

DRAFT

Draft Lizard Management Plan for Proposed Nova Energy Twizel Solar Farm

Contract Report No. 7414b

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Contract Report No. 7414b

August 2026

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1.0 Introduction

Nova Energy is proposing to develop a solar energy farm on a property east of Twizel township, Canterbury. The total area of the site is 868.54 hectares, with the proposed area of solar panel rows to be spread over an area of 565 hectares. Nova Energy commissioned Wildlands Consultants Ltd (Wildlands) to provide an assessment of the site's ecology and potential ecological effects for the project, together with two lizard surveys (Wildlands 2023a and 2024).

An initial survey using Onduline Artificial Cover Objects (ACOs) was undertaken between 28 February and 3 March 2023 (Wildlands 2023a), confirming the presence of McCann's skink (*Oligosoma maccanni*; Not Threatened¹), southern grass skink (*Oligosoma chionocholescens*; At Risk – Declining) and Southern Alps gecko (*Woodworthia* "Southern Alps"; At Risk – Declining) on the site.

An additional survey was subsequently undertaken using ACOs and funnel (Gee's minnow) traps between 18 and 23 December 2023 (Wildlands 2024) to better characterise potential effects associated with construction and operation of the proposed solar farm.

Both surveys confirmed the presence of lizard populations on site and therefore the requirement for a Lizard Management Plan (LMP, this document). This draft LMP has been developed to follow the principles provided by the Department of Conservation (DOC) in their 'Key principles for lizard salvage and transfer in New Zealand' guidelines document (DOC 2019; Table 1). These principles describe steps to take to enable the outcome of successful lizard management (specifically, providing overall protective benefit to lizards), including undertaking a thorough assessment of lizard values, assessing site significance, and an assessment of the actual and potential effects of the proposed activities on the lizards present. The guidelines also outline the steps for undertaking a lizard salvage, if this is required as part of mitigation.

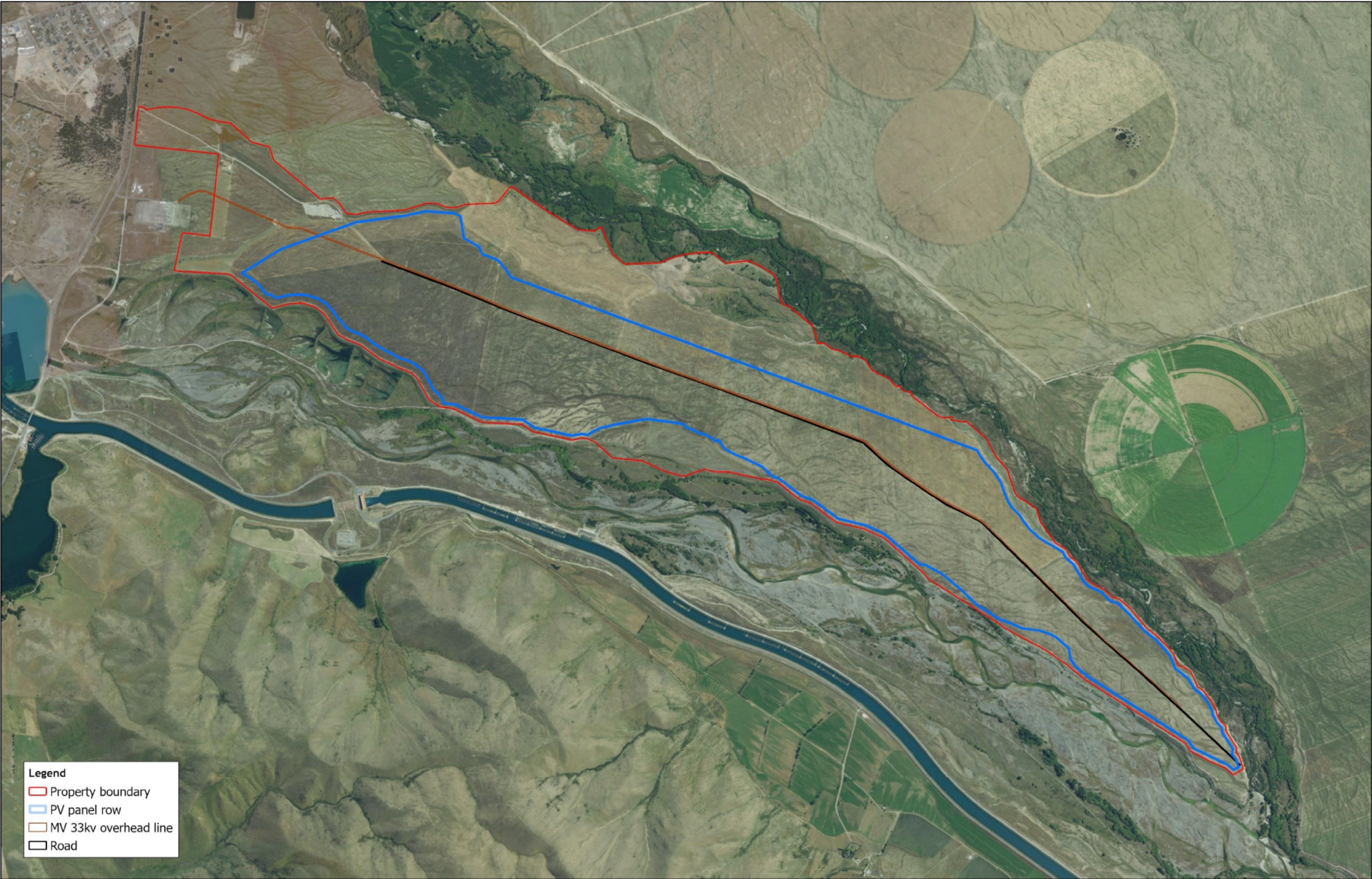
1.1 Project site and context

The site (Lot 3/DP422901/RT489342) is a long, narrow section of land to the east of Twizel. The land is currently zoned Rural and is used for pastoral farming. The site occupies outwash plain and river terraces between the Twizel and Ōhau Rivers and includes areas of historic river channels and old oxbows. Figure 1 shows the location of the site and indicative layout of the solar (Photo Voltaic) panels (PV panels).

The site is currently operating under a farm lease arrangement and is used predominantly as cropping and sheep grazing. The area is subdivided into fenced paddocks, with some used for hay/baleage production. Much of the site has been cultivated by direct drilling, resulting in widespread improved pasture species.

Scarps and old river terraces are present around the edges of the site, and these are critical habitats for indigenous biodiversity values including populations of Threatened and At Risk plants, lizards, and invertebrates (Wildlands 2023a).

¹ National threat statuses as per Hitchmough *et al.* (2026).



Legend

- Property boundary
- PV panel row
- MV 33kv overhead line
- Road

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Figure 1. Location of the proposed Twizel Solar Project



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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 (as per DOC 2019).

Key Principle	Summary of How Each Principle has been Addressed in this Document	Section in this Document Addressing the Principle
1. Lizard species' values and site significance must be assessed at both the impact (development) and receiving sites	Two At Risk – Declining and one Not Threatened species are present at the proposed solar farm site.	Sections 4.0 and 5.0
2. Actual and potential development-related effects and their significance must be assessed	Effects include but are not limited to disturbance (including death and injury) to lizards, loss of lizard habitat, fragmentation of lizard habitat, reduction of lizard habitat quality due to shading from panels, operational disturbance to lizards, disturbance of lizards during earthworks, and breeding failure/avoidance.	Section 6.0
3. Alternatives to moving lizards must be considered	All high and moderate value lizard habitats can be avoided by the proposed solar farm and associated development works.	Section 7.2
4. Threatened species require more careful consideration than less-threatened species	No Threatened species have been detected on site following intensive surveys. While it is unlikely they will be encountered, the Incidental Discovery Protocol will address any unexpected discoveries, including Threatened species.	Section 8.0
5. Lizard salvage, transfer and release must use the best available methodology	No lizard salvage is proposed. Incidentally captured lizards will be transferred and release following the Incidental Discovery Protocol.	Section 8.0
6. Receiving sites and their carrying capacity must be suitable in the long term	Incidentally captured lizards will be released into current high-moderate quality habitat or remediated habitat on site.	Section 8.3
7. Monitoring is required to evaluate the success of the salvage operation	Monitoring of lizard habitat enhancement and lizard populations will be undertaken.	Section 9.0
8. Reporting is required to communicate outcomes of salvage operations and facilitate process improvements	Standard reporting is required to Mackenzie District Council, the Department of Conservation and relevant iwi on the completion of works and monitoring periods.	Section Error! Reference source not found.
9. Contingency actions are required when lizard salvage and transfer activities fail	Contingencies are accounted for if habitat enhancement fails or areas to be avoided are impacted by development works. The Incidental Discovery Protocol will also be followed throughout works.	Section 7.4 and 8.0



1.2 Proposed works

The proposed works on site will include:

- Earthworks.
- Installation of solar panels.
- Construction of ancillary infrastructure, including buildings, pylons, service roads or fences required for solar farm operation.

2.0 Relevant Legislation

Due to the presence of indigenous lizards, the proposed solar farm requires a Wildlife Approval (WA) under the Wildlife Act (1953).

All indigenous lizards are protected under the Wildlife Act. Approval must be obtained before any activity that may disturb, injure, kill, or relocate lizards, including vegetation clearance and earthworks. Lizard management for the project will be implemented by authorised personnel listed in a WA issued for the project.

This Lizard Management Plan is a required supporting document for the WA application and must be approved by the Department of Conservation (DOC) prior to the commencement of any works that could affect lizards or their habitat (Schedule 7(2)(i)).

3.0 Implementation of the Plan

3.1 Reports to aid implementation

The previous Assessment of Ecological Effects (AEE) for the site undertaken by Wildlands includes the following reports:

- Wildland Consultants (2026a). Assessment of potential ecological effects of the proposed Nova Energy Solar Farm near Twizel. Wildland Consultants Ltd Contract Report No. 6620a. Prepared for Nova Energy. 91 pp.
- Wildland Consultants (2024). Additional lizard, vegetation, and invertebrate surveys of a proposed Twizel solar farm. Wildland Consultants Contract Report No. 6986. Prepared for Nova Energy. 29pp.
- Wildland Consultants (2024b). Tekapo ground wētā memorandum. Wildland Consultants Contract Report No. 6986b. Prepared for Nova Energy. 4pp.

This LMP is intended to be implemented in conjunction with the following reports:

- Wildland Consultants (2025). Pest Mammal Management Plan – Nova Energy, Twizel. Wildland Consultants Contract Report No. 6905. Prepared for Nova Energy. 26pp.
- Wildland Consultants (2026b). Terrestrial Invertebrate Management Plan for Proposed Nova Energy Twizel Solar Farm. Wildland Consultants Contract Report No. 7414a. Prepared for Nova Energy Ltd. 33pp.
- Wildland Consultants (2026c). Avifauna Management Plan for proposed Nova Energy Twizel solar farm. Wildland Consultants Contract Report No. 7414c. Prepared for Nova Energy. 22pp.



- Wildland Consultants (2026d). Biosecurity Management Plan for proposed Nova Energy Twizel solar farm. Wildland Consultants Contract Report No. 7414d. Prepared for Nova Energy. 14pp.

3.2 Summary of lizard management implementation

Lizard management will be carried out in consultation with DOC, appropriate iwi representatives, and Mackenzie District Council. The overarching approach of this management plan is **avoidance and remediation**, which is appropriate given the distribution of lizard populations on site and the likelihood that populations will persist within retained and enhanced habitats.

3.3 Roles and responsibilities

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

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 (DOC) 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.

3.3.1 Wildlife Approval holder

Nova Energy will be responsible for compliance with the WA and implementation of the LMP, as the approval holder. The applicant has never been convicted of any offence under the Wildlife Act, nor has any current criminal charges under the Wildlife Act pending before a court.

3.3.2 Authorised personnel

The authorised personnel for the project will be those suitably qualified as being trained and approved by the DOC lizard Technical Advisory Group and will be implementing lizard management at the site:

- Cameron Thorp – Wildland Consultants Ltd, Herpetologist (Project Herpetologist).
- Samantha King – Wildland Consultants Ltd, Senior Ecologist and Herpetologist.
- Jade Christiansen – Wildland Consultants Ltd, Herpetologist.
- Anna Meban – Wildland Consultants Ltd, Ecologist.

Table 2 identifies the roles and responsibilities for the implementation of actions identified in this LMP. Responsibilities for specific actions are also identified in the relevant sections of this document.

**Table 2 – Identified project roles and responsibilities for LMP implementation.**

Title	Responsibility	Timeline
Project Owner and Wildlife Approval holder Nova Energy	- Ensuring consent conditions and draft LMP align. - Project delivery, including overall compliance with resource consents, LMP and subsequent WA conditions to be issued for the project.	February 2025 to project completion.
Project Engineer(s) TBD	- Project engineering, project management, and delivery. - Liaison between contractors and ecologists. - Implementing actions where responsibility has been identified. - Confirm implementation of LMP and WA requirements. - Confirm compliance with LMP and WA.	February 2025 to project completion.
Construction Contractor Site Manager (TBD)	- Compliance with LMP and subsequent WA issued for the project. - Implementation of actions required by the LMP and WA including the following: - Reading and understanding the LMP and WA requirements. - Maintaining clear lines of communication with both the Project Engineer, Project Herpetologist and Contractors regarding changes to the works schedule. - Implementing actions where responsibility has been identified. - Briefing new personnel about the Contractor's responsibilities under this LMP.	February 2025 to project completion.
Project Herpetologist Wildland Consultants Ltd	The Project Herpetologist has been engaged by the Project Owner to provide technical advice to the Project Engineer(s), and to assist the Project Engineer(s) with compliance checks against this LMP and WA. The Project Herpetologist will: - Prepare and update the LMP as required. - Advise on lizard management required. - Where necessary, assist with Contractor training. - Design and undertake post-enhancement monitoring. - Complete the required compliance reporting.	LMP preparation: December 2024-March 2026. Lizard management implementation: c.October 2026 – monitoring during Years 1, 3, and 5 post habitat enhancement.
Contractors Various companies (TBD)	The Contractor(s) will be engaged by the Project Owner to implement the Project. The Contractor(s) will report to the Project Engineer(s) but work daily with the Contractor / Construction Site Manager. The Contractor(s) will: - Undertake landscape/restoration planning (in accordance with this LMP). - Implement habitat enhancement requirements. - Implement remediation requirements, such as rectifying plant establishment failure. Assist the Project Herpetologist with compliance and monitoring reporting.	TBD

4.0 Lizard Values

4.1 Desktop assessment

A desktop assessment was completed as part of the AEE for the site (see Wildlands 2026a). A summary of species previously recorded or potentially present within the wider area of the site is provided in Table 3.

Six lizard species have been found within the wider vicinity of the site, including four skink species and two gecko species (Table 3). Following multiple surveys of the site (see Section 4.2), three lizard species have been confirmed to be present on site.

Southern grass skink and McCann’s skink are widespread throughout the Mackenzie District and often persist in areas of grassland habitat comprising rank grass and scrub (as well as rocky areas) similar to that found at the proposed site. Southern Alps gecko are commonly found in rocky areas with shrubland, talus slopes, and braid plains.

Table 3 – Summary of lizard species present or potentially present on site, based on previous surveys and habitat on site. National threat statuses as per Hitchmough *et al.* (2026).

Species	Common Name	National Threat Status	Likelihood of Occurrence on Site
<i>Oligosoma maccanni</i>	McCann’s skink	Not Threatened	Presence confirmed (through site survey).
<i>Oligosoma chionocholescens</i>	Southern grass skink	At Risk – Declining	Presence confirmed (through site survey).
<i>Oligosoma</i> aff. <i>chloronoton</i> “West Otago”	Lakes skink	Threatened – Nationally Vulnerable	Unlikely (increasingly rare therefore unlikely to be present at this site; some habitat present on site but not detected during multiple surveys).
<i>Oligosoma laxa</i>	Scree skink	Threatened – Nationally Vulnerable	Highly unlikely (increasingly rare therefore unlikely to be present at this site; some habitat present on site but not detected during multiple surveys).
<i>Woodworthia</i> “Southern Alps”	Southern Alps gecko	At Risk – Declining	Presence confirmed (through site survey).
<i>Naultinus gemmeus</i>	Jewelled gecko	At Risk – Declining	Unlikely (some suitable dense scrub habitat present on site, but the habitat has been regenerating since the 1980s with no natural contiguous forest associations).

Potential habitat (complex piles) for Lakes skink is present in an area of old river terrace along the central southern edge of the site. This species has become increasingly rare and is sparsely distributed across the Mackenzie District and is therefore considered unlikely to be present. While this area also provides appropriate habitat for scree skink, this species is particularly rare at lower elevations and is highly unlikely to be present. Multiple intensive surveys have failed to detect either species on site.

It is unlikely that jewelled gecko are present at the site. All available shrubland is restricted to a narrow strip of talus slope and as a result of this habitat fragmentation, it is highly unlikely that any remnant populations or individuals remain within the project area.

Lakes skink, scree skink, and jewelled gecko are not considered further in this LMP.



4.2 Field surveys

4.2.1 Overview

Two lizard surveys were undertaken by Wildlands Herpetologists to determine the lizard habitats and lizard species present on site, and gain an understanding of their abundances and distributions. See Wildlands (2023a, 2024) for more detailed information regarding the lizard surveys.

Survey 1: Total survey effort included 296 ACO checks and 10 person hours of visual and manual searches (Wildlands 2023a).

Survey 2: Total survey effort included 600 ACO checks, 225 funnel trap nights and three person hours of visual and manual searches (Wildlands 2024).

4.2.2 Field survey results

Figure 2 shows the combined lizard survey results from Survey 1 and Survey 2.

Survey 1

- Seven Southern Alps geckos
- 50 McCann's skinks
- Four southern grass skinks
- 13 unidentified skinks

Unidentified skinks were seen either basking or under ACOs but were too quick to catch due to the hot conditions. It is highly likely these were McCann's skinks, based on their size and the abundance of this species on site.

Survey 2

- 19 Southern Alps geckos (including one recapture; Plate 1)
- 179 McCann's skinks (including 17 recaptures; Plate 2)

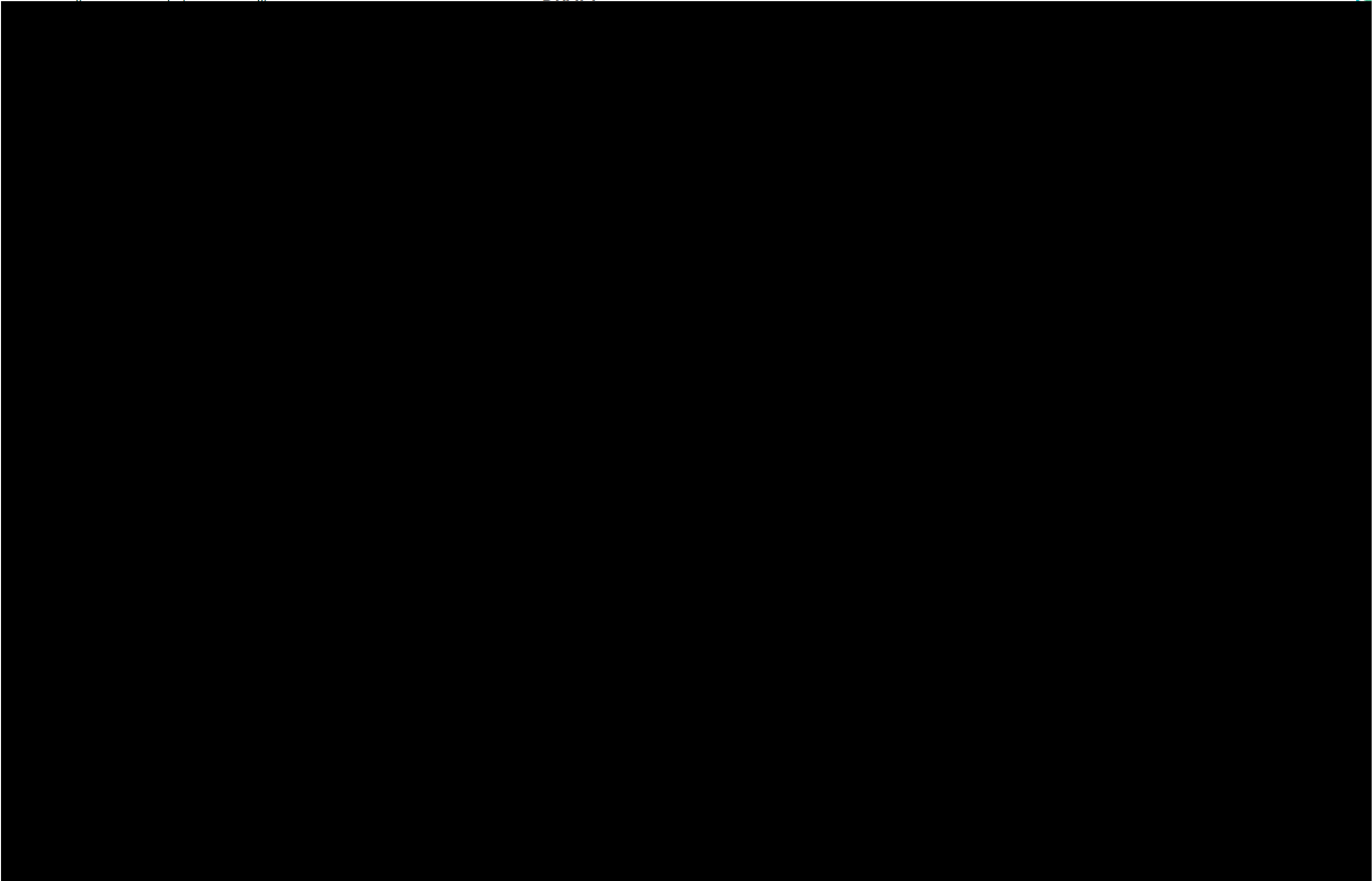


Plate 1 – A Southern Alps gecko found on site. 20 December 2023.



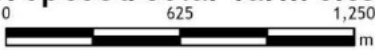
Plate 2 – A McCann's skink found on site. 20 December 2023.

Both McCann's skinks and sign (scat) were also detected under ACOs in areas with minimal ground cover along the central fence line, such as around small amounts of dense vegetation or small groupings of loose rocks, indicating that McCann's skinks are likely present across the site in low



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Figure 2. Combined results from the February-March and December 2023 lizard surveys at the proposed solar farm site, Twizel



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densities (even in low-quality habitat). McCann’s skink is likely to be the only species present along the fence line and in other areas of low-quality habitat due to the dry, exposed habitat, and shallow retreat site availability in these areas.

A large population of McCann’s skinks, a moderate population of Southern Alps gecko, and a small population of southern grass skink are likely to be present on site. No other lizard species were detected and following the intensive survey effort undertaken no additional lizard species are considered likely to be present on site.

4.2.3 Field survey limitations

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

4.3 Lizard habitats

4.3.1 Overview

Lizard habitat of varying quality occurs across the site. Habitat quality is primarily influenced by structural complexity, including the availability of refuges and food resources. The extent and quality of lizard habitat at the site are included in Table 4 and Figure 3.

Lizard species present within the site are part of wider populations associated with remnant habitats throughout the Mackenzie Basin area. Areas of lizard habitat were assessed as part of the AEE for the project (Wildlands 2023a, 2024).

Note that areas of flood channel shrubland and alluvial grassland habitat in the central northern part of the site were not surveyed, as they are outside or remote from the proposed development area².

Table 4 – Size and quality of lizard habitat at the site.

Lizard Habitat Quality	Size of Area (hectares)
High	2.27
Moderate	21.63
Low	33.98
Very low	766.11
Not assessed	44.57
Total area of site	868.54

4.3.2 High-quality lizard habitats

Areas of high-quality habitat where the highest lizard species diversity and high densities of lizards are present include:

² Based on a desktop assessment of these areas, lizards are considered likely to be present in these habitats in at least moderate densities where dense ground cover vegetation (e.g. rank grass) is present.



- The area of talus rock piles and dense ground cover vegetation at the base of the scarp herbfield and grassland where it intersects with the area of old river terrace in the central southern part of the site (Plate 3).



Plate 3 — High quality lizard habitat (rock piles and dense vegetation at the base of the scarp in the central southern part of the site). 16 December 2022.

4.3.3 Moderate-quality lizard habitats

Areas of moderate-quality habitat, where lizards are present or considered likely to be present in moderate densities include:

- All other areas of scarp herbfield and grassland around the edges of the site.
- The area of rock piles at the western end of the central fence line (Plate 4).



Plate 4 — Moderate quality lizard habitat (the area of rock piles at the western end of the central fence line). 22 December 2023.

4.3.4 Low-quality lizard habitats

Areas of low-quality habitat where lizards are present in low densities include:

- Sweet briar shrubland and discrete areas of browntop-sweet vernal-clover grassland and hares foot trefoil-sweet vernal grassland where there is relatively denser ground cover vegetation that has not been recently cultivated (e.g. the strip of grass along the northern side of the central fence line; Plate 5).

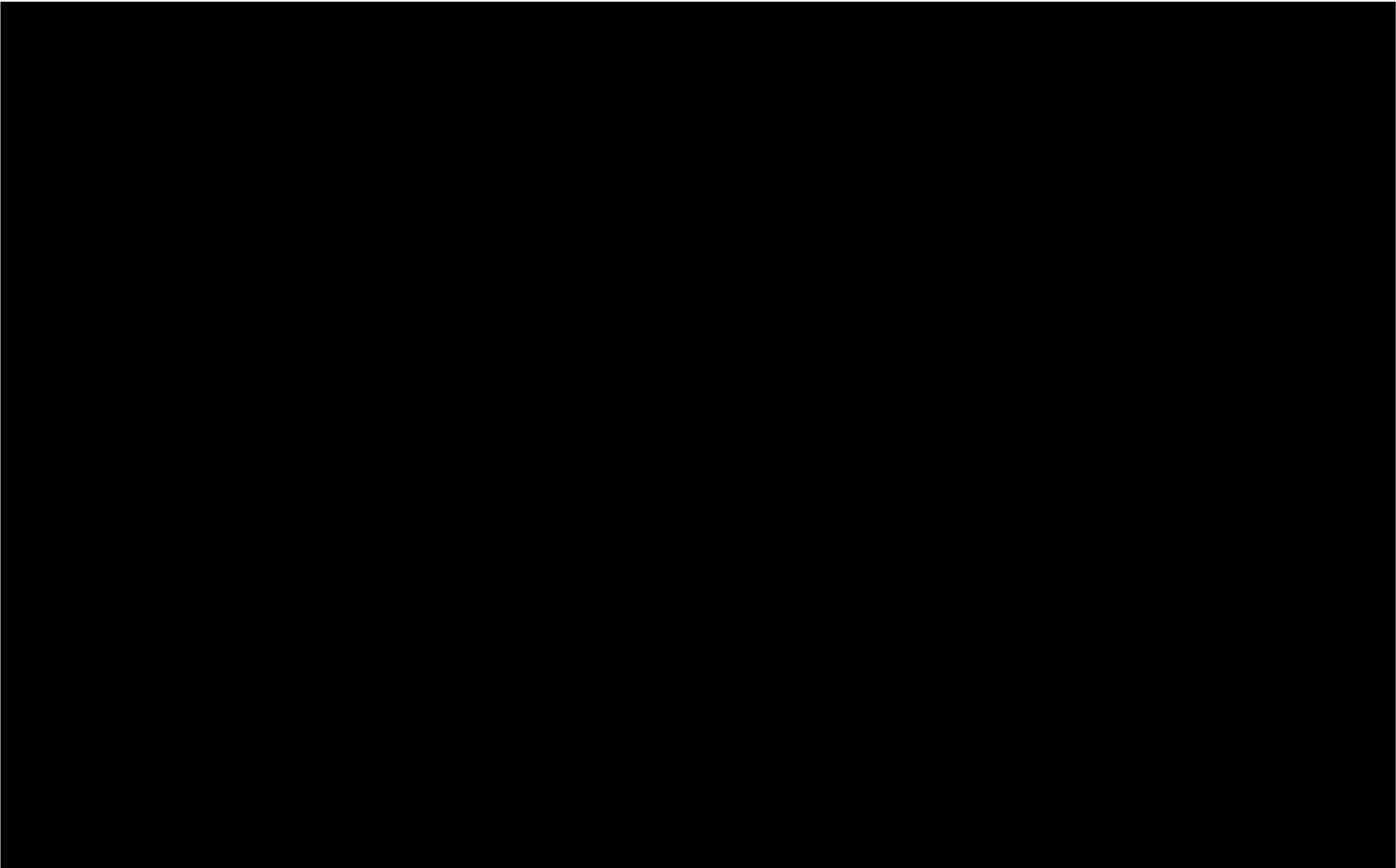


Figure 3. Lizard habitat quality at the proposed solar farm site, Twizel

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Plate 5 — Low quality (left of fence line) and very low/negligible quality (right of fence line) lizard habitat (along the central fence line). 20 December 2023.

4.3.5 Very low-quality lizard habitats

Areas of very low-quality habitat, where lizards may be present in very low densities, include:

- Most of the central area of the site, where panels are proposed (comprising browntop-sweet vernal-clover grassland and hares foot trefoil-sweet vernal grassland; Figure 3), has been largely cultivated and ground cover vegetation is sparse (Plate 5). Lizards are likely to be present in very low densities in marginal areas where there is sufficient rocky/vegetative ground cover³.

5.0 Ecological Significance

The habitats identified in the AEE (Wildlands 2023a) meet the ecological significance criteria for rarity/distinctiveness and ecological context in the Canterbury Regional Policy Statement (Environment Canterbury 2021) due to the confirmed presence of southern grass skink and Southern Alps gecko, both classified as 'At Risk – Declining' and found in fewer than three other regions.

Although much of the site supports very low-quality habitat for McCann's skink, a 'Not Threatened' species, the scale of the site is likely to reduce habitat availability in the local area. The proposed development will avoid areas of high to moderate quality lizard habitat, where lizards are present in higher diversity and densities.

6.0 Potential Effects on Lizards

6.1.1 Overview

Potential effects on lizards from the proposed solar farm have been assessed at a local population scale, using the Quality Planning Extent of Adverse Effects criteria (Quality Planning 2017). Potential ecological effects on lizards from solar farm development activities have been assessed as part of the AEE for the project (Wildlands 2023a, 2024). These are summarised in Table 5.

³ Surveys in similar habitats throughout the Mackenzie Basin have found McCann's skink are still present in sites that are perceived to be barren or lack significant cover or vegetation. Although no McCann's skinks were detected in the panel areas, it is highly likely that they will be persisting in very low densities in this marginal habitat.

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

Effect	Level of Effect Without Mitigation
Disturbance (including death and injury) to lizards	More than minor
Loss of lizard habitat	More than minor
Fragmentation of lizard habitat	Minor
Reduction of lizard habitat quality (shading from panels)	Minor
Operational disturbance to lizards	Minor
Disturbance to lizards during earthworks	Minor
Breeding failure/avoidance	Less than minor

6.1.2 Injury/death/displacement

The proposed solar farm may result in the permanent displacement, injury and death of individual lizards within the proposed solar farm development area. Without mitigation, this effect is likely to be **more than minor**.

6.1.3 Habitat loss

Lizard habitat is present throughout the impact area and loss of habitats at this site may not be avoided. The size and extent of the proposed solar farm development area means the impact to lizard habitats could be notable within the context of the local area. Without mitigation, this effect is likely to be **more than minor**.

6.1.4 Habitat fragmentation

Although the site is an active farm, lizard habitat is connected throughout the site and is comprised of areas of low to high quality habitats, all of which are connected across the site via fence lines, or unmaintained areas. The proposed solar farm will result in the fragmentation of habitats across a large site with varying levels of population density of at least one Not Threatened species confirmed present within the proposed development area. Without mitigation, this effect is likely to be **minor**.

6.1.5 Reduction of lizard habitats due to shading

Lizard habitats within the site could be shaded due to the installation of solar panels, resulting in the gradual shift in vegetation and species composition. This could reduce population abundance of lizards on site. Without mitigation, this effect is likely to be **minor**, due to the likely low densities of lizard populations over most of the site.

6.1.6 Operational disturbance

Vehicle strikes, noise and dust may affect lizard populations along newly-formed roads and vehicle accessways in areas adjacent to lizard habitat (e.g., where rock piles or ground cover vegetation is present along fencelines). While there is limited published literature about the impacts of dust on lizards, it is likely that lizards would avoid habitats if there was heavy dust deposition. Dust build up may also contribute to the deposition and increased growth of weedy vegetation within areas of rock piles on site, reducing interstitial spaces for lizards and therefore reducing habitat quality. Without mitigation, this effect is likely to be **minor**.

6.1.7 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 site footprint as a result of earthworks. Without mitigation, across the site, this effect is likely to be **minor**.



6.1.8 Breeding failure/avoidance

The proposed solar farm and associated earthworks may affect the behaviour of lizards, potentially altering social interactions and increasing stress, leading to reduced population functionality, poor breeding and low population recruitment. Without mitigation, this effect is likely to be **less than minor**, due to the likely low densities of lizard populations over most of the site.

6.1.9 Cumulative effects

Cumulative effects on lizards from additional regional development projects have been addressed in a separate report (Wildlands 2026e).

7.0 Management of Effects

7.1 Overview

Lizard salvage and transfer is only appropriate if avoidance and remediation measures have not resulted in, or cannot result in, no-net-loss of lizards from the development area (DOC 2019). A lizard salvage at a site where lizards are present at low densities over a large area is also likely to be extremely costly and inefficient and only result in a small number of lizards salvaged, which would not provide protective benefit to the local population or species. Due to the low quality of the lizard habitat proposed to be cleared, where one 'Not Threatened' species is potentially present at low densities, **avoidance and remediation** is appropriate to mitigate effects of development activities at this site.

7.2 Avoidance

All lizard habitat considered to be of high and moderate quality will be avoided by development activities. Vegetation and habitat types to be avoided are included in Table 6 and Figure 4.

Additionally, some areas of low and very low-quality habitat will be retained as lizard habitat corridors and will include areas of habitat enhancement (see Sections 7.3.2 and 7.3.5). Lizard habitat corridors will also be avoided. This includes the area along the central fence line where McCann's skinks were detected at low densities during the second survey.

Figure 4 shows areas of scarps and old river terrace habitat that will be avoided, and the areas that will be avoided as lizard habitat corridors.

Table 6 – Summary of development and avoidance areas on site.

Site area	Vegetation and habitat types	Size of area (hectares)
Proposed solar farm development area	2. Sweet brier shrubland	565
	3. Browntop-sweet vernal-clover grassland	
	8. Hares foot trefoil-sweet vernal grassland	
High and moderate quality lizard habitat to be avoided	5. Scarp herbfield and grassland	22.5
	6. [Wilding conifer]/scarp herbfield and grassland	
	9. Old river terrace	
Lizard habitat corridors to be avoided	3. Browntop-sweet vernal-clover grassland	3.67
	8. Hares foot trefoil-sweet vernal grassland	
Remaining areas not included within proposed solar farm development area	1. Flood channel shrubland 2. Sweet brier shrubland 3. Browntop-sweet vernal-clover grassland	277.37



Site area	Vegetation and habitat types	Size of area (hectares)
	4. Alluvial grassland	
	7. Sweet vernal-mouse-ear hawkweed herbfield and grassland	
	8. Hares foot trefoil-sweet vernal grassland	
	10. Haresfoot trefoil herbfield	
	11. Earthworks and quarrying	
	12. Ephemeral wetland	
	13. Tall fescue-rautahi marsh	
	14. Alder forest	
	15. Crack willow forest	
Total Site Area		868.54

7.2.1 Buffer zones

Shading of lizard habitat may occur due to the placement of solar panels which may result in the reduction of lizard habitat within the site. Shade modelling undertaken by Nova (Wildlands 2026a) identified a 27-metre maximum shadow in the middle of winter created by the solar panels. A 35-metre setback has been applied to all areas of high and moderate value lizard habitat, biodiversity nodes, and remaining areas of lizard habitat corridors to prevent shading from solar panels. The 35-metre setback is a conservative approach.

Solar panel installation and other development activities will not be undertaken within the buffer zone.

Responsibility: Nova Energy, Project Herpetologist.

7.3 Remediation

A significant proportion of the mitigation for the effects on lizards at the proposed solar farm site will be managed through remediation. Most remediation will be undertaken through the implementation of eco-sourced, lizard-friendly plantings and pest plant control in areas of high and moderate value lizard habitat outside of the proposed solar farm development area, as well as within lizard habitat corridors (as shown in Figure 4). Additional rock piles will be created within lizard habitat corridors from rocks excavated during earthworks. Pest mammal control will also be undertaken on site.

Although habitat enhancement measures described in this section cannot be implemented within the footprint of the solar farm development, and may therefore technically be considered compensative, they are designed to benefit populations of lizards currently living on site. Remediating habitat for lizards on site but outside the footprint of the development could potentially be of great benefit to lizard populations on site, more so than attempting to enhance habitat underneath solar panels that may no longer be suitable for lizards within the solar farm footprint. Therefore, enhancement planting within the site but outside the footprint of the development is considered here to be functionally restoration rather than compensation.

7.3.1 High-moderate quality habitat enhancement plantings

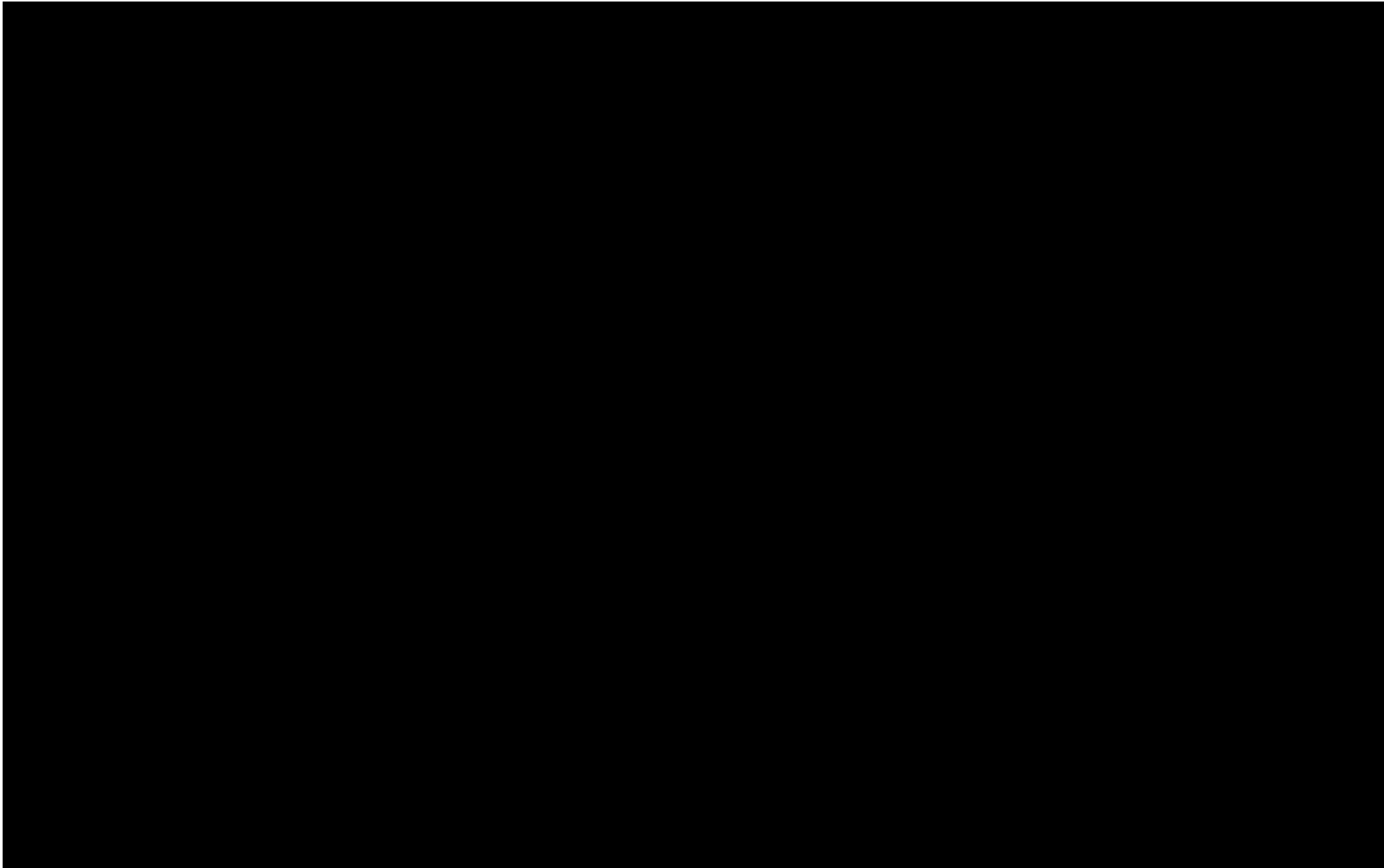
Habitat enhancement will be undertaken in areas of high and moderate value lizard habitat on site, including within scarp grassland and herbfield and old river terrace habitats. Lizard and invertebrate-friendly plantings will be undertaken in these areas, as detailed in Section 5.3.2 of the Terrestrial Invertebrate Management Plan (TIMP) for the site (Wildlands 2025a). Species to be planted to enhance the habitat for lizards and invertebrates include:

- Porcupine shrub (*Melicytus alpinus*)
- Creeping pōhuehue (*Muehlenbeckia axillaris*)
- *Coprosma petrei*



- Common mat daisy (*Raoulia australis*)
- Dwarf broom (*Carmichaelia vexillata*)

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Report: 7414
Ref: 11743
Client:
Name: Figures_LizardCorridors_Oct25.aprx
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Figure 4. Indicative areas for habitat enhancement corridors at the proposed solar farm site, Twizel



www.wildlands.co.nz, 0508 WILDNZ

Scale: 1:22,000
Date: 31/10/2025
Cartographer: LW
Format: A3R



The species to be planted are already present on site or will be introduced to the site to increase the quality of the habitat. These plantings will support the lizard populations on site and enhance the carrying capacity of the site by increasing the quality of the habitat in these areas (increase in refuges and/or food resources, including berries and invertebrates).

7.3.2 Lizard habitat corridors – biodiversity node enhancement plantings

Overview

Lizard habitat corridors will be retained through the central area of the site, and areas will be enhanced with plantings and rock piles within specific areas of “biodiversity nodes” to increase the quality of the habitat in these areas (indicative locations are displayed in Figure 4). Lizard corridors will connect habitats where there are high-moderate density lizard populations (i.e., scarps), protect known lizard habitat (along the central fence line), and remediate for the potential loss of McCann’s skinks (at low densities) in other areas of the site that will be developed.

Lizard habitat corridors (including biodiversity nodes) will be a minimum of five metres wide. No plantings will occur within five metres of Threatened or At Risk plant species identified on site. If required, proposed lizard habitat corridors will be realigned to avoid Threatened or At Risk plant species.

Biodiversity nodes will be established at regular intervals throughout the lizard habitat corridors within proximity to prior lizard observations. Biodiversity nodes will consist of small, planted areas (c.100 m²), providing small “islands” of habitat, where other areas of lizard habitat corridor are left to regenerate naturally over time but facilitate movement between habitats on site. A minimum of 30 biodiversity nodes of c.100m² will be created (see Figure 4). The area of rock piles in the north-west of the site, covering c.1,250m², will also be included as a biodiversity node (Figure 4). The total area of biodiversity nodes requiring planting is approximately 4,250 m².

Only eco-sourced indigenous plant material from the Mackenzie Basin will be used. The Pukaki Ecological District contains a limited number of eco-sourcing sites. It is suggested that the wider Mackenzie Basin area, which includes Pukaki, Omarama and Tekapo Ecological Districts is used for eco-sourcing to ensure dryland sites with the best quality plants are used, while protecting the ecology of the Mackenzie Basin. Every effort will be made to source the specific species in the lists provided but the final species to be planted will depend on the availability of plants at nurseries. Nurseries may need to collect seed from site, and therefore the final composition of plants will depend on the success of the seed growth.

Timing

Initial lizard habitat corridor planting will occur prior to construction of the solar farm, allowing additional lizard habitat to establish⁴.

Once rock piles have been created, plantings will then also be undertaken around rock piles to fill in any gaps between initial plantings and rock piles. These additional plantings will be undertaken within one year of the creation of rock piles.

Planting will be undertaken in either early spring (late August-September) or mid-late autumn (April-May) to enable plantings to establish whilst there is sufficient ground moisture present.

⁴ To give the nursery the best chance of supplying all plants and ensure that the plants have been eco-sourced appropriately, 18-24 months’ notice may be needed to source the seed and grow the plants to acceptable size for planting.



Site preparation

If necessary, ground cover vegetation in planting areas will be cleared in a lizard friendly manner (through use of hand weeding or use of a weed eater, on warm, fine weather days). Spot-spraying may be used, if determined necessary. This will be decided at the discretion of the Contractor who will be preparing the site.

Plant species

Lizard-friendly plantings will be undertaken to increase the complexity of the habitat and resources (refuges and food) for lizards. Planting will be undertaken by a suitably qualified professional contracted by Nova Energy. A planting schedule is outlined below in Table 7.

Plant protection

Plant guards will be required to protect plants from rabbit and hare browsing.

Responsibility: Nova Energy, Contractor.

7.3.3 Planting maintenance

Plant maintenance and monitoring will be commissioned by Nova Energy and implemented by a suitably qualified Contractor for 24 months after each planting stage (initial planting and additional planting following the creation of rock piles) or until the plants have established. This plant maintenance will include monitoring visits every one to two months over spring and summer to ensure the uptake and survival of plantings and determine what maintenance is required. Post-planting maintenance will include:

- Plants kept free of weeds by means of hand weeding only or weed eaters when necessary. Weeding will be undertaken three to four times a year (or as required) to ensure that weeds do not compromise plant growth.
- Hand weeding around the plants will allow for better establishment of the plants and limits disturbance to skinks.
- Where plant losses exceed 10 percent, these will also be replaced.

Maintenance will take place on warm, sunny days when the daily temperature exceeds 16°C as this is when skinks are most active. Contractors will also refrain from using sprays in and around lizard habitats, as the effects herbicides and insecticides have on lizards are largely unknown.

Planting maintenance and monitoring will be commissioned by Nova Energy and implemented by a suitably qualified Contractor.

Responsibility: Nova Energy, Contractor.

7.3.4 Pest plant control

Pest plant control will be implemented following the Biosecurity and Vegetation Management Plan (BVMP) for the site (Wildlands 2025d). Pest plant control methods are detailed in Section 4.2 of the BVMP. These include:

- Manual pulling, cutting and pasting or drilling for wilding conifers and other woody pest plants.
- Other appropriate methods for other pest plant species, noting that chemical sprays should be avoided in areas of high and moderate quality lizard habitat.



As per Section 8 of the BVMP, pest plant control will be undertaken every three years, commencing one year after site establishment begins.

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**Table 7** – Lizard biodiversity node habitat enhancement planting schedule.

Species	Common Name	Already Present on Site?	Estimated Time Required from Seed Source / Ordering to Planting	Establishment / Grade	Spacing (metres)	Estimated Percentage of Mix	Estimated Number of Plantings per 100m ² Node	Indicative Estimated Total Number of Plantings for all Nodes (c.4,250m ²)
<i>Muehlenbeckia axillaris</i>	Creeping pōhuehue	Yes	18-12 months	0.5L/RX90	1	15	15	640
<i>Discaria toumatou</i>	Matagouri	Yes	24-18 months	0.5L/RX90	1	13	13	550
<i>Melicytus alpinus</i>	Porcupine shrub	Yes	24-18 months	0.5L/RX90	1	11	11	470
<i>Coprosma petriei</i>	Turfy coprosma	No	24-18 months	0.5L/RX90	0.75	5	5	410
<i>Poa cita</i>	Silver tussock	Yes	12 months	0.5L/RX90	1	11	20	830
<i>Coprosma propinqua</i>	Mingimingi	Yes	12 months	0.5L/RX90	1	20	20	850
<i>Olearia odorata</i>	Scented tree daisy	No	18-12 months	0.5L/RX90	1	5	5	210
<i>Carmichaelia australis</i>	Common native broom	No	18-12 months	0.5L/RX90	1	15	4	160
Total						100	98	4,130



7.3.5 Lizard habitat corridors – rock piles

To increase the amount of suitable lizard habitat and increase the carrying capacity within the habitat corridors, corridors will also be enhanced through the placement of rock piles. Rock piles will be between a maximum of 0.5 metres in height, 1-2 metres wide and five metres long and placed at the ends of biodiversity nodes. The success of rock piles for lizard habitat enhancement will be monitored (see Section 9.3). DOC provides guidance on habitat enhancement that can be used to assist with rock placement (DOC 2023).

Timing

Rock piles will be created within lizard habitat corridors following the commencement of development works, in order to be able to source rocks excavated during earthworks on site.

Areas to locate rock piles will be clearly designated prior to plantings and development works being undertaken.

Rock pile creation

Rock piles will be created on site using rocks excavated during development works. Rock piles must be free draining and should comprise only coarse rocks, with minimal soil and gravel, which is more likely to be colonised by weeds.

Rocks will be of varying size dependent on the rocks excavated during earthworks. A grade of 50-200 millimetres will be used to provide optimal interstitial spaces amongst the rock piles for lizard occupation. Rocks will be sourced from excavated rocks, or from an alternative local source if too few rocks are sourced during earthworks. All rocks will be washed and free from soil to avoid unwanted grasses/invasive plants growing in the spaces.

7.3.6 Pest mammal control

While McCann's skink, and to a lesser extent Southern Alps gecko, are relatively abundant within high quality habitats on site in the absence of pest mammal control, the control of introduced mammalian pests may provide further protective benefit to lizard populations on site.

A Pest Mammal Management Plan (PMMP) has been developed to address the management of introduced mammals on site (Wildlands 2023b). This draft LMP refers to the PMMP for the site pest mammal control. Pest mammal control methods are detailed in Section 7 of the PMMP. These include:

- DOC-series traps (DOC-150s, -200s and -250s) for mustelids (weasels, ferrets, and stoats), spaced every 200 metres along trap lines. DOC-series traps will be alternated along trap lines for multi-species control. Hedgehogs will also be captured in these traps.
- Modified Timms traps for feral cats spaced every 400 metres along mustelid trap lines.
- The establishment of a rodent control zone in the scarp and old river terrace in the central southern part of the site. Bait station lines of Run-Through bait stations placed at 25-metre intervals will be set up within the rodent control zone and use a combination of poison baits (bromadiolone and diphacinone). The rodent control zone encompasses the high-quality lizard habitat on site (rock piles), as well as areas of moderate quality habitat (scarps).
- Dogs and fumigation for rabbits and hares.

- Trapinators and AT220s⁵ placed at 100 metre intervals around the perimeter of the site for possum control.

Pest mammal control transects and the rodent control zone are shown in Figure 2 of the PMMP.

Pest mammal control will begin prior to the creation of rock piles (see Section 7.3.5).

Any amendments to the PMMP will need to be discussed with, and approved by, the Project Ecologist before beginning pest mammal control.

Responsibility: Nova Energy.

7.4 Contingencies and risks associated with proposed management

There is often inherent uncertainty in the outcomes of lizard mitigation as a result of the complexities of the process and long-term management of habitat enhancement sites. In some cases, threatened species may be discovered on site or habitat enhancement may not be viable in the long term.

The main risks and resulting contingencies relating to the proposed management are described in Table 8 and summarised below:

- Additional lizard species encountered other than those known to be on site (unexpected discovery).
- Lizards are present in areas to be developed.
- Habitat enhancement is unsuccessful (lizard-friendly plants recommended for enhancement planting are unavailable or plantings do not survive).

Table 8 – Risks associated with proposed management.

Risk Associated with Management	Detail	Contingency
Additional lizard species encountered	Although unlikely, if any other species is encountered at any time on site.	Follow Incidental Discovery Protocol. Stop works, notify DOC, and develop further instructions (see Section 8.0).
Skink populations present in development areas	It is unlikely that lizards are completely absent from the impact site and may be displaced by earthworks.	Follow Incidental Discovery Protocol (see Section 8.0). Remediation (see Section 7.3).
Enhancement site failure	Recommended plants are unavailable.	Any plants that are unable to be sourced in the planting season prior to release, will be sourced in advance and planted in the following season post-release. Plants that are available will be planted as recommended, leaving space for infill planting the following year (thus keeping a complex diversity of plants across the entirety of the site).
	Plant survival is not sustained.	If more than 10% plant mortality occurs, plants will be replaced at the cost of Nova Energy. This will be determined through post planting monitoring (see Section 9.3).
	Lizards are not detected during monitoring.	If a 10% increase in lizard population numbers is not detected within lizard habitat corridors or the high-quality rocky habitat within the scarp and old river terrace in the central southern

⁵ AT220 traps can also effectively control feral cats, rats, and stoats.



Risk Associated with Management	Detail	Contingency
		part of the site (Figure 2) after five years of monitoring, adaptive management will be required (see Section 9.8). DOC will be notified and \$5,000 funding will be provided for lizard research and conservation in the Mackenzie Basin region. Funding may be provided to SRARNZ ⁶ or another suitable recipient as determined in consultation with DOC, Mackenzie District Council, and relevant iwi.
Areas to be avoided are disturbed or cleared	In the instance that areas to be avoided are cleared during development works.	Undertake additional habitat enhancement to offset for the loss and disturbance to lizards and their habitats. Notify DOC immediately and determine with DOC if any additional management is required. It is likely that this may include providing compensation for disturbance to lizards.

Substantial changes to the LMP will be undertaken in consultation with DOC. Any changes and updates to the LMP following consultation with DOC will be effective upon notification of all respective groups (unless a WA variation is required by DOC).

8.0 Incidental Discovery Protocol

8.1 Overview

Incidental discovery protocols are set out below for solar farm Contractors and are to be followed if any lizards are discovered in areas to be developed during construction of the solar farm.

Lizards could be present in vegetation such as grassland or on or under rocks. They may also bask in sunny exposed spots, such as next to dense ground cover vegetation or rock piles. They may be uncovered when disturbed by habitat clearance or earthworks.

Protocols to follow if live, injured, or dead lizards are found are outlined in the sections below.

8.2 Following the incidental discovery of a lizard

- Immediately (as soon as discovery of a lizard is made) restrict construction activities to beyond 25 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 the sun until a decision is made.
- Immediately inform the Environmental Manager/Operations Manager on site who 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).

⁶ The Society for Research on Amphibians and Reptiles in New Zealand.



- 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).
 - If a carcass is found:
 - Condition of carcass (see below).
 - Approximate time since death (if known).
 - Probable cause of death (if known).
- Healthy lizards are to be released into areas of appropriate habitat as described in Section 8.3, or at another suitable location as decided by the Project Herpetologist and Department of Conservation.
 - 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 Department of Conservation.
 - If the species encountered has a Threat Classification status of 'Threatened' (a higher conservation 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.
 - Should a nationally 'Threatened' lizard species be encountered during construction, 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 Lizard release

All incidentally captured lizards will be released on site following the below release protocol:

- Release lizards into the area of rock piles in the north-west central part of the site, which is included as a biodiversity node (see Figure 4). Once additional rock piles have been created within lizard corridors, lizards can also be released into these rock piles.
- At a minimum of five metres from other released lizards (with the exception of multiple lizards that are captured together at the same location, in which case they should be released together).
- At a minimum of 100 metres from the original capture location (to prevent possible homing behaviour).

Releasing captured lizards individually at least five metres away from each other will minimise overcrowding and competition for refuge sites, except for lizards that have been captured together should be released at the same location, so as to maintain cohesion of established lizard social groups.

8.4 Protocols for injured lizards

Following the incidental discovery of an injured lizard:



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

8.5 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 Monitoring

9.1 Overview

DOC's lizard mitigation guidelines (DOC 2019) recommend monitoring to evaluate the success of salvage operations. While no salvage is proposed for this project, monitoring of lizard habitat enhancement areas is necessary to assess the success of the habitat enhancement and trends in lizard population abundance.

Monitoring may not detect any changes in the population of lizards in the short term and may need to be carried out for up to five to ten years. Therefore, monitoring will be established during the first lizard active season post-habitat enhancement and post-construction and will be undertaken by a suitably qualified herpetologist every two years for a minimum of five years (i.e. a total of three monitoring periods, during Years 1, 3 and 5 post habitat enhancement). Monitoring will be undertaken in areas of high and moderate value lizard habitat outside of the proposed solar farm development area, as well as within lizard habitat corridors (including biodiversity nodes). This post enhancement monitoring will be commissioned by Nova Energy.

9.2 Goals and objectives

The purpose of long-term monitoring is to ensure the success of the habitat enhancement and pest mammal control program, and ensure that the high quality lizard habitats remain free of pest plants.

The objectives of long-term monitoring for lizards at the proposed Twizel solar farm are:

- **Objective 1:** Ensure a 90% survival rate of plantings, and effective control of pest plants, in lizard habitat corridors and high and moderate value lizard areas (scarps and the central southern old river terrace) on the proposed solar farm.
 - Monitor planting growth and establishment, and connectivity between habitats.
 - Determine success of plantings.
 - Determine the presence of pest plants requiring control (additional to the BVMP).
- **Objective 2:** Determine (at a minimum) a 10% increase in lizard population abundance within lizard habitat corridors and moderate value lizard areas.
 - Monitor lizard abundance within lizard habitat corridors and scarps.
- **Objective 3:** Determine the recovery of lizards within the rodent control area via a minimum 10% increase in lizard population abundance (see Figure 2 of the PMMP; Wildlands 2025).



- Monitor lizard abundance within the high-quality rocky habitat in the area of scarp and old river terrace in the central southern part of the site.

The design of the lizard population monitoring will be focused on detecting population persistence and a minimum 10% increase in lizard abundance at the site over five years following habitat enhancement (Objective 2) and rodent control (Objective 3). A 10% percent increase is the total increase from year one to year five (not year on year).

Populations of small-bodied lizards, particularly shorter-lived species such as the skinks present on site, can often respond well to intensive pest mammal control. While it is not anticipated that perverse outcomes of rodent control on lizard populations on site will occur, if such outcomes do occur adaptive management will be required (see Section 9.8). Adaptive management will be required if a 10% increase in lizard abundance is not achieved.

9.3 Objective 1 – Plant survival

Plantings should be successful throughout lizard habitat enhancement areas and have a survival rate of over 90%. If the survival rate of plantings drops below 90%, these plantings will be replaced (as detailed in Section 7.3.3 of this LMP).

Monitoring will determine whether planting maintenance requirements are being met. To ensure the establishment of lizard habitat enhancement plantings in high and moderate value lizard habitat, and plantings, vegetation growth and rock piles in lizard habitat corridors (including biodiversity nodes), photos will be taken at specific photopoints within the site. A number of photopoints will be chosen within these areas. Photos will be taken at these points before planting, as soon as possible (within two months) after planting, and then during years 1, 3 and 5 post habitat enhancement (i.e., at the same time as lizard monitoring). These photos will illustrate the rate of establishment of plantings and growth of vegetation over time, and provide additional information regarding the presence of any pest plants that require control (in addition to monitoring included within the BVMP).

9.4 Objective 2 – Lizard uptake in enhanced habitats

ACO checks will be undertaken over five days of appropriate weather (warm conditions, between 12-20°C and when rain is no heavier than 0.1-2.0 millimetres per hour) during the lizard survey season (October-March) during years 1, 3 and 5 post habitat enhancement.

ACOs will be set up along scarps and lizard habitat corridors, including both within and outside of biodiversity nodes, at c.15-30 metre intervals. ACOs will be left in place for a minimum of six weeks during the lizard active season before monitoring checks are undertaken. ACOs will be removed between each year of monitoring so as not to influence population dynamics.

9.5 Objective 3 – Lizard recovery in rodent-controlled habitats

Funnel trap checks will be undertaken over five days of appropriate weather (warm conditions, between 16-24°C and when rain is no heavier than 0.1-2.0 millimetres per hour) during the lizard survey season (October-March) in years 1, 3 and 5 following rodent control.

Funnel traps will be set up within the area of high-quality rocky habitat (rock piles) in the scarp and old river terrace in the central southern part of the site at c.10 metre intervals. Funnel traps will be checked daily and removed at the end of each monitoring period, following best practice (Hare 2012).



9.6 Lizard monitoring data collection

All lizards captured during lizard monitoring will be measured (snout-vent length, vent-tail length, and tail regeneration length), sexed, photographed, and marked with a temporary ID number.

9.7 Pest plant and pest mammal monitoring

Pest plant monitoring

Pest plant and mammal monitoring is required to verify the effectiveness of control measures and to ensure lizard habitat enhancement areas achieve Objective 1, including by confirming that pest plants do not overrun plantings or degrade the habitat quality of rock piles for lizards (refer to Section 5 of the BVMP for the site (Wildlands 2025b).

Pest plant monitoring includes:

- Undertaking a vascular plant survey one year following the commencement of solar panel installation and then additional surveys every three years.
- Designating six photopoints across the site (BVMP Figure 2), with photos to be retaken annually at these locations.

The vascular plant surveys will be used to inform whether current management and pest plant control is effective and determine if changes to the pest plant control methods, timing or search effort require amendments. The photopoints will help to track changes to the site over time. Ideally, the photopoints will help to demonstrate that pest plant control has been working and no extensive spread of pest plants or ecological weeds has occurred.

Pest mammal monitoring

Pest mammal monitoring will ensure that pest mammal populations are sufficiently low that they are not considered to be a significant factor in preventing an increase in lizard abundance in enhanced habitats on site (Objective 2).

Pest mammal monitoring is included within Section 6 of the PMMP for the site (Wildlands 2023b). Pest mammal monitoring includes:

- Tracking tunnels for mustelids and rodents.
- Night counts for feral cats, rabbits, and hares.
- Wax tags for possums.

These methods will be undertaken along transects established across the site (PMMP Figure 1).

Trap catch rates from pest mammal control traps and bait take from bait stations will also be used to provide monitoring data.



9.8 Adaptive management

If lizard capture rates increase by less than 10% following end of year five, lizard monitoring will continue for another two rounds (for a total of two additional monitoring periods, during years 7 and 9 post-habitat enhancement) to determine if management interventions are required.

If lizard capture rates decline between monitoring rounds, management intervention(s) will be implemented.

Management interventions may include:

- An additional round of monitoring that later that year (March/April).
- Revision of the pest mammal control regime. This may include implementing an increased density of pest mammal control devices, the use of different pest mammal control techniques, or bait switching (as detailed in Section 12 of the PMMP).
- Further habitat enhancement (including additional plantings and/or more intensive pest plant control).
- Funding provided to SRARNZ or another appropriate recipient to support lizard research and conservation in the Mackenzie Basin area.

These interventions will be determined in consultation with Nova Energy, Mackenzie District Council, DOC and relevant iwi, on an as required basis, based on follow up monitoring later in the lizard active season (i.e. March/April), and a review of pest mammal control success and habitat enhancement.

10.0 Report monitoring

A monitoring report will be produced following each monitoring period, detailing outcomes of the habitat enhancement and monitoring on site.

The report will contain information regarding the success of the habitat enhancement (from photopoints) and the results of lizard monitoring. The report will suggest any adaptive management that may be required.

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

Monitoring reports will be provided to Mackenzie District Council, DOC and relevant iwi, as required. Details for correspondence will be provided to the Project Herpetologist by Nova Energy, once obtained.

11.0 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. 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 Effect Without Mitigation	Mitigation	Level of Effect With Mitigation
Disturbance (including death and injury) to lizards	More than minor	Avoidance (Section 7.2). Contingencies and risks with proposed management is considered (Section 7.4). Incidental Discovery Protocol (Section 8.0).	Minor
Loss of lizard habitat	More than minor	Lizard habitat corridors and high and moderate lizard habitat will be enhanced (Section 7.3).	Less than minor
Fragmentation of lizard habitat	Minor	Lizard habitat corridors will be designated and enhanced to create additional connecting lizard habitat (Section 7.3).	Less than minor
Reduction of lizard habitat quality (shading from panels)	Minor	Contingencies and risks with proposed management is considered (Section 7.4). Avoidance and buffer zones (Section 7.2).	Minor
Operational disturbance to lizards	Minor	Avoidance and buffer zones (Section 7.2).	Less than minor
Disturbance to lizards during earthworks	Minor	Avoidance and buffer zones (Section 7.2). Contingencies and risks with proposed management is considered (Section 7.4). Incidental Discovery Protocol (Section 8.0).	Minor
Breeding failure/avoidance	Less than minor	Avoidance and buffer zones (Section 7.2).	Less than minor

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- Wildland Consultants 2026a. Assessment of potential ecological effects of the proposed Nova Energy Solar Farm near Twizel. Wildland Consultants Ltd Contract Report No. 6620a. Prepared for Nova Energy. 91 pp.
- Wildland Consultants 2026b. Terrestrial Invertebrate Management Plan for Proposed Nova Energy Twizel Solar Farm. Wildland Consultants Contract Report No. 7414a. Prepared for Nova Energy Ltd. 33pp.
- Wildland Consultants 2026c. Avifauna Management Plan for proposed Nova Energy Twizel solar farm. Wildland Consultants Contract Report No. 7414c. Prepared for Nova Energy. 22pp.
- Wildland Consultants 2026d. Biosecurity and Vegetation Management Plan for proposed Nova Energy Twizel solar farm. Wildland Consultants Contract Report No. 7414d. Prepared for Nova Energy. 14pp.
- Wildland Consultants 2026e. Assessment of Cumulative Effects for the Proposed Nova Energy Solar Farm near Twizel. Wildland Consultants Contract Report No. 6620c. Prepared for Nova Energy. 17pp



Appendix 1

Authorised personnel – relevant experience

Wildland Consultants Ltd will provide a highly skilled team with extensive and long-term experience in lizard monitoring, relocations and implementation of Lizard Management Plans. **Cameron Thorp** will lead the project, working closely with **Samantha King**, **Jade Christiansen**, and **Anna Meban**, who are all highly experienced in implementing Lizard Management Plans.

Cameron Thorp

Herpetologist – Dunedin

Cameron Thorp has seven years' experience working as a herpetologist in New Zealand. Cameron previously worked for EcoGecko Consultants (2018-2019) before joining Wildland Consultants in 2019. Cameron is experienced in the set up and implementation of lizard surveys, monitoring programmes and lizard salvages across New Zealand, and writing Lizard Management Plans, and Assessments of Ecological Effects (AEEs)/Ecological Impact Assessments (EclAs). Cameron has worked with a wide range of species across the country, including in alpine environments and with Nationally Critical species. He is currently serving on the Council for the Society for Research on Amphibians and Reptiles in New Zealand (SRARNZ).

Set out below are the following details regarding Cameron Thorp in order to meet the criteria that the Lizard Technical Advisory Group applies.

Appropriate qualifications as an ecologist

- Master of Science with Honours, Ecology, University of Otago.
- Post-graduate Diploma, Endangered Species Recovery, Durrell Wildlife Conservation Academy (Mauritius), 2014.

Suitable and relevant field skills from New Zealand and NZ lizard species. Experienced in the conservation management and/or ecological requirements of most/all NZ Not Threatened and At Risk lizard species (and many Threatened or endangered species).

- Experience surveying, including spotlighting, hand-searching, funnel traps (Gee's minnow traps and other forms of funnel trap), pitfall traps and artificial cover objects (such as Onduline and closed-cell foam covers), handling, recording morphometrics, monitoring (including mark-recapture studies), and translocating New Zealand lizards.
- Department of Conservation: surveys for Data Deficient lizard species, including alpine rock skink (Canterbury 2022), awakopaka skink (Fiordland 2020-2023) and hura te ao gecko (Otago 2020-2022), post-translocation monitoring for ornate skink and ngahere gecko on Matiu/Somes Island (Wellington 2018-2020), supervised vegetation clearance for McCallums Mill Road Widening/Ōpārara Arches Lizard Management (West Coast 2022).
- Rangitāne o Manawatū lizard handling and surveying training (Matiu/Somes Island and Manawatū 2023).
- Porirua City Council: surveys of six council reserves (2020-2021).
- Wellington City Council: surveys of two council reserves (2020), Miramar Peninsula surveys at Moa Point (2022).
- Greater Wellington Regional Council: long-term monitoring programme at Baring Head (2018-2021).
- Whanganui District Council: Plan Change 58 lizard survey, including discovering the largest known population of a Nationally Critical species (2021).
- Hawke's Bay Regional Council: survey of Napier population of northern spotted skink (2021).



- Waka Kotahi NZTA: Otaki to North of Levin motorway surveys (Kapiti Coast/Horowhenua 2021-2022), Takitimu North Link lizard salvage (Tauranga 2021), State Highway 58 Safety Improvements lizard salvage (Wellington 2019-2020).
- Mercury Energy's Turitea Wind Farm lizard survey and salvage of barking gecko, ngahere gecko and ornate skink (Palmerston North 2019-2020).
- OceanaGold's Macraes Phase III and Coronation Projects lizard monitoring (Otago 2018-2019), and Deepdell, Camp Creek and Cranky Jim's covenant lizard monitoring (2023).
- Lizard surveys for community groups, including: Kaipupu Wildlife Sanctuary and Picton Dawn Chorus (Marlborough 2019), Makara Peak Supporters (Wellington 2020), Sustainable Wairarapa (Onoke Spit and Ocean Beach 2020, Castlepoint 2021), ZEALANDIA wildlife sanctuary (Wellington 2019).
- University of Otago study: monitoring and radio-tracking of translocated ngahere geckos (Mana Island 2018).
- Various surveys for subdivision, afforestation and other development projects particularly in the Wellington, Christchurch, and wider Otago regions between 2018-2024.

Have complied with all permit conditions of previous permits, including reporting:

- Cameron has always complied with permit conditions of previous permits, including reporting.
- Author on compliance reports, including lizard salvage and monitoring reports (e.g., *Chard Farm, Gibbston lizard salvage* (100542-FAU)).

Evidence of Lizard Management Plans:

- LMP for a subdivision at 49 Cleat Street, Whitby, Porirua (97664-FAU).
- LMP for Styx Mill Road subdivision, Casebrook, Christchurch (108830-FAU).

Samantha King

Associate Principal Herpetologist and Ecologist - Christchurch

Samantha King has more than eleven years of experience working on a diverse range of herpetofauna projects and completed her MSc in Conservation Biology studying the genetics and morphology of a rare species of South Island green gecko. Samantha's field experience includes lizard surveys, salvage, release and monitoring using a range of species-specific methods (including lizard radio tracking and tail tipping for genetic analysis). Samantha also has extensive experience preparing and implementing Lizard Management and Conservation Plans, Compliance Reports and Monitoring Reports.

Samantha has worked under several survey permits:

- South Island survey permit (excluding PCL; 96003-FAU)
- Auckland(82063-FAU) and Canterbury (81898-FAU) region survey permits
- MSc research permit (63428-FAU)
- Cypress mining wildlife permit (WC-31903-FAU) (Solid Energy)
- Rockies and Millerton mines, (WC-32714-FAU),
- Under Marieke Lettink's permit (35196-FAU)
- The Escarpment Mine authority (36887-FAU).

Set out below are the following details regarding Samantha King in order to meet the criteria that the Lizard Technical Advisory Group applies.



Appropriate qualifications as an ecologist

- MSc, Conservation Biology, Massey University, 2018. Thesis: Genetic and phenotypic variation used to identify populations of endangered green gecko (*Naultinus*) found in the north-west South Island, New Zealand.
- Postgraduate Diploma Science, University of Auckland, Environmental Management, 2017
- BSc, Environmental Studies, Victoria University of Wellington, 2011
- Completed online Department of Conservation training courses:
 - Bird identification.
 - Wildlife health.
 - Introduction to natural heritage.

Suitable and relevant field skills from New Zealand and NZ lizard and frog species. Experienced in the conservation management and/or ecological requirements of most/all NZ Not Threatened and At Risk lizard species (and many Threatened or Endangered species).

- Herpetofauna management including searching, handling, monitoring, attaching small radio transmitters, and tail tipping for genetic analysis. (36887-FAU), (63428-FAU).
- Diurnal green gecko searches on West Coast, Golden Bay and Takaka Hill, Boyle River, Hanmer, Waiau Valley, Kaikoura Range, Leatham Valley, Wairau Valley, and Rakaia Gorge. (96003-FAU, 35196-FAU).
- Pitfall trapping for annual scree skink surveys in Mt Somers. (35196-FAU).
- Funnel trapping for Roamatimati and white-bellied skinks in the Rangitata head waters. (35196-FAU).
- Spotlighting for green geckos in Abel Tasman National Park. (35196-FAU).
- Field project leader for Escarpment Mine lizard salvage and management, with a leadership role in site hazard and risk assessments, creating efficient and novel species-specific survey techniques (36887-FAU).
- Spotlighting and manual searches for Archey's and Hochstetter's frog in Coromandel, Auckland.
- Undertaking biodiversity inventories for Oceana Gold WKP expansion – Coromandel including for forest gecko, and two frog species 2018-2021.
- Providing expert advice for surveying lizards on post-rehabilitated vegetation of Stockton Mine – March 2019.
- Providing expert advice on green gecko habitat preference and surveys on Denniston and Stockton plateaux – March 2019 (36887-FAU).
- Surveys and conservation management advice for green geckos in the Nelson region for Nelson City Council and Tasman Pine Ltd.
- Contributing to the Nelson City Council resource management plan on habitat requirements for Nationally Endangered or At Risk lizard species, with specific regard to green geckos. March-April 2019.
- Leading field surveys for lizards, using a variety of techniques in Kahurangi National Park, January 2021.
- Herpetologist for Coleridge Downs Irrigation Pipeline Lizard Salvage
- Lizard Management Plans for complex projects such as McCallums Mill Road, and Kawatiri Coastal Trail, 2021.
- Undertaken lizard salvage and consent monitoring of a sandmine in Auckland with spotlighting for *Dactylocnemis pacificus* and *Naultinus elegans*, 2021. (Surveys under 82063-FAU).
- Spotlight and pitfall surveys for lizards at Stillwater for Penlink roading project (82063-FAU).
- Pitfall trapping for grass skink in Canterbury.
- Lizard survey for Mackenzie District Council, 2023.
- Designed and established the NZDF Tekapo Military Training Area lizard monitoring, 2025.



- Tree ACO surveys for Tautuku gecko, broad-cheeked gecko and Waitaha gecko, 2023-2025.
- Set up and monitoring for Nationally Critical and Threatened species including harlequin gecko, West Coast green gecko, Southland green skink, and small-eared skink 2022-2025.
- Population distribution surveys for Alborn skink, including at Mahoneys Pakihi, Slab Hut Pakihi and Big River, 2021-2025.

Have complied with all permit conditions of previous permits, including reporting.

- Sam has always complied with permit conditions of previous permits, including reporting. In her capacity as field leader Sam has had to ensure that conditions of permit are upheld by all workers.
- Annual reporting for WAA:
 - Annual reporting for 96003-FAU.
 - Auckland and Canterbury regions and end of survey summaries, including ARDS reporting.
- Writing scientific and advisory reports specifically for clients such as the Department of Conservation, Bathurst Resources Ltd and Solid Energy.
- Annual Lizard Salvage and Monitoring Report contributing author – Escarpment Mine Bathurst Resources Ltd, 2014. (36887-FAU)
- Annual wildlife permit reporting for Cypress Mine WC-31903-FAU (Solid Energy), and Rockies and Millerton mines, WC-32714-FAU (Solid Energy) between 2012 and 2015.
- Annual wildlife permit reporting for Coleridge Downs Irrigation Pipeline Lizard Salvage.
- WAA compliance reporting for LMPs following salvage.

Evidence of Lizard Management Plans:

- Kawatiri Coastal Trail Lizard Management Plan – Kawatiri Coastal Trail Trust - 90101-FAU.
- Oparara Arches Lizard Management – McCallums Mill Road LMP – DOC.
- Coleridge Downs Irrigation Pipeline WAA Variation – Private.
- Te Arai South LMP – Private.
- Smooth Hill LMP – GHD / Dunedin City Council.
- 34 Kauri Point Road LMP – Private.
- Faringdon Oval LMP - 102434-FAU.
- 235 Kanohi Road LMP – Transpower.
- Westland Mineral Sands LMP – 9 Mile.
- Southland Wind Farm LMP – Contact Energy.
- Mornington Rd LMP – Dunedin.
- Corban Reserve LMP – Watercare (Auckland Council).
- Hanmer Elevations LMP.
- 130 Styx Mill Rd Subdivision 108830-FAU.

Reviewed and signed off on the following LMPs:

- Nevis Valley Gold LMP.
- Coronet Peak LMP.
- NZDF pipeline LMP- 117243-FAU.
- Tosswill Rd LMP – Ngai Tahu Properties Ltd– 118761-FAU.
- 121 Halswell Junction Road LMP – 118123-FAU.
- Hororata Pipeline LMP – Canterbury Plains Water Ltd.



Jade Christiansen

Herpetologist – Christchurch

Jade Christiansen has five years of experience working with lizards in New Zealand. Jade has a Master of Science in Zoology (2023) from the University of Otago investigating the translocation and habitat preferences of Kapitia skink (*Oligosoma salmo* – Nationally Critical). During her studies (between 2018 and 2023), Jade was involved in a range of herpetological work which included monitoring a range of lizard species, specifically those found in the Otago region. Since 2023, Jade has been employed as a herpetologist, where she has experience in the preparation and implementation of Lizard Management Plans, primarily within the Canterbury region.

Jade's field experience includes lizard surveying, translocation, salvage and monitoring using a range of methods including hand capture, visual searching, spotlighting, burrow-scoping and radio tracking, as well as trail camera and tracking tunnel monitoring.

Set out below are the following details regarding Jade Christiansen in order to meet the criteria that the Lizard Technical Advisory Group applies.

Appropriate qualifications as an ecologist:

- MSc, Zoology, University of Otago, 2022. Thesis: Habitat use and translocation techniques for the critically endangered Kapitia skink, *Oligosoma salmo*.
- BSc, Zoology and Ecology, University of Otago, 2020.

Suitable and relevant field skills from New Zealand and NZ lizard species. Experienced in the conservation management and/or ecological requirements of most/all NZ Not Threatened and At Risk lizard species (and many Threatened or endangered species).

- Tuatara monitoring at Orokonui ecosanctuary (hand capture, trail camera monitoring, burrow scoping, and spotlighting, as well as artificial retreat and tracking tunnels for hatchlings), 2018-2023.
- Teaching, advocacy and research of captive lizards at University of Otago (lizard handling – korero gecko, jewelled gecko, Otago skink), 2020-2022.
- Kapitia skink translocation monitoring and habitat assessment – Masters research and annual population monitoring (Artificial retreats (ground and arboreal), tracking tunnels, fluorescent powder, trail cameras, tail tipping), 2020-2022.
- Research assistant on kōrero gecko research (hand capture, rock turning, radio tracking), 2018-2019.
- Surveys and long term-monitoring for grass skink in Canterbury.
- Surveys for *Naultinus* sp. (jewelled gecko, rough gecko and barking gecko).
- Salvage and release for grass skink in and around Christchurch.
- Supervised progressive vegetation clearance for northern grass skink, 2024 and southern grass skink, 2025.
- Surveys for roamatimati and Mackenzie skink for NZDF, Tekapo Military Training Area, 2025.
- Supervised vegetation clearance for West Coast green gecko, 2024.
- Population distribution surveys for Alborn skink at Big River, 2025.
- Arboreal artificial retreat surveys for Tautuku gecko, 2024-2025.

Have complied with all permit conditions of previous permits, including reporting.

- Jade has always complied with permit conditions of previous permits, including reporting.
- Contributing author on different compliance reports:
 - Creamery Ponds, Halswell (94672-FAU).



- Bellgrove, Rangiora lizard salvage reports (100703-FAU).
- Faringdon Oval (102434-FAU).
- Kawatiri Coastal Trail - Section 6 (90101-FAU).

Evidence of Lizard Management Plans:

- Styx Mill subdivision LMP – 108830-FAU.
- Tekapo Military Camp pipeline LMP – 117243-FAU.
- 179 Milns Road subdivision LMP – 117499-FAU.
- 121 Halswell Junction Road subdivision LMP – 118123-FAU.
- 93 Tosswill Road subdivision LMP – 118761-FAU.

Anna Meban

Ecologist – Christchurch

Anna Meban has three years of experience working with lizards in New Zealand. Anna has a Master of Science in Conservation and Ecology (2024) from Lincoln University investigating the bait preferences in rabbits in the Mackenzie and Otago districts. During her studies Anna has been involved with a range of herpetological work as a student intern at the Department of Conservation and Wildlands as a casual employee. Anna's field experience includes lizard surveying, salvage and monitoring using a range of methods including, spotlighting, tracking tunnels and visual searches

Set out below are the following details regarding Anna Meban in order to meet the criteria that the Lizard Technical Advisory Group applies.

Appropriate qualifications as an ecologist:

- MSc, Conservation and Ecology, Lincoln University, 2024. Thesis: Bait preferences in rabbits (*Oryctolagus cuniculus*) and non-target species in rabbit-prone areas of New Zealand's South Island
- BSc, Conservation and Ecology, additional major Parks and Outdoor Recreation, Lincoln University, 2021
- Internship with Department of Conservation, Mahaanui Office, Canterbury, 2021

Suitable and relevant field skills from New Zealand and NZ lizard species. Experienced in the conservation management and/or ecological requirements of most/all NZ Not Threatened and At Risk lizard species (and many Threatened or endangered species).

- Experience surveying, using a range of different techniques including spotlighting, hand-searching, funnel traps (Gee's minnow traps), pitfall traps and artificial cover objects (such as Onduline), handling, monitoring, and salvage and release of New Zealand lizards.
- Species specific work undertaken as part of field surveys or monitoring programmes with New Zealand herpetofauna includes the following species: *Oligosoma* aff. *polychroma* 'Clade 5', *Oligosoma* aff. *polychroma* 'Clade 4', *Oligosoma maccanni*, *Oligosoma aeneum*, *Oligosoma* aff. *longipes* "southern", *Woodworthia* cf. *brunnea*, *Woodworthia chrysosiretica*, and *Naultinus gemmeus*.
- Lizard surveys and habitat assessments for subdivisions and development projects, particularly in Christchurch, the wider Canterbury region and North Island (e.g. Bowenvale, Cunliffe Road, Milns Road, Tekapo Military Camp, SH3 New Plymouth, Pound Road, Woodend Bypass) (2022-2025).
- Lizard salvage fieldwork around Christchurch (e.g. Creamery Ponds, Bellgrove, Farringdon Oval, Styx Mill Road) (2023-2025).
- Habitat assessments (e.g. Amberly Beach, Leistrella Road, Johns Road) (2023-2025).
- Department of Conservation jewelled gecko monitoring (2021).



Have complied with all permit conditions of previous permits, including reporting.

Anna has always complied with permit conditions of previous permits, including reporting.

- Contributing author on different compliance reports, including lizard salvage and monitoring reports (Styx Mill Road Lizard Salvage, 179 Milns Road).

Contribution to and author of Lizard Management Plans:

- Ashley Solar Farm.
- CPWL Hororata River.
- Cashmere Estates Stage 5 & 6.

DRAFT

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