of effects

Relative to the initial engineered design, the realigned footprint is slightly larger in total area, only partly coincident spatially, and broadly similar in mapped vegetation-community composition. The realignment also improves avoidance of some known ecological constraints, including surveyed spring annual herb point records. The realignment does not introduce a materially different class of ecological effect from those already identified for ARR, the DDF and the wider BOGP. Equivalence of effect classes does not establish unchanged total effect magnitude or quantitative adequacy of the BOGP-wide residual-effects package. Those matters depend on the final footprint being incorporated into the relevant BOGP impact accounting and management framework.

7 Existing effects management relied upon

7.1 Overview

The final ARR construction footprint relies on the BOGP-wide effects-management framework already developed for the BOGP, rather than a separate road-specific mitigation, offsetting or compensation package. The existing BOGP effects-management framework provides the mechanisms relevant to the ecological effects identified for the final ARR footprint. These include design avoidance and minimisation, construction-stage habitat controls, species-specific management, rehabilitation, offsetting, compensation, research and monitoring.

7.2 Design avoidance and minimisation

Several avoidance and minimisation measures have already been incorporated into the final road design. These included avoiding the airstrip area where *Sporophyla oenospora* was recorded, siting infrastructure away from cushionfield and other high-value habitats where possible, refining infrastructure locations to reduce effects on kōwhai, taramea and rock outcrops, avoiding habitat clearance near nesting birds, and salvaging notable plants, invertebrates, lizards and habitat values where feasible.

The final footprint intersects high and very high value dryland vegetation communities (**Table 2**). The realigned design also avoids known spring annual herb point records intersected by the initial engineered footprint. Design avoidance and minimisation reduce exposure to known constraints. Habitat-clearance controls, species-specific measures and residual-effects management remain necessary for the affected dryland communities.

7.3 Habitat clearance controls and ecological oversight

The Habitat Impact Management Plan[15] (HIMP) is the primary construction-stage mechanism for managing terrestrial habitat clearance and associated habitat-feature salvage. The HIMP was developed to manage actual and potential impacts of works associated with the BOGP and sets out methods to avoid or minimise adverse ecological effects on terrestrial and wetland habitats and associated vegetation during construction and operation.

Relevant HIMP measures include pre-impact habitat and biodiversity surveys for vegetation and habitat features, threatened plants, avifauna nests, lizards and terrestrial invertebrates; on-site construction method refinements; physical delineation of disturbance areas and salvage features; and salvaging of plants, habitat features and certain biodiversity values, including seeds, seedlings and invertebrate host-plant material where relevant. During habitat clearance, the HIMP provides for ecological oversight by suitably experienced and qualified ecologists and construction-assisted salvage of vegetation and habitat features, including rocks, boulders and coarse wood, where those features are to be reused in rehabilitation, or offset, or compensation sites.

[15] Baber, *Bendigo-Ophir Gold Mine Project: Habitat Impact Management Plan*.

Table 3. Integrated ecological effects and management summary for the final Ardgour Rise Road footprint.

Value	Baseline position	Principal effect	Existing management relied upon	Residual position / accounting implication
Vegetation and dryland habitat	Native and mixed communities quantified in Table 2; high to very high values occur	Permanent or long-term vegetation and habitat loss	HIMP, rehabilitation, BOGP residual-effects package	Habitat loss remains; include in final impact quanta
Spring annual herbs and cushionfield	Suitable habitat and potential dormant seed bank; mapped records do not define extent	Habitat and seed-bank disturbance	ARP, HIMP, spring-annual work programme	Residual uncertainty remains; replacement not demonstrated
Lizards	Footprint treated as occupied habitat	Habitat loss, mortality or injury, displacement	LMP, HIMP, salvage and relocation	Mortality reduced; habitat loss and relocation uncertainty remain
Terrestrial invertebrates	Dryland assemblages present; moth buffer avoided	Habitat and host-plant loss, soil disturbance, mortality	TIMP/HIMP; moth-buffer avoidance	Broader habitat effects remain
Wetlands and receiving environments	No mapped direct intersection	Indirect sediment, drainage, dust and side-cast effects	ESCP/HIMP/construction controls	Residual risk depends on implementation
Weed and road-edge effects	Adjacent dryland communities	Weed spread and edge modification	Biosecurity, rehabilitation, maintenance	Localised residual effects may remain
Nesting birds, if retained	Suitable vegetation where present	Nest disturbance during clearance	AMP/HIMP	Controlled through pre-clearance measures

For the final ARR footprint, these measures are relevant to managing vegetation clearance, preventing accidental disturbance outside the approved footprint, salvaging habitat features where practicable, and ensuring construction disturbance is recorded and reported. The HIMP also provides for annual compliance reporting and incident reporting where habitat clearance results in compliance failure or adverse ecological effects requiring urgent remedy.

7.4 Lizard management

The existing Lizard Management Plan[16] (LMP) applies to habitat clearance within the final road footprint, and it sets out the methods used to avoid or minimise adverse ecological effects on native lizards during construction and operation of the BOGP.

The LMP provides for pre-clearance lizard salvage within the DDF and relocation into the Ardgour Restoration Area, construction-assisted lizard salvage during habitat clearance, ecological rehabilitation of habitat, and offset or compensation for residual adverse effects on lizards through the broader restoration and sanctuary package. The LMP also identifies seasonal constraints for salvage in high and moderate value lizard habitat, salvage during warmer months when lizards are more active, pre-clearance induction, manual searching, and construction-assisted salvage where larger boulders or refuges require machinery.

The final road footprint should therefore be treated as part of the lizard management area where habitat-clearance triggers apply. Lizard salvage and relocation will minimise mortality and injury risk.

7.5 Spring annual herbs and cushionfield

Effects on cushionfield and spring annual herb habitat should be incorporated into the existing Applied Research Plan[17] (ARP) and associated spring annual work programme. No separate road-specific spring annual mitigation package is proposed or considered necessary.

The ARP provides the BOGP-wide research and management framework for cushionfield conservation management, rehabilitation and expansion, including mapping, baseline pressure assessment, identification of enhancement areas, restoration trials, *Raoulia* propagation and establishment trials, kōwhai and shrubland protection, and monitoring over at least seven years.

This is the appropriate framework for addressing uncertainty associated with cushionfield and spring annual herb habitat. The final road footprint should be included in the relevant final impact calculations and implementation planning for that programme.

7.6 Terrestrial invertebrates

For terrestrial invertebrates, the key road-design avoidance measure is maintenance of the 250 m buffer around the known airstrip moth locality. The final design avoids works within that buffer. Other dryland invertebrate effects are to be managed through the existing terrestrial invertebrate and habitat-impact framework.

The AEcE identifies salvage and relocation of notable invertebrates and habitat features where possible. The HIMP also records that procedures to avoid or minimise impacts on fauna, including avifauna, lizards and terrestrial invertebrates, are detailed in the AMP, LMP and TIMP respectively.

No additional road-specific invertebrate management measure is identified beyond maintaining the airstrip moth buffer and applying the existing TIMP and HIMP framework.

[16] Baber, *Bendigo-Ophir Gold Mine Project: Lizard Management Plan*.
[17] Simcock and Brownstein, *Applied Research Plan for Conservation Management, Rehabilitation and Expansion of Cushionfield*.

7.7 Erosion, sediment, drainage and side-cast management

Erosion, sediment, drainage and side-cast risks should be managed through construction-footprint delineation, controlled spoil placement, exposed-soil stabilisation and erosion and sediment controls implemented before and during earthworks.

These construction controls also serve an ecological function by preventing sediment deposition, spoil movement, runoff concentration, dust effects and accidental disturbance outside the footprint. The HIMP recognises that sediment and erosion control measures are to be deployed prior to habitat clearance to avoid or minimise effects on downstream wetlands, with detail to be provided through the relevant erosion and sediment control documentation.

For ARR, the ecological reliance is on clear construction-footprint delineation, no uncontrolled side-cast or spoil placement beyond the approved footprint, ensuring stabilisation of exposed soils, and implementation of erosion and sediment controls before and during earthworks.

7.8 Offsetting, compensation, restoration and monitoring

The residual effects associated with the final road footprint are considered most appropriately within the broader BOGP residual-effects framework, rather than through a separate offsetting or compensation assessment. This approach assumes that the final footprint is reflected in the project's impact calculations, management plan trigger areas, residual-effects accounting, and any associated offsetting and compensation measures.

The existing offset modelling and residual-effects package includes restoration of adjoining parts of Ardgour Station, development of pest-free sanctuaries, rehabilitation planting across post-mining landforms, management of the Mine Regeneration Zone, and wetland restoration. The final ARR footprint should be treated as part of that BOGP-wide effects-management context, rather than as a separate ecological package.

8 Residual effects

Residual effects are considered after application of the existing BOGP-wide effects-management framework, including avoidance and minimisation, habitat-clearance controls, species management, rehabilitation, offsetting, compensation, research and monitoring. The analysis addresses whether the final footprint introduces a different type of residual ecological effect from those already identified for the BOGP; it does not independently determine the quantitative sufficiency of the existing offsetting or compensation package once the final footprint is incorporated into final impact accounting.

The AEcE records that residual effects on terrestrial and wetland ecological values within the BOGP range from no residual effects to Very High residual effects after implementation of avoidance, minimisation / mitigation and remediation measures. It also records that, where residual adverse effects are assessed as moderate or greater, efforts to offset or compensate for those effects have been undertaken to the extent practicable. The same BOGP-wide approach is relied on for the final ARR construction footprint.

Permanent or long-term loss of existing terrestrial habitat remains where vegetation is converted to formed road, batters, drainage infrastructure, maintained margins or other permanent surfaces. Stabilisation and rehabilitation may improve some disturbed areas but do not restore the existing ecological structure and function lost from the construction footprint.

Residual effects on spring annual herbs remain uncertain because habitat and dormant seed-bank values cannot be defined solely from observed plant records. The ARP provides a response to that uncertainty, including broadscale surveys to identify additional populations, as well as germination and establishment trials. The Landscape and Ecological Rehabilitation Management Plan (LERMP)

and Ardgour Restoration Area Management Plan provide measures to manage, mitigate, maintain and restore cushionfields and associated spring annual populations.

Salvage and relocation reduce mortality and injury risk to native lizards. Residual habitat loss, displacement, fragmentation and uncertainty in relocation outcomes remain.

Avoidance of the known airstrip moth locality reduces this risk. Residual habitat-level effects remain for dryland invertebrate assemblages, and the available assessment does not demonstrate that those effects are fully offset or compensated.

No direct residual loss of mapped wetland habitat is identified. Residual risk is limited to indirect construction effects and depends on effective sediment, drainage, side-cast and footprint controls.

The final road footprint does not alter the types of residual ecological effect identified in the BOGP-wide assessment. The DDF is described as encompassing ARR, and the AEcE already evaluates residual effects and the habitat restoration and enhancement measures proposed to offset or compensate for residual adverse effects on terrestrial and wetland ecological values. The adequacy of the existing BOGP wide residual effects package to include the realignment has not been included in this assessment.

The realigned footprint follows the same general Ardgour Rise route as the initial engineered design but relocates substantial portions of the construction footprint, with approximately 4.28 ha of direct overlap. Despite that spatial redistribution, the mapped vegetation-community composition and principal ecological receptors remain broadly similar, and no different type of residual ecological effect is identified.

Residual adverse effects remain, particularly for terrestrial dryland habitat, cushionfield and spring annual herb habitat, lizards and dryland invertebrate habitat. Those residual effects are of the same broad type as those already assessed and are intended to be managed through the existing FTAA effects-management framework.

9 Uncertainty and limitations

The following limitations are relevant to interpreting this report. They do not change the effects conclusion reached above, but they inform the level of caution required when applying the existing BOGP-wide effects-management framework to the final ARR construction footprint.

This report is based on a desktop review and GIS overlay of existing ecological information. It does not provide a new field-verified ecological inventory of the final construction footprint. The assessment relies on the supplied final construction footprint, mapped vegetation communities, known ecological constraints, existing BOGP ecological assessments, spring annual survey information, and advice that mapped wetlands and the 250 m airstrip moth buffer are avoided.

It is assumed the supplied footprint represents the full construction disturbance area, including road formation, batters, cut and fill, drainage works, construction disturbance and the viewing platform. If construction activity, side-cast, spoil placement, machinery access, drainage works or temporary disturbance extends beyond this footprint, the ecological effects may differ from those assessed in this report.

The vegetation-community overlay is the best available spatial representation of terrestrial habitat within the final footprint. Mapped vegetation-community boundaries should not be interpreted as hard ecological boundaries. Vegetation communities across the ESA and DDF occur as a mosaic and transitions between communities are often gradual. As a result, ecological values may occur across mapped community boundaries, including within pasture margins or small unmapped habitat features.

There is particular uncertainty associated with spring annual herbs and potential dormant seed-bank areas. Spring annual herbs have been surveyed across the ESA and outside the ESA over multiple seasons, and parts of the final road footprint were surveyed in 2024 and 2025. Those surveys provide important information on known records and observed distribution. Absence of a spring annual record from part of the footprint should not be interpreted as absence of suitable habitat or dormant seed-bank potential. Known records are evidence of occurrence, not boundaries of population extent. The Applied Research Plan[18] (ARP) recognises the high ecological value of cushionfield systems and the limited experience available for cushionfield management, rehabilitation and expansion.

The ARP is therefore an important research and management response to uncertainty. It should not be interpreted as demonstrating certain replacement of affected cushionfield or spring annual values. Outcomes will depend on further mapping, trials, propagation, establishment, management, monitoring and adaptive responses over time, as are laid out in the ARP. The LERMP and ARAMP work together with the ARP to reduce the uncertainty.

Species-level terrestrial invertebrate loss within the final footprint has not been quantified. Terrestrial invertebrate values are considered at the habitat and effects level only. The final design avoids the airstrip moth buffer. Other terrestrial invertebrate values may occur within dryland herbfield, cushionfield, tussockland, shrubland, rocky habitat and pasture-edge habitats.

For lizards the footprint is instead treated conservatively as occupied lizard habitat for management purposes, consistent with the existing Lizard Values Assessment[19] and Lizard Management Plan[20]. Lizard salvage and relocation outcomes are uncertain and will depend on timing, weather, habitat structure, salvage effort, relocation-site condition, predator management, monitoring and adaptive management.

No new biodiversity offset or compensation accounting has been undertaken. The final ARR construction footprint is assumed to be incorporated into the final BOGP impact quanta, management-plan trigger areas and residual-effects framework. The quantitative adequacy of the BOGP-wide offset or compensation package for the final road footprint has not been independently verified. No separate no-net-loss, net-gain or ecological-equivalence conclusion is made for ARR. Accordingly, unchanged quantitative residual-effects outcomes for the BOGP cannot be inferred from this assessment.

Overall, these uncertainties support conservative implementation of the existing FTAA ecological management framework and confirm the need to incorporate the final footprint into the relevant BOGP-wide disturbance calculations, management-plan trigger areas, monitoring and reporting obligations.

10 Conclusion

The realigned ARR construction footprint is a revised version of the initial engineered alignment. The two footprints overlap by approximately 4.28 ha, or about 34 % of the current 12.48 ha footprint, so the realignment materially changes the precise location of construction disturbance.

Despite that spatial redistribution, the two designs follow the same general Ardgour Rise route and affect a broadly similar mix of mapped vegetation communities and ecological receptor types. The realigned design also avoids known spring annual herb point records intersected by the initial design.

[18] Simcock and Brownstein, *Applied Research Plan for Conservation Management, Rehabilitation and Expansion of Cushionfield*.
[19] RMA Ecology Ltd., *Bendigo-Ophir Gold Project: Lizard Values Assessment*.
[20] Baber, *Bendigo-Ophir Gold Mine Project: Lizard Management Plan*.

The classes of ecological effect identified are not materially different from those associated with the initial design and already considered within the wider BOGP ecological effects context.

The realigned ARR construction footprint affects high and very high value dryland habitat. The classes of ecological effect identified are not materially different from those already assessed for the BOGP.

Residual effects remain for terrestrial habitat, spring-annual and cushionfield values, lizards and dryland invertebrates. The adequacy of the existing BOGP wide residual effects package has not been included in this assessment.

A separate ARR-specific mitigation, offset or compensation package is not recommended, provided that the final construction footprint is incorporated into the relevant BOGP management plans that address specific ecological effects across the project.

Subject to that incorporation, the identified effects can be managed through the existing BOGP-wide ecological management, research, monitoring, offsetting and compensation framework, including the HIMP, LMP, LERMP, relevant terrestrial invertebrate measures, the cushionfield and spring annual ARP, erosion and sediment controls, rehabilitation and biodiversity outcome monitoring.