Review of Helios Solar Farm Ecological Assessment

Contract Report No. 7661

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Wildlands

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Contract Report No. 7661

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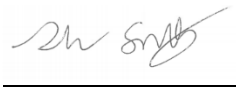

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1.0 Introduction

Central Otago District Council (CODC) is processing an application for a proposed grid-scale solar farm on rural land between Ranfurly and Naseby (hereafter known as Helios Solar Farm). An ecological assessment (Boffa Miskell, 2023) provided as part of the application identified several wetlands on the site. CODC has requested Wildlands undertake a site visit and a peer review of the ecological assessment.

The ecological impact assessment was reviewed by Wildlands staff. The review checked for information gaps, whether appropriate methods were used, and whether appropriate conclusions have been reached.

2.0 Review of the Ecological Impact Assessment

2.1 Introduction

The background effectively captures all relevant contextual information for the project.

The purpose and scope clearly set out the goals of the ecological impact assessment and set clear boundaries for the scope of the work.

Figure 1 clearly shows the proposed solar farm layout, although the legend is too blurry to read. The figure caption notes that a full-resolution version of the image is available in the Assessment of Environmental Effects (AEE).

Figure 2 provides good examples of typical mounted PV modules, including height ranges of the solar panels, row spacing, and solar panel width.

2.2 Proposal description

The description of the proposal is well written and comprehensive. It includes all pertinent information needed for assessing the potential ecological effects associated with development of the solar farm.

The proposed setbacks are appropriate.

The proposed screening planting was developed with input from Boffa Miskell ecologists to ensure appropriate species were selected. Where possible, the individual plants should be eco-sourced to ensure plant tolerance to local conditions.

The report states that sheep grazing will continue on site, which will remove the need for grass mowing and weed management. While sheep are an efficient tool for managing some weeds, the use of them for complete weed management will not likely be sufficient, and manual or chemical control may still be required in the future, depending on weed establishment and growth following construction.

The report states that, upon decommissioning, the solar farm site will be returned to its original condition. This is unlikely to be feasible, as permanent changes will have been made to the site's ecology and hydrology during operation. Restoration plantings and regrowth of indigenous vegetation should also be retained following decommissioning rather than restoring these areas to pasture, as they will be providing ecological values including habitat for indigenous fauna.

2.3 Project shaping

Minimum five-metre buffers from the edge of wetlands were proposed in the report, stating that a blanket application of 10-metre setbacks was considered but it would not benefit the wetlands. Ten-metre setbacks are considered standard and best practice (the National Environmental Standards for Freshwater state a 10-metre setback from natural wetlands for vegetation clearance and earthworks). Additionally, overseas research indicates that the lake effect (whereby solar panels close together can appear to be a pond or lake to aquatic/ semi-aquatic bird species) results in increased bird strike risk (Smallwood, 2022; Visser et al., 2019). To minimise this risk, we recommend considering a 10-metre setback from wetlands on site, at least for some of the larger wetlands while noting that this is not a statutory requirement in this instance. It is also noted that 10-metre setbacks are already proposed for the largest two wetlands, which is appropriate.

2.4 Methods

2.4.1 Terrestrial vegetation and habitats

A desktop assessment on terrestrial ecology values was undertaken and used appropriate resources. Two Boffa Miskell ecologists undertook an initial survey of terrestrial and wetlands vegetation and habitats across the site on 12–15 June 2023. As acknowledged in the report, this is an inappropriate time of year to conduct a vegetation survey in Otago, as many annual species will not be present, and therefore indetectable.

The methods used to survey the site are considered appropriate and standard practice.

A second survey was undertaken on 16–19 October 2023, however the focus of this survey was avifauna and wetland vegetation and habitats. While this is a more appropriate time of year for vegetation surveys, species would likely have gone undetected as the focus was primarily on wetland habitats and vegetation, rather than the wider terrestrial vegetation at the site. It is possible that searches for these plants were made outside of the wetland delineation plots during the October field surveys, but no such searches are mentioned in the application.

Appropriate wetland delineation protocols were used during the second survey.

A Wildlands ecologist undertook an independent survey of the site on 17 June 2025. The weather was fine, clear, and frosty. Ideally, this survey would have taken place in spring or summer, but timing was constrained by the review deadline.

Based on comparisons between the provided report and the Wildlands site visit, the wetlands and streams appear to have been thoroughly and accurately identified and mapped. Areas of fence line and shrubs are well mapped. Some shrubs were notably heavily browsed.

The plant species list is consistent between the site visits, and no additional species were observed.

The northeastern corner of the site (outside of the solar farm footprint) has the highest ecological values with extensive and diverse shrublands. The northern half of the fence line along back Road also has notable indigenous shrubs.

To date, it appears that no terrestrial vegetation survey has been undertaken in an appropriate time of year when annual species are detectable.

2.4.2 Lizards

A standard desktop assessment for lizards has been undertaken, using the Department of Conservation (DOC) BioWeb Herpetofauna Database to assess lizard records from the area.

No dedicated lizard survey (e.g. using survey equipment or thorough manual and visual searching) was undertaken.

2.4.3 Terrestrial invertebrates

No desktop or field assessment for terrestrial invertebrates has been undertaken. The report states that no habitat is available on-site for terrestrial invertebrate assemblages. This is not necessarily true, as the indigenous shrubs and wetlands on-site are likely to provide habitat for indigenous invertebrates, and herbfield and dryland environments on-site may be used by the high number of indigenous moth species that are present in the local area, including within Ranfurly and Naseby. Dry grassland and dryland environments are also important for other indigenous invertebrates such as grasshoppers and ground beetles. Even small habitat patches can be valuable to invertebrates.

2.4.4 Avifauna

Avifauna surveys have been undertaken thoroughly, using appropriate industry-standard methods. Avifauna surveys consisted of:

- A thorough desktop survey using appropriate sources.
- A nesting bird survey during October, when At Risk species such as tōrea/South Island pied oystercatcher, pīhoihoi/New Zealand pipit and pohowera/banded dotterel are likely to be nesting. The track log from the survey is not available and the area covered is unclear.
- Twenty-minute point counts, recording all indigenous species and their behaviour from four locations on-site. These point counts were carried out twice in one day which helps to account for temporal variation in bird behaviour.
- Five-minute bird counts (5MBCs) from 12 locations representing different habitats on-site, providing good coverage of the site.
- Incidental observations.

While a track log for the nesting bird survey would be a useful addition, it is not necessary due to the coverage of area and habitat types from the other survey methods.

2.4.5 Assessing Ecological Significance

The report accurately identifies the three statutory significance assessment criteria that are relevant to the site[1]. The significance of the terrestrial communities and habitats present at the site cannot be fully assessed against these criteria as vegetation surveys were not appropriately conducted and a lack of lizard and invertebrate surveys despite potentially suitable habitat being present on the site.

2.4.6 Evaluation of Ecological Effects

Ecological effects were evaluated using the Environment Institute of Australia and New Zealand's (**EIANZ**) EcIA guidelines (Roper-Lindsay et al. 2018), which is considered acceptable. However, we note that the EcIA guidelines are non-statutory and under review, and any evaluations using the guidelines should be sufficiently supported with ecological evidence.

[1] Schedule 4 of the Partially Operative Regional Policy Statement 2019 (**POORPS**; Otago Regional Council, 2021)
• Appendix 2 of the Proposed Otago Regional Policy Statement 2021 (**PrORPS**; Otago Regional Council, 2022)
• Appendix 1 of the National Policy Statement for Indigenous Biodiversity 2023 (**NPS-IB**;Ministry for the Environment, 2023a)

2.5 Existing ecological environment

2.5.1 Ecological Context

The background ecological context provides a comprehensive overview of the Māniatoto Ecological District, including historic and present vegetation, geology, and landforms. Notably, the Site is identified to be within a land environment where <10% indigenous vegetation remains nationally (Cieraad et al., 2015). Therefore, any remaining biodiversity should be protected.

2.5.2 Vegetation and Terrestrial Habitats

The report states that all indigenous vegetation is along fence lines, and lists several species listed as At Risk – Declining. Since this report was submitted, threat statuses for several indigenous species have been revised. Tūmatakuru / matagouri, previously At Risk – Declining, no longer holds a threat status (de Lange *et al.* 2023).

The report assesses the exotic pasture areas as moderate for rarity and distinctiveness, on the basis that "*the Site supports indigenous species that are nationally At Risk and occur on a landform on which <10% indigenous vegetation remains nationally*" but then classes the exotic pasture as a whole as negligible for ecological value. This assessment may undervalue the importance of the indigenous vegetation on site – as while it may be sparse, it may act as stepping stones for avifauna, lizards, and invertebrates, in addition to holding its own intrinsic value.

2.5.3 Wetland Habitats

The central and southwest wetlands and several small wetlands were assessed and delineated during an appropriate time of year, and therefore the assessment of the wetlands is considered thorough and accurate. The report acknowledges the presence of constructed farm ponds and correctly states they are not considered wetlands. We agree that the central and southwest wetlands are of moderate ecological value, and agree that a 10-metre buffer is appropriate to protect the wetlands from solar farm activities.

2.5.4 Threatened, At Risk Plants, or Locally Uncommon Plants, and Ecological Value

We agree with the assessment that At Risk – Declining species are of high ecological value. As stated above, the threat status of matagouri has been reduced from At Risk – Declining to Not Threatened.

It is possible that indigenous species with a national At Risk or Threatened status were undetected due to the timing of the survey, despite the highly modified and heavily grazed nature of most of the site. It is possible that searches for these plants were made during the October wetland delineation surveys, but no such searches are mentioned in the application. Assuming such searches were not made, then a supplementary survey to detect possible indigenous annual plants is recommended to be conducted in spring, prior to consent being granted.

2.5.5 Avifauna

Birds observed on-site were primarily exotic species, as expected for inland pasture-dominated sites. However, 12 indigenous species were confirmed on-site:

- Spur-winged plover (*Vanellus miles*; Not Threatened)
- Tōrea/South Island pied oystercatcher (SIPO) (*Haematopus finschi*; At Risk – Declining)
- Kāhu/Australasian harrier hawk (*Circus approximans*; Not Threatened)
- Poaka/pied stilt (Himantopus himantopus leucocephalus; Not Threatened)
- Pūtangitangi/paradise shelduck (*Tadorna variegata*; Not Threatened)
- Karoro/southern black-backed gull (*Larus dominicanus dominicanus*; Not Threatened)

- Kawaupaka/little shag (*Microcarbo melanoleucos brevirostris*; At Risk – Relict)
- Kuruwhengi/Australasian shoveler (*Anas rhynchotis*; Not Threatened)
- Tētē-moroiti/grey teal (*Anas gracilis*; Not Threatened)
- Pohowera/banded dotterel (*Anarhynchus bicinctus*; At Risk – Declining)
- Pīhoihoi/New Zealand pipit (At Risk – Declining)
- Riroriro/grey warbler (*Gerygone igata*; Not Threatened)

These are widespread, common species in the Otago region. Spur-winged plover and karoro are not protected, though all other indigenous birds on-site are either Partially Protected or Absolutely Protected under the Wildlife Act (1953).

We agree with the assessment that poaka and SIPO are likely to nest on-site, but pohowera may also possibly nest on-site due to their occasional habit of nesting on farmland in inland areas.

2.5.6 Lizards

We agree with the described likelihood of occurrence for each lizard species included in the desktop assessment, with the addition that southern grass skink (*Oligosoma* aff. *polychroma* Clade 5; At Risk – Declining[1]) are considered to be tussock skink (*Oligosoma chionochloescens*; At Risk – Declining) due to recent taxonomic changes[2].

The report states that during the site visit an assessment of habitat suitability for lizards was undertaken, that no lizard habitat was identified within the solar farm footprint, and that based on this habitat assessment no detailed lizard survey methods were undertaken. The report further states that no lizards are expected to occupy the solar farm footprint, though southern grass skink (tussock skink) and McCann's skink (*Oligosoma maccanni*; Not Threatened) may possibly (low likelihood) be present within the larger central and southwest wetland areas at the site, which are outside the works footprint. However, during a site visit on 17 June 2025, Wildlands identified small areas of apparent potential lizard habitat within the solar farm footprint, all associated with young shelterbelts within the southern half of the site footprint. These contained areas of dense grass and small shrubs, with each shelterbelt approximately three metres wide (Plates 1-3). It is considered that these areas could potentially support habitat for indigenous lizards, specifically tussock skink and McCann's skink. These areas of shelterbelts do not appear to have been explicitly assessed within the report. The site plan appears to show that these shelterbelts will be retained, however.

[1] National threat classifications for lizards from Hitchmough at el. (2021).

[2] Tussock skink is a recently described species (Jewell 2022) derived from a taxonomic split of southern grass skink. Populations previously attributed to southern grass skink in the majority of eastern and Central Otago, including south of the Hawkdun Range in the area around the proposed Helios Solar Farm site, are now considered to be tussock skink. Tussock skink has not yet been attributed a national threat classification but is likely to be attributed a threat classification of 'At Risk – Declining', the same as southern grass skink.

Plate 1 – Shelterbelt with dense grass and shrubs within the proposed Helios Solar Farm footprint. 17 June 2025.

Plate 2 – Shelterbelt with areas of dense grass within the proposed Helios Solar Farm footprint. 17 June 2025.

Plate 3 – Shelterbelt with areas of dense grass within the proposed Helios Solar Farm footprint. 17 June 2025.

Otherwise, we agree that the rest of the solar farm footprint, based on the habitat description, is unlikely to support indigenous lizards, though they could possibly be present in the larger wetland areas.

2.5.7 Terrestrial invertebrates

A brief look at local records on iNaturalist revealed significant Lepidoptera diversity in the local area, including species believed to be declining (e.g. New Zealand blue butterfly, *Zizina oxleyi* and New Zealand red admiral, *Vanessa gonerilla*). Other indigenous taxa found in the area include sheetweb spiders (*Cambridgea* sp.), bees (*Leioproctus fulvescens*), and ground beetles (*Megadromus curtulus*). Important pollinators, herbivores, parasitoids and predators were all recorded within five km of the site. Many of these species are dependent upon particular habitat types or plant species to survive.

The habitat present on-site is mostly low value to indigenous invertebrates, as grazed exotic pasture does not provide the food or shelter needed by invertebrates adapted to indigenous habitats. However, the wetlands, patches of shrub, drylands and herbfields and exotic and indigenous trees may support indigenous invertebrates. *Muehlenbeckia*, *Aciphylla,* and *Carmichaelia* spp. are all valuable food sources for moths and beetles which are found locally. Small populations of indigenous invertebrates are highly likely to be on-site and supporting functioning communities. An invertebrate field survey would be needed to assess invertebrate communities on-site and potential effects.

2.5.8 Freshwater values

The freshwater ecological values were not assessed at the site as it is understood that no works in waterways are anticipated or proposed. A quick assessment of the New Zealand Freshwater Fish Database (Stoffels 2022), shows that approximately two kilometres downstream of the site, there are recent (2017) records of Otago roundhead galaxiids (*Galaxias anomalus*), which are a Nationally

Endangered species (Dunn *et al.* 2017). If the waterways onsite provide fish habitat, then these species may be onsite.

2.5.9 Summary of Ecological Values

The table showing the summary of ecological values is well presented, but we disagree with the conclusion that exotic grasslands/cropland (pasture) and small wetlands should be considered negligible. While this may be true, it cannot be concluded to be so until appropriate lizard and invertebrate surveys have been undertaken.

2.6 Ecological significance

We agree with the conclusion that the site meets ecological significance under the POORPS, PrORPS, and NPS-IB criteria. However, the site may meet additional criteria if lizards or notable invertebrates are present, which would require lizard and invertebrate surveys to fully assess.

2.7 Assessment of ecological effects

2.7.1 Vegetation and Terrestrial Habitats

The loss of indigenous species cannot be accurately assessed as no vegetation survey was undertaken during an appropriate season, and therefore annual indigenous species may not have been detected.

Should no other indigenous species be found during a vegetation survey at an appropriate time of year, then we agree with the assessment that the magnitude of effect for the loss of indigenous vegetation would be considered moderate at the site, with a high level of impact.

Where possible, indigenous shrubs should be avoided, rather than relying on remediation. Long-lived established shrubs provide habitat for indigenous lizards and invertebrates, and their removal could result in losses to these populations as well.

2.7.2 Wetlands

If the wetlands are retired from grazing, fenced, restored, and the setbacks outlined in the report are followed, then we agree there will likely be a net gain level of effect for wetland values at the site.

We agree that there will likely be no hydrological effects to wetlands as a result of the solar farm construction and operation.

2.7.3 Avifauna

The assessment of effects on avifauna is comprehensive. We generally agree with the effects identified, although we add that nesting habitat for pohowera may also be potentially compromised by development. Removal of indigenous vegetation will temporarily reduce habitat availability, but birds will be able to use higher-quality habitat off-site until habitat is restored on-site.

We have some concern regarding kawaupaka breeding in nearby riparian vegetation, as a 10 metre setback is likely inadequate to avoid disturbance during the breeding season, which can extend until May for this species.

A major effect of the solar farm on avifauna is solar panel strike, which is considered a **negligible** magnitude of effect. We consider this effect may be higher, due to the likelihood of kārearea/eastern falcon (*Falco novaeseelandiae*; Threatened – Nationally Vulnerable) striking the solar panels, and the lake effect potentially impacting water birds including kawaupaka. Research overseas has found

impacts on closely-related species from solar panel strike (Smallwood, 2022; Visser et al., 2019). We recommend the magnitude of effect be raised to **minor**.

2.7.4 Lizards

No assessment of effects on lizards was undertaken, based on lizards being considered to not be present within the solar farm footprint.

2.7.5 Terrestrial Invertebrates

No assessment of effects on terrestrial invertebrates was undertaken, as indigenous invertebrate assemblages were considered not likely to be on-site.

Removal of indigenous vegetation (particularly *Carmichaelia, Aciphylla* and *Muehlenbeckia* spp.) will likely be detrimental to invertebrates on-site, even though they are being replanted, as establishment will not be immediate and mature plants are of greater value to invertebrates due to the amount and complexity of habitat and food that they provide. Invertebrates currently using the vegetation will also be killed along with any eggs or larvae therein. Over most of the site, invertebrate values are likely to be very low, but within pockets of indigenous vegetation there may be important populations of locally-endemic, Threatened or At Risk species. There are likely to also be other effects on invertebrates from the development, but these cannot be quantified without a field survey.

Nevertheless, it is noted that very few individuals of *Carmichaelia*, *Aciphylla* and *Muehlenbeckia* spp. are within the development footprint. Most individuals of these species are either in the northeastern corner or along the eastern fence line along Ranfurly Back Road; avoidance of vegetation clearance in both areas is important to reducing effects on invertebrates.

2.7.6 Freshwater

Because no works in waterways are proposed and works would be set back by a minimum of 10 metres from all streams and water races, we agree that the current proposal would have no adverse effects to waterways. The main concern is loose fine sediment entering the waterway during the earthworks, but this will be mitigated by standard sediment control measures. We also agree that if work is required to upgrade or create any new waterway crossing, then additional resource consents should be sought, and if the work involves disturbing the stream bed or bank then a fish survey should be conducted to assess the need for a fish management plan.

2.7.7 Summary of Assessment of Effects on Terrestrial Ecology Values

The summary of assessment of effects on terrestrial ecology values is misleading, as it shows the magnitude of effect only for the largest scale used in above sections. While vegetation clearance may have a low level of effect at the ecological district scale, the level of effect for the site is stated previously as high.

The table should show the level of effect for the site, as that is what is relevant to the report. While the level of effect of this one project may be low on an ecological district scale, multiple projects with low effects will result in higher cumulative effects. Since assessing the cumulative effects of unrelated projects is beyond the scope of the provided report, the table should showcase the local (site-specific) level of effects. Additional columns could be included to outline the level of effect at wider scales.

2.8 Recommendations and residual effects

2.8.1 Recommendations

We agree that areas of the site should be remediated with indigenous shrubs, for the additional reason that this will enhance the quality of the habitat for lizards and invertebrates and therefore have a beneficial effect on any populations present on site or that disperse into the area following remediation. We further agree that ongoing weed release, survival monitoring and replacement of plants that do not establish/survive should also be undertaken to support plantings.

Additionally, predator control within wetlands on site targeting mustelids and cats may also be beneficial for lizards, though the potential for mesopredator release of rats and mice (significant lizard predators) makes the overall effects on lizards complicated to anticipate.

The removal of crack willow and common alder from the southwest wetland will greatly benefit the condition of the wetland, as will the suggested fencing and supplementary planting. Removal will need to be outside of the bird breeding season, and after May, unless a suitably-qualified ecologist can confirm that no kawarau are breeding in the trees to be removed.

2.8.2 Avifauna

No further surveys are needed. If works are to occur during the breeding season for most species (September-March), then an avifauna survey should be undertaken prior to works commencing to ensure nesting birds are not disturbed. Following the pre-construction avifauna survey, the setback from the rivers or any riparian vegetation where avifauna are breeding should be increased to 50 metres to avoid disturbing these birds.

2.8.3 Lizards

Lizard surveys should be undertaken by a suitably qualified and experienced herpetologist in areas of shrubland and rank grass associated with shelterbelts within the southern half of the site, unless these shelterbelts are being retained as part of the development. If the shelterbelts are being retained, then lizard habitat will not be affected by the proposed development and no survey would be required.

2.8.4 Terrestrial invertebrates

Effects on terrestrial invertebrates will need to be assessed after a field survey has been undertaken. The survey should include walkthrough transects using a sweep net, pitfall trapping and light trapping at a minimum.

2.8.5 Assessment of Residual Effects

We agree with the assessment of residual effects for terrestrial vegetation and avifauna, however invertebrate values at the site, and potentially lizard values, still require assessment.

2.9 Summary and conclusions

The summary and conclusions are generally sound and comprehensive. Again, there is a notable lack of discussion around lizard and invertebrate values.

2.10 Appendix 1: Further details – proposal description

Appendix 1 provides a well detailed description of the solar panel arrays and tracking.

2.11 Appendix 2: Further details – methodology

Appendix 2 clearly and accurately outlines the EIANZ EcIA guidelines.

2.12 Appendix 3: OSNZ squares

The OSNZ squares are provided in Appendix 3.

2.13 Appendix 4: Plant Species list and wetland plots

The species list is comprehensive and aligns with the species seen on site by a Wildlands ecologist in June 2025. However, it is potentially lacking annual species that were undetectable due to the timing of the survey.

The wetland plot table is comprehensive and accurately states whether plots were identified as wetlands. Rapid tests, prevalence index tests, and pasture exclusion appear to all be accurately applied.

2.14 Appendix 5: Vegetation map and wetland plot location map

The vegetation and wetland plot location maps are clear and easy to understand. They appear to be comprehensive.

2.15 Appendix 6: Site context map

The site context map clearly shows the site location.

2.16 Appendix 7: Full avifauna species list

The species list provided is comprehensive and we do not anticipate additional species being present at the site.

3.0 Landscape Management Plan

The proposed mitigation package includes a Landscape Planting and Maintenance Plan. One of the objectives of this plan is to provide visual screening along parts of the site boundary. These plantings would include an extension of the existing conifer shelter belts along Ranfurly-Naseby Road with more exotic conifers, and dryland indigenous plants along Ranfurly Back Road.

The plan proposes that all plants are irrigated, weeds controlled for at least the first three years following planting, plant guards placed around all plants, and dead plants replaced in the following growing season. Domestic stock will be excluded from all planted areas. This is considered an appropriate management regime for the exposed dry site. If this regime is followed, establishment rates of over 85% would be expected to be achieved after five years.

The indigenous species proposed for the screening plantings are considered suitable for the site, and provide a good selection of plants naturally found in the wider area. Pot sizes are appropriate for the species; PB3 is suitable for shrubs, while the slightly larger PB6/6.5 size is important for the establishment of the taller-growing indigenous trees such as kōhūhū (*Pittosporum tenuifolium*), mānatu/lowland ribbonwood (*Plagianthus regius*) and kōwhai (*Sophora microphylla*).

Anticipated growth rates for the proposed species are provided in Appendix 1 of the plan. Growth rates of indigenous plants after five years can be highly variable in central Otago, reflecting subtle differences in soil moisture retention, exposure to wind, and speed of early root development. It can therefore be challenging to accurately predict early growth rates across a large site, and variability is inevitable. However, in general the expected heights at five years presented in the plan are considered to represent reasonable maximum heights for the species. Average heights may be slightly lower for some species, especially Coprosma spp. Achievement of these heights could be obtained with successful early establishment of plants, and thorough application of the proposed maintenance regime; without this, slightly lower early average height growth is considered likely. Regardless of early variability in growth, however, it is reasonable to assume that average plant heights close to those given in the plan would be achieved by the plantings after 5-7 years.

The mature plant heights presented in the plan are considered realistic maximums for the site.

4.0 Summary and Conclusions

Overall, terrestrial vegetation and habitats, wetlands, and avifauna were well-considered with appropriate management actions recommended. However, the vegetation survey was undertaken during winter, when annual plants would be undetectable. We recommend a walk-through survey is conducted during late spring to record any indigenous annual plants that may be present at the site, prior to consent being granted, unless the applicant can confirm that searches were made for such species during their October surveys.

No lizard survey was undertaken at the site, based on the site not being considered to support lizards. During the 17 June 2025 site visit by Wildlands potential lizard habitat was identified on site in several shelterbelts in the southern half of the site. If these shelterbelts are not being retained, then it is recommended that a more detailed lizard habitat assessment of these areas is undertaken, which may further require a dedicated lizard survey to better determine if lizards are present in these areas. Dependent on the results of a dedicated lizard survey, if lizards are present a Wildlife Act Authority (WAA) and associated Lizard Management Plan (LMP) may be required to address potential adverse effects on lizards in these areas. LMPs are designed to follow the effects management hierarchy and the principles provided by DOC in their *'Key principles for lizard salvage and transfer in New Zealand'* guidelines document (DOC 2019). We consider that for the species which are potentially present, if required a LMP should be able to appropriately address adverse effects of the proposed development on lizards. However, if the shelterbelts are being retained, no such lizard surveys or plans will be required.

We recommend a terrestrial invertebrate survey be undertaken prior to consent being granted.

As no works in waterways are proposed and works would be set back by a minimum of 10 metres from all streams and water races, we agree that the current proposal would have no adverse effects on waterways if standard sediment control measures are in place. If any work are to be conducted near (less than 10 metres) or within the waterways, then the waterways should be properly assessed for the presence of Otago roundhead galaxiids. If works are to be conducted during the breeding season for avifauna, and avifauna are found to be nesting along waterways or in riparian vegetation, then the setback should be increased to 50-metres. Alternatively, the works could take place outside of the breeding season to avoid disturbing nesting birds.

Acknowledgments

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