

Memorandum

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Attention: Sarah Brooks
 Company: Helios Energy Limited and Helios CAN Op LP
 Date: 5 February 2025
 From: Dr Jaz Morris (Senior Ecologist / Associate Principal)
 Message Ref: Grampians Station Solar Farm – Ecology – Preliminary Advice
 Project No: BM220390F

Background

Helios Energy Limited and Helios CAN Op LP (**Helios**) are proposing to establish and operate a solar farm on a ~574 ha site at Grampians Station, c.20 km from Takapō / Tekapo¹ township in Mackenzie District (the **Site**). The solar farm, located off Haldon Road and Mackenzie Pass Road, would include photovoltaic (**PV**) solar arrays, a battery energy storage system (**BESS**), and a substation. The proposed solar farm would be built on land leased from Grampians Station and connected into the national electricity transmission grid via connection to one of the two existing Transpower high-voltage transmission lines that cross the Site.

Helios has commissioned Boffa Miskell Limited (**Boffa Miskell**) to undertake surveys of the ecological values at the proposed solar farm site, and to provide ecological project shaping input on the solar farm layout to avoid and minimise potential adverse effects on ecological values. Helios has also commissioned Boffa Miskell to prepare a detailed Ecological Impact Assessment (**EclIA**) report (in preparation) to accompany future applications for the approvals required for the proposed solar farm.

The purpose of this memo is to outline the ecological surveys completed to date, summarise the findings and outcomes of the project shaping process, and to provide a preliminary, high-level description of ecological values and possible ecological effects of the proposal. Helios intends to include this memo in an application for Ministerial referral of the project for fast-track consenting under the Fast Track Approvals Act 2024.

The Project

The proposed development will consist of rows of bi-facial solar photovoltaic panels mounted on a ground mounted single axis tracking system. Additional associated electrical infrastructure and a substation will facilitate connection to the existing 220 kV Transpower overhead lines running through the project site. The solar farm will have a connection capacity of 300 MW. Energy storage facilities will be located in the centre of the site near to the substation. The proposal will include:

- Approximately 500,000 photovoltaic panels for the purpose of generating electricity to be supplied to the National Grid.
- Solar panel mounting structures (including a tracking system), and steel piles. The mounting frames will be located approximately 6-8 m apart (pole to pole) and the panels will have a maximum

¹ Where known, Te Reo Māori place names and species names, or dual names, are used throughout this document.

operational height of 2.8 m. The bifacial solar panels and associated infrastructure will cover approximately 25% of the site. Except for the new areas of planting, the remainder of the Site will remain as open grassed areas to enable the grazing of sheep.

- Associated components including inverters, transformers, and electrical cabling to connect the solar panel arrays to the substation.
- An operations and maintenance building, new and upgraded access tracks, parking and storage yard, fencing, and a security system.
- Energy storage facilities (BESS) providing approximately 100 MWh of storage capacity, located centrally within the site screened by an existing shelterbelt.
- A 220 kV substation located centrally behind existing shelterbelt, connecting the facility to the National Grid operated by Transpower. No new transmission lines are required.
- New and infill planting along existing shelterbelts, boundaries and native species enhancement of gullies and waterways.

Ecological Surveys Completed to Date

Since 2020, Boffa Miskell ecologists have completed seven separate visits to the Site to obtain information about the existing ecological environment. This has included surveys of vegetation, wetlands, and birds, and habitat assessments for lizards, terrestrial invertebrates, and freshwater habitats (see Table 1).

Table 1. Ecological investigations undertaken at the Site.

Survey	Date / Duration	Survey Type	Description
Vegetation and Wetlands	5-6 November 2020 / 2 days	Vegetation survey (<i>note</i> : undertaken in relation to a different land use proposal - engaged by the landowners directly)	Walkover survey to determine the presence / extent of indigenous vegetation and wetland habitats (<i>note</i> : this survey was undertaken in relation to a separate land use proposal but covered approximately 2/3 of the Site).
	28-30 March 2023 / 3 days	Vegetation survey and wetland survey / delineation	Walkover survey to determine the presence / extent of indigenous vegetation and wetland habitats within the Site.
Birds	5-6 November 2020 / 2 days (combined with vegetation survey)	Incidental observations during bird breeding season	Incidental observations of birds, including nesting birds, were recorded during a walkover survey for vegetation. See above.
	20 October 2022 / 1 day	Nesting bird survey and scoping survey	Scoping and walkover survey timed to coincide with the breeding season of At Risk ² indigenous species that could potentially nest on Site (tōrea / South Island pied oystercatcher (SIPO), pīhoihoi / NZ pipit, and pohowera / banded dotterel).
	28-30 March 2023 / 3 days (combined with vegetation survey)	Flight path monitoring and five-minute bird counts (5-MBCs)	5-MBCs were conducted at seven locations across the Site to provide context on both exotic and indigenous species present on Site and their relative abundances. Flight path surveys were timed to coincide with the migration periods for domestic migrant species (e.g., SIPO, banded dotterel, and ngutu pare / wrybill).
	1-2 August 2024 / 2 days	Flight path monitoring and 5-MBCs	As above.
	15-19 January 2024 / 5 days	Flight path monitoring and 5-MBCs, deployment of bioacoustic recorders	As above for flight path monitoring and 5-MBCs. In addition, three bioacoustic recorders were deployed to detect vocalisations of national migrant species potentially traversing across the Site at night on their northward migration.
Lizards	2-3 May 2024 / 1.5 days	Site walkover and habitat appraisal	Site walkover and habitat appraisal, visual survey, and hand searches for lizards within the proposed solar farm build area and setback areas.
Freshwater Fauna and Habitats	28 April 2023 / 0.5 days	Rapid Site walkover, habitat appraisal and eDNA collection	Site walkover and high-level habitat appraisal of waterways within the proposed solar farm setback areas within the Site, and collecting eDNA samples from two waterways.

² All references to nationally Threatened and At Risk species in this memo are based on the most recent threat assessments for those species, based on the New Zealand Threat Classification System (<https://nztcs.org.nz/>).

Summary of Ecological Values (Preliminary Findings)

Site Ecological Context

The Site is located c.20 km from Takapō and c.12 km from Burkes Pass in the Pūkaki Ecological District (ED) in the Mackenzie Ecological Region. The original vegetation of the ED was strongly influenced by recent glaciation, a harsh inter-montane basin climate and infrequent natural fires. By the time of European settlement, any forest cover had generally been removed by fires, and the district was likely dominated by short tussockland, tall tussockland, and scrub³.

The Site sits on a gently sloping landform at an elevation of c.580-620 m elevation between the Mackenzie River and Snow River fans, which drain Mackenzie Pass and Hakataramea Pass respectively. It generally comprises cultivated improved pastures on which the original indigenous vegetation cover has been completely removed. These areas are subject to routine farming practices including cultivation (e.g., direct drilling), cutting / baling, and cattle and sheep grazing. Narrow stream channels and wetlands have not been fully cleared of indigenous vegetation and support a small range of grazing-tolerant indigenous plant species.

The Site does not support any naturally uncommon ecosystems⁴. In terms of the Threatened Environment Classification⁵, the Site is within a land environment (N5.1a), where <10% indigenous vegetation remains nationally. This context means that any remaining indigenous vegetation at the Site is inherently of a relatively high priority for protection.

Vegetation and Wetlands

Terrestrial Vegetation

The proposed solar farm 'build area' (meaning areas covered by solar PV panel arrays, transformers, BESS, substation, etc.) within the Site entirely comprises improved pastures (exotic grasslands and short rotation cropland). Exotic tree shelterbelts and plantation areas of exotic conifers are present on the Site boundary or between paddocks; these are proposed to be retained for visual screening reasons. No parts of the build area meet the current Mackenzie District Plan definition of 'indigenous vegetation⁶.' Areas of indigenous vascular plant species were identified and excluded from the build area, including areas that comprise only very isolated / scattered indigenous shrubs or tussocks (see Figure 1).

Wetlands

Wetlands present at the Site comprise a number of generally narrow riparian / palustrine marsh wetlands occupying linear depression / channel features, including areas occupying / surrounding stream channels. All are modified by grazing and contain a generally simplistic flora typically dominated by exotic grasses and / or indigenous sedge species. Wetlands and their boundaries were determined using the Wetland Delineation Protocols⁷. All wetlands are avoided by the solar farm layout / construction, with at least 10 m setbacks (Figure 2).

³ Harding, M. A. (2009). *Canterbury Land Protection Strategy: A Report to the Nature Heritage Fund Committee*. Nature Heritage Fund, Wellington, 132 pp.

⁴ Williams, P. A., Wiser, S., Clarkson, B. R., Stanley, M. C. (2007). New Zealand's historically rare terrestrial ecosystems set in a physical and physiognomic framework. *New Zealand Journal of Ecology* 31(2): 119–128.

⁵ The Threatened Environment Classification is a combination of three national databases: Land Environments of New Zealand, Land Cover Database (Version 2) and the Protected Areas Network. The Threatened Environment Classification shows how much indigenous vegetation remains within land environments, how much is legally protected, and how the past vegetation loss and legal protection are distributed across New Zealand's landscape. See Walker, S., Cieraad, E., and Barringer, J. (2015). *The Threatened Environment Classification for New Zealand 2012: a guide for users*. Landcare Research, 27 p. Landcare Research New Zealand Ltd, Dunedin.

⁶ Following Consent Order [2023] NZEnvC 273 on Plan Change 18, we understand the current definition is: "a community of vascular plants, mosses and/or lichens that includes species native to the ecological district and many include exotic species."

⁷ See Ministry for the Environment (2022). *Wetland delineation protocols*. Ministry for the Environment, Wellington.



Figure 1. Mechanically cultivated exotic pastures typical of the Site, surrounding a dry 'channel' landform with matagouri shrubs. The channel feature and matagouri shrubs, and similar features elsewhere on the Site, are excluded from the build area. The build area is entirely exotic pastures that do not meet the definition of 'indigenous vegetation.'

Avifauna

Thirty bird species were observed during site visits, of which 15 were indigenous and 15 were exotic.

5-MBCs

- 1,411 bird observations were made during 5-MBCs including 12 indigenous and 14 exotic species.
- Unsurprisingly, based on the open, farmed habitats within the Site, exotic birds were common and made up 64% of all observations during the 5-MBCs. Thirty-six percent of all observations made during the 5-MBCs were indigenous birds; pūtangitangi / paradise shelduck and spur-winged plover (both Not Threatened) made up 89% of these observations. Two At Risk species (NZ pipit and SIPO) and one Threatened species (tarapirohe / black-fronted tern) were observed in low numbers.

Flight-path monitoring

- In total 484 indigenous bird observations were made during flight path monitoring.
- Two indigenous species were observed during the flight path monitoring but not 5-MBCs: kāmana / black swan (Not Threatened) and kārearea / eastern falcon (Threatened – Nationally Vulnerable). The most common species observed were spur-winged plovers, kāhu / harrier hawks, paradise shelducks, and SIPO; these species constituted c.89% of all observations of indigenous birds. Two NZ pipits (At Risk – Declining) were observed making short flights, and falcon were observed traversing and hunting. SIPO traversing the Site did not follow a defined route / direction but traversed the Site at random.
- The available data suggests that the Site does not form part of a notable flyway or migratory route for indigenous migratory bird species such as SIPO or banded dotterel, nor does the Site appear important for species such as black-fronted tern that often roam widely across pastoral areas.

Nesting bird survey

- Banded dotterels (not detected during the 5MBCs or flight-path monitoring) were observed during the survey but were not breeding. Based on survey results and assessment of the available habitats, it was concluded that the Site provides breeding habitat for small numbers of SIPO, and for spur-winged plover, but the Site does not provide nesting habitat for banded dotterel, NZ pipit, or falcon.

Other

- The bioacoustic analysis did not detect any calls of national migrant bird species or of any other additional bird species not already recorded on Site.
- Habitats on site lack complex concealing habitat suitable for cryptic wetland bird species such as Australasian bittern or marsh crane; it is considered unlikely these species visit the Site.

Summary

The most notable bird species observed at the Site are eastern falcon (one bird or pair is regularly present; not breeding at the Site), and the At Risk – Declining species SIPO (breeding), banded dotterel (not breeding), and NZ pipit (not breeding). Based on the data available, the Site does not appear to be an important foraging habitat for other Threatened species such as black-fronted tern, nor does it appear to form part of an important bird flyway or migratory route. Improving GPS transmitter technology is enabling new research on migratory New Zealand bird species, and we understand that some studies are currently underway in the wider Mackenzie Basin. This work is generally being undertaken by universities and the Department of Conservation (**DOC**). Prior to completing an EclA for any substantive consent application, and where possible, we will re-evaluate the findings above in the light of any new data available from such studies.

Herpetofauna

- The proposed solar farm build area does not support indigenous lizard species or lizard habitat, as it entirely comprises cultivated improved pastures and lacks indigenous vegetation. Regular cultivation and grazing means that the Site also lacks rank exotic grass habitats often used by skink species. Precautionarily, a small number of possible man-made lizard refugia habitats (slash piles and rock piles) have been excluded from the current solar farm layout.
- Within setback areas (within the Site but outside the build area), Southern Alps gecko and southern grass skink (both At Risk – Declining) were observed.

Terrestrial Invertebrates

- The proposed solar farm build area is likely of low ecological value for indigenous terrestrial invertebrates; it likely lacks intact soils including undisturbed soil horizons, lacks indigenous vegetation, and is subject to substantial ongoing pasture management and cultivation.
- Setback areas (within the Site but outside the build area) containing indigenous plant species (tussocks, shrubs, non-vascular species, etc.) and uncultivated soils are likely to support a greater diversity of indigenous terrestrial invertebrates.

Freshwater Fauna and Habitats

- Waterways including a water race and a natural stream are excluded and set back (>10 m) from the build area (Figure 2). eDNA surveys have been undertaken in the waterways, both of which go to ground west of the site and lack permanent downstream connections.

Overall Ecological Values and Ecological Significance

Ecological values for vegetation and fauna (other than birds) in the proposed build area are negligible. Exotic pastures in the build area are used at times by At Risk and Threatened bird species of high and very high ecological value respectively, but they are highly mobile, and the Site is not a notable habitat type, nor does it support large indigenous bird populations.

The proposed build area does not contain ecologically significant values based on Canterbury Regional Policy Statement (2013) ecological significance criteria. The overall Site (including setback areas) is considered to meet some ecological significance criteria, such as rarity criteria relating to the presence of, At Risk plant species and wetlands in setback areas. However, following relevant assessment guidance⁸, the presence of small numbers of highly mobile At Risk species such as SIPO in exotic pastures is not considered to meet significance criteria.

Project Shaping Process

Project Shaping – Solar Farm Layout and Setbacks from Ecological Features

The ecological surveys were carried out based on a draft solar farm layout prepared by Helios and its consultants. Following completion of these surveys, Helios and Boffa Miskell updated and refined the solar farm layout to achieve the following:

- Fully avoid areas of indigenous vegetation, wetlands (including 'natural inland wetlands')⁹ whether indigenous wetland species are present or not, waterways, and locations of potential lizard habitat.
- Implement minimum construction setbacks to avoid adverse effects. An example of setbacks adopted by Helios and incorporated into the updated solar farm layout are shown in Figure 2.

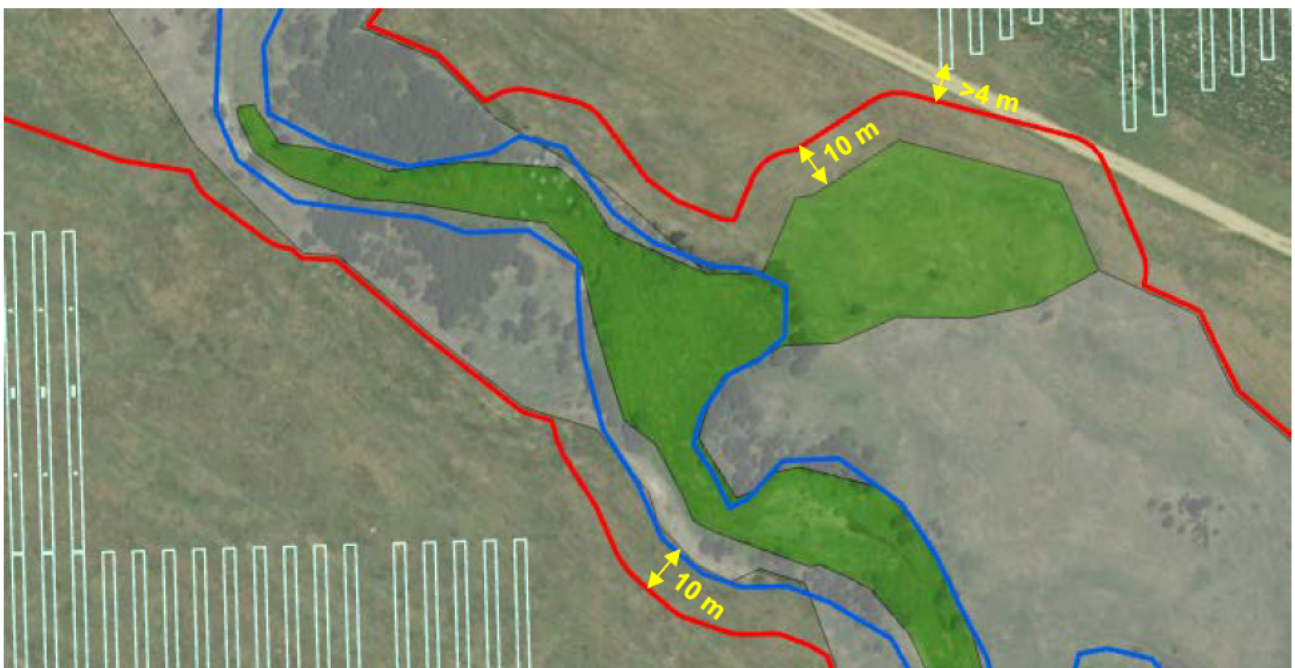


Figure 2. Indicative diagram of Site habitat mapping, solar farm setbacks, and recommended 'no build' area. The 'no build' area recommended to Helios by Boffa Miskell is depicted in red. This is based on wetlands (shaded green) and associated waterway channels¹⁰ (outlined in blue) buffered by 10 m, and indigenous shrublands (shaded grey) buffered by 1 m. Solar arrays would be located on improved pastures outside setbacks as depicted in cyan. Not to scale.

⁸ Wildlands (2013). *Guidelines for the application of ecological significance criteria for indigenous vegetation and habitats of indigenous fauna in Canterbury region*. Contract report 2289i prepared for Environment Canterbury.

⁹ As defined under the Resource Management Act 1991 and the National Policy Statement for Freshwater 2020 respectively.

¹⁰ Some stream channels support wetland vegetation, hence they have been inclusively mapped as both wetlands and waterways.

Project Shaping – Construction Methodology

Existing waterway crossings are used to access the Site for construction and operational vehicle access. Based on project shaping discussions, all underground cabling will be gathered at existing waterway crossing points. Methods for cable laying beneath wetlands and waterways will use Horizontal Directional Drilling (HDD), to avoid and minimise effects, rather than generally more impactful methods such as open trenching.

Engagement with Mana Whenua and Involvement During Ecological Assessments

Holders of mana whenua over the site include Te Rūnanga o Arowhenua who are represented by Aoraki Environmental Consultancy Limited (AECL). AECL representatives attended a pre-application meeting with Mackenzie District Council and Helios' project team and advisors on Site on 21 October 2022. AECL representatives attended part of the vegetation and bird survey in March 2023. During this visit, the survey methods and findings to date were discussed, as well as ecological enhancement opportunities and opportunities for mana whenua to be involved in enhancement work. AECL representatives were also invited to attend during a further bird survey in August 2023, but this was not possible due to winter driving conditions. Future engagement with and involvement of mana whenua in development of Site enhancement and ecological impact management measures is anticipated.

Summary of Preliminary Findings – Potential Ecological Effects

Vegetation

Vegetation clearance and indirect effects to vegetation: Areas of indigenous vegetation are avoided entirely. The solar farm build area is entirely exotic pasture; impacts to exotic pasture are not of ecological concern.

Enhancement works (positive impacts): Enhancement actions (to be detailed in future reporting) in setback areas support generally sparse / patchy indigenous species represent positive opportunities to improve existing conditions in these areas. Setback areas within the Site (approximately 70 ha) include two large corridors of wetland / shrubland habitat. Retiring these areas from grazing and undertaking indigenous planting using appropriately eco-sourced species would be beneficial.

Terrestrial Fauna (Excluding Avifauna)

Loss of fauna habitat / mortality: Because build areas of the Site lack lizard habitat, no adverse effects in terms of habitat loss for or mortality of indigenous lizards are anticipated. Neither lizard management nor a Wildlife Act Authority (permit) from DOC are unlikely to be required for the proposed project. Terrestrial invertebrate habitats within the build area are limited to exotic pastures that would remain similar following development, and on this basis negligible if any adverse effects to indigenous terrestrial invertebrate habitats are anticipated. Both lizard species and terrestrial invertebrates may benefit from enhancement actions in setback areas, where higher quality habitats for both are present.

Avifauna

Loss of foraging and breeding habitat: Whilst bird habitats at the Site are typical of exotic pastoral areas, the build area of the Site is used by species such as SIPO which will be unlikely to breed in developed areas of the Site following construction. Likewise, following construction, the Site is considered likely to be less suitable / attractive for banded dotterel or NZ pipit to forage in. Impact management measures in relation to loss of breeding and foraging habitat will be considered further in any substantive application.

Collision mortality: There is some evidence in overseas scientific literature that bird mortality can occur as a result of collision with large-scale solar PV panel arrays. It is hypothesised that birds, particularly migrating water and wetland birds, may perceive reflected light from solar panels as a lake or water body and attempt

to land on the panels, resulting in collision and injury or mortality¹¹. To our knowledge, no NZ solar farms have monitored or reported bird strikes. This is because most large-scale solar farms projects currently underway in NZ are in the planning phase, very few have been built, and for those that have been built, construction has only occurred very recently (in the last 1-3 years). Precautionarily, we consider that bird strike at the Grampians solar farm site cannot be entirely ruled out. Therefore, the EclA report will provide assessment of this possible impact for the bird species using and overflying the Site relying on international studies and the detailed bird data obtained for the Site. Notably, the data collected do not suggest that the Site is a notable hotspot or flyway for indigenous bird species. Nevertheless, and precautionarily, monitoring and / or impact management measures in relation to bird strike may be recommended.

Wetlands and Waterways

Waterway and wetland enhancement (positive impacts): All wetlands would be set back from construction works. Further, the solar farm proposal does not involve works in waterways, water abstraction, or changes to soil drainage / runoff patterns. Discharges from solar panels are direct runoff of rainwater only and are unlikely to lead to changes in the hydrological functioning of adjacent wetlands nor would this introduce contaminants to waterbodies. At this time, we consider that the proposal will have no significant adverse effects on wetlands, freshwater habitats, or species. Overall, fencing and enhancement works generally mean that the proposal is likely to be beneficial for wetland and waterway habitats.

Summary and Conclusions

- The layout of the proposed solar farm is based on detailed ecological investigations. Project shaping advice was provided to fully avoid construction works within (and impacts to) indigenous vegetation and habitats including wetlands and waterways.
- The build area of the solar farm therefore entirely comprises intensively managed cultivated exotic pasture and short-rotation croplands used for cattle and sheep grazing.
- The project avoids lizard habitat and important habitats for terrestrial invertebrates. While these fauna groups occur in setback areas within the Site, they are likely to benefit from anticipated ecological enhancement activities.
- Five bird surveys occurred across multiple seasons and multiple years, along with specialist lizard and freshwater habitat assessment. The Site supports a range of indigenous and exotic bird species, including small numbers of SIPO that use the Site for breeding. Findings from the bird surveys were typical of large, open, high-country farmland sites.
- Bird habitat loss and potential impacts of bird strike with solar panels are the main potential ecological impact of the solar farm proposal. However, the likelihood of bird strike for migratory species (which are thought to be the most vulnerable types of bird species based on overseas studies) is unlikely to be high, and more likely to be low, as the detailed flight path monitoring surveys conducted do not suggest that the Site forms part of any important flyways, migratory routes, or notable bird habitats. Monitoring and impact management for indigenous bird species may however be required, with recommendations to be provided in future detailed assessments.
- The project avoids works in waterways and wetlands; these areas are to be set back from construction works and enhanced. Where cables need to cross waterways or wetlands, construction methods such as HDD will be employed to avoid all works, including temporary construction works, in these habitats.

¹¹ E.g., Kosciuch, K., Riser-Espinoza, D., Gerringer, M., & Erickson, W. (2020). A summary of bird mortality at photovoltaic utility scale solar facilities in the Southwestern U.S. *PLoS One* 15 (4), e0232034.

Appendices

Appendix 1 – Additional Site Photo

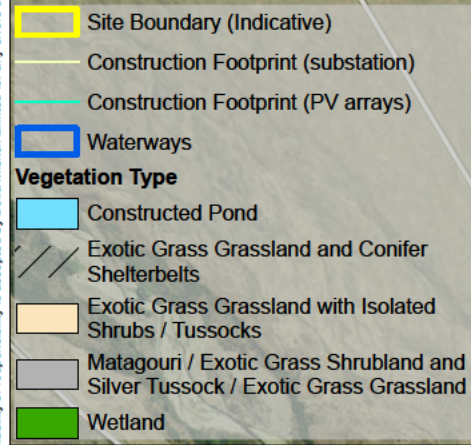
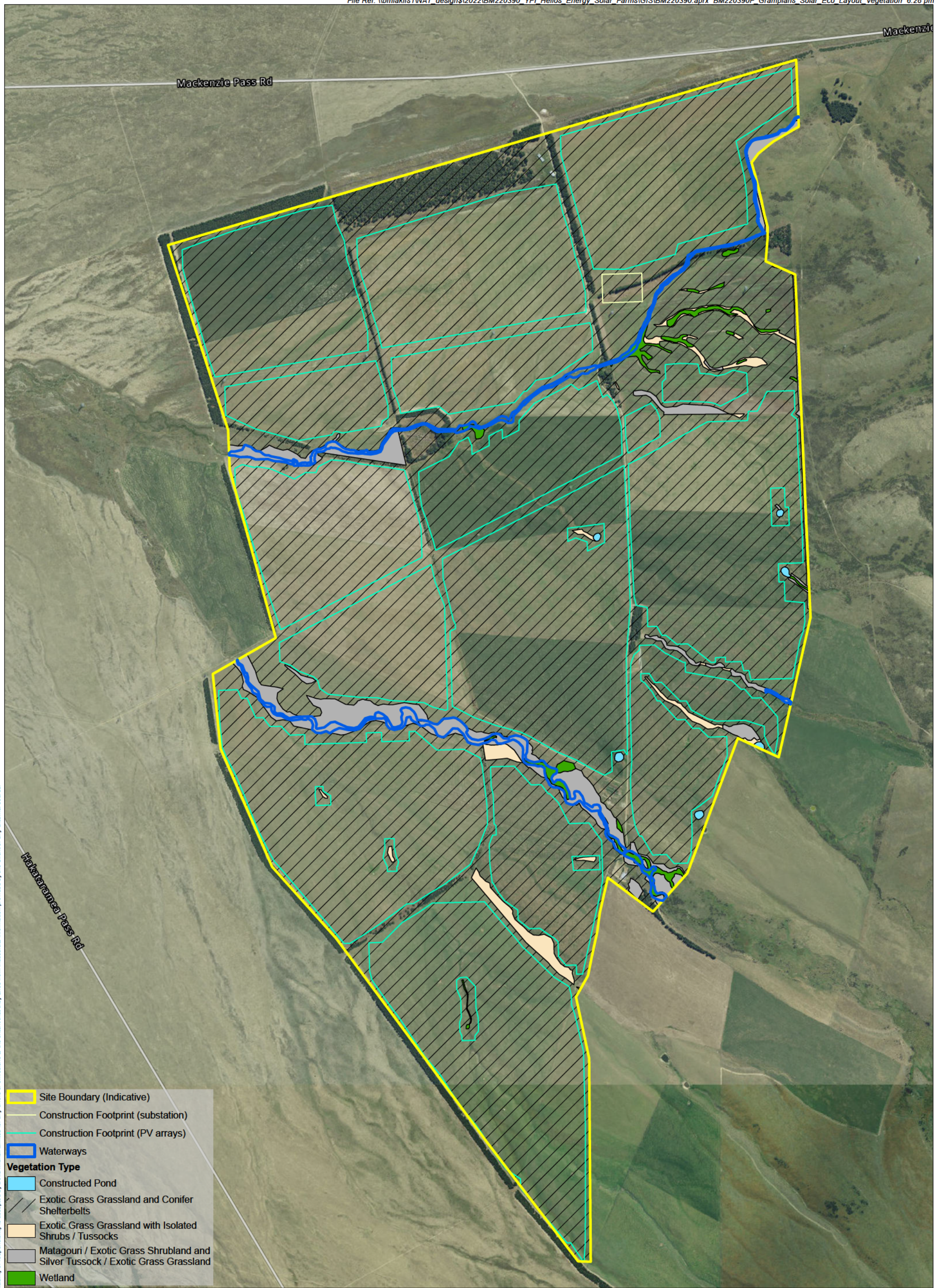


Figure 3. Typical exotic pasture at the Site.

Appendix 2 – Maps

(see overleaf)

This plan has been prepared by Boffa Miskell Limited on the specific instructions of our Client. It is solely for our Client's use in accordance with the agreed scope of work. Any use or reliance by a third party is at that party's own risk. Where information has been supplied by the Client or obtained from other external sources, it has been assumed that it is accurate. No liability or responsibility is accepted by Boffa Miskell Limited for any errors or omissions to the extent that they arise from inaccurate information provided by the Client or any external source.



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