DRAFT

# Draft Biosecurity and Vegetation Management Plan for Twizel Solar Farm

Contract Report No. 7414d

Providing outstanding ecological services to sustain and improve our environments

Wildlands

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**Contract Report No. 7414d**

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# Contents

# 1.0 Introduction

This management plan relates to the Nova Energy Ltd (Nova) solar farm located near the township of Twizel in the Mackenzie Basin. The proposed solar farm site is located within the Pukaki Ecological District, characterised by dry outwash plains between Lakes Tekapo and Benmore, and mostly below 600 metres above sea level.

Wildland Consultants Ltd (Wildlands) has previously conducted an Assessment of Ecological Effects (AEE) on the site and several ecological surveys[1]. Important biodiversity values have been identified at the site. These values include Threatened and At-Risk plants, birds, lizards and terrestrial invertebrates. Wetland habitats were also identified at the site.

The AEE identified a need for specific management plans to manage effects on flora and fauna on-site, and to inform future management strategies in the context of the development. This included the development of a Biosecurity and Vegetation Management Plan (BVMP) to minimise the risk of introducing pest plants and associated threats to biodiversity values present at the site and monitor and manage indigenous vegetation values present at the site.

The BVMP is one of five ecological management plans associated with this development (the other management plans relate to lizards, invertebrates, pest animals and avifauna) and details the measures recommended for minimising the introduction and spread of pest plants at the site.

The purpose of the plan is to provide guidance for protecting existing indigenous vegetation biodiversity values at the site from pest plant spread. The BVMP sets out provisions and guidance to prevent pest plants from becoming widespread at the site and monitor indigenous vegetation and Threatened or At Risk plants

# 2.0 Site Description

## 2.1 Project site and context

The site (Lot 3/DP422901/RT489342) is a long, narrow section of land to the east of Twizel (Figure 1). The Ōhau River is located along the southern boundary and the Twizel River to the north. The site is mostly flat with an access road through the centre and old river terraces near the boundary. It is currently used as pastoral land for farming in a Rural Zone and is classified as an Outstanding Natural Landscape. The development area is located on outwash plain and river terraces between the Twizel and Ōhau Rivers and includes areas of historic river channels and old oxbows.



[1] Wildland Consultants (2026). Assessment of potential ecological effects of the proposed Nova Energy Solar Farm near Twizel. Wildland Consultants Ltd Contract Report No. 6620. Prepared for Nova Energy. 67pp.

Wildland Consultants (2026). Pest Management Plan – Nova Energy, Twizel. Wildland Consultants Contract Report No. 6905. Prepared for Nova Energy Whakatane. 24pp.

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. 36pp.

Wildland Consultants (2026). Terrestrial Invertebrate Management Plan for proposed Nova Energy Twizel solar farm. Wildland Consultants Contract Report No. 7414a. Prepared for Nova Energy. (In preparation)

Wildland Consultants (2026). Lizard management plan for proposed Nova Energy Twizel solar farm. Wildland Consultants Contract Report No. 7414b. Prepared for Nova Energy.

Wildland Consultants (2026). Avifauna management plan for proposed Nova Energy Twizel solar farm. Wildland Consultants Contract Report No. 7414c. Prepared for Nova Energy.

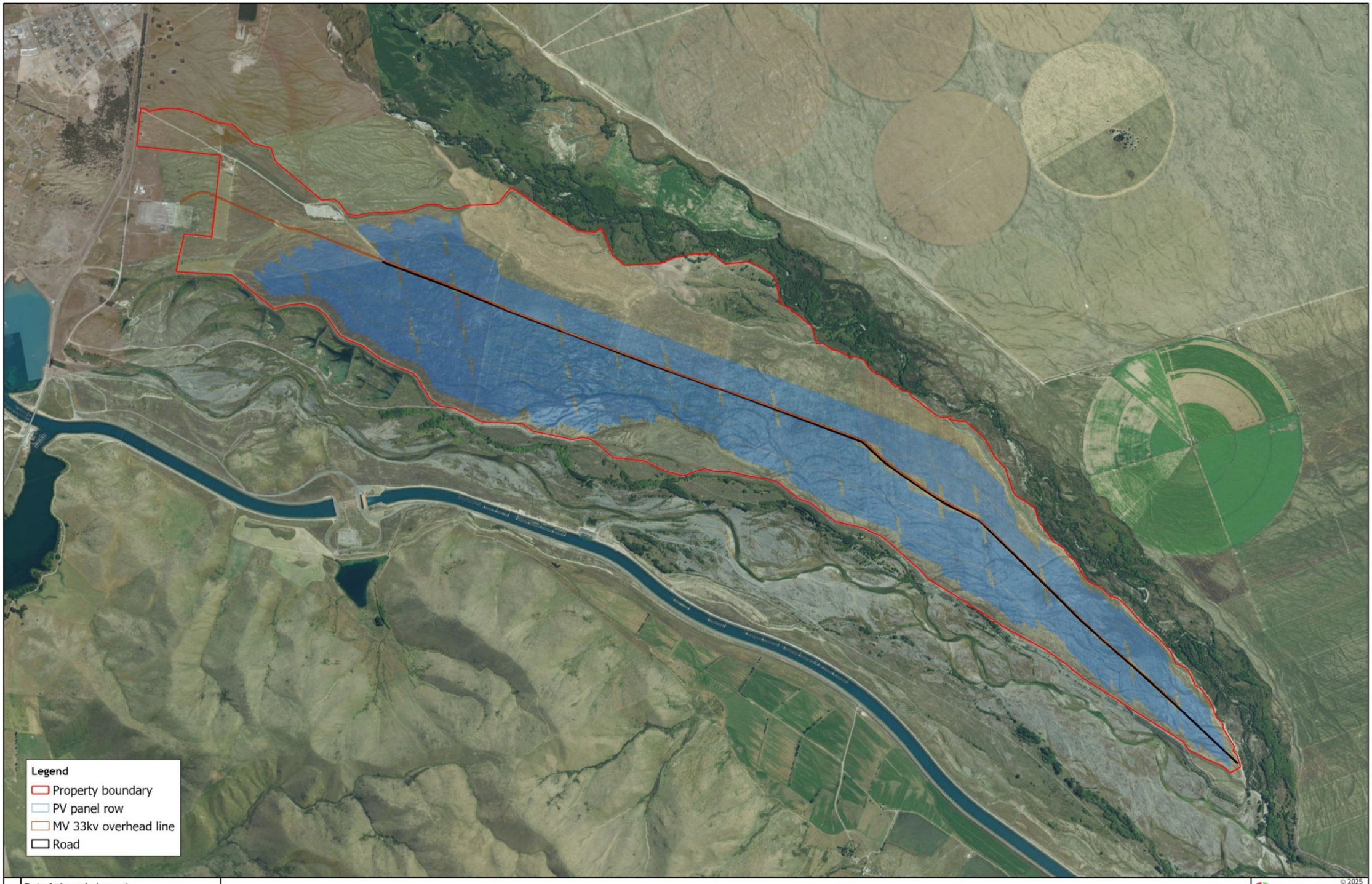


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**Figure 1. Location of the proposed solar farm site**

0 1 2 Kilometers



Scale: 1:25,000
Date: 31/10/2025
Cartographer: LW
Format: A3R

The design includes minimum setbacks from key areas with ecological value. A setback of 10 meters will be applied to ecologically significant indigenous vegetation, whilst a minimum 100-meter setback will be applied for wetlands within and outside of the project area (Wildland Consultants 2025).

## 2.2 Current and recent land use

The site is currently operating under a farm lease arrangement, predominantly as cropping and sheep grazing. The area is subdivided into fenced paddocks, and some have been used for hay/baleage production. Most of the site has been cultivated by direct-drilling, and this has led to a widespread distribution of improved pasture species across the site.

## 2.3 Site ecological values

The assessment of ecological effects and additional surveys undertaken by Wildlands identified the distribution and location of Threatened and At-Risk vegetation, invertebrates, lizards, and avifauna at the site (Figure 2). Areas of ecologically significant vegetation and habitats were also identified (Figure 2). Historically rare ecosystems, inland outwash gravels (outwash plains), and ephemeral wetland habitats (Williams *et al*. 2007, Holdaway *et al*. 2012) have been identified at the site (Wildlands 2024).

Seven plant species classified as At-Risk or Threatened are present at the site.

# 3.0 Pest Plants

## 3.1 Pest plants detected on the site

Six plant species recorded on the site are listed as either 'pest' or 'Organisms of Interest' (OoI) in Environment Canterbury's Regional Pest Management Plan (CRPMP; 2018-2038; Table 1). An additional six plants have been identified as environmental (ecological) weeds (McAlpine and Howell 2024).

**Table 1 – Pest plants and Organisms of Interest (PEST, OoI, respectively), listed in the CRPMP that were recorded at the site.**

| Scientific Name | Common Name(s) | Growth Form | Pest Status |
|---|---|---|---|
| *Cytisus scoparius* | Broom | Shrub | PEST |
| *Echium vulgare* | Vipers' bugloss | Herb | OoI |
| *Hypericum perforatum* | St John's wort | Herb | OoI |
| *Lolium arundinaceum* | Tall fescue | Grass | Ecological weed |
| *Lupinus polyphyllus* | Russell lupin | Herb | PEST |
| *Pilosella officinarum* | Mouse-ear hawkweed | Herb | OoI |
| *Pinus contorta* and *Pseudotsuga menziesii* | Wilding conifers | Tree | PEST |
| *Rosa rubiginosa* | Sweet briar | Shrub | Ecological weed |
| *Salix ×fragilis* | Crack willow | Tree | Ecological weed |
| *Sambucus nigra* | Elder | Shrub | Ecological weed |
| *Sedum acre* | Stonecrop | Herb | Ecological weed |
| *Solanum dulcamara* | Bittersweet | Herb | Ecological weed |

## 3.2 Pest plants and ecological weeds in the surrounding area

Some pest plants and ecological weeds that are not currently found on the site are likely to be present in the surrounding area. The proximity of the site to the township of Twizel provides an increased risk of novel ecological weed invasions of species originating from domestic gardens.

## 3.3 Key threats

The proposed solar farm will result in a change in current land-use and management. Although Nova intends to keep grazing the site the proposed panel area will no longer be cropped for hay/baleage. Grazing and cropping are likely to be limiting the establishment and spread of woody weeds (pest plants and ecological weeds). The change in land use and management combined with vegetation clearance and soil disturbance has the potential to accelerate the spread of weeds at the site.

Edge effects are suboptimal environmental conditions for key ecological values or areas of increased risk at the boundary of habitats of interest. Modifications associated with the solar farm could alter local microclimate conditions (e.g. soil moisture, sunlight, and wind exposure) and potentially influence adjacent dryland habitats. For example, exotic grasses could become more abundant and outcompete Threatened or At Risk dryland plants. Edge effects will be monitored through qualitative and quantitative vegetation surveys (outlined in Section 5.1), and adaptive grazing will be used to manage grass spread at the site.

Woody species pose a threat to the ecological values present. The establishment of woody pest plants has the potential to displace and out compete indigenous plants present through shading. Wilding conifers are present at low levels at the site. If not controlled, the site may become a source for seeds and impact the wider area.

Six woody pest plants and ecological weed species have been detected on the site to date:

- Broom (Cytisus scoparius).
- Wilding conifers (Pinus contorta, Pseudotsuga menziesii).
- Sweet briar (Rosa rubiginosa).
- Crack willow (Salix ×fragilis).
- Elder (Sambucus nigra).

Wilding conifers are referred to in the Canterbury Regional Pest Management Plan (CRPMP) which covers multiple species that include pines (*Pinus* spp.), larch (*Larix decidua*) and Douglas fir (*Pseudotsuga menziesii*) (CRPMP 2018).

Wilding conifers (*Pinus contorta*, *Pseudotsuga menziesii*) and *Rosa rubiginosa* have been detected within the proposed panel area. Wilding conifers can have significant ecological impacts on indigenous ecosystems, particularly in low stature vegetation, outcompeting indigenous vegetation. Wilding conifers can spread through open environments quickly, and establishment of wilding conifers can have negative impacts on soils and indigenous flora and fauna. Other impacts of wildling conifers include changes to the hydrology of wetlands and other aquatic habitats and an increase to the risks associated with wildfires (CRPMP 2018).

If uncontrolled, they could spread within the panel area and areas with ecologically significant vegetation. Some At-Risk plants have been detected around the edges of the panel area (Wildlands 2024, Wildlands 2026), *Convolvulus verecundus f. verecundus*, *Raoulia australis*, *Carmichaelia vexillata* are low growing and are particularly susceptible to shading by woody weeds.

Crack willow and alder have been detected on the site, however they are located near the northern boundary of the site, far from the proposed panel area in habitats characterised by more moisture, around old river channels and wetlands. There is no evidence of current spread into the remainder of the site, including the proposed panel area and areas which contain indigenous biodiversity and vegetation. If the spread of crack willow or elder is detected, control should be undertaken.

Crack willow and alder are the only examples of large trees on the site. These have some ecological value, providing habitat for indigenous avifauna. The removal or control of these would require caution and should be undertaken in consultation with an avifauna ecologist. However, the removal and control of these trees is not included in the current plan, and these trees are located well outside the panel area.

Russel lupin (*Lupinus polyphyllus*) was detected in the 2023 site visit. Russel lupin is a significant threat in Canterbury and may pose a threat to ecological values present at the site if it becomes more widespread. Based on previous site visits it is not anticipated to be a key threat, however, this should be monitored and controlled if it appears to become more widespread across the site or is deemed to provide a seed source to the surrounding area.

From an operational perspective, Nova intends to prevent the establishment of tall woody weeds within the panel area to ensure there is no shading of solar panels.

# 4.0 Pest Plant Control

## 4.1 Search and control

Searches of the development area should be undertaken every three years to locate and control wilding conifers and other woody weeds, commencing one year following the beginning of development at the site. Wildling conifers produce cones every three to four years, regular control will reduce the risk of spread from the site into the wider environment. Non-woody species such as Russel lupin should be considered for control when observed, especially if they appear to be increasing in number.

The search area needs to include the panel area and areas where low stature At Risk plants are present (Figure 2). The wider panel area should be searched by systematically walking north to south. An appropriate distance between lines walked is 30–50 meters, which will allow for pest plants to be observed either side of the line walked. Areas around At Risk plants should also be searched for woody pest plants establishing in close proximity to At Risk plants (Figure 2).

The search will need to be undertaken at a fine resolution and the entirety of the areas where At Risk plants are located will need to be searched. An appropriate distance between lines for finer resolution searches is 5–10 meters. When woody pest plants are detected, control should be undertaken using the methods outlined below.

## 4.2 Control methods

### 4.2.1 Wilding conifers

Wildling conifers can be controlled through manual pulling, cut and pasting stems, or drilling, depending on the size (Table 2). Small seedlings (<2 centimetres diameter at the base and typically <0.5 metres tall) can be hand pulled, ensuring the whole plant is removed, including roots.

Medium-sized saplings and trees (2–20 centimetre diameter at breast height) can be removed by either cutting or sawing at the base of the trunk, as close to the ground as possible then applying a Glyphosate-based gel to the entirety of the cut trunk to ensure that the tree does not regrow from the stump.

It is unlikely that large trees will be detected in the future on site as small and medium trees will be detected and removed before they reach >20 centimetres in diameter at breast height, provided surveillance and control at the site is undertaken every three years. Removal of large trees can be achieved through either drilling and poisoning or felling techniques. A chainsaw or a large drill bit could be used for drilling, with cuts/holes bored into the trunk, through the bark and into the cambium of the tree. The cuts/drill holes should be then filled with Glyphosate, poisoning the tree. Poisoned trees can be left in situ to break down, however, depending on the location and proximity to solar panels, removal by an arborist may be required to ensure infrastructure is not damaged.

Hand pulling, cut and paste and drilling are preferable methods for control to reduce impacts on lizards and invertebrates present on the site. Other methods such as spraying will result in more herbicide being released into the environment which could cause injury or death to lizards and invertebrates present.

**Table 2 –** Wilding conifer size guide and control methods.

| Wilding Size | Diameter | Height | Control Method |
|---|---|---|---|
| Small | <2 cm at the base | <0.5 m | Hand pulling |
| Medium | 2–20 cm at breast height | Often over 1 m | Cut and paste |
| Large | >20 cm at breast height | Often taller than 10 m | Drilling |

### 4.2.2 Other pest plants and ecological weeds

Other woody pest plants present such as broom and briar rose can be controlled through the methods outlined above. If additional pest plants and ecological weeds are detected on the site, for example novel garden escapes, the New Zealand weed buster website[2] should be consulted to determine the most appropriate control method for that species.

Herbicide spray should be avoided if there is any risk of it blowing onto grasshopper habitat (short-stature vegetation, bare open soil, and herbfield). Indigenous grasshoppers are highly sensitive to chemical sprays.

# 5.0 Vegetation Monitoring and Surveillance

The change in land use may adversely impact the biodiversity values present at the site through a change in grazing regime and shade conditions, resulting in changes to vegetation.

Vegetation monitoring surveys shall be undertaken throughout and around the proposed development area by a suitably qualified and experienced practitioner (SQEP) of botany with experience identifying key plant species to monitor for changes in vegetation cover and ensure that indigenous vegetation, particularly populations of Threatened and At-Risk plants are not being negatively impacted, through competition with exotic grasses, pest plants and/or ecological weeds.

[2] https://www.weedbusters.org.nz/

## 5.1 Pre-construction site survey

As a precautionary measure to cover a potential timelapse between the AEE surveys and construction, a pre-construction vegetation survey of the solar farm site will be undertaken. This survey will be undertaken by a SQEP of botany and will target known habitats of Threatened and At Risk vascular plants within the site using (but not limited to) the following methods:

- Review most up to date aerial imagery of the site and identify any changes since AEE vegetation mapping was undertaken including sparely vegetated areas or rocky surfaces.
- Delineate target areas and print field maps.
- Undertake systematic walk-through survey of the site with detailed investigations within all the different habitats encountered and delineated target areas.

## 5.2 Monitoring design

To detect any effects of the solar farm on the adjacent dryland habitat a Before-After Control-Impact (BACI) design is required. This involves the monitoring of both the Impact site (potentially affected by the solar farm) and (if available) a Control site (expected to be unaffected, with all reasonable endeavours made to confirm a suitable control site).

The Control site helps to distinguish effects of the solar farm from other changes that may occur over time. Without a Control site, any natural changes occurring over time (e.g. due to changes in weather) or wider landscape trends could be mistaken for effects resulting from the solar farm. This subject is covered in detail in Section 5.3.2.

The monitoring will begin before the solar farm has been constructed so that:

1) The condition of the Impact site before solar farm is built can be determined (providing a baseline for comparison with the condition after construction); and
2) Any natural differences between the Control and Impact sites (unrelated to the solar farm) can be characterised before the construction begins.

## 5.3 Monitoring locations

Monitoring locations will be determined based on the results of the pre-construction site survey and exterior edge survey.

### 5.3.1 Exterior edge survey

If landowner consent is obtained, a Threatened and At Risk plant survey of the exterior edge of site will be undertaken by a SQEP of botany. This will be a systematic search, undertaken in spring/early summer, covering the exterior perimeter of the site, where panels are located within 100m of the site boundary, and up to 80 metres (from site boundary), targeting known habitats and previous records of Threatened and At Risk flora (including non-vascular plans and lichens) around the site using (but not limited to) the following methods:

- Review and collate previous records of Threatened and At Risk flora into digital data layer and load onto a handheld GPS device.
- Undertake systematic walk-through survey of the exterior of the site with detailed investigations within all the different habitats encountered.

- Navigate to locations of all previous Threatened and At Risk flora observations to confirm either presence or absence.

### 5.3.2 Control site survey

The recommended control site is the Department of Conservation (DOC)-managed Pukaki River Tekapo River Confluence Dryland Recovery Conservation Area, five kilometres to the west of the Nova Twizel Solar Site. This site is preferred because of its proximity and similar aspect. If landowner consent is obtained, this area should be surveyed for Threatened and At Risk plants (including locations of previous records) and vegetation habitats mapped to facilitate the selection of control site monitoring locations.

## 5.4 Vegetation monitoring surveys

The vegetation monitoring surveys will comprise qualitative and quantitative methods with two components:

- Qualitative walk-through surveys.
- Quantitative permanent transect-based surveys.

### 5.4.1 Qualitative surveys

Qualitative surveys will involve searching areas of high-value vegetation at the edges of the panel areas and noting any observable change. This will also include noting expansion or reduction of Threatened and At Risk plant distribution or density. Within the wider site, searches will be undertaken to determine if any additional pest plants or environmental weeds that were not previously detected at the site are present and warrant control. This will also help to identify potential garden escapees from Twizel.

### *5.4.2* Transect surveys

To monitor Threatened and At Risk plants and potential edge effects, permanent monitoring transects (with multiple quadrats) will be established perpendicular to the site boundary, running from the edge of the solar array footprint, across the periphery buffer zone (on site), over the exterior terrace edge and down the terrace riser (off site).

The upper end of the transect will be permanently marked with a steel waratah (or similar), and an accurate sighting compass used to record the bearing that points towards the terrace edge. Each transect will have a permanent photopoint at the start and end of each transects, taken 1.5 metres above ground. A measuring tape will run from the start of the transect along the bearing and a 1m$^2$ quadrat will be placed along the northern side of the tape, with quadrat spacing based on a log series (plots located at 0, 2, 6, 9, 13, 18, 22, 27, 31, 37, 42, 48, 53,60, 67, 74, 82, 90, 99, 110 metres along the transect from the waratah).

The percentage cover of all vascular and non-vascular plants and lichens up to 50 centimetres high (groundcover) will be recorded in each 1 m$^2$ plot. Percentage cover of all species >2 metres tall (i.e. tall shrubs) will be recorded in a 4 m$^2$ plot centred on the middle of the 1 m$^2$ plot. Data on all Threatened and At Risk plant species present within 4 m$^2$ plots will also be recorded, including:

- A photo showing condition of plant (for future compassion).
- General condition scored from 1–5 (1 being very unhealthy and 5 being very healthy).
- A GPS waypoint and plot diagram showing location of plant/s (within the plot).
- Immediate and potential threats (e.g. weeds, browse, human activities, no immediate threats).

- Management actions (if any).
- Three soil moisture readings (taken within each 1 $m^2$ plot).

A minimum of 15 transects will be established with at least 10 transects intersecting with recorded point locations of Threatened and At Risk plants in the southwest of the site with transects separated by a minimum of 10 metres. If the 4 $m^2$ monitoring plots along the transects fail to capture at least five of each Threatened and At Risk plant species known from the site or recorded during the exterior site survey additional transects will be added, although the 10-metre spacing will be maintained.

### *5.4.3* Control site survey

A minimum of five transects will be established in the control site. Locations will be selected following the establishment of the impact site transects, so that that control site transects are as environmentally similar (i.e. vegetation, slope, aspect, elevation range, etc.) as transects at the impact site. Control site transects will be established measured replicating the methods used at in the impact site. While the control site transects will aim to capture Threatened and At Risk plant species (if present), replicating environmental conditions of the impact site transects will take precedence and there will be no requirement to capture these species at the control site.

### 5.4.4 Timing

Monitoring transects will be established prior to work commencing at the site to inform baseline conditions. The first remeasure of the permanent plots and transects will occur one year after works begin at the site, with subsequent measurements occurring every three years after that, for up to 20 years.

## 5.5 Triggers and adaptive management

The vegetation monitoring will be used to determine whether current setbacks from Threatened and At Risk plants are effective, if edge effects are occurring because of the development and whether current management and pest plant control is effective. This will determine if changes to the site management including grazing and pest plant control methods are required and/or if changes to the solar array are required.

An adaptive management approach will be undertaken as there is residual uncertainty around how plant communities will respond to land use changes and a potential reduction in browse pressure from rabbits at the site and what specific factors (if any) will be contributing to any potential decline in Threatened or At Risk plant species at the site.

Specifically, if a detectable increase in pest plants and ecological weeds occurs, or if a trend of increasing dominance of pasture grasses is observed, Nova will ensure additional control effort occurs at the site. Similarly, if a new ecological weed or pest plant occurs at the site and is not being managed, Nova will ensure contractors are aware of the issue and will control the spread of the plant.

If an outward spread of exotic grasses, ecological weeds or a decline in Threatened or At Risk plants is detected in data gathered from the permanent vegetation monitoring transects and/or a decline in Threatened or At Risk plants is observed by the ecologist during qualitative surveys, a response will be triggered in accordance with the conditions of the resource consent. This response will comprise one or more of the following actions:

a) Compare and analyse transect data from the impact and control site for directional environmental trends.

b) Additional days will be spent monitoring the pest plants, depending on the nature of the decline in Threatened or At Risk plants. The length of the additional monitoring period will be determined by the ecologist informed by the nature and extent of the decline.

c) If the cause of decline is obvious, for example pressure from pest plants, then additional control will be undertaken as soon as reasonably practicable, and before the decline becomes worse.

d) If the cause of decline is less obvious, or an outward spread of exotic grass and weed species from the panel area into indigenous dryland areas is detected, further investigation determined by the ecologist will be undertaken, likely including consultation with DOC and/or engaging a consultant who specialises in dryland plants and management to determine the best course of action.

e) The results of further investigations will inform management measures to address the decline or halt the spread of exotic grass and weed species into dryland habitats, if it is determined to be caused either directly or indirectly by the land use change. This could include a range of measures, such as:

   i. Additional pest plant/ecological weed or exotic grass management.
   ii. Additional pest animal management.
   iii. Changing the sheep grazing regime.
   iv. Restriction of operational tracking panel angle/s on rows close to boundary (to reduce shading effects)
   v. Decommission/remove panels at edges (to increase setbacks).

f) As each measure is implemented, additional monitoring will be undertaken to assess the success of the measure in addressing the issue and the need for additional measures. Monitoring methodology and timeframes will depend on the effect and management and will be determined on a case-by-case basis. If external parties are involved (i.e. DOC or other consultants), monitoring methods and time frames will also be consulted on. If there is no evidence that management has been effective, further investigation and management will be undertaken.

g) The results of monitoring will also inform an assessment of whether the vegetation plant survey methodology and control measures set out in this BVMP need to be updated. An assessment will be undertaken at the end of each three-yearly monitoring period to determine whether any changes need to be made to the BVMP.

## 5.6 Photopoints

The establishment of photopoints throughout the site will help to track changes to the site over time. Ideally, the photopoints will help to demonstrate that the interventions outlined in previous sections have been working and no extensive spread of pest plants or ecological weeds has occurred.

Photopoints are photographs taken at regular intervals at the same location. They are aimed in the same direction and thus have the same composition. This allows relatively slow processes, such as plant growth and changes to habitats, to be monitored over time. Photopoints are simple to interpret and are therefore ideal for monitoring in situations where it is desirable to track changes in vegetation over any timeframe. Once a series of photopoint photographs have been recorded over several years, any incremental but substantial changes can easily be seen. This means that photopoint photographs are a suitable method to document changes to vegetation.

### 5.6.1 Creating Photopoint Pictures

Photopoints are easy to establish, following some basic principles:

- Select a photopoint taken from a location marked by a solid object such as a gate or fence post that is not likely to be moved. Mark the photopoint location for easily locating the site in the future and record the coordinates of the location on a topographic map, with a GPS unit, or as a sketch.
- Select a frame that will show the item of interest or that you think will be suitable to document change at the site. Make sure it is a frame that can easily be repeated in the future and that will enable the perspective to be maintained over the years. This can be achieved by including a significant object in the picture such as a large, long-lived tree, a fence or stream along one edge, hills or buildings in the background, or a fence post or gate.
- Time for taking the picture. Pictures should be taken annually on the same date each year (or as close as possible to the annual date), and at the same time of day. Minimising shadows is desirable to obtain a good quality picture and so, if possible, take the photograph on overcast or cloudy days rather than sunny days.
- Retaking photographs. When repeating your photopoint, take a copy of your last photograph with you to confirm the location and frame. Retaking photographs is relatively easy if you set up a simple frame the first time with a long-term reference point in the centre or edge of the frame. Take a minimum of two to three photographs at each photopoint and label each photograph with the location and date taken.

Photopoint pictures do not provide quantitative data, but the images can be used to intuitively show the changes occurring at a site and can be linked to descriptive information.

Six locations throughout the site have been identified as potential locations for establishing photopoints (Figure 2). Photopoints in the west of the site should be taken from the scarps and raised areas to provide a good overview of the site. A selection of points has been suggested throughout the centre of the site (Figure 2). Additional photopoints can be established to capture areas with higher value indigenous biodiversity at the site.

Photopoints are taken and reviewed annually. The main purpose is to demonstrate trends over time. However, it is possible that severe weed invasions could be detected from reviewing photopoints. If this is the case, an adaptive management response will be triggered, and additional pest plant control effort will be undertaken. Photopoints are unlikely to detect changes in Threatened or At Risk plants at the site, however, if the photopoints raise any concerns, further investigation will be required and the triggers and adaptive management outlined in Section 7.1 will be followed.

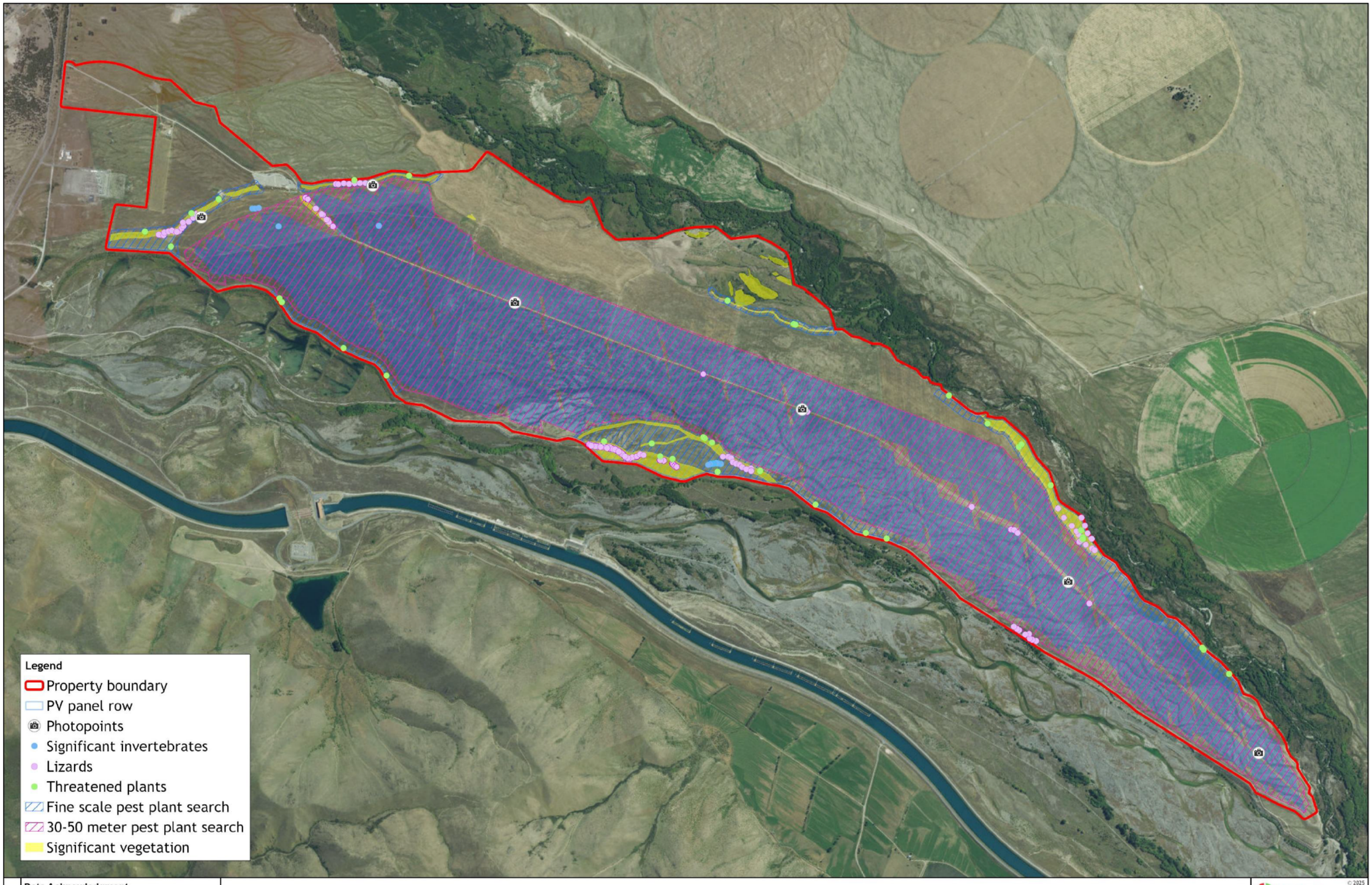


Figure 2. Pest plant search area and photo point locations

# 6.0 Biosecurity Management During the Development Phase

## 6.1 Biosecurity checks

Biosecurity checks and biosecurity cleaning of vehicles should be part of the Standard Operating Procedures (SOP) when moving vehicles between locations. Checks should be made that vehicles are not being used in locations where pests (not already present on site) or other unwanted organisms are known to be present. The use of machinery and tools onsite risks the introduction of seeds of weeds not already present being transported to the site. For example, dirty tools or mud on tracks and tires could transport weeds to the site. All machinery used during works shall be checked and cleaned of debris and exotic pest species (weed) seeds prior to commencing works.

Vehicles and tyres should be checked and cleaned when vehicles are coming from outside of the Mackenzie Basin. Cleans and checks should also be undertaken if vehicles have been working in areas with pests not already present at the site. Details on the distribution and risks posed by pests and other organisms within the region are managed by Environment Canterbury (ECan) through its Biosecurity programme and the CRPMP. The Official New Zealand Pest Register (ONZPR) managed by the Ministry for Primary Industries (MPI) also has the most up to date information about pests and disease-causing organisms in New Zealand.

## 6.2 Local materials

Gravel will likely need to be sourced for the establishment phase of the solar farm, for example building access roads. Gravel and soil will contain seeds and other potentially harmful organisms. If gravel or fill is brought in from far away, then there is an increased risk of introducing novel pest plants and other pathogens that are not already present at the site which could threaten the ecological values present at the site. Gravel should be sourced as locally as possible. Gravel extraction has occurred on the site, and if possible, using gravel from the site would be preferable. Alternatively, gravel should be sourced from as close to the site as possible, ideally from within the Mackenzie Basin, from a site free of Russel lupin.

## 6.3 Eco sourcing plants

The Lizard Management Plan (Wildland Consultants 2025), Invertebrate Management Plan (Wildland Consultants 2025), specify the planting of indigenous vegetation at the site. The transport of plants to the site from other areas has the potential to introduce additional pest plants or pathogens not currently present on the site. This poses a potential threat to the ecological values at the site and therefore where possible, plants should be eco-sourced from the local area.

Eco-sourcing is the propagation of indigenous plants from seeds (or sometimes cuttings) that have been collected from naturally occurring indigenous vegetation within the same ecological district (in this case the Pukaki Ecological District). The aim is to collect seed from as close to the planting site as possible to ensure that local genetic traits are maintained. However, the Pukaki Ecological District contains a limited number of eco-sourcing sites and it recommended that wider Mackenzie Basin area, which includes Pukaki, Ōmārama and Tekapo Ecological Districts is used for eco-sourcing to ensure the best quality dryland sites are used for gathering plant material, while still protecting the unique ecology of the Mackenzie Basin. The use of locally adapted plants will also help to maximise the survival rates of the restoration plantings.

# 7.0 Biosecurity Management During the Operational Phase

Biosecurity management during the 'operation phase' of the solar farm will require similar considerations to those outlined in the previous section relating the development phase. Protocols developed around cleaning vehicles and machinery during the development phase will still need to be followed. Additionally, monitoring and surveillance of pest plants and ecological weeds at the site will need to occur, as described in more details in the following section.

# 8.0 Summary of Biosecurity and Vegetation Management and Timing

The requirements for biosecurity and vegetation management throughout the duration of the project are summarised in Table 3. During the predevelopment phase, baseline vegetation surveys will be undertaken, and vegetation transect monitoring and photopoints will be established, before work on the site commences. Biosecurity controls and will also need to be established prior to work commencing at the site. Through the development phase, vegetation monitoring will commence and all machinery (including vehicles) should be checked and cleaned and any plants of materials being used at the site should be sourced locally.

Throughout the operational phase, vegetation monitoring will continue and biosecurity protocols and spill and fire management protocols will need to be followed. Any additional materials or plants bought to the site during the operational phase should be sourced locally. Pest plant control should be undertaken every three years starting one year after site establishment begins. Vegetation monitoring surveys should be undertaken every three years from the date of the initial survey. Photopoint monitoring is to occur annually.

**Table 3 –** Summary of biosecurity management procedures to be undertaken throughout the development and operational phases of the solar farm development.

| Action | Timing |
|---|---|
| **Predevelopment Phase** | |
| Baseline vegetation surveys (exterior edge of site and control site) | Spring/summer prior to the commencement of works |
| Select transect monitoring locations (impact and control site) | Spring/summer prior to the commencement of works |
| Establish permanent transect monitoring (impact and control site) | Spring/summer prior to the commencement of works |
| Pre-construction site survey | Prior to the commencement of works |
| **Development Phase** | |
| Qualitative walk-through vegetation surveys | Spring/summer, one year after works begin at the site |
| First remeasure of permanent transect surveys | Spring/summer, one year after works begin at the site |

| Action | Timing |
|---|---|
| Establishment of biosecurity controls and checks in Sections 4 and 5 of this management plan to control and prevent pest plant incursion. (This means ensuring all people working on the site are familiar with when and how to undertake biosecurity checks and cleans) | Controls and protocols established prior to works commencing at the site and throughout development. |
| Check/clean all machinery | Throughout development- in a dedicated area for machinery arriving onsite. |
| Eco sourcing and using local materials | Ongoing - whenever materials or plants are introduced to the site. |
| Establishment of spill and fire management protocols | Controls and protocols established prior to works commencing at the site and followed throughout development. |
| Establishment of photopoints | Establish before work commences onsite. |
| **Solar Farm Operational Phase** | |
| Biosecurity controls | Continue to follow biosecurity controls and management protocols outlined above throughout the operational phase. |
| Pest plant control and monitoring | Control to be undertaken every three years, commencing one year after development begins. |
| Qualitative walk-through vegetation surveys | Spring/summer, undertaken every three years, following the first remeasure (at year one). |
| Permanent transect monitoring surveys | Spring/summer, undertaken every three years, following the first remeasure (at year one). |
| Photopoint monitoring | Photopoints are retaken annually. |

# 9.0 Conclusion

The site contains a number of ecological values, including Threatened and At-Risk plants, birds, lizards and terrestrial invertebrates and wetland habitats, previously detailed by Wildland Consultants 2023. The potential for edge effects on ecologically significant indigenous dryland habitat adjacent to the site and the introduction and spread of pest plants and ecological weeds, have been identified as a key threats to the biodiversity values present at the site. The biosecurity protocols and vegetation monitoring set out in this management plan need to be implemented from prior to the commencement of works on the site. During development and operation phases, vegetation monitoring (and if required management) will need to be ongoing. Biosecurity risk will need to be managed through following protocols, cleaning and ensuring materials and plants are sourced locally. Pest plant monitoring and control should be undertaken every three years once work has begun on site with a particular focus on woody weeds and the protection of Threatened and At-Risk plants on and around the site.

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