BEFORE THE COMMISSIONERS APPOINTED BY THE CENTRAL OTAGO DISTRICT COUNCIL

UNDER	the Resource Management Act 1991
IN THE MATTER	of RC230179 an application for a 33-lot subdivision at Rocky Point on Tarras-Cromwell Road (SH8)
BY	**TKO PROPERTIES LIMITED**
	Applicant

STATEMENT OF EVIDENCE OF SAMANTHA JANE KING

Dated: 4 November 2024

TODD & WALKER law
LAWYERS | NOTARY PUBLIC

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Statement of evidence of Samantha King

Introduction

[1] My name is Samantha Jane King

[2] I am employed by Wildland Consultants Limited as a Senior Herpetologist (lizard expert).

[3] My qualifications are a Bachelor of Science from Victoria University of Wellington, a Post Graduate Diploma in Environmental Management from Auckland University and a Master of Science in Conservation Biology from Massey University.

[4] I am a member of the Society for Research on Amphibians and Reptiles in New Zealand, and have presented my research at the World Congress for Herpetology. I am the Nelson Tasman representative for the New Zealand Herpetological Society. I am considered a suitably qualified herpetologist under the guidelines set out by the Department of Conservation (DOC).

[5] I have been instructed by TKO Properties Limited to give expert ecological evidence in respect of RC230179, an application for a 30-lot subdivision located at Rocky Point on Tarras-Cromwell Road (SH8).

[6] My evidence is based on the Lizard Management Plan (LMP; in draft), which has been prepared for TKO Properties Limited and is included as a separate document accompanying my evidence. The draft LMP follows the Department of Conservation's Key Principles for Lizard Salvage and Transfer (DOC, 2019).

Code of Conduct for Expert Witnesses

[7] While this is not an Environment Court hearing I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023. This evidence is within my area of expertise, except where I state that I am relying on material produced by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of evidence

[8] My evidence will address:

(a) background information regarding my involvement in the project;

(b) an outline of lizard values at Rocky Point, and of the draft LMP; and

(c) my response to the ecological matters relating to lizards raised in the Central Otago District planner's section 42A report addendum, and by submitters.

Executive summary

[9] Two species of indigenous lizard have been observed within the proposed subdivision. McCann's skink (*Oligosoma maccanni*) and Kawarau gecko (*Woodworthia* "Cromwell") were confirmed during site visits in 2023 and 2024. McCann's skink (Not Threatened) are often found in modified dry, open environments where there is a complex of rocky outcrops, tussock and scrub. Kawarau gecko (At Risk – Declining) are regionally endemic to Otago and have been classed as Regionally Declining (Jarvie *et al.* 2023). They are found in predominantly rocky areas including rocky scrubland, and crevices of rock outcrops, as well as under loose bark and in tree crevices.

[10] Potential effects of the subdivision and associated earthworks on lizards include accidental injury/death/displacement, disturbance to lizards, loss of indigenous lizard habitat, breeding failure/behavioural effects and increased predation.

[11] The proposed effects management includes avoiding most lizard habitat due to the relatively small footprint of roads, building platforms and curtilage areas. Planned works avoid rocky outcrops and stacks, and situate platforms away from kānuka scrub where possible. The remaining lizard habitats that will be affected by works, including cushionfields, are likely to hold lower densities of lizards than rocky substrates and kānuka shrubland.

[12] To address residual adverse effects on lizards that cannot be avoided, remedied or mitigated, habitat restoration and enhancement measures are also proposed. These include offsetting measures involving habitat enrichment and planting which are likely to provide additional habitat for McCann's skink and Kawarau gecko. Predator control will also be implemented for hedgehogs and ferrets, as well as a cat ban notice on all titles.

Background and involvement in the project

[13] Wildlands was engaged by TKO Properties Limited in November 2023 to provide technical peer review of ecological assessments prepared by Mr Beale for the proposed Rocky Point subdivision. Subsequently, Wildlands was further engaged to develop a Lizard Management Plan, and to undertake a desktop assessment of invertebrate values.

[14] I have undertaken the following work related to the Rocky Point subdivision site:

a) Read Dr Mandy Tocher's lizard survey report for Rocky Point.

b) Completed a one-day field assessment of lizard habitat and lizard values at Rocky Point.

c) Drafted a Lizard Management Plan (LMP).

Indigenous lizards within the Rocky Point subdivision area

[15] Assessment of the Department of Conservation BioWeb Herpetofauna database found records of six indigenous lizard species within a 20 kilometre radius of the Rocky Point subdivision site. This included historic records, due to a lack of formal surveys in this area.

Site visits for lizards

[16] A three-day visual encounter survey/walk through survey was carried out over the Bendigo Estate site by Dr Tocher (of LizardExpertNZ) from 17 to 19 March 2023, under Wildlife Act Authority 62386-FAU.

[17] I visited the proposed subdivision site on 17 April 2024, whereby opportunistic manual searches were undertaken (under Wildlife Act

Authority 96003-FAU). The findings of my site visit undertaken in April 2024 concurred with the LENZ survey results. Dr Tocher found that Kawarau gecko and McCann's skink were common and widespread over the site. Both species of lizards were detected across the site. In addition, Kawarau gecko were also detected in crevices and underneath loose bark of kānuka.

Lizard habitats on site

[18] Lizard habitat is widespread through all of the vegetation types, resulting in lizard populations being present in moderate-high densities across the entirety of the Rocky Point site (Appendix 1). Throughout each of the identified vegetation types[1], loose rock slabs and/or outcropping are present, which provide habitat for the two lizard species identified within the site.

[19] In areas where the rocks and outcrops are less abundant, lizards of both species are found using the scab weeds and cushionfield for cover. In addition, Kawarau gecko was observed occupying kānuka tree trunks, under loose bark and within crevices.

Sizable lizard populations are present directly adjacent to proposed building platforms, and curtilage areas on the site. Lizards were even present in areas already disturbed by recent habitat removal. Presumably these lizards have recolonised these areas from the surrounding abundant populations since the disturbance occurred.

Background to Lizard Management Plan and Mitigation

[20] Adverse effects of any development on lizards can be complex and difficult to quantify. DOC has set out guidelines (The Key Principles for Lizard Salvage and Transfer in New Zealand, DOC, 2019) in order to assist suitably qualified herpetologists with the requirements of lizard management and understanding effects on lizards.

The proposed Activity and associated ecological mitigation

[1] Beale Consultants 2023: Bendigo Hills Estate & Rocky Hills Subdivisions Terrestrial Ecology Impact Assessment.

[21] A full description of the proposed subdivision is provided in the application and in evidence of Mr Beale. Briefly, the main points relevant to lizards are:

(a) Earthworks

(b) Removal of both indigenous and exotic vegetation

(c) Ongoing changes in land use [i.e. potential increased predation, disturbance etc.]

[22] The relatively small footprint of roads, building platforms and curtilage areas results in most lizard habitat on site remaining intact. In addition, high quality lizard habitat such as rocky outcrops/stacks and kānuka scrub have been avoided where possible.

[23] The design by Mr Baxter has been updated to reduce the number of lots and reduce the size of building platforms in Lots 1 to 9 to further reduce adverse effects on indigenous biodiversity values. The requirement for underground services to follow existing and proposed access routes where possible will also reduce the footprint of earthworks and thus reduce the clearance of lizard habitat. This ensures that all services are located within the roading infrastructure, which negates the requirement for overhead or above ground services, and reduces overall impacts lizard habitats

[24] Key actions proposed in the draft LMP to minimise, remediate and mitigate effects on lizards include:

- Avoidance of high quality lizard habitats (rocky outcrops) where possible.

- The retention and removal (where retention is not possible) of rocks from within earthworks areas and placement into adjacent unaffected habitats.

- Stacking of all removed kānuka in a suitable location within the Landscape and Vegetation Protection Area (LVP, representing

all of the Rocky Point site outside of the development area), providing additional habitat for lizards

- Enrichment planting within existing habitats.
- Predator control for hedgehogs and ferrets, as well as a ban on cat ownership.
- Ongoing monitoring to determine uptake of lizards into the created habitats made from rocks and cleared kanuka.

Issues raised in section 42A report

[25] I have set out my responses to issues raised in the section 42A report in the following table.

Issue Raised	**Response**
No survey information presented.	The surveys were undertaken in appropriate weather conditions as provided by Dr Tocher. The weather conditions were undertaken within average minimum air temp 8°C – maximum average air temperature 23°C. Due to the species and habitats present at the proposed subdivision, trapping is not an entirely suitable survey method. Lizards are less likely to use/enter traps when there is high quality habitat nearby. Dr Tocher used standard accepted lizard survey methods for the work (Visual Encounter Surveys) and systematic searching. For a site like this, these are the same methods I would use and are consistent

	with DOC best practice and the DOC Toolbox for Herpetofauna[2].
Significant additional work will need to be undertaken prior to works commencing to identify lizard populations in areas to be developed, set up site control measures, identify suitable areas for habitat reconstruction and to set up those habitats.	From the survey undertaken, it is very clear where lizards and populations are present, and I do not consider an additional survey is required. Site control measures have been provided in the draft LMP, such as pre-start meetings, habitat delineation and a clear schedule of timing for habitat clearance and reconstruction. Habitat reconstruction locations are outlined below. Therefore I disagree that further work is required.
It would be preferable to have an indication of likely locations for habitat reconstruction available prior to the hearing.	Habitat reconstruction will be completed within the LVP, within 100 metres from individual curtilage areas, or other earthworks areas as practical, where areas of bare ground lacking indigenous vegetation cover are present. Habitat reconstruction is limited by earthworks and associated rocks and wood available from the activity. Therefore, to ensure that the work is done with practicality in mind, rocks and habitat will be reconstructed as close as possible to the habitat clearance areas, but far enough away that the habitat reconstruction is not adversely impacted by the development.

[2] https://www.doc.govt.nz/documents/science-and-technical/inventory-monitoring/im-toolbox-herpetofauna-sytematic-searches.pdf

Cat free subdivision	This has been incorporated into the LMP for all title holders to have cat ban. This will be included as a consent condition notice on each title.
It is not clear how building platforms and curtilage areas avoid lizard habitat.	The amount of lizard habitat has been mapped against the development footprint and habitats highlighted that will be cleared (draft LMP). The design avoids the majority of high quality lizard habitats throughout the site already, by utilising open areas and avoiding most tor/outcrops and intact shrubland. The actual habitat clearance required will be subject to a walk over of the site prior to earthworks commencement to determine key areas for avoidance.
Proposed design controls for buildings and landscaping proposed by Mr Baxter will be acceptable to achieve herpetological objectives has not been addressed in the amended application. I invite the applicant to confirm how building platform and cartilage locations have been located to minimise effects on lizard habitats, and how the design controls proposed by Mr Baxter will help achieve herpetological objectives prior to the hearing.	Most of the subdivision (roads, curtilage areas and platforms) are situated outside high quality lizard habitat (rock tors and shrubland). Most areas designated for development/earthworks will avoid high quality habitats and the remainder will be situated in low quality habitats where a low density of lizards are likely to be present. The areas mapped for supervised habitat clearance (Appendix 2) provides an overview of lizard habitats affected by the proposal. These areas have been mapped conservatively in order to ensure that the maximum amount of mitigation is applied to prevent adverse effects to lizards.

Response to matters raised in submissions

[26] I support the suggestion of a restriction on keeping cats raised by Dr Tocher and in a submission by Ms Wardle. Not only would this limit a rise in predation risk to lizards from domestic animals, but enable future control of feral cats likely to already exist on the site.

Proposed lizard management consent condition

[27] I agree with the submitters that draft consent conditions should be determined prior to the approval of this application. I have outlined suggested consent conditions below.

[28] The draft Lizard Management Plan will be finalised by a suitably qualified herpetologist and will be subject to review and consultation by Central Otago District Council, Department of Conservation and relevant iwi (Aukaha). The final approved LMP will include:

Avoidance:

- Avoidance of key lizard habitats (rock tors) by development works, through detailed design and collaboration with project engineers and site contractors. Final confirmation of actual habitat avoidance required will be undertaken by the site engineer, contractor and Herpetologist.
- Installing services in a way that reduces earthworks (such as installing cables within existing and new road and access footprints).

Remediation:

- Enrichment planting to improve existing habitat and to increase both plant and lizard diversity
- Creation and retention of rocky habitats and kānuka treeland on site.
- Site wide hedgehog control methods and outcomes.
- A cat ownership ban will be included as a notice on all titles.

Minimisation

- Methodology of supervised habitat removal of approximately 1.5 hectares of lizard habitat and salvage where key habitats cannot be avoided.

- Placing restrictions on gardening and resident landscaping to protect lizard habitat within lots through consent notice on titles.

Offset and compensation

- Details of enrichment planting proposed for the site, including estimated numbers/densities of plants required, monitoring and maintenance required.

Contingencies, monitoring and reporting

- Monitoring of uptake of lizards into created rock stacks and/or woodpiles.

- Reporting detailing LMP implementation, including total area of habitat clearance will be submitted annually to DOC, Iwi and Central Otago District Council.

- Contingencies for all lizard management will be developed and implemented as required.

- A lizard discovery protocol will be prepared.

Conclusion

[29] There is a high density population of both McCann's skink and Kawarau gecko on site. The population is connected to a wider and highly abundant population of both species.

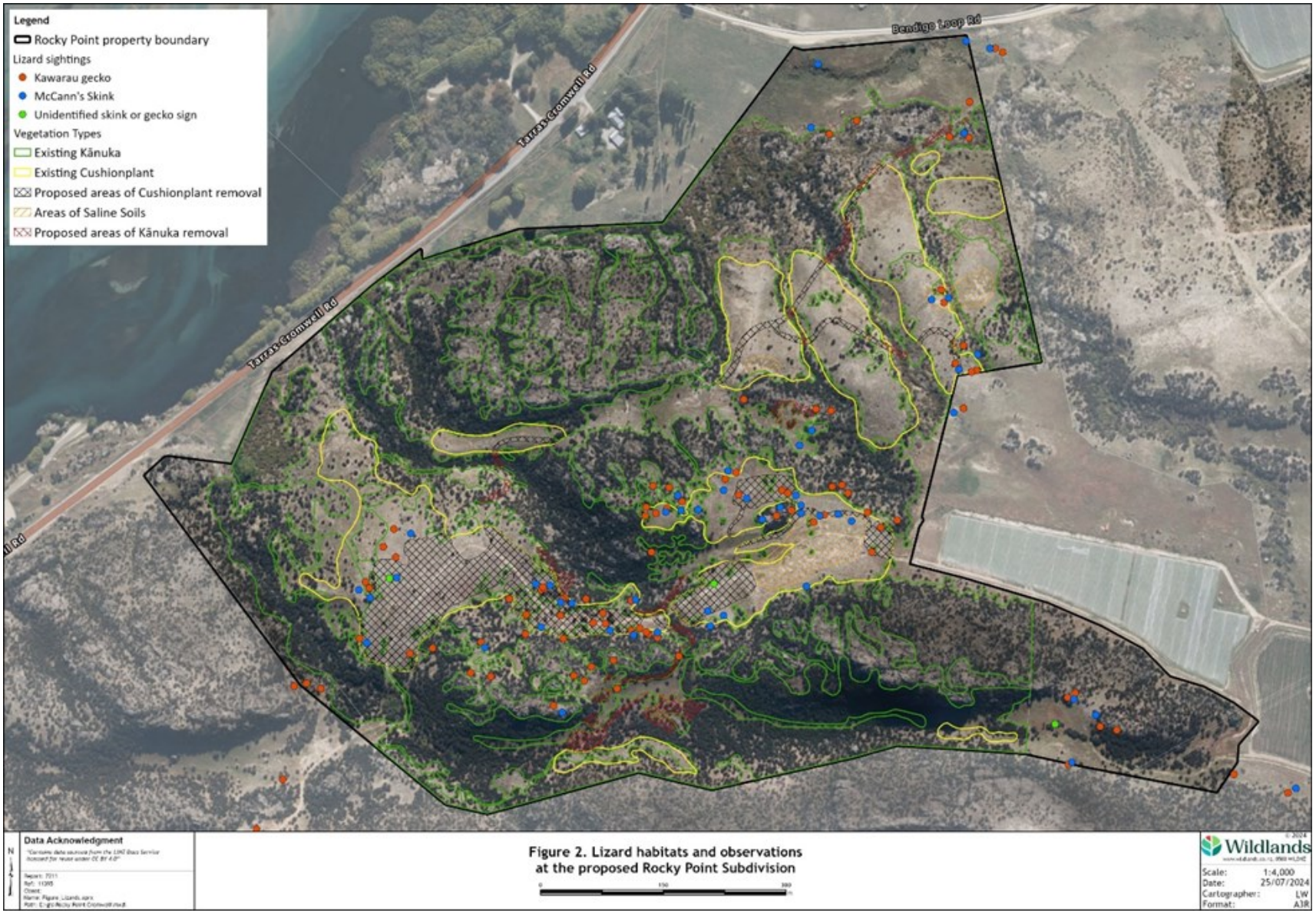
[30] The LMP (in draft) will seek to address any potential adverse effects from development through appropriate management including avoidance, remediation and minimisation of effects.

[31] I consider it entirely feasible that the actions outlined in the LMP will be able to demonstrate “overall protective benefit” to local McCann’s skink and Kawarau gecko populations at the site.

Samantha Jane King

04 November 2024

Appendix 1. Lizard habitats and observations at the proposed Rocky Point subdivision.



Appendix 2. Proposed lizard habitat clearance at Rocky Point subdivision.

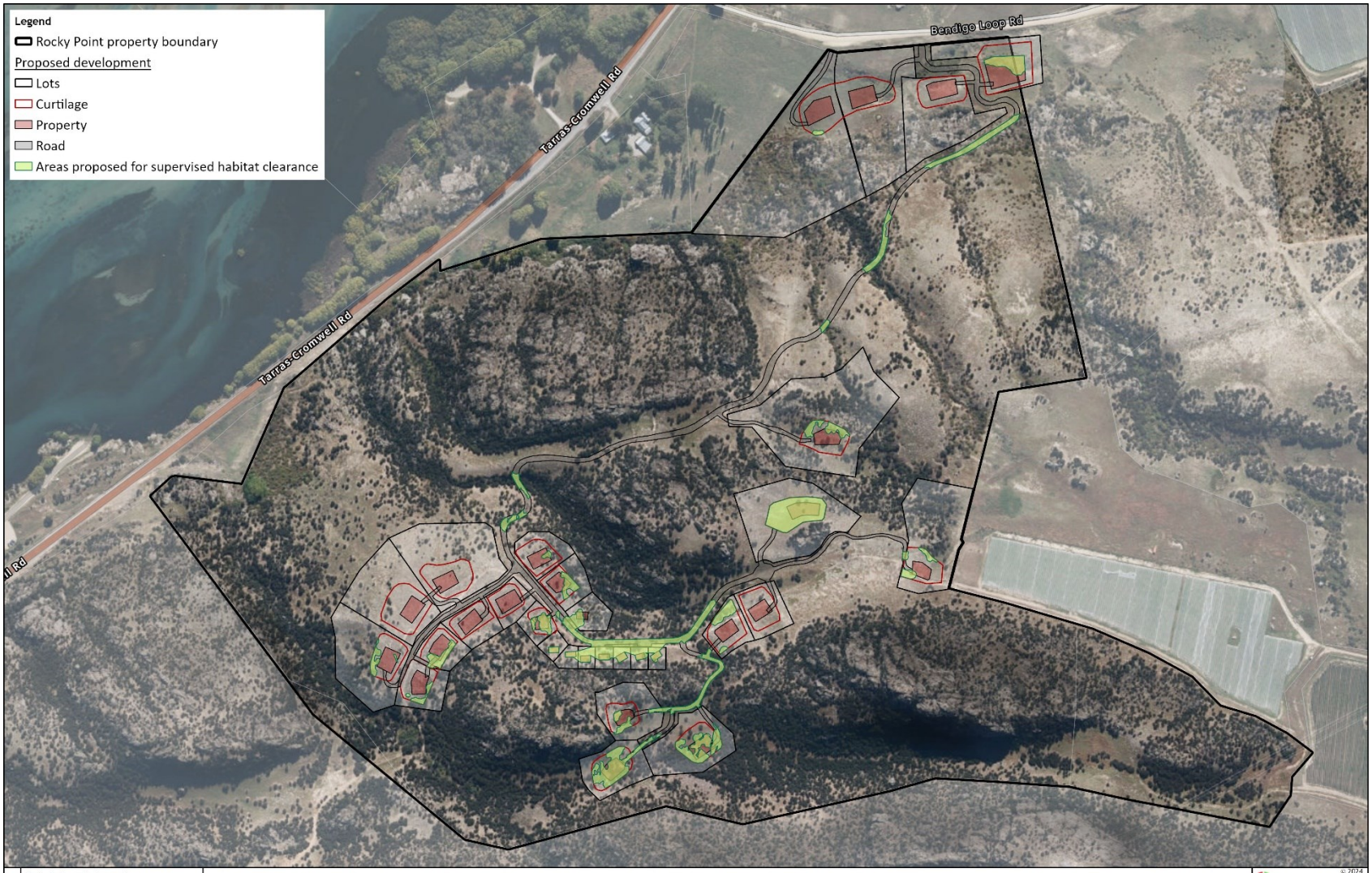


Figure 4. Areas proposed for supervised habitat clearance at the proposed Rocky Point Subdivision

Lizard Management Plan for Rocky Point Subdivision

Contract Report No. 7211

Providing outstanding ecological services to sustain and improve our environments

Wildlands

Lizard Management Plan for Rocky Point Subdivision

Contract Report No. 7211

October 2024

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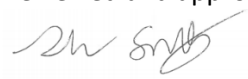

_____
24/10/2024
Des Smith
Senior Principal Ecologist, South Island Regional Manager
Wildland Consultants Ltd

Cite this report as follows:

Wildland Consultants (2024). *Lizard Management Plan for Rocky Point Subdivision.* Wildland Consultants Contract Report No. 7211. Prepared for TKO properties Ltd. 32 pp.

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1.0 Introduction

TKO Properties Limited (TKO) is proposing to subdivide a property at Rocky Point which was formerly part of Bendigo Station. The property is located above the head of Lake Dunstan between the Tarras Cromwell Road (SH8) and the Bendigo Scenic Reserve (Figure 1). The property covers an area of 68.6 hectares.

The Rocky Point will comprise of 30 Lots. In addition, a network of internal roads will provide vehicular access to the Lots and building platforms. Works proposed for the development of the subdivision include construction of buildings, driveways, access roads, curtilage areas and waste water disposal fields.

A lizard survey was carried out across Rocky Point by Mandy Tocher (LizardExpertNZ; LENZ), under Wildlife Act Authority 62386-FAU, in March 2023 (Tocher, 2023). Two lizard species were commonly found and widespread over the site: Kawarau gecko (*Woodworthia* "Cromwell"; At Risk – Declining) and McCann's skink (*Oligosoma maccanni*; Not Threatened).

A Lizard Management Plan (LMP; this document) and Wildlife Act Authority (WAA) is therefore required. This LMP follows the principles outlined by the Department of Conservation in their guidelines (DOC, 2019) (Table 1). These principles describe steps to take and enable the outcome of successful lizard management (including salvage, if determined to be the right mitigation option).

1.1 Project site and context

1.1.1 Subdivision Configuration

As detailed in Beale (2024), TKO is proposing concentric areas of occupation in 22 of the 30 lots to be created at Rocky Point (Figure 1). The remaining eight lots are smaller in size and allocated to chalet style housing without curtilage areas.

The innermost area of occupation for each lot will be the designated building platform, which will incorporate the dwelling, any garaging or supplementary building, and any metalled hard standing used for parking and egress around buildings. It is assumed that these areas will be cleared of all vegetation to make way for construction. The curtilage areas have been specifically designed for each lot to enable suitable living space around each building platform. Covenants will be established limiting modification of the curtilage areas.

The configuration of the building platforms, curtilage areas and driveways are shown in more detail on the Baxter Design landscape plans (Figure 1).

1.1.2 Access

The Rocky Point development will be accessed off Bendigo Loop Road. The access road will be vested as road as shown on Figure 1. Underground services will be installed within the road corridors.

1.1.3 Landscape and Vegetation Protection

The balance of the property beyond the building platforms and curtilage areas will be defined as a Landscape and Vegetation Protection Area (LVP). The LVP will be the subject of a conservation covenant prohibiting vegetation clearance and imposing an obligation on owners to undertake pest control. The LVP will be managed by an owner representative group.

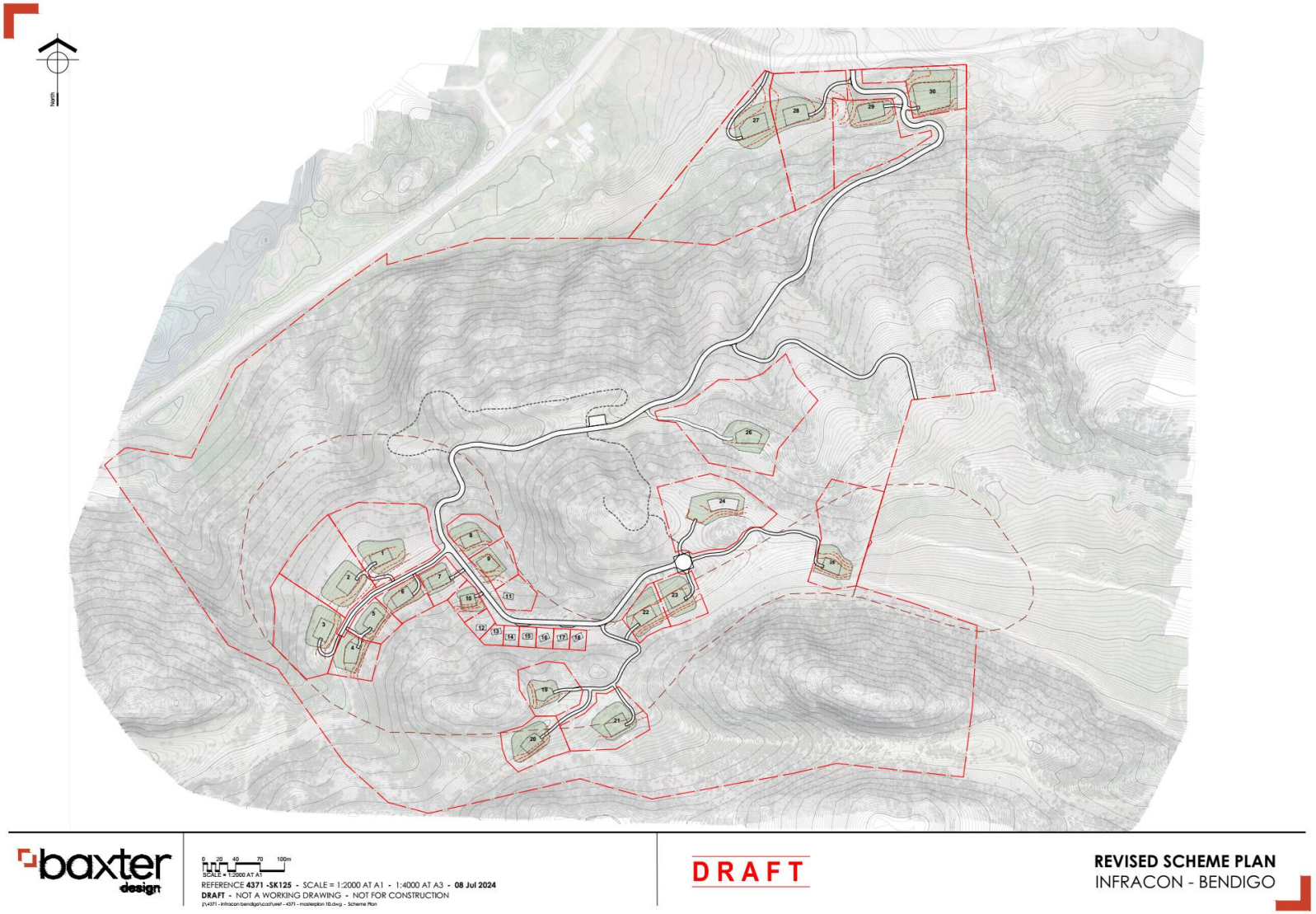

Figure 1 – Scheme Plan for Rocky Point Subdivision. Provided by Baxter Design.

Table 1 – Key principles for lizard salvage and transfer in New Zealand and corresponding section in this LMP that details the application of each principle.

Key Principle	Summary	Section in this Document that Addresses the Principle
Lizard species' values and site significance must be assessed at both the impact (development) and receiving sites	One Not Threatened, and one At Risk – Declining species have been confirmed present at the site. It is possible that one other species may be present.	Section 3.0
Actual and potential development-related effects and their significance must be assessed	Effects include but are not limited to disturbance during earthworks, death and injury, fragmentation of habitat, loss of indigenous habitat, ongoing disturbance, and increased predation to lizards.	Section 5.0
Alternatives to moving lizards must be considered	Alternatives to moving lizards have been considered through avoidance of high quality habitats (kanuka shrubland and rocky outcrops).	Section 6.0
Threatened species require more careful consideration than less-threatened species	It is highly unlikely that Threatened species are present. Supervised clearance is required for At Risk gecko habitat, as well as habitat enhancement.	Section 3.0, 6.0
Lizard salvage, transfer and release must use the best available methodology	Supervised manual habitat removal will be undertaken in designated affected areas throughout the proposed subdivision.	Section 6.4.4
Receiving sites and their carrying capacity must be suitable in the long term	Lizards will be released throughout the wider area. Habitat enhancement and predator control will be undertaken throughout the wider area, which will be protected in perpetuity.	Section 6.3, 6.4
Monitoring is required to evaluate the success of the salvage operation	Monitoring will be undertaken of the habitat enhancement within the protected area, to determine if reconstructed rocky habitats are habituated by lizards' long term.	Section 10
Reporting is required to communicate outcomes of salvage operations and facilitate process improvements	Reporting will be undertaken for predator control, success of the LMP implementation. Reports will be provided to the consenting authority, mana whenua and DOC following any supervised habitat removal. Additional reporting will be delivered annually to provide results on the outcome of habitat monitoring.	Section 11

Key Principle	Summary	Section in this Document that Addresses the Principle
Contingency actions are required when lizard salvage and transfer activities fail	Contingency actions include: • Management for discoveries of species At Risk and Threatened not already recorded from the site. • Management of reconstructed habitats if they fail to uptake. • Management and monitoring of the success of predator control. • Management measures where more lizards than expected are salvaged.	Section 7.0

2.0 Wildlife Act 1953

Due to the presence of indigenous lizards, the proposed subdivision requires a Wildlife Act Authority under the Wildlife Act (1953).

All indigenous lizards are protected under the Wildlife Act (1953) and a permit under the Wildlife Act must be obtained from the Department of Conservation before any indigenous lizards can be disturbed or relocated. Lizard mitigation work will be undertaken by a Department of Conservation-approved herpetologist who has been authorised to implement lizard management for the project through a Department of Conservation Wildlife Act Authorisation (WAA) issued for the project.

A LMP (this document) is required to accompany the WAA application and must be submitted to the Department of Conservation and approved prior to undertaking any activities that potentially impact on lizard populations, and any lizard management proposed to mitigate these effects.

2.1 Responsibilities

Any lizard management must be carried out in consultation with the DOC, Otago Regional Council and mana whenua.

Delivery of, and compliance with this draft LMP will be the responsibility of permit holder who will liaise with the Site Manager, Site Engineer(s), Project Herpetologist and vegetation clearance and earthworks contractors as required.

2.1.1 Implementation of the Lizard Management Plan

The implementation of the LMP will be supervised by a suitably qualified and experienced Herpetologist (permit holder). The responsibilities of the permit holder are to:

- Facilitate a project start-up meeting with the Project Herpetologist, site manager, site engineer(s) and vegetation clearance and earthworks contractors before the earthworks season commences, to determine habitats scheduled for clearance to enable forward planning and avoid delays in the construction schedule.
- Contact the Project Ecologist and Herpetologist a minimum of six weeks before any of the areas outlined in Figure 4 are scheduled for clearance.
- Invite mana whenua to participate in and support any translocation deemed necessary and appropriate, to ensure appropriate exercise of kaitiakitanga responsibilities and that cultural concerns are addressed.
- Maintain clear lines of communication with the Project Herpetologist, Site Manager, Site Engineer(s) and vegetation clearance and earthworks contractors regarding changes in the works schedule.
- Brief new personnel about the vegetation clearance contractor's responsibilities under this plan.

All personnel working on site are responsible for alerting the Project Herpetologist, Site Engineer(s) and the Environmental Manager upon discovery of any 'At Risk' or 'Threatened' lizards not otherwise identified in this LMP.

The Project Herpetologist is responsible for reporting the discovery of 'At Risk' or 'Threatened' lizards to the Local Area Manager (Department of Conservation) and for maintaining a database with an incident register and file log of actions taken for each discovery of an 'At Risk' or 'Threatened' lizard not otherwise identified in this LMP.

3.0 Lizard Values

3.1 Desktop assessment/literature review

Department of Conservation BioWeb Herpetofauna Database observations within 20 kilometres of the site, were assessed to provide context for lizard fauna recorded within the site and inform an assessment of ecological values for the Project Area (Table 2). Historic records were included, due to a lack of formal surveys within the area.

McCann's skink and Kawarau gecko were confirmed during site surveys in 2023 and 2024. McCann's skink are often found in modified dry, open environments where there is a complex of rocky outcrops, tussock and scrub. Kawarau gecko are regionally endemic to Otago and have been classed as Regionally Declining (Jarvie *et al.* 2023). They are found in predominantly rocky areas including rocky scrubland, and crevices of rock outcrops, as well as under loose bark and in tree crevices.

It is possible that tussock skink[1] may be present within the site, at low densities in damper sites.

While there are historic records of Lakes skink (Mt Pisa, 1986), it is likely that due to the slow life history characteristics of this species it is likely extinct within the site, and the probability of its discovery is unlikely.

It is highly unlikely that any other species of indigenous lizard typically found in the region are present within the site, due their habitat requirements (orange spotted gecko) and the geographic separation between the site and location the species was recorded (korero gecko).

[1] Because tussock skink have recently been taxonomically revised, (formerly southern grass skink in Central Otago and Southland; Jewel 2022), their distributions are not yet well defined. Dr. Tocher suggests that tussock skink are present in and around Lake Dunstan (LENZ, 2023). Genetic testing of suspected tussock or southern grass skink would help to determine which species are actually present within the site.

Table 2 - Results of the Department of Conservation Bioweb herpetofauna database search, within a 20 kilometre radius of the site, and an assessment of the likelihood of the presence of these species at the site. Conservation status as per Hitchmough *et al*. 2021 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	Conservation Status	Regional status	Record Distance (km)	Preferred Habitats	Likelihood of Occurrence
Oligosoma maccanni	McCann's skink	Not Threatened	Regionally Not Threatened	14.4	Open habitats- dry rocky environments such as rock outcrops, and montane grassland	Presence confirmed during site surveys
Woodworthia "Cromwell"	Kawarau gecko	At Risk - Declining	Regionally Declining	3.7	Rocky scrubland, talus, and creviced rock outcrops	Presence confirmed during site surveys
Oligosoma chionocloescens	Tussock skink	At Risk - Declining	Regionally Declining	12.6	Range of habitats including coastal dunes, wetlands, grassland, shrublands, rocky shrubland/herbfield, screes, tussock, stony river beds and even cities	Possible
Woodworthia "Otago/Southland large"	Korero gecko	At Risk - Declining	Regionally Declining	15.2	Mature native forests, rocky scrub/grasslands, boulderfields and scree	Highly unlikely
Oligosoma aff. *chloronoton* "West Otago"	Lakes skink	Nationally Vulnerable	Regionally Vulnerable	No records	Grassland, scrubland, tussockland, rocky areas, scree, herbfield, fellfienld, stony riverbeds, terraces and lake edges (from montane to alpine areas).	Unlikely
Mokopirirakau "Roys Peak"	Orange spotted gecko	At Risk - Declining	Regionally Declining	15.0	High-altitude (1,100-1,800m) alpine and subalpine creviced rock outcrops, rocky shrubland, boulderfield, talus, scree and rocky tussockland	Highly unlikely

3.2 Lizard survey

3.2.1 Field survey methods

A three-day visual encounter survey/walk through survey was carried out over the Bendigo Estate site by Dr Mandy Tocher (LENZ) from 17 to 19 March, 2023, under Wildlife Act Authority 62386-FAU. The surveys were carried out in weather conditions suitable for lizard activity in Central Otago (average minimum air temp 8°C – maximum average air temperature 23°C). Where possible, lizards detected were captured and identified prior to release.

In addition to Tocher's survey in 2023, the Bendigo Estate site was also visited by Wildlands herpetologist, Samantha King, on 17 April 2024, whereby opportunistic manual searches were undertaken (under Wildlife Act Authority 96003-FAU).

Lizard survey methods sometimes have poor detection rates because of typically low population densities, species' cryptic colouration, difficulty in surveying preferred habitats and behaviour/activity patterns. As such, even intensive lizard surveys are unlikely to detect all individuals in the population or, possibly, all species present.

3.2.2 Field survey results

Tocher found that Kawarau gecko and McCann's skink were common and widespread over the Bendigo Hills Estate site. Kawarau gecko were so common across the property that they (or their sloughed skinks) were predictably present under most loose slabs on the property (**Error! Reference source not found.**). Although McCann's skink were not observed as frequently as Kawarau gecko, they were still commonly observed foraging and taking refuge under living and dead scab weeds and using them as basking platforms (**Error! Reference source not found.**).

The findings of the Wildlands survey undertaken in April 2024 concurred with the LENZ survey results. Both species of lizards were detected across the site. In addition, Kawarau gecko were also detected in crevices and underneath loose bark of kānuka.

3.3 Lizard habitat

According to Beale Consultants (2024a), seven vegetation types occur over the site, including:

- Kānuka shrubland/scrub
- Cushion field
- Grey shrubland
- Sweet briar shrubland
- Silver tussock grassland
- Exotic herbfield
- Exotic grassland
- Rocky substrates

Over much of the property there is evidence of active regeneration of kānuka across rocky to gravelly substrates and within the cushionfields, due to the exclusion of grazing stock (Beale, 2024). Throughout each of the identified vegetation types, loose rock slabs and/or

outcropping are present, which provide habitat for the two lizard species identified within the site.

In areas where the rocks and outcrops are less abundant, lizards of both species are found using the scab weeds and cushionfield for cover. In addition, Kawarau gecko was observed occupying kānuka tree trunks, under loose bark and within crevices. Therefore, lizard habitat is widespread through all of the vegetation types; resulting in lizard populations being present in moderate-high densities across the entirety of the Bendigo Hills Estate. Detailed vegetation descriptions are provided in Beale (2024a).

Sizable lizard populations are present directly adjacent to proposed building platforms, and curtilage areas on the site. Lizards were even present in areas already disturbed by earthworks. Presumably these lizards have recolonised these areas from the surrounding abundant populations since the disturbance occurred.

These findings were further supported by the walk over survey by Wildlands in 2024 (Plates 1-3). Table 3 details the indigenous vegetation extent within the impact site (Beale, 2024a).

Plate 1 - Kānuka scrub and shrubland.

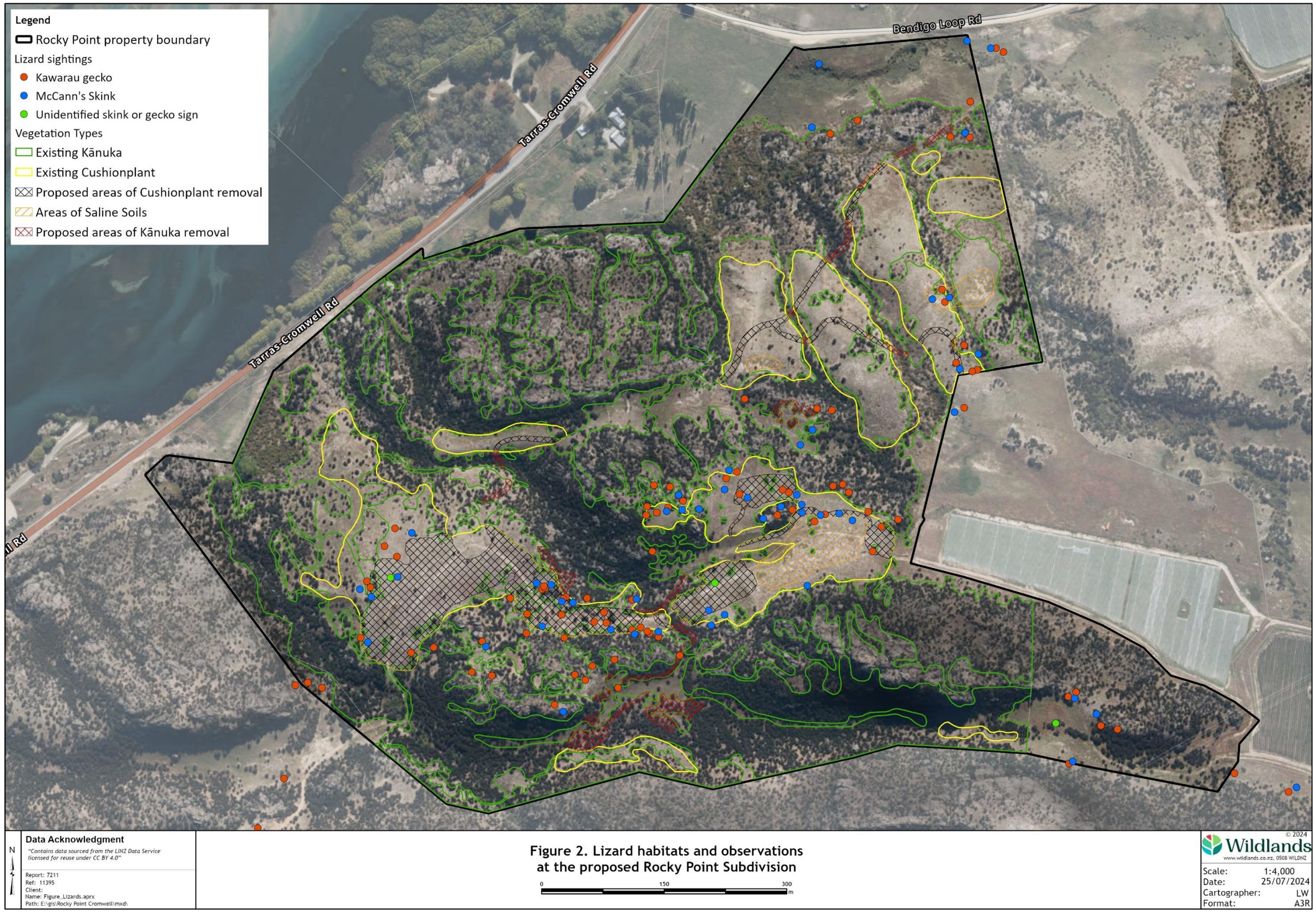

Figure 2. Lizard habitats and observations at the proposed Rocky Point Subdivision

Plate 2 – Rocky substrates.

Plate 3 – Cushion field habitat with kānuka scrub in the background.

Table 3- Vegetation types and estimated area at the impact site.

Vegetation	Impact site (hectares)
Kānuka shrubland/scrub	36.71
Cushionfield	14.13
Sweet briar shrubland	4.2
Grey shrubland	Too fragmented to be mapped – scattered throughout site
Exotic herbfield and grassland	15.4
Rocky substrates	Found in all vegetation types throughout the site

4.0 Ecological significance

The habitats identified in Figure 2 meet the ecological significance criteria for rarity/distinctiveness and ecological context in the Otago Regional Policy Statement (ORPS) and the National Policy Statement for Indigenous Biodiversity (NPS-IB) because of the presence of an At Risk – Declining species, endemic to the Otago region; Kawarau gecko. The presence of indigenous fauna at this site requires consideration under the NPS IB, and particularly the NPS-IB's objective to achieve no overall loss in indigenous biodiversity.

4.1.1 Natural levels

The LENZ survey report acknowledged that lizards are unlikely to be at natural levels (pre-human), due to the history of land use modification following human settlement in the area. While the LENZ survey report argues that the habitats have been created to favour Kawarau gecko and McCann's skink preferences, the report also acknowledges that other species once present within the site, are likely now extinct due to the modification. In addition to this, Kawarau gecko is a generalist species of gecko and is likely to have more arboreal behaviours if the opportunities are provided (see survey results Section 4.2.2).

5.0 Effects on lizards

Effects on lizards from the proposed subdivision and associated earthworks have been assessed at a local population scale, using the Quality Planning Extent of Adverse Effects criteria (Quality Planning, 2017).

5.1.1 Proposed works

Within the development area, stands of kānuka and individual trees along with areas of cushionfield, grassland vegetation and exotic herbfield will be permanently removed during development of the building platforms, curtilage areas, driveways and access roads. Gravel for the roads and track upgrades will be sourced from an off-site weed free source.

Areas affected by the development will be clearly defined on the ground in advance of the works to ensure the movement of machinery and other construction related activities avoid disturbance to adjoining areas of kanuka shrubland and scrub, grey shrubland, cushionfield, grassland and rocky terrain.

A schedule summarising the approximate areas of indigenous dominant vegetation that would be cleared during the development is set out in Table 5.

Table 4 – Habitat effected within the project area, potential lizard species present, and assessment of the percentage of habitat to be disturbed by clearance of the site.

Habitat Type	Species Present	Total area	Approximate Area to be Affected by Works (ha)
Kānuka shrubland/scrub	Kawarau gecko McCann's skink	36.7	1.28
Cushionfield	Kawarau gecko McCann's skink	14.1	3.76
Grey shrubland	Kawarau gecko McCann's skink	Fragmented throughout the site	Fragmented throughout the impact site
Sweet Briar shrubland	Kawarau gecko McCann's skink	4.2	
Exotic herbfield	McCann's skink	15.4	
Grassland	McCann's skink		
Rocky substrates	Kawarau gecko McCann's skink	Dispersed throughout all vegetation types	Dispersed throughout all vegetation types

5.2 Potential effects

Potential effects on lizards resulting from the proposed development are detailed below.

- Accidental injury/death/displacement
- Disturbance to lizards during earthworks
- Loss of indigenous lizard habitat
- Breeding failure/behavioural effects
- Increased predation to lizards

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

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

Habitat loss and fragmentation: Lizards and their habitat were found throughout the entirety of the site and loss of habitats cannot be avoided. This will result in permanent habitat loss for indigenous lizards at this site. Due to the high density of lizards present, this effect is likely to be **more than minor** without mitigation.

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

Increased predation*:* The proposed subdivision will increase domestic cat abundance, as well as attract rodents, which may have an impact on lizard populations adjacent to the impact site. Rabbit control may result in the increase of grassland and therefore increase overall mouse abundance. This effect is likely to be **minor** without mitigation.

5.3 Significance of effects

The level of ecological effects on indigenous lizards without mitigation actions are taken are presented in Table 6.

Table 5 – Potential significance of effects to lizards and their habitats without mitigation.

Effect	Level of Effect Without Mitigation
Accidental injury/death/displacement	More than minor
Disturbance during earthworks	More than minor
Habitat loss	More than minor
Breeding failure/behavioural effects	Minor
Increased predation	Minor

6.0 Management of Effects

Most of the lizard habitat within the Rocky Point subdivision will be avoided due to the relatively small footprint of the roads, building platforms and curtilage areas. Effects on lizards have been minimised through the avoidance of rocky outcrops and stacks, and situating platforms away from kānuka scrub where possible. It is likely that a proportion of lizards will be affected by the proposed works, but habitats affected are likely to hold lower densities of lizards than rocky substrates and kānuka shrubland.

6.1 Summary

To address significant residual adverse effects on lizards that cannot be avoided, remedied or mitigated, habitat restoration and enhancement measures are also proposed. These include offsetting of habitats offsite which are likely to provide additional habitat for McCann's skink and Kawarau gecko. Key management options for lizard species that are present at Rocky Point are summarised in Table 6, and have been adapted from Beale (2024a and 2024b). All ongoing management requirements will be contracted and managed by the Rocky Point Service company (proposed by TKO Properties).

Table 6 - Summary of proposed lizard management options for all species at Rocky Point subdivision site, adapted from Beale (2024a & b).

Management type	Type	Detail
Avoidance	Development design	The final development design will allow for the avoidance of key lizard habitats: - Building platform design - Curtilage area design and construction - Services to be provided in a minimal way that prevents additional earthworks (such as installing cables underneath road ways).
	Vegetation/habitats	Key vegetation will be avoided which provides high value habitat for lizards.
		Rock stacks, loose rock piles (comprising more than one rock) outcrops will be avoided along with the implementation of setbacks and no disturbance zones. No vegetation or rock outcrops shall be disturbed or removed beyond the development footprints.
Minimise	Development design	The final development design will minimise (where practicable) the development footprints for dwellings, curtilages, roads, water tanks, laydown areas, car parks and wastewater disposal facilities. The development is to be actively managed through consent notice conditions in order to minimise adverse effects on biodiversity values. Implementing site controls that require all works associated with construction of dwellings and supporting infrastructure including machinery movements and storage, laydown and parking areas to take place within construction zones clearly defined on the ground.
		Restrictions to gardening/resident landscaping – following the Landscape and Vegetation Protection Area.
	Vegetation/Habitats	Rock stacks, outcrops and piles will be prohibited from moving, deconstruction and/or use for construction, or landscaping purposes.
	Construction/Implementation	All services will be installed underground and within road footprints

		Salvage and relocation of lizards to habitats on site which will be avoided, which may include the following:
		- Supervised clearance, where required of:
		  - Kānuka treeland.
		  - Rock stacks, outcrops and piles

		Follow Incidental Discovery Protocol

Management type	Type	Detail
Remedy	Vegetation/habitats	Creating schist rock habitats, under the supervision of the Project Herpetologist, ahead of the development works through retrieving and hand placing of slab rocks across areas naturally impoverished of rock, on open and sunny sites.
		Pest plant control, incursion monitoring and control for two years.
		Rabbit and goat control will be ongoing, and implemented as required.
	Predator control	Cat free subdivision and ban, placed as a consent notice on each title.
		Ongoing hedgehog control, which will be implemented by the Rocky Point Service company.
Offset	Planting	Three sites have been selected (total 5 hectares), to offset the effects from the development. These are “Hemlock Gully”, “Panorama Rise” and “Pylon Flat”. Their aspect and situation (south to south-west) may have limited benefits to indigenous lizards at the site, but once established, will provide additional connective habitats for Kawarau gecko.
Compensation	Land protection	The balance of the site will be formally protected under covenant.
	Compensation planting	The covenant will be enhanced with enrichment planting at four sites, as well as around the perimeter of the building platforms, which provides additional habitat for Kawarau gecko.

6.2 Avoidance

The majority of lizards and their habitats can be avoided by the proposed subdivsion and associated works. Where possible, key lizard habitats will be avoided by any development works, and additional works will be completed to enable avoidance (Table 6).

6.2.1 Development design

The final development design will allow for the avoidance of key lizard habitats:

- Building platform design
- Curtilage area design and construction
- Services to be provided in a minimal way that prevents additional earthworks (such as installing cables underneath road ways).

6.2.2 Vegetation and habitats

Key plant species will be avoided which provide high value habitat for lizards These species are mostly confined to gullies and rock outcrops on site.

- Mature kānuka
- Kōwhai
- Matagouri
- Mingimingi
- Porcupine shrub
- Korokia

Rock stacks, loose rock piles (comprising more than one rock) outcrops will be avoided along with the implementation of setbacks and no disturbance zones. Setbacks and no disturbance zones will be a minimum of one metre around small rock stacks (small rock piles and rock outcrops less than a metre) and a minimum of two metres around significant outcrops (taller and wider than 2 metres, and associated with indigenous vegetation).

No vegetation or rock outcrops shall be disturbed or removed beyond the development footprints (Figure 1 and 4).

6.3 Remediation

The majority of remediation will be undertaken through site wide pest control, including rabbit and goat control as well as pest plant control. Remediation through pest control is detailed in the Ecological Enhancement and Monitoring Plan (EEMP, Beale 2024b). Rabbits will be controlled on an ongoing basis across Rocky Point through a combination of measures such as night shooting, pindone poisoning and gassing of burrows to achieve sustainable pest numbers (Modified McLean scale). Goats will be controlled through daytime shooting operations.

Programming of the control measures will be informed by walk over inspections by a suitably qualified expert with the intensity of operations determined from twice yearly monitoring rounds.

Suitably qualified professional rabbit and goat control contractors shall be used to undertake this work.

6.3.1 Creation of habitats

Rocks

Schist rock habitats, will be created using rocks that will be removed prior to earthworks and construction. These will be retained and placed in rock piles under the supervision of the Project Herpetologist, ahead of the development works within the Landscape and Vegetation Protection Area (LVP). Hand placing of slab rocks across areas naturally impoverished of rock, on open and sunny sites will be undertaken. The rock habitats will be completed to form stacked rocks, with small crevices suitable for lizard occupation. They will be placed in the LVP in areas where habitat is already present but requires additonal enhancement. Any lizards caught during the removal of loose rocks will be relocated to constructed habitats (see Section 6.4). All rock stacks will be marked and recorded to ensure that they can be used as supplementary release sites and for future monitoring, if required (Section 6.4).

Kānuka

All kānuka removed during supervised vegetation clearance (Section 6.4) will be stacked and placed outside existing lots in LVP. This will provide additional habitat for invertebrates and lizards, and also allow for any lizards present in the vegetation to be relocated incidentally.

6.3.2 Hedgehog control

Control of rodents, stoats and weasels is not considered a priority at this stage, because it may be difficult to successfully implement, and the various habitat improvements described in other sections are likely to provide improved protective refugia for lizards. Traditional predator control is also increasingly considered to detrimentally affect lizards and may disrupt predator diversity, creating an increase in other predators that may have a greater impact on lizard populations. However, hedgehogs are likely to be adversely affecting invertebrate and lizard species at the site. Hedgehogs can travel large distances over single nights and are likely at moderate densities in the wider area. Although there are no best practice pest control methods for hedgehogs, they can be trapped using DOC200/150 traps using dense trap spacing. Ferrets will also be controlled using DOC250 traps spaced at 150 metre spacings throughout the wider LVP.

In order to suppress hedgehogs, trap densities should be spaced a maximum of 50 metre apart throughout the development and restoration areas (Figure 3). Hedgehog control will be undertaken by a qualified pest control operator employed by the Rocky Point Service company that oversees the site, paid for by the residents of the development. Trap checks will be undertaken monthly. Approximately 218 traps will be required within the LVP to udnertake this work, and an indicative layout is provided in Figure 3. The indicative layout is subject to change, based on access and the practicality of servicing the number of traps. DOC200/150 traps will be baited with peanut butter or fruit paste. DOC250 traps will be baited with rabbit meat and/or a hen egg. Ongoing control will be implemented by the Rocky Point Service company. By-catch (especially of other predators) will be recorded and monitored.

Figure 3. Indicative locations for pest control at the proposed Rocky Point Subdivision

6.4 Minimise

6.4.1 Development design

The final development design will minimise (where practicable) the development footprints for dwellings, curtilages, roads, water tanks, laydown areas, car parks and wastewater disposal facilities. The development is to be actively managed through consent notice conditions in order to minimise adverse effects on biodiversity values.

The construction and earthworks associated with the site will include implementing site controls that require all works associated with construction of dwellings and supporting infrastructure including machinery movements and storage, laydown and parking areas to take place within construction zones clearly defined on the ground.

6.4.2 Information for land owners

Each new landowner will be provided by a factsheet regarding the biodiversity values on site and wider natural environment. This will provide residents with the feeling of responsibility towards the biodiversity adjacent to their properties, including lizards. The factsheet will contain information on biodiversity, trapping initiatives and incentives for enhancing biodiversity in their backyard. The factsheet will be distributed by the Rocky Point Service Company.

6.4.3 Consent notice conditions

Restrictions to gardening/resident landscaping

Rock stacks, outcrops and piles will be prohibited from moving, deconstruction and/or use for construction, or landscaping purposes. This includes planting of any plants (ecologically suitable or ornamental) amongst rock stacks.

The use of herbicides will be prohibited both within curtilage areas and outside in order to protect indigenous biodiversity values, and prevent the decline of invertebrate biomass, which provides significant food resource for lizards.

Cat free subdivision

It is acknowledged that there is likely an abundance of feral cats present in the Bendigo Hills and surrounding environment. While cats are likely having a detrimental impact on lizards in the area, they are also likely to be contributing to the suppression of rabbits in the area. However, it is essential that no more additional cats are allowed into the environment, due to their ability to roam significant distances and detrimental impact on indigenous fauna. Therefore, a cat free subdivision will be implemented by way of consent condition notices on titles. This may be difficult to enforce, and will rely on the social good-will of the resident community.

Maintaining a cat free subdivision will enable feral cat control to be a future option wildlife mangers in the District, because there will be no risk of domestic cat bycatch.

Construction/Implementation

All services (power, internet, water, wastewater – where applicable) will be installed underground and within road footprints to prevent the unecessary disturbance of additional lizard habitat.

6.4.4 Supervised habitat removal

Overview

Although much significant habitat will be avoided, supervised habitat removal will be required in high value areas, which targets Kawarau gecko and includes the following:

- Kānuka treeland.
- Rock stacks, outcrops and piles
- Loose rock, or cushion plant

Much of these areas have been mapped using the most available up to date aerial imagery. A full assessment on site, prior to vegetation clearance and earthworks will be undertaken in order to determine and mark out sites which require supervised habitat clearance. An estimated 1.3 hectares will require some form of manual habitat clearance, whether this is vegetation clearance, or rock removal. These areas are located within curtilage, building platform and road footprints across the site. A buffer area will be marked around sensitive or high quality lizard habitats prior to clearance, to ensure these habitats are avoided.

Manual vegetation clearance

Manual clearance of vegetation will be undertaken using suitably qualified chainsaw operators. The permitted herpetologists will search all felled tree branches and trunks (including all cavities, holes and loose bark) for Kawarau geckos.

All woody material will be stacked and left on site to provide additional refugia (within the LVP). If no geckos are detected the foliage will be removed and placed within the surrounding habitat to provide additional habitat and refuges for lizards (this reduces the chances of any missed geckos being harmed). Felled material will be placed within the LVP to prevent lizards dispersing back into the construction area during works. No vegetation will be mulched (see Figure 4).

Rocks and loose scab weeds

All rocks and loose scab weeds will be checked and any lizards caught will be relocated to available habitat outside of any lots or road areas.

Timing

All manual habitat clearance will be undertaken at maximum of one month prior to site clearance and earthworks. This ensures that the majority of lizards and their habitats can be removed prior to development, and reduces the risk of lizards dispersing back into the site.

Any lizard salvage or supervised clearance will be undertaken at the discretion of the Project Herpetologist in the following consistent weather conditions (more than three days) between **October - April (inclusive)** when:

- The temperature is between 14^{o}C and 22^{o}C; and
- No lower than 10^{o}C overnight; and
- Rain is no heavier than 0.1 - 2.0 mm per hour.

Data collection

Lizard capture data will include species identity, sex, length, and any tail regeneration. Each stage of salvage will be recorded, including start/stop time, GPS coordinates, and a habitat description for the capture location, date and time. Weather conditions will be recorded during and at the beginning and end of each salvage event.

Transportation and release

As the wider area outside of the subdivision extent (LVP) will be enhanced and trapped, lizards will be released into suitable habitat within 100 metres of their capture point (into the LVP). Suitable habitat will either be uninhabited rock stacks or crevices and loose bark or scrub and rank grass, depending on the species. All lizards will be released five metres apart unless more than one lizard is found, and these will be released together in relocated rock stacks or woodpiles.

All captured lizards will be temporarily placed in clean individual lizard cloth bags, and stored in ventilated, hard-sided containers (to prevent accidental crushing), in full shade. A small amount of damp leaf litter or vegetation from the capture site will be placed inside the cloth bags with the lizard to provide cover and prevent dehydration. Any lizards captured will be handled and held following best practice and released as soon as practical to the pre-selected lizard release area. Lizards will be released within five hours of capture into the habitats nearby (outside of lots).

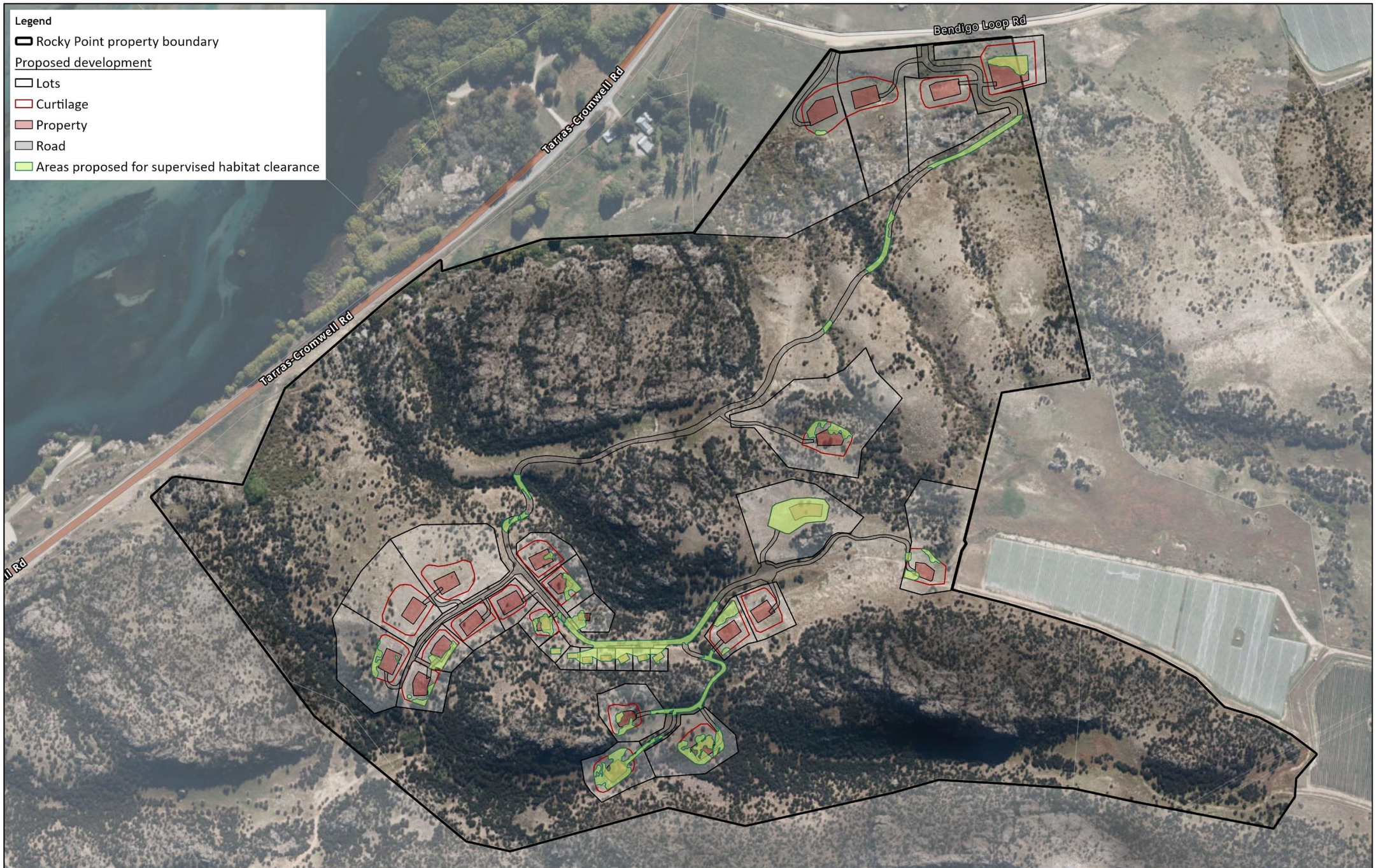

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Figure 4. Areas proposed for supervised habitat clearance at the proposed Rocky Point Subdivision

0 150 300 m

Wildlands
www.wildlands.co.nz, 0508 WILDNZ

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Cartographer:	LW
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6.4.5 Offset

Offsets must be able to deliver measurable conservation outcomes resulting in no net loss or preferrably a net gain. This requires the ability to measure losses at the impact site and gains at the offset site, and to demonstrate that management is able to balance these losses and gains. The science and practice is new and there are no examples to learn from, it is very difficult to collect the required data (counts and other measures); and responses to management is largely unknown (DOC, 2023).

In this case, offsets have been proposed to address the residual adverse effects of the subdivision development on indigenous vegetation. Details of the offset locations are provided in Beale (2024b). Lizards have not been measured as part of the offset, either at the subdivision site or the proposed offset site. However, it is likely that the proposed offset will provide limited additional benefit to lizards, with offset planting comprising of several lizard friendly plant species (Table 7 provides a subset). The proposed offset is spread between three sites ranging between 1.2 and 2.7 hectares in area.

6.4.6 Compensation

Compensation planting

The LVP will be enhanced with enrichment planting at four sites, as well as around the perimeter of the building platforms, which provides additional habitat for Kawarau gecko (Beale 2024b). Enrichment planting will comprise of the following species which will benefit lizards. Indigenous plant species suitable for Central Otago dryland sites have been selected for enrichment planting at the four sites. These plants have good survival rates and provide good long-term habitat for lizards such as McCann's skink and Kawarau gecko (Table 7).

Therefore, the plants chosen are those that provide a multitude of benefits to lizards (e.g. high levels of invertebrate biomass, nectar and fruit as well refuge (Table 7)).

Table 7 – Recommended planting within the four sites as well as their benefit to lizards and growth habit.

Common name	Scientific name	Benefits to Lizards	Beneficiaries	Growth Habit
Cromwell broom	*Carmichaelia compacta*	C, R, I	Terrestrial skinks	Shrub
Coprosma dumosa	*Coprosma dumosa*	C, N, F, I	Terrestrial skinks	Shrub
Poataniwha	*Melicope simplex*	C, N, I	Terrestrial skinks, geckos	Shrub
Scrub pōhuehue	*Muehlenbeckia complexa*	C, F, I	Terrestrial skinks, geckos	Shrub
Korokio	Corokia cotoneaster	C, N, F, I	Terrestrial skinks, geckos	Shrub
Porcupine shrub	*Melicytus alpinus*	C, F, I	Terrestrial skinks, geckos	Shrub
Mingimingi	*Coprosma propinqua*	C, N, F, I	Terrestrial skinks, geckos	Shrub
Coprosma crassifolia	*Coprosma crassifolia*	C, N, F, I	Terrestrial skinks, geckos	Shrub
Kānuka	*Kunzea serotina*	C, R, I	Geckos	Tree
Scented tree daisy	*Olearia odorata*	C, N, I,	Terrestrial skinks, geckos	Shrub
Kōwhai	*Sophora microphylla*	C, R	Gecko	Tree
Tī kōuka / Cabbage tree	*Cordyline australis*	C, R, F	Terrestrial skinks, geckos	Tree
Tātarāmoa / bush lawyer	*Rubus schmidelioides*	C, F, I	Terrestrial skinks, geckos	Vine

Key to known benefits to lizards: C = Cover, R = retreats, N = nectar, F = fruit, I = invertebrates.

The Ecological Management and Enhancement Plan has outlined the compensation and enrichment planting proposed for the development (Beale, 2024b). A Protocol will be developed to inform on site enrichment planting protocols, biosecurity and weed control methods.

Land protection

The balance of the site will be formally protected under covenant (LVP). This will prevent future development of high quality lizard habitats, and maintain connectivity within the landscape. Protection will enable the populations to recover long term, and provide resilience within the wider landscape for both species. The protected area may also serve as a site which can be monitored long-term, as a study site, for lizard populations in Central Otago.

7.0 Contingencies and risks associated with proposed management

There is inherent uncertainly in the outcomes of lizard management at the site, as a result of the complexities of the process. In some cases, Threatened species (nationally or regionally) may be discovered during supervised vegetation clearance and habitat removal, or habitat enhancement and compensation planting uptake fails. In addition, predator control could change predator guilds at the site. It is possible that there may be a risk in a significant number of lizards being detected during habitat clearance, especially as this number cannot be estimated prior to works occurring.

The main risks and resulting contingencies relating to the proposed lizard management include (see Table 8 for more details):

- Additional lizard species encountered other than those known to be on site (unexpected discovery).
- Habitat enhancement and/or planting uptake fails.
- Predator control causes negative impacts (mouse eruptions).
- More than expected lizards (>250 individuals) are salvaged from the impact site (overcrowding).

Table 8 – Risks associated with salvage and proposed management

Risk Associated with Salvage	Detail	Contingency
Additional lizard species encountered	Although unlikely, if any other species is encountered during salvage.	Stop works, notify DOC, and develop further instructions. Follow Incidental Discovery Protocol.
Habitat enhancement/planting uptake fails	Habitat creation from salvaged rocks is not taken up by lizards.	Continue monitoring for another two years. Determine if rocks need to be relocated, and relocate if possible, and continue to monitor for uptake.
	Compensation planting fails	Follow instructions in Beale (2024b).
Changes in predator diversity	A grid of DOC200 traps may potentially interrupt typical predator diversity at the project site. This may have a flow on effect to lizards and other biodiversity.	If predator monitoring and trap catch suggests a change in predator abundance, which is likely to affect lizard populations (such as increased mouse presence), pest control methods will be altered with consultation from the Project

		Herpetologist and DOC. Predator control may be required to cease for limited periods of time.
More than expected lizards are relocated during manual habitat clearance	Although it is not possible to accurately estimate the number of lizards that will be relocated during habitat clearance, it is considered that more than 250 lizards (of any species) will be a significant number and will require a contingency to address the risk.	Additional compensation will be required to address effects. Additional planting will be required around reconstructed rocky habitats to enrich habitats and increase potential carrying capacity. An additional five plants per reconstructed rock pile will be planted.
Residual skink populations remaining following manual habitat clearance.	It is unlikely that all lizards will be removed from the impact site and may be displaced by earthworks.	Incidental Discovery Protocol (Section 9).

7.1 Adaptive management of predator control through monitoring

If predator control monitoring indicates any concerning changes in abundance of the various predator species, predator control will be altered to target the pest species that have become more abundant. Options may include ceasing trapping, changing bait types, or introducing different traps as they come available (i.e. specialised traps which target hedgehogs). These interventions will be determined in consultation with Rocky Point Service Company and DOC, on an as required basis, based on repeat monitoring.

7.2 Additional enrichment planting

If over 250 lizards (of any species) are relocated during habitat clearance, additional enrichment planting will be required. Enrichment planting will be undertaken around reconstructed rock piles. Five plants will be planted per rock pile created. Planting will follow the species outlined in Table 7 and will be undertaken in the appropriate planting season as per Beale (2024b).

8.0 Incidental Discovery Protocol

8.1 Overview

Incidental discovery protocols are set out below for the contractors who will be working on site, and are to be followed if any further lizards are discovered, post mitigation, during the earthworks and construction of the Rocky Point Subdivision.

Where lizards might be found:

Lizards could be present in and on vegetation such as rank grass, kānuka or herbfield. Lizards can also be found sheltering in rocky areas - within or under rock slabs and outcrops which are present throughout all vegetation types within the proposed extent of works. They may also bask in sunny exposed spots, such as in open areas, on rocky piles or other low vegetation such as scab weed. They may be uncovered when disturbed by habitat clearance or earthworks.

8.2 Protocols for incidental discovery of a lizard

Following the incidental discovery of a lizard:

- Immediately (as soon as discovery of a lizard is made) restrict construction activities to beyond 10 metres of the place of discovery.

- If possible, capture the lizard and place in a container with grass. Ensure to create breathing holes in the container for the lizard. Hold in captivity in a **cool, shady** location out of sun until a decision is made.

- Immediately inform the environmental manager/operations manager on-site whom will then follow the protocol outlined in this management plan.

- Notify the project herpetologist within eight hours.

- Document:
  - Date and time.
  - Weather conditions.
  - Observer name(s).
  - Photographs of the animal and the location where it was found. Photograph the lizard from above trying to show the head and any markings on the upper body or back. A cell-phone picture is adequate for this and will help with identification of species.
  - Location (GPS coordinates).
  - Species.
  - Sex and age (where possible).
  - If injured:
    - What part of the animal is injured? (Photograph the injury).
    - Time since injury (if known).
    - Probable cause of injury (if known).
    - Go to Section 9.3.
  - If a carcass is found:
    - Condition of carcass (see below).
    - Approximate time since death (if known).
    - Probable cause of death (if known).
    - Go to Section 9.4.

- Healthy lizards are to be released into a “similar habitat” or suitable release sites that the project herpetologist or the Department of Conservation should decide on.

- If lizards are unable to be captured and/or photographed, note as much detail as possible: what colour was it; what colour patterns; how big was it; whether it was robust or slender; what habitat was it found in? You may need to describe these details to the project herpetologist and the Department of Conservation.

- If the species encountered has a Threat Classification status of ‘Threatened’ (a higher Conservation threat status than ‘At Risk’) then all works must cease immediately (as soon as the discovery is made), until an assessment is made of the works programme risk for that species, and any specific management identified, including avoidance. The project herpetologist will immediately consult with the Department of Conservation to ask for advice on how to proceed. Further works may not proceed until approval has been granted to continue or a lizard management plan has been drafted for the relevant species.

8.3 Protocols for injured lizards

Following the incidental discovery of an injured lizard:

- Follow the above procedures.
- Immediately (within one hour) contact a pre-identified local veterinarian, and arrange for the injured lizard to be delivered to the veterinarian. This may require a monetary contribution for care.

8.4 Protocols for lizard carcasses

Following the incidental discovery of a lizard carcass:

- Notify the Project Herpetologist at Wildland Consultants within eight hours. The project herpetologist will notify the Department of Conservation and ask for advice on how to proceed.
- Arrange for the carcass to be sent to Wildbase (06 350 5329), Massey University, in Palmerston North, unless advised otherwise by the Department of Conservation.

9.0 Significance of effects after management

Accurately predicting the level of effect with mitigation in place is difficult, but Table 9 gives a broad picture of how effects can be significantly reduced with mitigation measures in place. We consider that if the effects management outlined in this plan are properly implemented, the overall level of effect will be **less than minor.**

Table 9 - Potential significance of ecological effects if effective mitigation is implemented as recommended above

Effect	Level of adverse effect without mitigation	Mitigation	Level of effect with mitigation
Accidental injury/ death/ displacement	More than minor	• Avoidance of high quality habitats. • Supervised habitat removal.	Minor
Disturbance during earthworks	More than minor	• Supervised habitat removal.	Minor
Habitat loss	More than minor	• Avoidance of high quality habitats. • Retention of rock and woody debris. • Offset planting. • Compensation planting. • Additional enrichment planting as required.	Less than minor
Breeding failure/Behavioural effects	Minor	• Avoidance of high quality habitats. • Hedgehog control	Less than minor
Increased predation	Minor	• Cat free subdivision • Hedgehog control • Adaptive management	Less than minor

10.0 Post release monitoring

It is widely acknowledged that lizard management and salvage related activities are not well reported or very successful. Lizard Salvage Guidelines (DOC, 2019) recommend monitoring to evaluate the success of the salvage operation. However, post-release monitoring for a low number of Not Threatened and At Risk lizards is likely to be incredibly challenging in a habitat where lizards are highly abundant.

Alternatively, monitoring the uptake from lizards into newly created rock stacks and piles will provide useful information on the success of habitat enhancement at the site. Therefore, habitat uptake monitoring will be undertaken yearly for five years following the creation of rock stacks within the wider site. This will only be undertaken if more than 50 rock stacks are created across the site. Monitoring of relocated rock stacks will be undertaken each year in early summer or early autumn in appropriate weather conditions. See contingency, Section 8.2 for additional contingencies if monitoring deems that rock stack habituation is unsuccessful.

11.0 Reporting

A report will be prepared, including details of the lizard species, number of individuals salvaged and released, and capture and release locations. Any rock stacks created or wood piles constructed will also be recorded and reported. The salvage report will be provided to TKO Properties, Otago Regional Council, DOC, and mana whenua, within six months of the completion of all lizard habitat removal on site.

Lizard species and location details will be provided to the Department of Conservation as part of the Wildlife Authorisation permit obligations. ARDS cards will be completed and submitted to DOC.

Additionally, if monitoring is required, an annual report summarising the monitoring outcomes and predator control will be reported by the Project Herpetologist to the listed stakeholders above, providing details of success, failure and any adaptive management that may be required.

Acknowledgements

Thank you to Simon Beale and Mandy Tocher for providing additional information about the site and TKO Properties for access.

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