WILLIAMSON
WATER & LAND ADVISORY

Assessment of Environmental Effects

The Point Solar Farm

FAR NORTH SOLAR FARM LTD

WWLA0631 | Rev. 1

30 June 2023

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Williamson Water & Land Advisory
not
P.O. Box 314
Kumeu
New Zealand
www.wwla.kiwi

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Contents

Appendices:

Glossary of Abbreviations

Term	Definition
AEE	Assessment of Effects on the Environment
AMP	Avifauna Management Plan
CLWRP	Canterbury Land and Water Regional Plan
CMP	Construction Management Plan
CTMP	Construction Traffic Management Plan
CVA	Cultural Values Assessment
DoC	Department of Conservation
EEP	Ecological Enhancement Plan
ERP	Emissions Reduction Plan
ESCP	Erosion and Sediment Control Plan
FTE	Full Time Equivalent
HAIL	Hazardous Activities and Industries List
HVDC	High Voltage Direct Current
LMP	Lizard Management Plan
MBIE	Ministry of Business, Innovation and Employment
MDP	Mackenzie District Plan
MW	Megawatts
MWp	Megawatts-Peak
NES – Freshwater	Resource Management (National Environmental Standards for Freshwater) Regulations 2020
NESCS	Resource Management Act (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
NES-ETA	National Environmental Standards for Electricity Transmission Activities 2009
NPS-HPL	National Policy Statement for Highly Productive Land 2022
NPS-REG	National Policy Statement for Renewable Electricity Generation 2011
PV	Photovoltaic
REG	Renewable Energy Generation
RGMP	Robust Grasshopper Management Plan
RMA	Resource Management Act 1991

1. Introduction

1.1 Overview

This Assessment of Environmental Effects (AEE) report has been prepared on behalf of Far North Solar Farm Ltd (the Applicant). The AEE supports a resource consent application to Mackenzie District Council for the construction and operation of a 420 megawatts-peak (MWp) photovoltaic solar farm at Section 3 SO 384036 (the site) located in the Mackenzie Basin. The proposed solar farm is for utility-scale renewable energy generation, which will be connected to the local BENMORE-ISLINGTON line substation for supply into the national electricity network.

The Applicant requests that this application be publicly notified.

This report has been prepared by Williamson Water & Land Advisory Ltd (WWLA) in fulfilment of section 88 of the Resource Management Act 1991 (RMA).

1.2 Applicant and Property Details

Table 1. Applicant and property details

Applicant	Far North Solar Farm Ltd
Legal Description	Section 3 SO 384036
Record of Title	509805
Owner of application site	Douglas Robert McIntyre, Waitaki Trustees (Golden Acres Limited)
Occupier of application site	Far North Solar Farm Ltd
Site area	968 ha total site area (work area is approximately 670 ha)
Councils **Plans**	**Mackenzie District Council** Mackenzie District Plan 2004 **Environment Canterbury** Canterbury Land and Water Regional Plan
Address for service during consent processing	**Williamson Water & Land Advisory** Attention: Laila Alkamil Email: s 9(2)(a) Ph. s 9(2)(a)
Address for service during consent implementation and invoicing	**Far North Solar Farms Ltd** Attention: Richard Homewood Email: s 9(2)(a) Ph: s 9(2)(a)

We attach the relevant Record of Title in **Appendix A** and the prescribed application forms in **Appendix B**.

1.3 Overview of Resource Consent Requirements

Resource consents are sought from Mackenzie District Council under the following rules of the Mackenzie District Plan 2004 (MDP):

- **Rule 1.5(e)** – Any other utility not specifically listed as a Permitted or Discretionary activity as a discretionary activity;
- **Rule 3.4.5** – Non-farm buildings and extensions of these buildings outside of a defined Farm Base Area within the Mackenzie Basin Subzone High Visual Vulnerability area as a non-complying activity; and

- **Rule 4.3.1** – Any earthworks or tracking which are not provided for as a Permitted or Controlled Activity as a discretionary activity.

Overall, resource consent is sought from Mackenzie District Council as a **non-complying** activity.

1.4 Consent Duration

Resource consent is sought for a duration of 35 years.

2. Electricity Supply Network

Secure and reliable electricity is critical to the economic, social, environmental and cultural well-being of Canterbury's people and communities. As New Zealand's population continues to grow and the nation aims to reduce its emission targets, greater demand is placed on renewable sources of electricity. This section sets out an overview of the Applicant's involvement in solar farm development, the country's current electricity portfolio and the current challenges facing renewable energy generation (REG).

2.1 Applicant's Involvement in the REG Sector

The Applicant is one of the largest developers of solar farms in New Zealand. They currently hold resource consents which authorise the construction and operation of four solar farms in the North Island, with construction planned to commence at various stages throughout 2023.

This experience and ongoing work allows the Applicant to understand the issues and solutions concerning solar farm development in rural and semi-rural areas. Based on this, the Applicant has developed a specific site-selection criteria for how suitable sites are chosen, based on the available grid connection and National Grid capacity, visual screening and landscape features, topography, irradiance, and site features.

2.2 Overview of New Zealand's Electricity Portfolio

2.2.1 Electricity Generation

The majority of New Zealand's electricity is provided via hydroelectric schemes. Currently, there is 5,000 Megawatts (MW) of installed hydro capacity, most of which is located in the South Island[1].

Geothermal generation has previously been an integral party of New Zealand's electricity portfolio, with most of the country's installed capacity situated in the Taupo Volcanic Zone. Currently, geothermal makes up approximately 15% of New Zealand's electricity generation.

Wind generation is also forming an important source of electricity generation, with this currently making up approximately 5% of the country's electricity.

The remainder of New Zealand's electricity portfolio is comprised of coal, oil and gas – which provides baseload, backup and peak electricity supply.

For further information, refer to **Figure 1** below.

[1] https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/electricity-statistics/

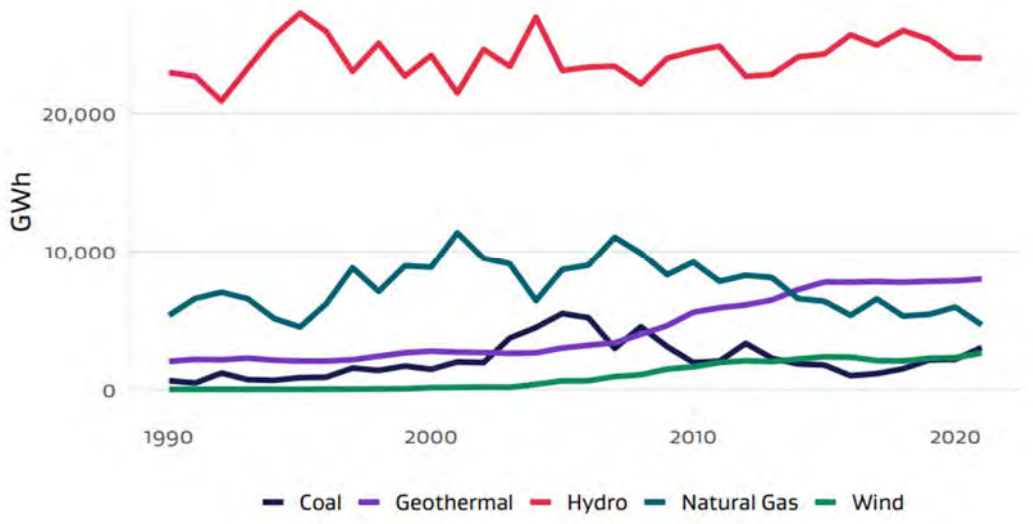


Figure 1. Electricity generation by major source. (Source: MBIE, 2022).

2.2.2 Electricity Demand

According to the Ministry of Business, Innovation and Employment (MBIE)[2], approximately a third of New Zealand's demand is from households and a third is from industrial sectors. The majority of industrial electricity demand is from the wood, pulp, paper and printing sectors and the basic metals sectors, with the Tiwai Point aluminium smelter being the largest single user of electricity in the country. Electricity demand is expected to increase substantially with the advent of electrification driven by the need for decarbonisation. Whilst 40% of all energy came from renewables in 2022 this will need to increase to 100% by 2050 if New Zealand is to meet its goal of carbon neutrality. Additional demand growth is also expected from electrification of process heat and transport, as well as new growth sectors such as the Meridian South Island Hydrogen, Electrification of NZ Steel Arc furnaces, as well as multiple recently-announced new data centres. This demand growth will need to be met with a substantial increase in renewable energy.

Alongside this, residential electricity consumption continues to grow. In 2021, this increased 1.5% compared to 2020 and 3% compared to 2019. Electricity and natural gas consumption follows a seasonal pattern which peaks in September – with consumption in the September 2021 quarter being the highest recorded since reporting started in 1990. On 9 August 2021, New Zealand saw its highest ever peak electricity demand which was coupled with insufficient available electricity generation. This resulted in wide-spread interruptions that affected more than 34,000 households[3].

2.2.3 Emissions Reduction Plan

On 16 May 2022, the Government released New Zealand's first Emissions Reduction Plan (ERP), which sets out the objectives, policies and actions required for meeting the country's emissions budget (which covers 2022 to 2025). The ERP also sets out the direction for how future emissions budgets will be met and how New Zealand will contribute to efforts to limit global temperature rises to 1.5 Celsius above pre-industrial levels. Chapter 11 of the ERP outlines New Zealand's direction for reducing emissions in the energy and industry sectors. With these sectors making up just over a quarter of New Zealand total's gross greenhouse gas emissions, decarbonising them will be vital to achieving the country's emissions budget.

However, the impacts of climate change on hydro storage is impeding New Zealand's ability to rely on this renewable energy source. In 2022, hydro storage and inflows were below the 90-year average for the first half

[2] Ibid.

[3] https://www.mbie.govt.nz/dmsdocument/23550-energy-in-new-zealand-2022-pdf

of the year, due to dry weather conditions from La Nina weather patterns. This, in addition to low natural gas production, resulted in a 29.5% increase in coal use for electricity generation[4].

As a result of this, the Government has signalled that significantly more REG is needed to support New Zealand's electricity network, taking into account population growth and impacts of climate change on the capacity of hydro storage[5].

[4] Ibid.

[5] https://www.mbie.govt.nz/have-your-say/renewable-electricity/

3. Environmental Setting

3.1 Site Location and Description

The site is located within the Mackenzie Basin and in close proximity to Lake Benmore, which has important implications for electricity transmission (see **Figure 1** below). The site is accessed off State Highway 8, east of the Twizel River and via a 7 km gravel farm track through the Bendrose Farm.

The site is relatively flat pastoral land, with the surrounding area dominated by other rural land uses. The entire site is classed as “improved pasture” under the MDP.

There are no identified natural hazards on the site, including no fault lines or flood prone areas. A review of the Mackenzie District Council’s GIS Viewer indicates no HAIL[6] activities on the site.

A centre pivot irrigator is located to the north of the site. Other farming infrastructure within the site includes water tanks and sheds associated with the pivot irrigator, sheds, water tanks, containers for storage along the northern boundary of the site, temporary storage of hay bales, farm fences and farm tracks.

A National Grid transmission line and its associated support structures extend north to south through the approximate centre of the site. This transmission line extends north from the Benmore Dam Power Station northeast to Te Waipounamu / the South Island.

[6] Hazardous Activities and Industries List.

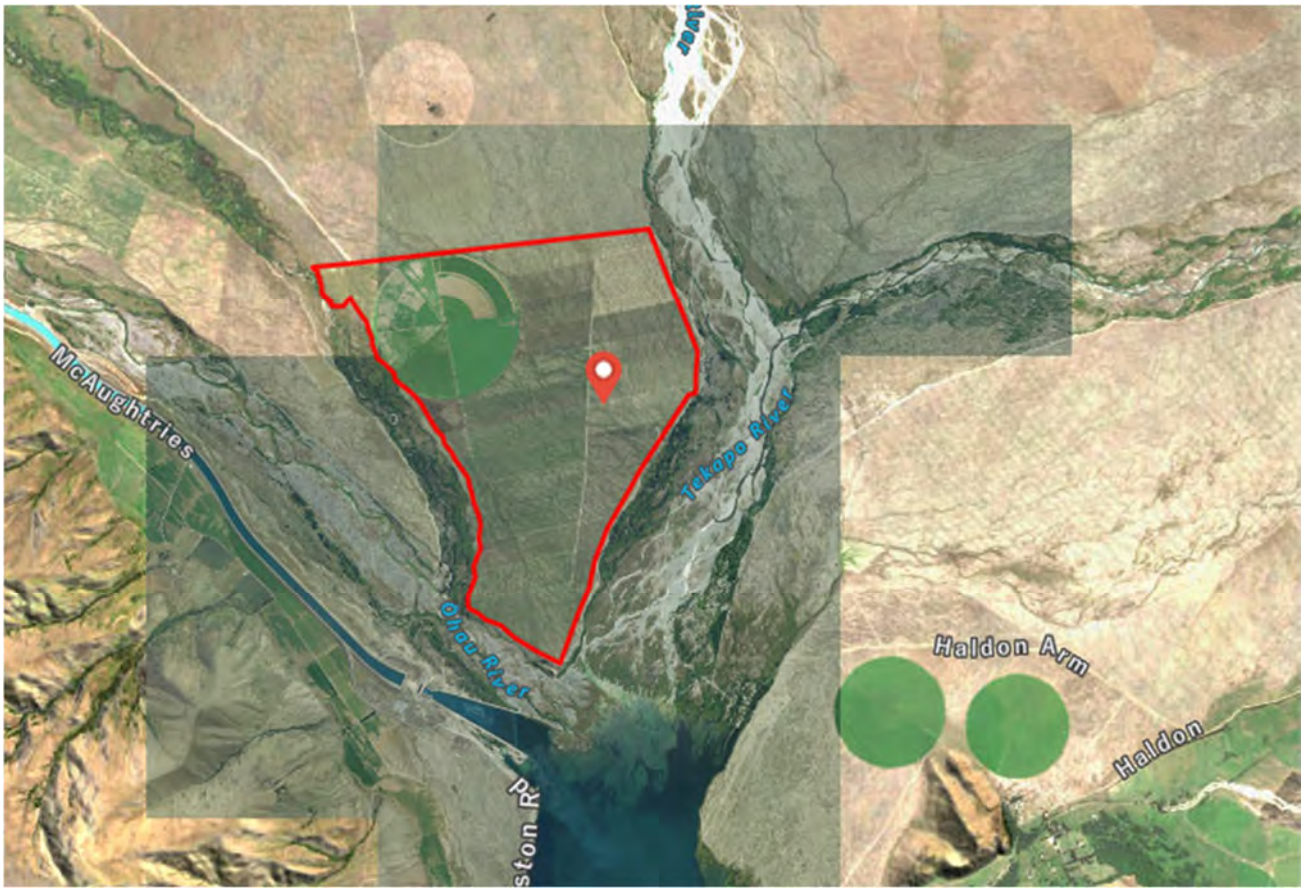


Figure 2. Site plan (property boundary shown in red). (Source: Mackenzie District Council, 2023).

3.2 Geology and Soils

The soil on the site is described as consisting of stony silt loam to sand loam textured brown (upland and high country yellow brown earth) soils in low (500-900mm) rainfall inland areas with a potential for slight to moderate wind erosion[7]. The soil on the site is classed as having a Land Use Capability (LUC) of 6, indicating non-arable soil with slight to moderate limitations to pastural use[8] (refer to **Figure 2** below). Therefore, the National Policy Statement for Highly Productive Land 2022 (NPS-HPL) does not apply to this site.

[7] According to information obtained from Manaaki Whenua Landcare Research: https://ourenvironment.scinfo.org.nz/maps-and-tools/app/Land%20Capability/lri_luc_main

[8] Ibid.

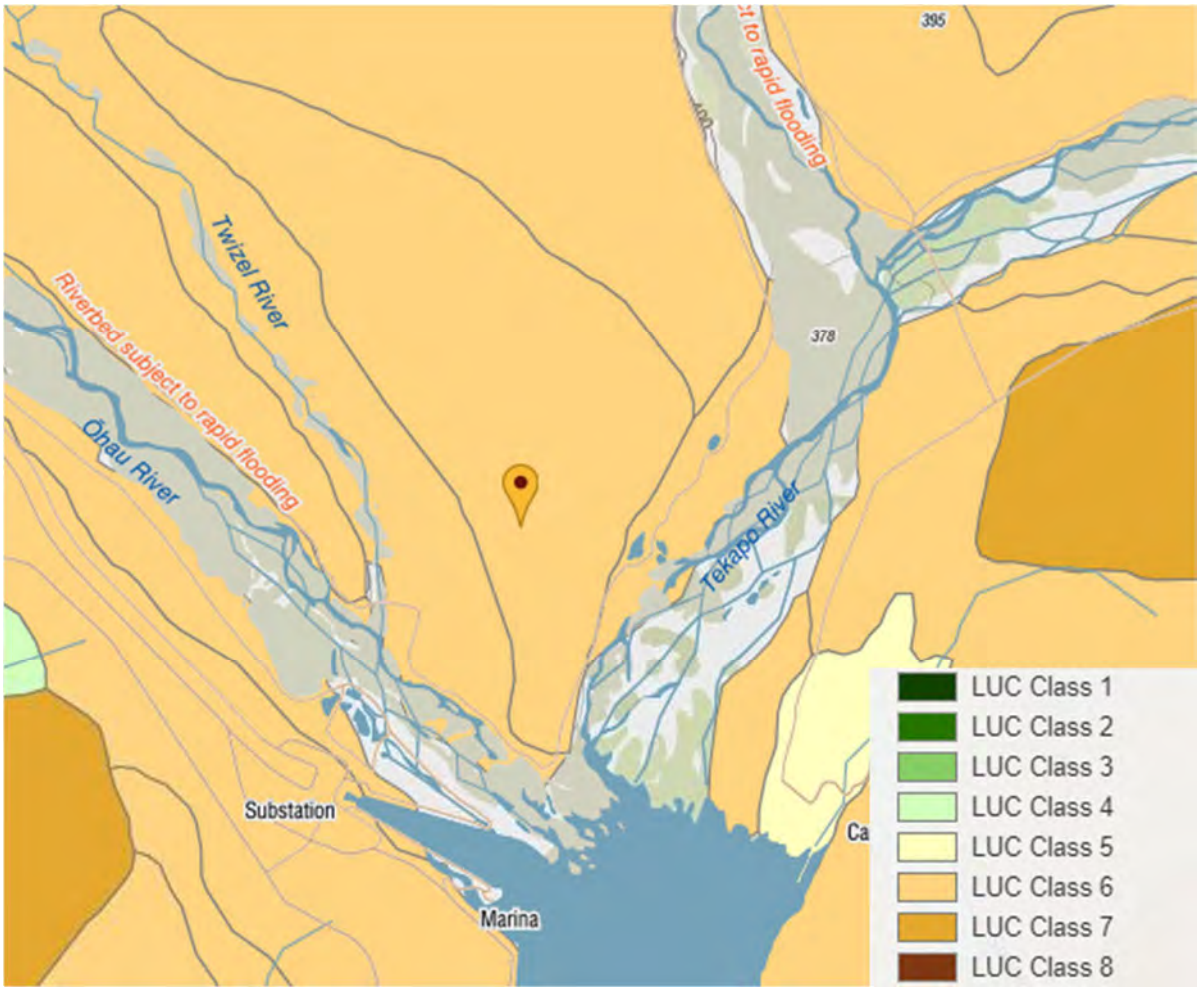


Figure 3. LUC Map (site location indicated by pin). (Source: Manaaki Whenua Landcare Research, 2023).

The geology of the site is described as *Late Quaternary*, consisting of unconsolidated to poorly consolidated mud, sand, gravel and peat of alluvial and colluvial origin[9].

3.3 Archaeology and Cultural Heritage

A review of the NZ Archaeological Association 'ArchSite' database has been undertaken and there are no known archaeological features registered on the site. Accidental Discovery Protocols will be followed in the unlikely event an archaeological site is discovered through the course of the works.

Mana whenua have been approached and it is expected that a Cultural Values Assessment (CVA) is likely to be prepared to inform the knowledge of the culture values of the site (refer to **Section 8.2** for further details).

3.4 Landscape Values

A Landscape and Visual Assessment has been prepared for the proposal and is attached as **Appendix C**. The below sections summarise information contained in that assessment.

[9] Information retrieved from https://data.gns.cri.nz/geology/

3.4.1 General setting

The Mackenzie Basin subzone in which the site is situated has been identified as an Outstanding Natural Landscape (ONL) in the MDP.

Its distinct landscape character stems from its uniqueness, wildness, colouring, openness of the vast basin landscape enclosed by the encompassing mountain ranges, and legibility.

At a broad scale, the outstanding physical, perceptual and associative values of the Mackenzie Basin stems from:

- Its distinctive Mackenzie Country landscape character with its unique, natural and visual qualities of the high-mountain basin environment;
- Its unspoiled openness and vastness and the long open views to the Southern Alps and other mountains encircling the basin;
- The highly legible landscape features throughout the basin, including the moraines, roches moutonnée, valleys, terraces, fans, and outwash plains;
- The high degree of aesthetic and experiential values afforded by the highly legible, glacially derived basin and expansive sky, large river valleys and enclosing mountains, the scenic outlook over Lake Pukaki and Lake Tekapo with their vivid turquoise blue water colour, the golden tussock-laden slopes which surround the basin and transient values contributed to by seasonal weather and vegetation colour; and
- The high degree of shared and recognised values that are evident through inspiration works by artists and writers, being nationally important for tourism, astronomy and the plentiful recreational opportunities that are provided.

At a local scale, the site adds to most of the above-mentioned landscape values. However, the outwash plain that the site is situated on is not unspoiled. This is because the land cover consists of a centre pivot irrigator and is used for grazing stock (e.g. the greening effect has occurred on site), despite the site being classed as an ONL.

The outwash plain that the site is situated on displays a moderate degree of perceptual values and a moderate degree of associate values. Even though these landscape values are not deemed as high as the wider area, they add to the landscape values of the wider area.

3.4.2 Visual Catchment

The site, much like the majority of the land within the Mackenzie Basin, is privately owned and views of and access to the site and from its perimeter are difficult to gain. The exception to this is a gravel four-wheel drive track which wraps around the east, south and western boundaries of the site and affords users views over the site and the braided Tekapo, Ohau and Twizel Rivers alongside.

Due to this, the site when seen from most public places forms part of the expansive views over the Mackenzie Basin. As the site is predominantly devoid of built form, it contributes to the unspoiled openness and vastness of the Mackenzie Basin and the long open views to the Southern Alps and other mountains encircling the basin.

From desktop analysis and on-site investigations, the site is visible from the below mentioned public places:

- State Highway 8.
- The Alps to Ocean Trail.
- McAughtries Road.
- Falston Road.
- Haldon Road.
- Haldon Arm Road.

- Lake Benmore.
- The Benmore Range.
- Ben Ohau.

Additionally, the site may be seen from numerous large farming properties located alongside these public places and the Lake Benmore – Ohau C, Benmore Views, and Falstone Campgrounds.

3.5 Ecological Values

Wildlands has undertaken an assessment of the terrestrial ecological values of the proposed solar farm site. Their report is provided in **Appendix D** and is summarised in the following sections.

3.5.1 Overview

The site is located between the lowest reaches of the Tekapo and Twizel Rivers. The Tekapo River discharges into the head of Lake Benmore, a human-made hydro lake, immediately adjacent to the east of where the Ohau River also discharges into the lake. The Twizel River flows into the Ohau River about 1 km upstream from the lake.

The site is low-lying flat land, comprising the low interfluve between the Tekapo and Twizel Rivers. As such, the site is underlain by alluvial gravels. The lower reaches of the Tekapo and Twizel Rivers are both braided systems, with a line of low eroded cliffs on the edges of the river channels.

The site is located in the Pukaki Ecological District, which is characterised by dry outwash plains between Lakes Tekapo and Benmore, mostly below 600 m above sea level. The Ecological District was historically typified by extensive red tussockland, replaced at altitude by snow tussock. Pasture now occupies much of this Ecological District, with some tussocklands and areas of scrub remaining. Grazing by sheep and rabbits have significantly affected grasslands.

In terms of the wider area, the Lake Rautaniwha Conservation Area is adjacent to the subject site, and is made up of several separated sections. One of these sections primarily lies along the Twizel River, on the western side of the site. The Ben Ohau Conservation Area and adjacent Pukaki Flats Conservation Area are located 7 km north of the site. There are hard tussock grasslands to the east of the Twizel River. There is also the Glenbrook Conservation Area approximately 8 km to the southwest of the site.

In addition to this, the entirety of the Ohau River has been identified as a Site of Natural Significance in the MDP. It is recognised primarily for its avifauna habitat values, as well as areas of wetland. It extends along the Ohau River from Lake Benmore into, and including, areas of Lake Rautaniwha. This area overlaps with the north-eastern boundary of the site.

The site is also immediately adjacent to an Important Bird Area (IBA), which includes the Ohau, Pukaki, Twizel and Tekapo Rivers. The area is in the wedge that forms the Ohau-Tekapo Delta, where the Ohau and Tekapo Rivers enter Lake Benmore.

3.5.2 Notable Existing Environmental Modifications

The site is in close proximity to the Ohau C hydro power station on the Ohau canal network, which is part of the larger Waitaki hydro scheme. This scheme comprises five hydro-generation stations in the Upper Waitaki catchment and three in the Lower Waitaki catchment, as well as a series of dams and canals to optimise generation potential. The Ohau canal network runs from Lake Ohau down through Lake Rautaniwha and into Lake Benmore. It is also fed by the Pukaki Canal, which brings water from Lakes Tekapo and Pukaki. Development of this hydro scheme has caused notable modifications to the surrounding environment through the construction of dams, formation of lakes (e.g. Lake Benmore), and diversion of water and has drastically altered the hydrological regimes of the rivers in the Mackenzie Basin.

3.5.3 Vegetation

3.1.1.1 Vegetation and Habitat Types

Vegetation cover at the site is predominantly grazed exotic grassland and cropland, with some small remnants of indigenous dryland and shrubland communities around the margins.

There are no wetlands on site, but a number of wetlands were identified within 100 m of the site boundary (see **Figure 3** below). Including the off-site wetlands, the following six vegetation and habitat types were identified:

- Sweet briar-matagouri shrubland.
- Cocksfoot grassland.
- Brassica cropland.
- Brome-hawkweed-sheep's sorrel grassland/herbfield.
- Stonefield drylands.
- Wetlands (off-site only).

For further information on these different vegetation and habitat types, refer to the Ecological Impact Assessment (**Appendix D**).

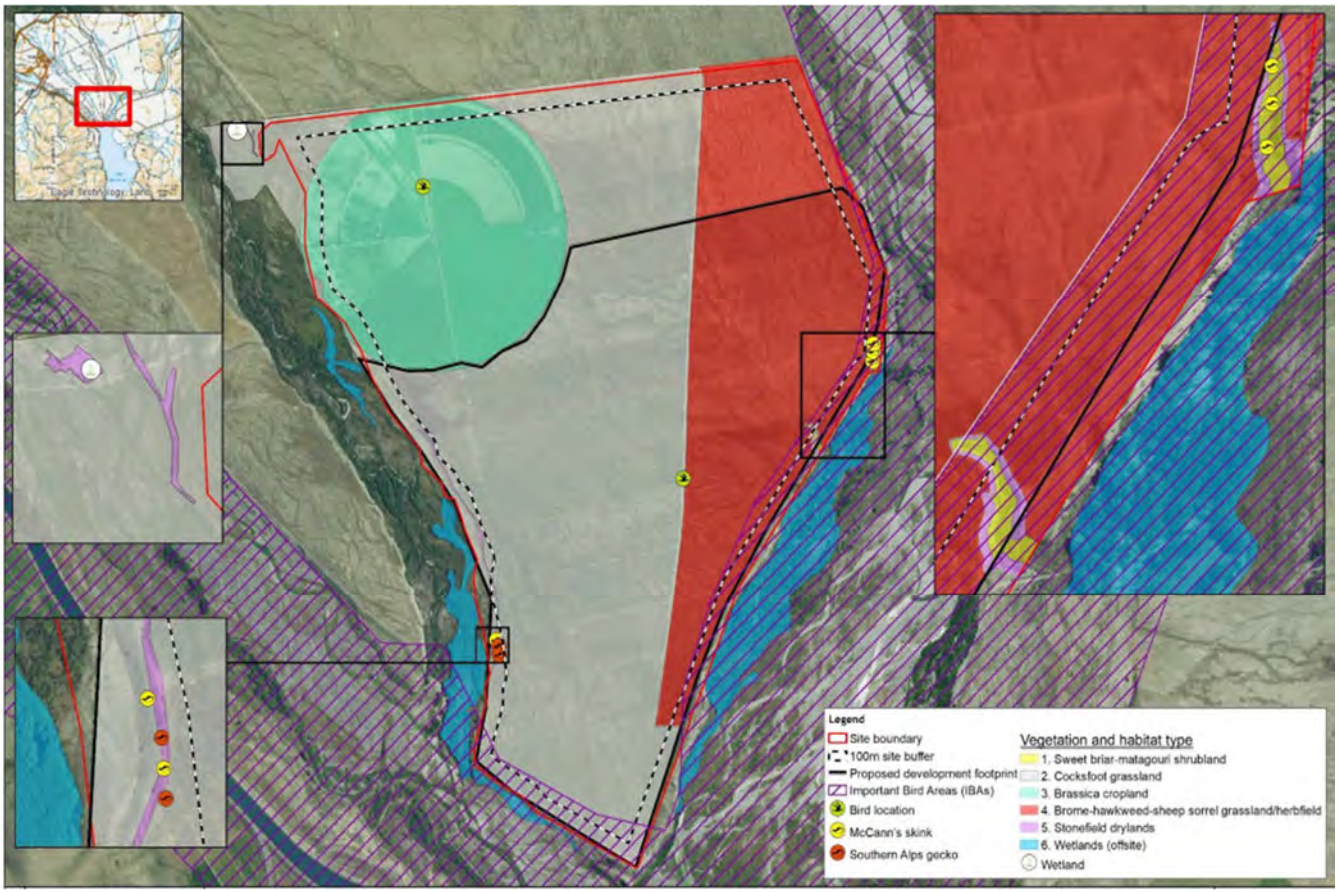


Figure 4. Ecological features identified on site. (Source: Wildlands, 2023).

3.5.4 Flora

Fifteen indigenous and 42 exotic vascular plant species were recorded on the site during field surveys. Only one species with a national threat ranking was recorded on the site – the tumatakura/matagouri (classified as At Risk-Declining).

The following four species with a national threat ranking were recorded within 100 m of the site boundary:

- Maniototo peppercress: Threatened – Nationally Critical.
- Stout dwarf broom: At Risk – Declining.
- Desert broom: At Risk – Declining.
- Common mat daisy: At Risk – Declining.

3.5.5 Avifauna

The desktop assessment found records of 47 species (and two hybrid taxa) within five kms of the subject site between January 2021 and January 2023. Records of seven 'Threatened' species were found in the desktop assessment, including the Nationally Critical kaki/black stilt and kotuku/white heron, Nationally Endangered tarapirohe/black-fronted tern, Nationally Vulnerable puteketeke/Australasian crested greb, taranui/Caspian tern and parera/grey duck and Nationally Increasing ngutu pare / wrybill.

Eight 'At Risk' species were recorded on the site, including:

- Declining pohowera/banded dotterel;
- Tarapuka/black-billed gull;

- Kotereke/marsh crake;
- Pihoihoi/ New Zealand pipit;
- Torea/South Island pied oystercatcher;
- Relict mapunga/black shag;
- Kawaupaka/little shag; and
- Nationally Uncommon Australian coot.

Thirty bird species were recorded during the field survey. Of these, 15 are indigenous and 15 exotic. One 'Threatened' species (the tarapirohe/black-fronted tern, Nationally Endangered) and four 'At Risk' species were detected (the 'Declining' pohowera/banded dotterel and tarapuka/black-billed gull, and 'Relict' mapunga/black shag and kawaupaka/little shag). Exotic passerines were the most common birds at the site, with skylarks being especially abundant.

Tarapirohe/black-fronted tern and pohowera/banded dotterel were observed during the field survey. Both species use the site for foraging and breed in or directly adjacent to the site. The site provides potential foraging and breeding habitat for kaki/black stilt and several other 'Threatened' or 'At Risk' species.

The stonefield dryland areas provide suitable habitat for the pohowera/banded dotterel and South Island pied oystercatcher ('At Risk – Declining') to forage and breed and may also be utilised by the pihoihoi/New Zealand pipit. Banded dotterel were observed feeding in the cocksfoot grassland, brome-hawkweed-sheep sorrel grassland/herbfield, and brassica cropland, and they could use these habitats for breeding.

3.5.6 Lizards

Two lizard species were found during the field visit. The McCann's skink ('Not Threatened') and Southern Alps gecko ('At Risk – Declining') were observed in stonefield dryland habitat. Two individuals of each species were found in rock piles at the base of a west-facing terrace slope in the southwestern part of the site. Three McCann's skinks were also found among rock piles in a gully in the northeastern part of the site.

'Confirmed' and 'potential' lizard habitats were present in the following vegetation types:

- Sweet briar-matagouri shrubland.
- Cocksfoot grassland.
- Brome-hawkweed-sheep's sorrel grassland/herbfield.
- Stonefield drylands.

Areas of high quality lizard habitats are present on the site. These include the areas of stonefield dryland and sweet briar-matagouri shrubland, particularly where there are relatively deep rock piles amongst indigenous shrubland vegetation (i.e. embedded cobbles at the bottom of talus slopes). These areas could potentially support 'Threatened' species (i.e. Lakes skink and/or scree skink), which are present in similar habitat in the Mackenzie Basin.

3.5.7 Terrestrial Invertebrates

The desktop survey revealed that four notable invertebrate species have been recorded within a five km radius of the site:

- Grass moth.
- Giant dragonfly.
- Bumblebee.
- Cabbage white butterfly.
- New Zealand blue butterfly.

In general, habitat was lacking or was of low-quality for indigenous invertebrates. The invertebrate fauna were generally found to be lacking in diversity, though the hot weather during surveys is likely to have suppressed activity.

Robust grasshopper populations, if present, will be confined to the braided river margins off-site, in particular the eastern margin. Minute grasshopper and short-horned grasshopper may also be present in the open stonefield and herbfield habitat at the eastern margin of the site, though due to time and weather constraints this part of the site was not investigated. Some patches of relatively open ground – currently thickly overgrown with exotic herbs - could become habitat for indigenous grasshoppers if restored.

Tekapo ground wētā may also be present in dry, open areas of the site; their range and distribution is not well-known.

3.6 Summary of Ecological Values

Ecological features and values adjacent to the site, associated with the rivers and their margins, are extremely high.

Ecological values on site vary considerably, subject to the character of the vegetation and habitat types that are present. Most of the site has a cover of exotic pasture and part of it is irrigated and cropped. These areas have low value for indigenous plants but are nevertheless utilised by 'Threatened' and 'At Risk' indigenous birds and it is possible that lizards may also be present, albeit these habitat types are unlikely to provide significant habitat for lizards. Undeveloped gullies on the margins of the site are important habitat for indigenous plants, avifauna, lizards and invertebrates.

4. Description of Proposed Works

4.1 Project Overview

The Applicant has selected a site suitable for a grid connected solar farm to help New Zealand move towards its Zero Emissions goal. The selected site is unique in its scale, with capacity to power up to 6% of New Zealand's daytime peak energy demand, a scale which is supported by the substantial existing grid infrastructure running through the property, alongside the high sunshine hours and flat terrain of the Mackenzie Basin. This proposed solar farm will provide power to support 100,000 homes based on average annual household consumption. Utility scale solar in New Zealand has the benefit of enhancing security of supply during dry periods of low hydro-electricity production; stabilising and lowering energy prices in real terms; and will greatly assist the transition away from fossil fuel energy generation which is still a significant part of the energy mix in the country. This generation will displace thermal and hydro generation, leaving water in the hydro dams for evenings and peak times.

The site was selected carefully after a large search across the district and surrounding districts. The site has a suitable location, includes a National Grid transmission line and is immediately adjacent to a Transpower grid point and substation. The land is rural, flat and north facing with few neighbours and limited viewpoints overlooking the land.

The site is currently operated as an extension of a dairy farm, providing feed and grazing to the main farm near Twizel. The area of the solar farm will change to low scale sheep grazing, to prevent the growth of weeds and minimise fire risk. The solar farm has been designed to allow continued grazing, with wide spacing of the solar panels and a fixed, reasonably high, mounting system. Overall, panels will only cover approximately 33% of the site, when considering setbacks from property boundaries, river margins and space between the arrays.

4.2 General Layout Overview

The proposed solar farm will consist of approximately 420 MWp photovoltaic panels on single axis trackers (see site layout plan in **Appendix E**). This will include the solar array and associated structures (medium voltage substations, inverters, main control room, SCADA data room and staff office).

The solar tables are steel structures, and each table is attached to the ground by eight steel poles, centralised along its length. Each table structure is designed to move so the solar panels pivot east to west towards the rays of the sun as the sun moves through the sky. In the morning the solar panels will face east, at midday the solar panels will be more or less horizontal and at the end of the day the solar panels will face west.

The panels will be on a single axis tracker mounting system. For more information, refer to **Figures 5** and **5a** below.

The panels are mounted in a single, portrait format (known as 1P), with the pivot in the middle of the 2 m high panel. They will rotate during the day and have positions for high wind and snow events. They will start each day at a relatively low angle (to prevent shading of other panels) and tilt up as the sun rises higher, then once self shading stops, will follow the sun across the sky, being level with the ground at noon. Late in the afternoon, as self-shading occurs, they will reduce their angle and be almost flat again at sunset. The highest tilt is expected to be around 65 degrees (this depends on the exact panels selected, the tracker hardware and the spacing between the rows). The maximum tilt will be for a relatively short time, twice a day.

Each inverter is similar in size to a 20-foot shipping container frame which is approximately 6 m long, 2.4 m wide and 2.9 m high. The container frames and all parts of the inverter will be finished in the colours black, sandstone grey, gull grey, or similar.

Inverters have been clustered within specific parts of the site, so they are as efficient as possible. They have also been situated within the central part of the site where the solar tables assist in visually screening them from view, in particular, when potentially seen from the west.

Example drawings of the mounting scheme, inverters and substation are provided in **Appendix E.** The final design of the layout and mountings will be confirmed closer to the commencement of works, as part of the construction, final design, and project implementation phase.

Figure 5. Single axis tracker in 1P format. (Source: FNSF, 2023).

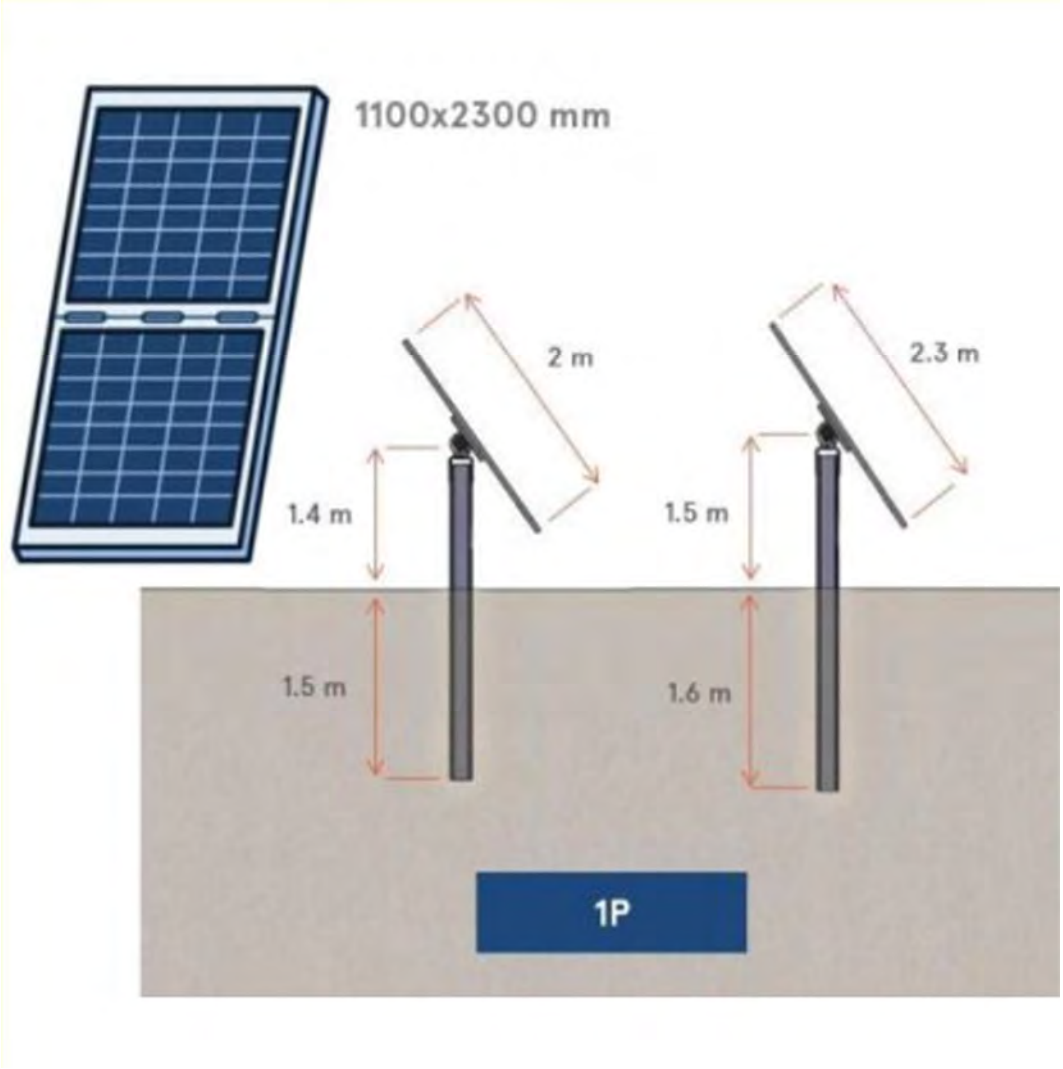


Figure 5a. Sample dimensions for a 1P Single Axis Tracker (Source: www.altenergymag.com, 2023)

Figure 6. Example of screw pile driving method to be used on site. (Source: FNSF, 2023).

4.3 Preparation

Since the mounting structures are piled, establishing the solar farm requires minimal earthworks (approximately 2,500m^3 across the entire site):

- Upgrading and re-gravelling of internal accessways.
- Creating a temporary compound for loading, unloading and turning.
- Foundation blocks for the substations.
- Perimeter security fencing (barbed wire fencing to a height of 1.8 m).

4.4 Infrastructure Establishment and Construction

Transpower will be responsible for connection of the solar farm to their network which will involve an underground circuit. Any work associated with cabling to the transmission network is outside the scope of this application.

The overall construction period will be approximately 12-18 months, with the mechanical construction and primary electrical works all being carried out in the first 7 months on site. Deliveries will be to a strict schedule during the regular working week with an average of 6 per day throughout the construction period.

Some 100 full time equivalent (FTE) staff will be employed during the course of construction and there is opportunity for short term and longer-term jobs for people from the local area.

4.5 Operational Activities

4.5.1 Maintenance Requirements

Once constructed, the solar farm requires some maintenance which will involve the creation of 5 FTE roles locally. Monitoring of the system is carried out remotely however maintenance to the communications systems, motors for the tracking tables, solar panel and inverter connections will all require some intervention during the operational life of the plant. Annual cleaning will also be carried out.

Row spacing (pitch) of 6m will be used throughout the site which provides a 4 m gap between the rows at level.

The panels themselves are warranted with a 30 year power warranty and an expected useful lifespan which exceeds the duration of the consent period.

At the end of the consented period the solar farm will be decommissioned and all materials and associated on site cabling removed for recycling. The site will be completely reinstated as per the lease agreement.

4.5.2 Planting and Maintenance

As discussed in the Landscape and Visual Assessment (**Appendix C**), to assist with screening the site from visual receptors, native shrub vegetation will be planted. This will consist of the following:

- A 40 m wide landscape strip along the southern boundary of the site.
- The vegetation within the landscape strip will consist of the following species:
  - *Plagianthus regius* subsp. *regius* – ribbonwood/mānatu;
  - Discaria toumatou – Matagouri;
  - Olearia lineata;
  - Corokia cotoneaster; and
  - Kunzea robusta – Kānuka.
- Plants will be approximately 50 cm tall when planted.
- Planting of up to 500,000 individual plants will occur within the first two planting seasons following the granting of the resource consent. Following this, further planting will occur progressively over the lifespan of the project.
- The landscape strip will be fenced off by a rabbit / hare-proof fence around the perimeter of the site and the security fencing around the site. Additionally, plants will be planted with pest protective sleeves as appropriate.
- A slow-release fertiliser will be included at the time of planting, as appropriate.
- All vegetation will be implemented with mulch, to suppress weeds and retain moisture.
- Vegetation will be irrigated as required, noting that drought-tolerate species will be selected.

In addition to the proposed planting required for visual screening, the Applicant is proposing to plant unused land on the site for the purposes of improving ecological values. This will involve planting an area of approximately 89 ha, which can support around 890,000 individual plants. A 40 m wide strip around the development footprint will be revegetated with shrubs and trees, for the purposes of providing visual screening. The rest of the ecological enhancement area will be characterised by indigenous shrubs, tussocks and herbs, with exposed stony gravel. This will be a representative of a restored outwash plain and will provide habitat for 'Threatened' and 'At Risk' indigenous lizards and invertebrate species. The total number of indigenous plants to be planted in the enhancement area will be between 500,000 -750,000 and will be mixture of the species below (amongst others):

- Mānatu/ribbonwood (Plagianthus regius subsp. regius);

- Matagouri;
- Olearia lineata;
- Corokia cotoneaster;
- Kānuka (Kunzea robusta);
- Coprosma propinqua;
- Phyllocladus alpinus;
- Sophora microphylla;
- Desert broom (Carmichaelia petriei);
- *Hebe* species;
- Golden spaniard (*Aciphylla aurea*);
- *Carex* species;
- Celmisia semicordata;
- Festuca novae-zelandiae;
- Gaultheria antipoda; and
- *Poa* species.

For further information on this, refer to the Ecological Impact Assessment (**Appendix D**).

4.5.3 Firefighting Supplies and Emergency Access

The Applicant has been in discussions with Fire and Emergency New Zealand (FENZ) regarding other solar farm proposals. Based on these discussions, the following is proposed:

- Installing sprinkler or inert gas emergency systems for the substations on site, as these were identified as having the highest fire risk;
- Firefighting supplies (via a water tank/irrigator) will be provided on the site in accordance with the New Zealand Fire Service Firefighting Water Supplies Code of Practice SNZ PAS 4509:2008 (Water Supplies Code of Practice);
- Ensuring access around the perimeter of the site is provided for fire appliances; and
- Ensuring grass beneath the panels is managed to reduce fire risk over summer. The Applicant has proposed that grass is maintained on the site via sheep grazing.

We also note that there is sufficient width between the panels to allow for emergency access.

In addition to the points above, the Applicant will engage with FENZ during design, construction and pre-commissioning of the facility in order for FENZ to:

- Familiarise themselves with the site;
- Understand what materials are located on site;
- Understand what owners wish to protect in the event of a fire (i.e. substations, particular assets);
- Understand what emergency response plans and procedures are in place; and
- Provide advice on other fire risk management measures should be considered.

We expect that FENZ will proffer resource consent conditions to address and manage fire risk from the proposal.

4.5.4 Works In Proximity to National Grid Infrastructure

All works in proximity to the National Grid support structures and transmission lines will be undertaken in accordance with the New Zealand Code of Practice for Electrical Safe Distances 2001 (NZECP34: 2001).

No works will be carried out within 12 m of the outer edge of the transmission lines. There will be no machinery operating in proximity to the transmission lines and no piling / earthworks will be undertaken within the 12 m setback. Therefore, specific mitigation, with respect to dust and operation of machinery, are not considered necessary given the separation distance provided.

Access to the transmission lines and support structures for Transpower will be maintained at all times.

The Applicant has proffered resource consent conditions to address these matters (see **Appendix F**).

Furthermore, Transpower is fully aware of the proposal, as the Applicant has been in discussion with them regarding connection of the solar farm to the National Grid.

4.6 Stormwater

Whilst the panels themselves are impermeable, they are mounted individually with a minimum 20 mm spacing in between each panel. The ground underneath will remain vegetated and permeable. Rain (stormwater) will runoff from the panels and fall to the ground, where it will infiltrate into the soil as normal. As noted above, only minor earthworks associated with the upgrade of existing site tracks are proposed for the development. No grading or contouring of the site is proposed which would otherwise alter the flow of stormwater runoff.

4.7 Consideration of Alternatives

Schedule 4 of the RMA requires consideration is given to alternatives where it is likely that an activity will result in any significant adverse effects on the environment. As discussed in **Section 6** below, the proposed activity is not considered to result in any significant adverse effects on the receiving environment.

Notwithstanding this however, the Applicant has assessed the viability of sites across New Zealand for solar farming. This particular site was chosen as being suitable for a solar farm for the following reasons:

- National Grid transmission lines traverse the site and provides a suitable grid connection point via the Benmore-Islington 220 kV transmission line, which stretches south to Benmore and connects with the High Voltage Direct Current (HVDC) line, and north to Christchurch as a major load centre. Very few transmission lines are better suited in terms of capacity that would allow a solar farm of this scale to connect.
- The site receives well above average sunlight hours / irradiance and is relatively flat – making it suitable for solar panels to be erected.
- The site is co-located to the extensive Hydro Power Scheme within the Mackenzie Basin, further strengthening the grid connection point.

On this basis, this site is considered the best practicable option for a solar farm of this scale.

5. Resource Consent Requirements

5.1 Overview

The requirements for resource consent are determined by the rules in the MDP and the Canterbury Land and Water Regional Plan (CLWRP). The rules which apply are determined by the zoning of the site, any identified notations and the nature of the activities proposed.

The overlays and planning limitations which apply to the site are presented in **Table 2**.

Table 2. Zoning and planning notations

Planning notation	Comment
Mackenzie Basin Subzone	Applies across the entire site. This zone identifies the site as being an Outstanding Natural Landscape.
Rural Zone	Applies across the entire site.
Sites of Natural Significance	Sites of Natural Significance have been identified in proximity to the site, but not within the site itself, around the margins of Lake Benmore by the north-eastern corner of the site, No proposed works or structures are located in this area.
Mackenzie Basin Subzone High Visual Vulnerability	The entire site is located within an area identified as being of high visual vulnerability.

5.2 Mackenzie District Plan

Resource consents required for the proposed works under the MDP are outlined in **Table 3**.

Table 3. Resource consents required

Proposed activity	Rule reference / description	Activity status	Comment
Construction and operation of a solar farm	**Rule 1.5(e)** – Any other utility not specifically listed as a Permitted or Discretionary activity.	Discretionary	The proposal is not specifically provided for as a permitted or discretionary activity and therefore falls under Rule 1.5(e).
Erecting solar panels within the Mackenzie Basin Subzone High Visual Vulnerability area.	**Rule 3.4.5** – Non-farm buildings and extensions of these buildings outside of a defined Farm Base Area within the Mackenzie Basin Subzone High Visual Vulnerability area.	Non-complying	The solar panels are non-farm buildings and therefore consent is required under Rule 3.4.5.
Earthworks	**Rule 4.3.1** – Any earthworks or tracking which are not provided for as a Permitted or Controlled Activity as a discretionary activity.	Discretionary	The proposal involves earthworks greater than 1000m^3 and therefore resource consent is required under Rule 4.3.1.

For the avoidance of doubt, the Applicant is seeking resource consents under the rules above and any other rules which may apply to the activity, even if not specifically noted. Overall, resource consent is required from Mackenzie District Council for a **non-complying** activity.

5.3 Permitted Activities

The activities listed in **Table 4** have been identified as permitted activities under the CLWRP and MDP. An assessment against the relevant standards is set out below.

Table 4. Permitted activities

Proposed activity	Rule reference / description	Comment on compliance
Canterbury Land and Water Regional Plan		
Construction-phase stormwater discharge	**Rule 5.94A** – The discharge of construction-phase stormwater from a reticulated stormwater system to a surface waterbody, or onto or into land in circumstances where a contaminant may enter groundwater or surface water, provided: 1. The area of disturbed land from which the discharge is generated is less than: (a) 1000 m^2 for any construction-phase stormwater generated as a result of work carried out in an area shown as High Soil Erosion Risk on the Planning Maps; or (b) Two hectares in any other location; and 2. The concentration of total suspended solids in the discharge shall not exceed: (a) 50g/m^3 where the discharge is to any spring-fed river, Banks Peninisula River, or to a lake except when the background total suspended solids in the waterbody is greater than 50g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or (b) 100g/m^3 where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the waterbody is greater than 100g/m^3 in which case Schedule 5 visual clarity standards shall apply; and 3. The discharge does not result in an increase in the flow in the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20% (one in five yar event); and 4. The discharge is not from, into or onto contaminated or potentially contaminated land; and 5. The discharge does not contain any hazardous substances; and	Will comply. • The proposed area of disturbed land is not within a High Soil Erosion Risk area and will not exceed two hectares. • All construction-phase stormwater will soak to ground. • The proposed discharge will not result in an increase in flow in any receiving waterbody. • The discharge is not from or into or onto contaminated land. • The discharge does not contain any hazardous substances. • The proposed discharge will not occur within a Community Drinking-water Protection zone.

Proposed activity	Rule reference / description	Comment on compliance
Canterbury Land and Water Regional Plan		
	6. The discharge does not occur within a Community Drinking-water Protection Zone as set out in Schedule 1.	
Operational stormwater discharge	**Rule 5.95** – The discharge of stormwater, other than into or from a reticulated stormwater system, into a river, lake, wetland or artificial watercourse or onto land in circumstances where a contaminant may enter a river, lake, wetland or artificial watercourse, provided: 1. The discharge is not from, into or onto contaminated or potentially contaminated land; 2. The discharge is not into: (a) A water race, as defined in Section 5 of the Local Government Act 2002; and (b) A wetland, unless a wetland is part of a lawfully established stormwater or wastewater treatment system; and (c) A waterbody that is Natural State, unless the discharge was lawfully established before 1 November 2013; and 3. The discharge does not result in an increase in the flow of the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20% (one in five year event); and 4. The discharge meets the water quality standards in Schedule 5 after reasonable mixing with the receiving waters, in accordance with Schedule 5; and 5. The concentration of total suspended solids in the discharge shall not exceed: (a) 50 g/m^3 where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake except when the background total suspended solids in the waterbody is greater than 50 g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or (b) 100 g/m^3 where the discharge is to any other river or to an artificial watercourse except when the	Will comply. • The discharge is not from or into contaminated or potentially contaminated land; • The discharge is to ground soakage only – there will be no discharge of stormwater to any waterbody, water race or wetland. • The discharge meets water quality standards as set out Schedule 5. • The concentration of total suspended soils in the discharge will not exceed specified limits. • The discharge is not within a Community Drinking-water Protection Zone. • The discharge does not occur where there is an available reticulated stormwater system.

Proposed activity	Rule reference / description	Comment on compliance
Canterbury Land and Water Regional Plan		
	background total suspended solids in the waterbody is greater than 100 g/m^3 in which case the Schedule 5 visual clarity standards shall apply; and 6. The discharge to water is not within a Community Drinking-water Protection Zone as set out in Schedule 1; and 7. The discharge does not occur where there is an available reticulated stormwater system.	
Operational stormwater discharge	**Rule 5.96** – The discharge of stormwater, other than into or from a reticulated stormwater system, onto or into land where the contaminants may enter groundwater, provided: 1. The discharge is not from, into or onto contaminated or potentially contaminated land; and 2. The discharge: (a) Does not cause stormwater from up to and including a 24 hour duration 10% Annual Exceedance Probability rainfall event to enter any other property; and (b) Does not result in the ponding of stormwater on the ground for more than 48 hours, unless the pond is part of the stormwater treatment system; and (c) Is located at least 1 m above the seasonal high water table that can be reasonably inferred for the site at the time the discharge system is constructed; and (d) Is only from the land used for residential, educational or rural activities; and (e) Does not occur where there is an available reticulated stormwater system, except where incidental to a discharge to that system; and (f) Is not from a system that collects and discharges stormwater from more than five sites.	Will comply. • The discharge is not from, into or onto contaminated or potentially contaminated land. • The discharge will soak to ground and will not enter any other property or result in the ponding of stormwater on the ground for more than 48 hours. • The discharge is located at least 1 m above the seasonal high-water table. • The land is used for rural activities only.[10] • There is no available reticulated stormwater system. • The proposed stormwater is from one site only.

[10] The CLWRP does not include a definition of 'rural activities' and instead refers to the definitions under the relevant District Plan. The MDP does not define 'rural', however it is noted the application does not meet the definition of 'industrial activity' under the MDP.

Proposed activity	Rule reference / description	Comment on compliance
Canterbury Land and Water Regional Plan		
Earthworks	**Rule 5.175** – The use of land to excavate material, provided: 2. Over an unconfined or semi-confined aquifer: (a) The volume of material excavated is less than 100 m^3; or (b) The volume of material excavated is more than 100 m^3 and: (c) There is more than 1 m of undisturbed material between the deepest part of the excavation and the seasonal high water table level; and (d) The excavation does not occur within 50 m of any surface waterbody.	Will comply. • There will be at least 1 m of undisturbed material between the deepest part of the excavation and the seasonal high water table. • No earthworks will take place within 50 m of any surface waterbody.
Mackenzie District Plan		
Operational noise	**Rule 2.3 – Permitted Noise Activities**	Will comply. • The noise from the substation will not exceed 65 dB at a distance of 10 m from the inverters. Therefore, no standards under Rule 2.3 are infringed.
Lighting	**Rule LIGHT-R2: Security Lights** 1. Security lights must be fitted and controlled with a motion sensor.	Will comply. • The proposed lighting will be controlled with a motion sensor. • All lighting will be directed away from adjacent roads, residential properties and lakes. • All lighting will be positioned so that light shines below in a horizontal fashion. • The colour temperature of the lighting will not exceed 300 K. • Only light emitting diode, low pressure sodium and high pressure sodium light sources will be used. • No more than 5 lux between 0600 and 2200 hours will be be spilled from outdoor lighting to any receiving environment.
Security fencing	**Rule 15.1.1a – Irrigators and fences** i. There shall be no irrigators (including centre pivot and linear move irrigation systems) or fences (other than replacement fences) within Scenic Viewing Areas, Scenic Grasslands, Sites of Natural Significance or Lakeside Protection Areas identified on the Planning Maps within the Mackenzie Basin Subzone.	Will comply. • There will be no fencing within any Scenic Viewing Areas, Scenic Grasslands, Sites of Natural Significance or Lakeside Protection Areas.

Proposed activity	Rule reference / description	Comment on compliance
Canterbury Land and Water Regional Plan		
Vegetation clearance in an improved pasture area	**Rule 1.1.1 – Indigenous Vegetation Clearance** … 7. The clearance is of indigenous vegetation within an area of improved pasture and the clearance is not within a location specified in Rule 1.3.2.	Will comply. • The proposed vegetation clearance is within the site – which is classed entirely as improved pasture. • It is not within a location specified in Rule 1.3.2.

5.4 Other Consents and Approvals Required

The appropriate approvals from Transpower have been sought for the connection of the solar farm to the electricity transmission network in accordance with the Electricity Industry Participation Code 2010.

Upon completion of the detailed design, the Applicant will obtain building consents (if required) for the proposed structures in accordance with the Building Act 2004.

If required, a Wildlife Act Authority from the Department of Conservation (DoC) will be sought prior to salvage and translocation of lizards (if required), in accordance with the Wildlife Act 1953.

6. Assessment of Effects on the Environment

6.1 Introduction

The following sections identify and assess the types of effects that may arise from the proposed works. This assessment also outlines the measures that the Applicant proposes to avoid, remedy or mitigate any potential adverse effects on the environment.

Actual and potential effects on the environment have been identified as including:

- Positive effects;
  - Renewable Electricity
  - Ecological Enhancement
- Effects on soils;
  - Landscape and visual effects;
  - Physical effects
- Perceptual effects
- Cultural effects;
- Construction effects;
  - Noise effects
  - Dust effects
  - Traffic effects
- Operational effects;
  - Noise effects
  - Glare effects
- Stormwater diversion and discharge effects; and
- Effects of earthworks and sedimentation generation on water quality.

6.2 Positive Effects

6.2.1 Renewable Energy

The proposal directly supports the uptake of low-carbon REG and supports the reduction of New Zealand's greenhouse gas emissions. In doing so, the proposal provides security and resilience to the electricity generation network, by reducing pressure and reliance on the National Grid and regional distribution network. The provision of renewable energy is an important positive effect, as it contributes directly to New Zealand's goal of net zero emissions by 2050 as set out in the Climate Change Response (Zero Carbon) Amendment Act 2019. It is noted that solar panels become carbon neutral in a relatively short period of time (depending on the generation that is displaced), estimated to be approximately eight years in New Zealand which is four times longer than the worldwide average[11].The Mackenzie region as a whole is likely to be a critical area in terms of New Zealand reaching its climate change targets, given the substantial existing grid infrastructure, its interconnection to Benmore, the HVDC feeding the North Island, and its high irradiance coupled with vast flat land.

More broadly, the proposed solar farm will provide electricity generation to meet the demands of approximately 100,000 homes and therefore it provides economic and social benefits by enabling the functioning of

[11] *Energy payback time and carbon footprint of commercial photovoltaic systems*, prepared by M.J. (Mariska) de Wild-Scholten, dated December 2013.

communities and businesses across the Canterbury region. It is estimated that the proposal will reduce carbon emissions from electricity generation in New Zealand (each year) to the same extent as removing 65,000 cars from the roads[12].

In terms of New Zealand's energy transition, the proposal provides a unique opportunity to generate power during the day, thereby allowing the hydro lakes to store more water during the day to increase capacity at night. Given climate change and more extreme weather events that are expected, there is a higher likelihood of severe drought affecting the performance of hydro lakes. Therefore, the co-location of the proposed solar farm with the hydro power scheme will assist with providing a more resilient power generation network.

6.2.2 Ecological Enhancement

The proposed ecological enhancement zone will provide significant ecological benefits. An area of approximately 89 ha is proposed to be planted in indigenous vegetation, consisting of between 500,000 – 750,000 plants. This area will be managed in accordance with the proposed Ecological Enhancement Plan (EEP), which is proposed as a condition of consent (see **Appendix F**).

The proposed ecological enhancement area will increase the habitat for indigenous lizards and increase biodiversity values on site, creating a significant ecological corridor for birds, invertebrates and other 'At Risk' and 'Threatened' fauna. Overall, the proposed planting will provide a significant increase in the overall ecological value of the site.

6.3 Effects on Soils

As described in **Section 3.2** of this report, the site has a LUC classification of 6, indicating non-arable soil with slight to moderate limitations to pastoral use. On that basis, this proposal will have no effect on prime soils.

Furthermore, this proposal also allows for sheep or seasonal crop farming to take place in-between the solar panels. The carbon status of the soils will be maintained and the solar panels can be easily removed and the site reinstated to full grazing on the completion of solar use. Overall, there are considered to be no effects on soils.

6.4 Landscape and Visual Effects

The Landscape and Visual Assessment (see **Appendix C**) considers effects that can occur in relation to physical features, viewing audiences and visual amenity as well as effects on existing landscape character and amenity values. The below sections summarise the information contained in that assessment.

6.4.1 Physical Effects

The proposed solar farm is situated over approximately 600 ha of land within the Mackenzie Basin and will inevitably introduce elements of built form within the site replacing the rural character within the site with a semi-industrial and renewable power generation character.

The solar farm will be situated on the relatively flat topography of the outwash plain. Earthworks associated with the solar farm will consist of creating new access tracks throughout the site, placing cables underground in which the land cover will be immediately reinstated, and pile driving the supporting pole structures of each solar table into the ground. These changes to landform are relatively small, to the point that the legibility of the outwash plain will not be affected by these earthworks. Also, when seen, the low-lying nature of the solar farm will be in keeping with the outwash plains flat topography, therefore the landforms legibility will remain evident and intact from beyond the site.

[12] Based on calculations using MBIE's electricity generation data.

The solar farm, as the name suggests, is a method of farming a readily available natural and renewable resource within the Mackenzie Basin, being one of the sunniest places within Aotearoa New Zealand[13]. Much like the current agricultural land use of the site and neighbouring station, it will specialise in its task. Similar to a farm and the way paddocks and stock-lanes are carefully arranged, the solar farm has been arranged to optimise the best yield from the site. The grid like pattern is not a natural pattern, however it is consistent with the way in which the agricultural land cover has been manipulated within the site to maximise productivity.

The point of difference with this proposed solar farm, unlike other solar farms in New Zealand, is it will reduce the amount of stock grazing within the site, with the long-term task of re-establishing native vegetation throughout the entire site. There are a number of positives associated with this. With regard to landscape character, the current greening effect that the intensive agricultural land use has had on the Mackenzie Basin will be remedied. Furthermore, the solar farm will not compromise the ability to undertake agricultural or other land management activities on the neighbouring station or on the banks of the rivers.

One of the key characteristics of the rural landscape of the Mackenzie Basin is its open character which stems from its openness, vastness, lack of built form (which is mostly clustered in discreet areas) and in part due to the prevalence of large farms / stations and landholdings.

The reduction in open character will not impact on the wider basin as it is concentrated to the site area only and, as assessed below, it is difficult to distinguish from most public places beyond five kms away, which includes areas within the South Basin. The exception to this are elevated areas on the Benmore Range and Ben Ohau. From the closer public places, it is simply the size and scale of the solar farm that visually reduces the open character of Mackenzie Basin.

Within this 'South Basin' area, which is approximately 21,500 ha in area, the 600 ha solar farm will equate to an approximate net reduction of 2.8% of the open area. While this percentage is small, the solar farm remains large as it is within an area of high visual vulnerability and will result in a reduction to the open character of the South Basin area that forms part of the much larger Mackenzie Basin, which is an intrinsic value of this ONL.

6.4.2 Perceptual Effects

The site will be visible to varying degrees from a small number of public places (for further information on this, refer to the Visual Simulations included in **Appendix C**). Unlike a dwelling or residential development, large portions of the solar farm, in particular the solar panels, will be lightly seen, sitting just above ground level at 1.5m – 2.2m tall. Within the expansive wider landscape this is a very low height. When visible, the panels low height is highlighted through the ability to look across the solar farm and see the existing vegetation on the farm side of the outwash plain, outwash plains on the far side of the site and the surrounding mountains. As such, the solar farm does not interfere with the open and long ranging views over the Mackenzie Basin.

The visible changes arising from the solar farm will result in a change of character within the site, from that of an open rural pastoral character to a predominately semi-industrial and renewable power generation character. In addition to the open character of the site, the aesthetic values of the site also stem from its relatively flat topography, and the steep scarp faces that dramatically descend to the adjacent rivers. Because the solar farm sits so low on the site, the visual coherence of this landform and its aesthetic values will remain intact.

Due to the location of the site in one of the sunniest locations in Aotearoa New Zealand, the power generation aspect of the solar farm will be perceived as in keeping with the large-scale hydro canals and the radiance of the other local electricity infrastructure.

Based on the above, the proposed solar farm has been located, and its associated landscape mitigation has been designed, so as to mitigate its potential visibility from all but three public places. Unavoidably, the farm will be seen from McAughtries Road, Greta Track and the Benmore Range Easement Track in which its resulting adverse visual effects will be of a **moderate degree**.

Once the mitigation vegetation has matured, the proposal will also have **no to a very low degree** of adverse visual effects on people travelling / spending time in **all other public places**. This is because the proposal will

[13] https://niwa.co.nz/climate/summaries/seasonal/summer-2022-23

be screened from view by the proposed vegetation or will be seen from so far away it will be difficult to distinguish.

6.4.3 Summary of Landscape Effects

In summary, taking into account the proposed landscaping package and the ecological and biodiversity enhancement activities proposed, the proposed solar farm will have a more than minor adverse effect on the outstanding landscape values of the Mackenzie Basin. These adverse effects will be reduced by the proposed landscape mitigation and the ecological and biodiversity enhancements planned, which will benefit the natural character landscape values of the basin.

6.5 Cultural Effects

The Applicant has met with Te Rūnanga o Ngāi Tahu for comment regarding this proposal (refer to **Section 8.2**). To date, no formal comments have been received on the application and CVA is yet to be received, however one is expected to be provided in due course.

Pending provision of a CVA, the following is noted regarding cultural effects at this point in time:

- The proposal is for the purpose of providing renewable electricity, which supports the economic and cultural well-being and health and safety of people and communities;
- In addition to the provision of renewable energy, the proposal includes significant ecological enhancement initiatives, including an 89 ha area of indigenous planting that will increase habitat for 'At Risk' and 'Threatened' species;
- The proposal involves minimal earthworks and no stream works are proposed;
- A range of environmental management and mitigation measures are proposed to avoid, remedy and mitigate any actual and potential adverse effects – this includes proposing a suite of management plans to ensure works are appropriately managed; and
- The Applicant also intends to liaise with tangata whenua to seek opportunities to create positive cultural benefit through the implementation of activities associated with the Ecological Enhancement Plan. Initial discussions have already identified possible opportunity to engage locally owned plant nurseries to supply product, expertise and labour.

On the basis of the points raised above, cultural effects are anticipated to be less than minor.

6.6 Construction Effects

A detailed Construction Management Plan (CMP) will be prepared by the appointed Contractor to minimise the impact of construction activities. The CMP will reflect the proposed work sequencing and site establishment works required for the project.

6.6.1 Noise Effects

The proposed construction activity is limited to earthworks for the construction of internal accessways, installation of the solar arrays (which use a small rig for driving piles to the relevant depth (c. 1.6m)) and battery powered hand tools. The proposed construction works will be undertaken in accordance with the *New Zealand Standard NZS 6803:*1999 '*Acoustics – Construction Noise*'.

The noise produced from the construction activities is likely to be indiscernible from normal rural activities, such as harvesting or cultivating. Overall, the noise effects from construction activity are considered to be less than minor.

6.6.2 Dust Effects

The proposed works require minor earthworks only and therefore the potential for dust generation is low. Notwithstanding this however, appropriate dust control measures will be implemented to minimise potential effects. Dust mitigation measures are likely to include the following:

- Minimise the extent of exposed areas at any given time where possible;
- Maintain site accesses in good condition, including with gravel to minimise dust generation;
- Enforcement of maximum speed limits on the site to prevent dust generation; and
- Any vehicle loads moving fine material to be covered appropriately.

Overall, with these control measures in place, dust effects are considered to be less than minor.

6.6.3 Traffic Effects

A Construction Traffic Management Plan (CTMP) will be prepared to manage construction traffic.

Construction traffic will be focused towards the initial phase of the build period with up to 15 truck deliveries per day over the construction period (approximately 12 months). Construction staff will park on site in the temporary compound area. All construction plant and equipment will be unloaded within the site and all turning and manoeuvring of vehicles is limited to the site. Once completed, site maintenance is limited and will be carried out by staff arriving in small vans.

Overall, traffic effects are considered to be less than minor.

6.7 Operational Effects

6.7.1 Noise Effects

Operational noise effects are minimal and will not be noticeable from the boundary of the site. The substation units are vented and will emit a low hum in operation. Average maximum sound pressure at a 10 m distance was measured at 65dBA.

Overall, operational noise effects are considered to be negligible.

6.7.2 Glare Effects

Refer to the Glint and Glare Study in **Appendix G.**

The solar panels are coated in low-reflectivity material to reduce the reflection of light and are set at low angles to reduce glare effects offsite. PV solar panels are designed to reflect as little sunlight as possible (generally around 2% of light received), resulting in minimal glare. Seen from above (such as from an aircraft), they appear dark-grey and do not cause a glare or reflectivity hazard. Compared to other everyday materials, solar panels reflect less light than building roofs, vehicles and water.

In addition to this, the Glint and Glare Study found that providing ample screening around solar farms largely addresses any potential or actual glint and glare effects on road users and neighbours. For this site, generous setbacks are provided from the property boundary and extensive planting is proposed. On that basis, glint and glare effects are considered to be less than minor.

6.8 Stormwater Diversion and Discharge Effects

As discussed in **Section 4**, the solar arrays will be elevated above the ground, thereby enabling the existing groundcover below to remain. On that basis, there is no significant increase in impermeable surface cover across the site, and existing site drainage channels will remain.

On that basis, stormwater diversion and discharge effects are considered to be less than minor.

6.9 Effects of Earthworks and Sedimentation Generation on Water Quality

Earthworks activities have the potential to cause adverse erosion and sedimentation effects. In particular, earthworks and the associated mobilisation of sediment may adversely affect high quality freshwater habitats and associated aquatic organism in the vicinity of the works, if not managed appropriately.

The works involve approximately 2,500 m^3 of earthworks in order to install piles into the ground to support the solar panels. No earthworks will be undertaken within 100 m of any surface waterbody. The proposed works will be undertaken in accordance with an approved Erosion and Sediment Control Plan (ESCP), which will be developed in line with best practice erosion and sediment control measures as set out in Environment Canterbury's *Erosion and Sediment Control Toolbox*[14].

The measures to be implemented to protect against the adverse effects from earthworks will include:

- Stablished entry / exit points and wash down facilities;
- Silt fences (as required);
- Sediment retention devices (as required);
- Stockpiles to generally be avoided (and if not avoided, covered when not in use); and
- Runoff diversion bunds where appropriate to capture sediment in any surface water runoff.

Taking into account the minimal nature of earthworks proposed and the measures set out above, any potential effects of earthworks and sedimentation generation on water quality is considered to be less than minor.

6.10 Summary of Effects

The proposed solar farm will provide numerous positive effects, notably the provision of REG for the equivalent of approximately 100,000 homes in the Canterbury region, noting that the Mackenzie district has a population of 4,800 as at the 2018 Census.

The proposal will also increase security of electricity supply during dry periods of low hydro electricity production, assist in stabilising electricity prices with more renewable generation, and achieve New Zealand's emissions targets. There are also important social and economic benefits at a local and regional level associated with the construction of the solar farm, including improved biodiversity values associated with the proposed planting as well as local job creation.

Construction of the proposed solar farm has the potential to give rise to a limited range of adverse effects, which overall are considered to be less than minor, albeit with some visual and landscape effects being minor or more than minor. Taking into account the positive effects, in particular the provision of renewable energy and the ecological benefits proposed by the ecological enhancement planned, the actual and potential effects of the proposal are able to be appropriately managed and mitigated.

[14] https://esccanterbury.co.nz/

7. Statutory Assessment

7.1 Section 104 of the RMA

Section 104 of the RMA sets out the matters to which a consent authority must have regard to, subject to Part 2 of the RMA, when considering an application for resource consent. These are:

- Any actual and potential effects on the environment of allowing the activity (refer **Section 6** above);
- Any relevant provision of:
  - a national environmental standard;
  - other regulations;
  - a national policy statement;
  - a New Zealand coastal policy statement;
  - a regional policy statement or proposed regional policy statement;
  - a plan or proposed plan; and
- Any other matter the consent authority considers relevant and reasonably necessary to determine the application.

The following subsections address the relevant provisions identified above.

7.2 Part 2 of the RMA

Part 2 of the RMA sets out the purpose and principles of the Act. The purpose of the RMA is to promote the sustainable management of natural and physical resources.

The Court of Appeal decision in *RJ Davidson Family Trust v Marlborough District Council* [2018] NZCA 316 clarifies that if a plan has been "competently prepared" under the RMA then it may be that in many cases the consent authority will feel assured in taking a view that there is no need to refer to Part 2 as it would not add anything to the evaluation exercise[15]. The MDP and Canterbury Regional Policy Statement are considered to contain provisions which have been prepared having regard to Part 2, and which contain a coherent set of policies designed to achieve clear environmental outcomes. Based on the direction established by the Court of Appeal, it is considered that an assessment against Part 2 therefore adds little, if any value, to the overall evaluation.

Based on the assessment of the proposal against the objectives and policies set out in **Section 7.5**, the proposal is considered to be consistent with Part 2 of the RMA.

7.3 Proposed Conditions of Consent

Section 108AA of the RMA sets out the requirements for conditions of resource consents as follows:

(1) A consent authority must not include a condition in a resource consent for an activity unless –

(a) The applicant for the resource consent agrees to the condition; or

(b) The condition is directly connected to 1 or both of the following:

(i) An adverse effect of the activity on the environment:

[15] Para. [25]

(ii) An applicable district or regional rule, or a national environmental standard; or

(c) The condition relates to administrative matters that are essential for the efficient implementation of the relevant resource consent.

Mitigation measures are recommended throughout the supporting technical reports, particularly the Ecological Impact Assessment (**Appendix D**), in order to ensure adverse effects are appropriately avoided, remedied, mitigated or otherwise compensated for. Draft conditions proposed by the Applicant are set out in **Appendix F**. The Applicant recognises and expects that a full suite of conditions will be developed through the resource consent process.

The proposed conditions represent key conditions which capture all of the mitigation measures and management plans identified in the Ecological Impact Assessment (see **Appendix D**). In particular, the proposed conditions require:

- The preparation and implementation of the following management plans, which will contain measures that will clearly avoid, mitigate, offset or compensate the disturbance to species, populations and their habitats:
  - Lizard Management Plan (LMP)
  - Avian Management Plan (AMP)
  - Robust Grasshopper Management Plan (RGMP)
- An Ecological Enhancement Plan (EEP), which will set out measures for how indigenous vegetation on site will be managed, including measures for invasive species removal, soil cultivation and weed control. The EEP will also include what ongoing monitoring will take place to assess the success of the ecological enhancement initiatives.
- The preparation and implementation of a CTMP. The CTMP will include the required traffic management measures, site access points and heavy vehicle restrictions.
- The preparation and implementation of a CMP, which will detail management procedures and methods to be implemented to ensure ongoing compliance with these conditions.
- The preparation and implementation of an ESCP that will outline the erosion and sediment controls to be used on site to manage sediment runoff and earthwork effects.

7.4 National Environmental Standards

7.4.1 Resource Management Act (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011

The National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) Regulations (2011) came into effect in 2012. The NESCS applies to assessing and managing the actual or potential adverse effects of contaminants in soil on human health from five activities, including soil disturbance. The NESCS only applies to land which is considered to have had an activity occur which is on the Hazardous Activities and Industries List (HAIL). As set out in **Section 3.1**, there is no indication any HAIL activities have been undertaken on the site and therefore the NESCS is not considered to apply to this proposal.

7.4.2 Resource Management (National Environmental Standards for Freshwater) Regulations 2020

The Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NES-Freshwater) sets out requirements for carrying out certain activities that pose risks to freshwater and freshwater ecosystems.

There are no wetlands on site, but a number of wetlands were identified within 100 m of the site boundary. No works are proposed within 100 m of the wetlands. On that basis, the NES-Freshwater does not apply to the proposal.

7.4.3 National Environmental Standards for Electricity Transmission Activities 2009

The National Environment Standards for Electricity Transmission Activities 2009 (NES-ETA) sets out a national framework for activities on existing electricity transmission lines however they do not apply to the construction of new transmission lines or REG. Therefore, the NES-ETA does not apply to the proposed works.

7.5 National Policy Statements

7.5.1 National Policy Statement for Renewable Energy Generation 2011

The National Policy Statement for Renewable Electricity Generation 2011 (NPS-REG) recognises the importance of renewable energy in helping New Zealand achieve the Government's target of 90 percent of electricity from renewable sources by 2025. The NPS-REG promotes a more consistent approach to balancing the competing values associated with the development of New Zealand's renewable energy resources when councils make decisions on resource consent applications.

This proposal is directly supported by the single objective of the NPS-REG, which sets out to provide for the development, operation and maintenance and upgrading of new and existing REG activities. The proposed solar farm will provide a resilient and renewable source of electricity generation for the Mackenzie District, which will reduce the dependency and pressure on the National Grid and improve the resilience of New Zealand's electricity network.

It is also noted that the Government is proposing to strengthen the NPS-REG to enable renewable electricity activities. The Government has identified that an additional 300-500 MW of electricity is required per year over the next 30 years to meet projected demand – 170% more than todays capacity[16]. This proposal will contribute an additional 420 MWp to the National Grid, significantly increasing the nation's renewable electricity store.

7.6 Mackenzie District Plan Assessment

An assessment of the proposal against the relevant provisions of the MDP is provided in **Table 5** below.

Table 5: Mackenzie District Plan objectives and policy assessment

Objective/policy	Comment
Strategic Direction	
A Thriving Community	
Objective ATC-O1 – The Mackenzie District is a desirable place to live, work, play and visit, where: 1. (14) There are a range of living options, businesses and recreation activities to meet community needs; (1) Activities that are important to the community's social, economic and cultural well-being, including appropriate economic development opportunities, are provided for; and (2) The anticipated amenity values and character of different areas are maintained or enhanced.	The proposal will contribute to the desirability and liveability of the district by: • Providing local employment opportunities associated with the construction and on-going operation of the solar farm; • Providing renewable electricity which will improve the resilience of the National Grid and support activities that are important to the community's social, economic and cultural well-being; and • Provide mitigation (via extensive screening) in order to maintain amenity values as far as practicable.
Objective ATC-O3 – The importance to the District and beyond of infrastructure, particularly nationally and regionally significant infrastructure, is recognised and provided for.	The proposed solar farm will be a regionally significant piece of infrastructure, providing approximately 420MWp of electricity to the National Grid.
Objective ATC-O4 – The local, regional and national benefits of the District's renewable electricity generation and electricity	The proposal provides a unique opportunity to generate power during the day, thereby allowing the hydro lakes to store more water during

[16] https://www.mbie.govt.nz/have-your-say/renewable-electricity/

Objective/policy	Comment
transmission activities and assets are recognised and provided for.	the day to increase capacity at night. Overall this will improve the resilience of the National Grid and hydro schemes.
Mana Whenua	
Objective MW-O1 – The role of mana whenua is recognised and their historic and contemporary relationship with the District's land, water bodies, indigenous species and other sites and areas of significance are recognised and provided for.	Engagement with mana whenua is ongoing as discussed in **Section 8.2** in order to ensure this proposal provides for their relationship with the land's whenua, water bodies and indigenous vegetation and species.
Objective MW-O2 – Mana whenua are able to: (1) Be actively involved in decision making that affects their values and interests; (2) Exercise their kaitiakitaka responsibilities; and (3) Carry out customary activities in accordance with tikanga.	The proposal will provide opportunities for meaningful engagement with mana whenua throughout the project lifecycle. Through this, mana whenua can determine their own desired level of involvement in the project by helping to identify opportunities for collaboration, as well as identifying potential adverse cultural effects and measures to address these. The Applicant is committed to developing the solar farm in the spirit of partnership, in line with Te Tiriti o Waitangi.
Natural Environment	
Objective NE-O1 – The values of the natural environment, including those that make the District unique, contribute to its character, identity and well-being, or have significant or outstanding intrinsic values, are recognised and provided for, and where appropriate protected and enhanced. This includes, but is not limited to, values associated with the following important natural resources: (1) Mahika kai resources; (2) Night sky darkness; (3) Outstanding natural features and landscapes; (4) Significant indigenous biodiversity; and (5) Water bodies and their margins.	The design of the proposed solar farm has prioritised ecological enhancement and restoration. Approximately 89 ha of native planting is proposed to provide a net gain of ecological values as a result of the proposal.
Light	
Objective LIGHT-O1 – Outdoor lighting allows activities to occur beyond daylight hours and provides safety and security for activities, while: (1) Protecting views of the night sky; and (2) Managing light spill to maintain amenity values, health and safety and the safe operation of the transport network.	The site will have security lighting installed with motion sensors. Overall, the views of the night sky will be maintained and light spill will be negligible from the site. There will be no effects on the safety of road users or on amenity values in receiving zones.
Policy LIGHT-P1: Manage the location, design and operation of outdoor lighting to ensure: 1. It does not distract or interfere with the safety of road users; and 2. It is compatible with the zone in which any light spill is received.	
Section 7 Rural	
Objective 2 - The preservation of the natural character and functioning of the District's lakes, rivers, and wetlands and their margins, and the promotion of public access along these areas.	The preservation of the natural character and functioning of the District's lakes, rives and wetland and public access along these areas will be maintained.
Objective 3A - Protection of outstanding landscape values, the natural character of the margins of lakes, rivers and wetlands and of those natural processes and elements which contribute to the District's overall character and amenity.	The aesthetic value of the site stems from its relatively flat topography and open character that forms part of the wider Mackenzie Basin. Because the proposal will not be seen from most frequented public places, it will not impact on the general open character of the Mackenzie Basin, when experienced from these surrounding public places as the proposal will not interrupt the views over the basin.
Rural Policy 3A2 - To limit structures and tall vegetation within scenic viewing areas to enable views of the landscape to be obtained within and from these areas.	The site does not form part of nor is adjacent to a scenic viewing area. Therefore, it will not interfere with the views gained from these identified areas.

Objective/policy	Comment
Rural Policy 3A3 - Avoid or mitigate the effects of subdivision, uses or development which have the potential to modify or detract from areas with a high degree of naturalness, visibility, aesthetic value, including important landscapes, landforms and other natural features.	The site forms part of the Mackenzie Basin's ONL, which is an important landscape at a national level. As discussed in **Section 4** of this report, the agricultural land use activities within the site and neighbouring blocks of land have reduced the landscape values attributed to this site.
Policy 3A5 - To encourage the use of guidelines for the siting and design of buildings and structures, tracks, and roads, tree planting, signs and fences.	This policy and the Landscape Guidelines contained in Appendix K of the MDP are focused on buildings, rather than solar panels and inverters. Nonetheless, the Landscape and Visual Assessment (**Appendix C**) considers the proposal against the Landscape Guidelines in Appendix K.
Objective 3B – Activities in the Mackenzie Basin's outstanding natural landscape (4) Subject to (2)(a), to protect and enhance the outstanding natural landscape of the Mackenzie Basin subzone in particular the following characteristics and/or values: (a) The openness and vastness of the landscape; (b) The tussock grasslands; (c) The lack of houses and other structures; (d) Residential development limited to small areas in clusters; (e) The form of the mountains, hills and moraines, encircling and/or located in, the Mackenzie Basin; (f) Undeveloped lakesides and State Highway 8 roadside; (5) To maintain and develop structures and works for the Waitaki Power Scheme: (a) Within the existing footprints of the Tekapo-Pukaki and Ohau Canal Corridor, the Tekapo, Pukaki and Ohau Rivers, along the existing transmission lines, and in the Crown-owned land containing Lakes Tekapo, Pukaki, Ruataniwha and Ohau and subject only (in respect of landscape values) to the objectives, policies and methods of implementation within Chapter 15 (Utilities) except for management of exotic tree species in respect of which all objective (1) and all implementing policies and methods in this section apply; (b) Elsewhere within the Mackenzie Basin subzone so as to achieve objective (1) above. (6) Subject to objective 3B(1) above and to rural objectives 1, 2 and 4: (a) To enable pastoral farming; (b) To manage pastoral intensification and/or agricultural conversion throughout the Mackenzie Basin and to identify areas where they may be enabled (such as Farm Base Areas); (c) To enable rural residential subdivision, cluster housing and farm buildings within Farm Base Areas around existing homesteads (where they are outside hazard areas)	The open character of the site will not be protected due to the size and scale of the solar farm. However, due to the location of the solar farm and its visibility being limited to a small number of public places, the openness and vastness of the Mackenzie Basin when perceived from the surrounding public places will remain largely intact.
Policy 3B1 – Recognition of the Mackenzie Basin's Distinctive Characteristics (7) To recognise that within the Mackenzie Basin's outstanding natural landscape there are: (a) Many areas where development beyond pastoral activities is either generally inappropriate or should be avoided;	The assessment in Section 6 of the Landscape and Visual Assessment (**Appendix C**) has taken into consideration the outstanding landscape values of the Mackenzie basin and has assessed the proposed solar farm, which is within an area of high visual vulnerability. However, as discussed in this report, the solar farm in this location is not entirely inappropriate. The site is within an area of high visual vulnerability, therefore by default it would have a low ability to absorb development. However,

Objective/policy	Comment
(b) Some areas with greater capacity to absorb different or more intensive use and development, including areas of low or medium visual vulnerability and identified Farm Base Areas; (c) Areas, places and features of particular significance to Ngāi Tahu. (8) To identify, describe and map as overlays, specific areas within the Mackenzie Basin that assist in the protection and enhancement of the characteristics and/or values of the outstanding natural landscape contained in Objective 3B(1) being: (a) Lakeside Protection Areas, shown on the planning maps; (b) Scenic Viewing Areas, in Appendix J and shown on the planning maps; (c) Scenic Grassland Areas, in Appendix J and shown on the planning maps; (d) Sites of Natural Significance, in Appendix I and shown on the planning maps, and (e) Land above 900m in altitude, shown on the planning maps. (9) As part of an assessment of the suitability of an area for a change in use for development: (a) To identify whether the proposed site has high, medium or low ability to absorb development according to Appendix V (Areas of Landscape Management); (b) To require an assessment of landscape character sensitivity (incorporating natural factors including geomorphology, hydrology, ecology, vegetation cover, cultural patterns, landscape condition and aesthetic factors such as naturalness and remoteness).	regarding the solar farm and its location, it will only be seen from a small number of public places. This means the open space values that stem from the vastness of the open plains, as perceived from most of the surrounding public places, will be maintained. However, when seen from the nearby public places, due to its size and scale, the solar farm will be likely to be a prominent feature. The underlying ecological values of the site will be significantly enhanced. Mackenzie Basin is the fifth sunniest place within Aotearoa New Zealand. These elements provide the context that assists in visually absorbing the proposed solar farm into the receiving environment. In doing so this landscape setting reduces the potential degree of adverse visual effects. It is worthwhile mentioning that by locating the solar farm near a substation, rather than elsewhere in the landscape, it reduces the amount of potential additional infrastructure that may be seen from public places, e.g. additional transmission towers and overhead power lines. It is also noted the site is relatively adjacent to the Ohau canal and can be viewed in association with this element in the landscape. For the above reasons it is considered that this landscape has some capacity to absorb change.
Policy 3B2 –To ensure adverse effects, including cumulative effects, on the environment of sporadic development and subdivision are avoided or mitigated by: (1) Managing residential and rural residential subdivision and housing development within defined Farm Base Areas (refer to Policy 3B3); (2) Enabling farm buildings within Farm Base Areas and in areas of low visual vulnerability subject to bulk and location standards and elsewhere managing them in respect of location and external appearance, size, separation and avoidance of sensitive environments; (3) Strongly discouraging non-farm buildings elsewhere in the Mackenzie Basin outside of Farm Base areas.	This policy matter is focused on residential and rural residential development and its potential sprawl throughout the district. Therefore, it is not applicable to the proposed solar farm. It is applicable to note that the proposal will not result in additional domestic activities within the landscape.
Policy 3B8 – To recognise and provide for the use and development of renewable energy generation and transmission infrastructure and operations within the footprint of current operations or on land owned by infrastructure operators as at 1 October 2011 while, as far as practicable, avoiding, remedying or mitigating significant adverse effects on the outstanding natural landscape and features of the Mackenzie Basin.	The proposed 420 MWp solar farm will provide renewable energy into the National Grid, which is equivalent to powering 100,000 homes. The solar farm is within a property that has a national grid power line extending north to south through its centre, and within close proximity of Ohau C Power Station and is immediately north of Lake Benmore. However, this property was not owned by an infrastructure operator prior to 1 October 2011. As discussed in **Section 6** of this AEE, the proposed solar farm will result in a minor effect on landscape values in the Mackenzie Basin.
Policy 3B10 – To avoid, remedy or mitigate adverse reverse sensitivity effects of non-farm development and residential activity on rural activities and activities such as power generation, transmission, infrastructure, state highways and the Tekapo Military Training Area.	The proposed solar farm will not result in reverse sensitivity effects on the surrounding environment.

Objective/policy	Comment
Objective 6 - A level of rural amenity which is consistent with the range of activities anticipated in rural areas, but which does not create unacceptably unpleasant living or working conditions for the District's residents or visitors, nor a significant deterioration of the quality of the general rural and physical environment.	Nationally and internationally, solar farms of this size and scale are commonly located within rural environments and represent an additional type of production activity that features a grid pattern of built form directly associated with electricity infrastructure. However, unlike farming crops which use the land and soil for productive use, the proposal uses the sky and climate to produce energy, and in this instance the Mackenzie Basin has the fifth highest sunshine hours in Aotearoa New Zealand. Unlike a busy housing development, the solar farm will be a relatively static operation with very few people coming and going from the site. Due to this, the proposal will not result in a busy environment, rather it will remain relatively 'quiet' similar to that of the current pastoral use of the site. As assessed above, the solar farm will be seen from a small number of public places. When seen, in particular from the McAugtries Road beside the Ohau C Power Station where people fish, the static appearance and quiet nature of the solar farm will not result in reverse sensitivity effects on these people, and the current pleasantness will not be affected to a significant degree.
Rural Policy 6D - To encourage and/or control activities to be undertaken in a way which avoids, remedies or mitigates adverse effects on the amenities and physical environment of rural areas.	The proposed solar farm will be appropriately screened, with extensive setbacks of the panels from the property boundary. These measures aim to avoid, remedy and mitigate adverse on amenity and the physical environment.
Objective 7 - Minimal loss of life, damage to assets and infrastructure, or disruption to the community of the District, from natural hazards.	There are no natural hazards identified for the site. In any case, the proposed solar farm is designed to withstand seismic events and extreme weather such as rain, wind and snow.
Section 16 Utilities	
Objective 1 – Utilities whose functioning and operation avoid, remedy, or mitigate adverse effects on their surrounding environment.	The proposed solar farm is relatively static with very few people coming and going from the site and will therefore not result in a visually busy environment, like a residential development of this size and scale. Due to this, when experienced from the surrounding public places, its operations will not exacerbate the adverse visual effects.
Policy 1 – To avoid, remedy or mitigate adverse environmental effects created by the operation of utilities through the application of performance standards to separate incompatible activities, maintain visual amenities, safety, and the quality of the environment.	
Section 19 Ecosystems and Indigenous Biodiversity[17]	
Objective – Land use and development activities are managed to: (a) Protect areas of significant indigenous vegetation and significant habitats of indigenous fauna; (b) Outside areas of significant indigenous vegetation and significant habitats of indigenous fauna, ensure the maintenance and enhancement of indigenous biodiversity, and (c) Despite (a) and (b), recognise and provide for the national significance of the Waitaki Power Scheme and the National Grid when managing effects on indigenous biodiversity arising from the development, operation, maintenance, refurbishment or upgrade of those utilities.	No significant indigenous vegetation will be lost as a result of this proposal. All proposed works and structures will be appropriately setback from areas of significant ecological value. In addition to this, the proposal will enhance indigenous vegetation on site by planting an area of approximately 89 ha. This will contribute to the permanent habitat creation for 'Threatened' and 'At Risk' plants and provide a significant increase in the extent of indigenous vegetation on site.
Policy 3 – Outside areas of significant indigenous vegetation and significant habitats of indigenous biodiversity is maintained or enhanced by: (a) Avoiding adverse effects on indigenous vegetation and habitats of indigenous fauna as far as practicable; (b) Remedying any adverse effects that cannot by avoided; then	Adverse effects on indigenous vegetation and habitats of indigenous fauna are appropriately avoided and remedied by the following: ● Ensuring no works are undertaken in areas identified as having high ecological value; ● Undertaking lizard surveys prior to undertaking works on the site to identify and relocate (if needed) any protected species; and

[17] Section 19 was incorporated into the MDP following public notification of Plan Change 18. Plan Change 18 is still subject to appeal.

Objective/policy	Comment
(c) Mitigating any adverse effects that cannot by remedied; then (d) Offsetting any significant residual adverse effects in accordance with Policy 4.	• Planting approximately 89 ha of native vegetation, providing significant ecological benefits as discussed in **Section 6.2.2**.
Policy 8 – To recognise and provide for activities, including voluntary initiatives, that contribute towards the protection, maintenance or enhancement of indigenous biodiversity.	The proposal involves planting approximately 89 ha of native vegetation. This will provide significant enhancement of indigenous biodiversity values on site, which will provide important habitat for 'Threatened' and 'At Risk' species. In addition to this, the project will provide nationally important information regarding the management of dryland ecosystems and will help address a critical dryland ecosystem knowledge gap that currently exists in New Zealand.

7.7 Canterbury Regional Policy Statement

An assessment against the relevant provisions of the Canterbury Regional Policy Statement is provided in **Table 6** below.

Table 6: Canterbury Regional Policy Statement objective and policy assessment

Chapter 5 – Land Use and Infrastructure	
Objective / Policy	**Comment**
Objective 5.2.1 - Development is located and designed so that it functions in a way that: (2) Enables people and communities, including future generations, to provide for their social, economic and cultural well-being and health and safety; and which: (a) Maintains and where appropriate, enhances the overall quality of the natural environment of the Canterbury region, including its coastal environment, outstanding natural features and landscapes, and natural values; (b) Provides sufficient housing choice to meet the region's housing needs; (c) Encourage sustainable economic by enabling business activities in appropriate locations; (d) Minimises energy use and /or improves energy efficiency; (e) Enables rural activities that support the rural environment including primary production; (f) Is compatible with, and will result in the continued safe, efficient and effective use of regionally significant infrastructure; (g) Avoids adverse effects on significant natural and physical resources including regionally significant infrastructure, and where avoidance is impractical, remedies or mitigates those effects on those resources and infrastructure; (h) Facilities the establishment of papakainga and marae; and (i) Avoids conflict between incompatible activities.	The proposal will provide renewable electricity to the National Grid – and in doing so, will enable people and communities, including future generations, to provide for their social, economic and cultural well-being and health and safety. Furthermore, the proposal will maintain, and where practical, enhance the quality of the natural environment. The proposal has an operational and functional requirement to be located in the rural zone. It will not cause reverse sensitivity effects, instead it is complementary to the agricultural activities and hydro scheme infrastructure already in place.
Policy 5.2.2 (1) – To recognise the benefits of enabling people and communities to provide for their social, economic and cultural well-being and health and safety and to provide for infrastructure that is regionally significant to the extent that it promotes sustainable management in accordance with the RMA.	The proposal directly supports the uptake of low-carbon REG and supports the reduction of New Zealand's greenhouse gas emissions. In doing so, the proposal enables people and communities to provide for their social, economic and cultural well-being, while also providing ecological benefits in the form of native vegetation planting. Overall, the proposal promotes sustainable management in accordance with the RMA.

Policy 5.2.2 (2) – To achieve patterns and sequencing of land-use with regionally significant infrastructure in the wider region so that: (b) Adverse effects resulting from the development or operation of regionally significant infrastructure are avoided, remedied or mitigated as fully as practicable.	Adverse effects from the proposed solar farm are sufficiently avoided, remedied and mitigated as far as practicable.
Chapter 9 – Ecosystems and Indigenous Biodiversity	
Objective 9.1.1 – Land use and development, and the introduction and spread of animal and plant pests, have contributed to the ongoing loss and degradation of Canterbury's ecosystems and indigenous biodiversity. Objective 9.2.1 – The decline in the quality and quantity of Canterbury's ecosystems and indigenous biodiversity is halted and their life-supporting capacity and mauri is safeguarded. Policy 9.3.4 – To promote the enhancement and restoration of Canterbury's ecosystems and indigenous biodiversity, in appropriate locations, where this will improve the functioning and long term sustainability of these ecosystems.	The proposal aims to deliver ecological benefits in the form of an 89 ha enhancement area, which will support approximately 890,000 native plants. This will include a 40 m wide strip surrounding the entire development footprint, which will be revegetated with shrubs and trees. Overall, this is expected to increase ecological values on the site significantly, which will support Canterbury's ecosystems and indigenous biodiversity. In terms of potential adverse effects on ecosystems and indigenous biodiversity, all proposed works will be undertaken in accordance with management plans (including a Lizard Management Plan and Biosecurity Management Plan).
Chapter 12 – Landscape	
Objective 12.2.1 – Outstanding natural features and landscapes within the Canterbury region are identified and their values are specifically recognised and protected from inappropriate subdivision, use and development. Policy 12.3.2 – To ensure management methods in relation to subdivision, use or development, seek to achieve protection of outstanding natural features and landscapes from inappropriate subdivision, use and development.	The assessment in Section 6 of the Landscape and Visual Assessment (**Appendix C**) has taken into consideration the outstanding landscape values of the Mackenzie basin and has assessed the proposed solar farm, which is within an area of high visual vulnerability. However, as discussed in this report, the solar farm in this location is not entirely inappropriate.
Section 16 – Energy	
Objective 162.2 – Reliable and resilient generation and supply of energy for the region, and the wider contributions beyond Canterbury, with a particular emphasis on renewable energy, which: (10) Provides for the appropriate use of the region's renewable resources to generate energy; (11) Reduces dependency on fossil fuels; (12) Improves the efficient end-use of energy; (13) Minimises transmission losses; (14) Is diverse in the location, type and scale of renewable energy development; (15) Recognises the locational constraints in the development of renewable electricity generation activities; and (a) Avoids any adverse effects on significant natural and physical resources and cultural values or where this is not practicable, remedies or mitigates; and (b) Appropriately controls other adverse effects on the environment.	The proposal provides a unique opportunity to generate power during the day, thereby allowing the hydro lakes to store more water during the day to increase capacity at night. Given climate change and more extreme weather events that are expected, there is a higher likelihood of severe drought affecting the performance of hydro lakes. Therefore, the co-location of the proposed solar farm with the hydro power scheme will assist with providing a more resilient power generation network. Adverse effects on significant natural and physical resources and cultural values are appropriately avoided and managed, as discussed in **Section 6**. The annual generation is equivalent to the average annual load of around 100,000 homes. This generation replaces hydro from the local sources, which allows that water to be used in the evening or morning peaks. The solar farm will use the existing transmission infrastructure, which is designed to be as efficient as possible and is already in place. Due to the capacity of the existing infrastructure, a large scale solar farm is required to justify the connection costs incurred. The diversity of having solar and hydro together allows them to be co-optimised, matching a controllable generation type (hydro) with an intermittent generation (solar).
Policy 16.3.3 – To recognise and provide for the local, regional and national benefits when considering proposed or existing renewable energy generation facilities, having particular regard to the following: (1) Maintaining or increasing electricity generation capacity while avoiding, reducing or displacing greenhouse gas emissions;	The proposal directly supports the uptake of low-carbon renewable electricity generation, which contributes to New Zealand achieving net-zero status by 2050. In addition, the proposal will increase the security of supply at a national level, providing renewable electricity that could power approximately 100,000 houses and improving the resilience of the National Grid.

(2) Maintaining or increasing the security of supply at local and regional levels, and also wider contribute beyond Canterbury	

7.8 Other matters

7.8.1 Climate Change Response (Zero Carbon) Amendment Act 2019

The Climate Change Response (Zero Carbon) Amendment Act 2019 provides a framework for the development and implementation of climate change policies to address climate change in New Zealand and contribute to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5 Celsius above pre-industrial levels. The amendments set a new domestic greenhouse gas emissions reduction target for New Zealand, including reducing net emissions of all greenhouse gases (except biogenic methane) to zero by 2050.

The proposed solar farm will generate renewable electricity for the Canterbury region, which decreases reliance of the National Grid on fossil fuel sources of electricity, and directly supports the goal of net zero emissions from greenhouse gases by 2050.

7.9 Iwi Management Plans

7.9.1 Waitaki Iwi Management Plan 2019

The Waitaki Iwi Management Plan 2019 sets forward the aspirations for Te Runanga o Araowhenua, Te Runanga o Waihao and Te Runanga o Moeraki (Ka Papatipu Runaka). It constitutes their expression of rakatirataka in fulfilment of their kaitiaki responsibilities in the Waitaki Catchment.

Of relevance to this proposal, the plan outlines the following strategic objectives:

- *Mana whenua have a co-governance and co-management role over the Aoraki; and*
- *Wahi tupuna are protected and the relationship mana whenua have with these landscapes is enhanced.*

The proposal will provide opportunities for mana whenua to be actively involved throughout the project lifecycle. In addition, the mitigation measures put forward (see **Section 3.4**) and the ecological enhancement proposed will ensure the landscape values of the surrounding area is protected.

Overall, the proposal is consistent with the strategic objectives identified in this plan.

7.9.2 Iwi Management Plan of Kati Huirapa

The Iwi Management Plan of Kati Huirapa sets forward a number of key aspirations / objectives for their rohe.

Of relevance to this application are the following aspirations:

- *The Crown and other agents with authority delegated by the Crown, consult with Takata Whenua on all matters Māori as set out in the Resource Management Act;*
- *Breeding areas for fish, birds, all species in waterways remain undisturbed;*
- *Corridors of undisturbed vegetation be maintained along all rivers, and between rivers and forests, any areas of indigenous flora and habitats of indigenous fauna to maintain the seasonal migration and movement of birds, all creatures;*
- *The protection and restoration of natural habitats be encouraged;* and
- *The planting of flax and other native species which are a source of traditional materials be encouraged.*

The proposal will provide opportunities for kaitiakitanga over the lifecycle of the project; will increase the biodiversity value of the site by the proposed ecological enhancement area and will provide important habitat for

birds and other species. There will be no discharge of contaminants or stormwater to any adjacent waterbody. The proposal is overall consistent with the aspirations expressed in the document.

7.9.3 Ngai Tahu Resource Management Strategy for the Canterbury Region

This document outlines the key issues and aspirations for Ngai Tahu in the Canterbury region with regards to natural resource management. Of relevance to this proposal are the following policies:

- *That Ngai Tahu retain the right to be involved in and contribute to, the resource allocation and management decisions which impact on Tribal resources;* and
- *That the Canterbury Regional Council should encourage landowners or occupiers to plant vegetation on riparian strips to prevent contaminated run-off into any wetland, waterway or lake.*

The proposal involves extensive planting that will provide important habitat for At-Risk and Threatened species. The proposal will result in a transition away from intensive dairying farming to an activity that will result in no discharge to any waterbody / wetland. There will be no impact on waterways as a result of the proposed works. As noted above, mana whenua will be provided opportunities for engagement throughout the entire lifecycle of the project.

7.10 Notification Assessment

The Applicant requests that the resource consent applications be publicly notified. In accordance with section 95A(2)(a) and 95A(3)(a) of the RMA, public notification is therefore mandatory.

8. Consultation

8.1 Overview

The Applicant had a pre-application meeting with Mackenzie District Council on 1 July 2022 to outline the project and seek guidance from Council regarding likely consent requirements. Minutes from this meeting are provided in **Appendix H**. Further details on consultation undertaken to date is provided in the sections below.

8.2 Mana Whenua

The Applicant has engaged with Te Rūnanga o Ngāi Tahu, which to date has included the following:

- An initial email on 28 February 2023 outlining the proposal and approaching iwi for initial comment (refer to **Appendix I**).
- A meeting on 19 May 2023 with Te Rūnanga o Ngāi Tahu General Manager – Strategy and Influence at their Christchurch office. Project development plans were shared and discussed.
- Email introduction on 22 May 2023 by Ngāi Tahu to the three hapū groups who hold mana whenua status over the project area – Arowhenua, Moeraki and Waihao.
- In-person meeting held on 23 May 2023 with representatives from Moeraki and Waihao. Project was introduced and document detailing development plans was shared.

The three separate hapū groups have advised that consultation and engagement with them should advance independently of each other until such time as it may be considered appropriate for one hapū to take the lead. This will be discussed and decided by the hapū themselves as engagement develops.

Both Moeraki and Waihao have advised they use a mana whenua-owned consultancy to assess resource consent applications and prepare cultural impact assessments and have requested these services be engaged with on their behalf. Both hapū have advised that personal engagement with them should also continue. Further contact with hapū Arowhenua has been sought. For further information, refer to communication record in **Appendix I**.

Meaningful engagement with mana whenua will continue throughout the project lifecycle. Through this ongoing engagement, mana whenua can determine their own desired level of involvement in the project by helping to identify opportunities for collaboration, as well as identifying potential adverse cultural effects and measures to address these. The Applicant is committed to developing the solar farm in the spirit of partnership, in line with the principles of Te Tiriti o Waitangi.

8.3 Department of Conservation

An initial online meeting with DoC, Wildlands and the Applicant was held on 12 May 2023 (refer to **Appendix I**). The purpose of the meeting was to introduce the project to DoC, summarise the key design considerations and ecological enhancement package and measures proposed to mitigate adverse ecological effects.

Following this initial meeting, DoC provided some initial comments on the application based on a desktop assessment of the site. The following comments were provided:

- Ensuring solar panels are setback a distance of 10-20 m from the moraine wall edge to avoid potential adverse effects on *Lepdium*.
- The gullies on the plateau may have remnant vegetation which should be preserved and should be avoided when spraying / cleaning the solar panels.
- Concern raised regarding the visibility of the site from the Twizel River trail, the Pukaki / Tekapo River 4WD track and the Benmore camping ground.

Engagement with DoC is ongoing regarding these matters and the Applicant is expecting DoC to provide further comments regarding the proposal in due course.

9. Conclusion

This AEE report has been prepared on behalf of the Applicant to accompany a resource consent application to Mackenzie District Council for the construction and operation of a 420 MWp photovoltaic solar farm at Section 3 SO 384036 located in the Mackenzie Basin. The proposal requires resource consent from Mackenzie District Council under the rules of the MDP as a **non-complying** activity.

The AEE report draws the following conclusions:

- The proposal has the potential to give rise to landscape and visual amenity effects. Consistent with the mitigation hierarchy, where effects on landscape values cannot be avoided, they have been appropriately remedied and mitigated.
- The actual and potential effects of the proposal include significant positive effects in relation to the provision of REG for the Mackenzie District as well as the enhancement of ecological values on site.
- The proposal is considered consistent with Part 2 of the RMA; and
- The proposal is consistent with the objectives and policies of the MDP, Canterbury Regional Policy Statement and NPS-REG.

The proposal will be undertaken in accordance with robust mitigation measures to ensure adverse effects on the receiving environment are appropriately mitigated.

The Applicant requests that this application is publicly notified in accordance with section 95A(2)(a) and 95A(3)(a) of the RMA.

Appendix A: Record of Title

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General of Land

Identifier	**509805**
Land Registration District	**Canterbury**
Date Issued	12 January 2010

Prior References
387077

Estate	Fee Simple
Area	973.4790 hectares more or less
Legal Description	Section 3 Survey Office Plan 384036

Registered Owners
Douglas Robert McIntyre and Waitaki Trustees (Golden Acres) Limited

Interests

Subject to Part IVA Conservation Act 1987

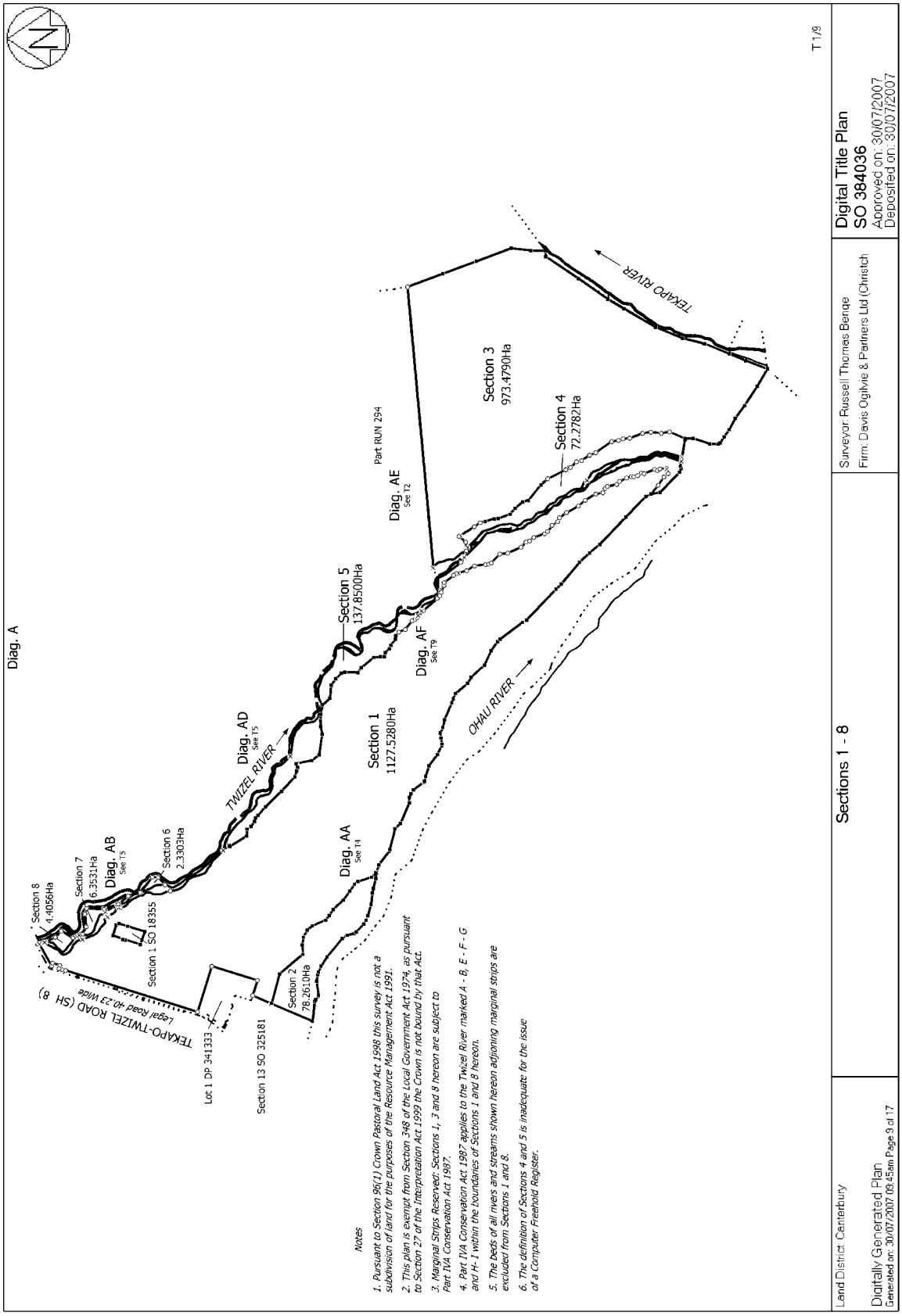
Subject to Section 11 Crown Minerals Act 1991

Appurtenant hereto is a right of way for the purposes of farm management and stock access and a right to convey water created by Deed of Easement 7584791.4 see CIR 387078 - 19.10.2007 at 9:00 am

Appurtenant hereto is a right of way created by Easement Instrument 8634143.6 - 11.11.2010 at 7:00 am

9611963.3 Mortgage to Westpac New Zealand Limited - 14.1.2014 at 2:39 pm

11207764.4 Variation of Mortgage 9611963.3 - 20.9.2018 at 11:19 am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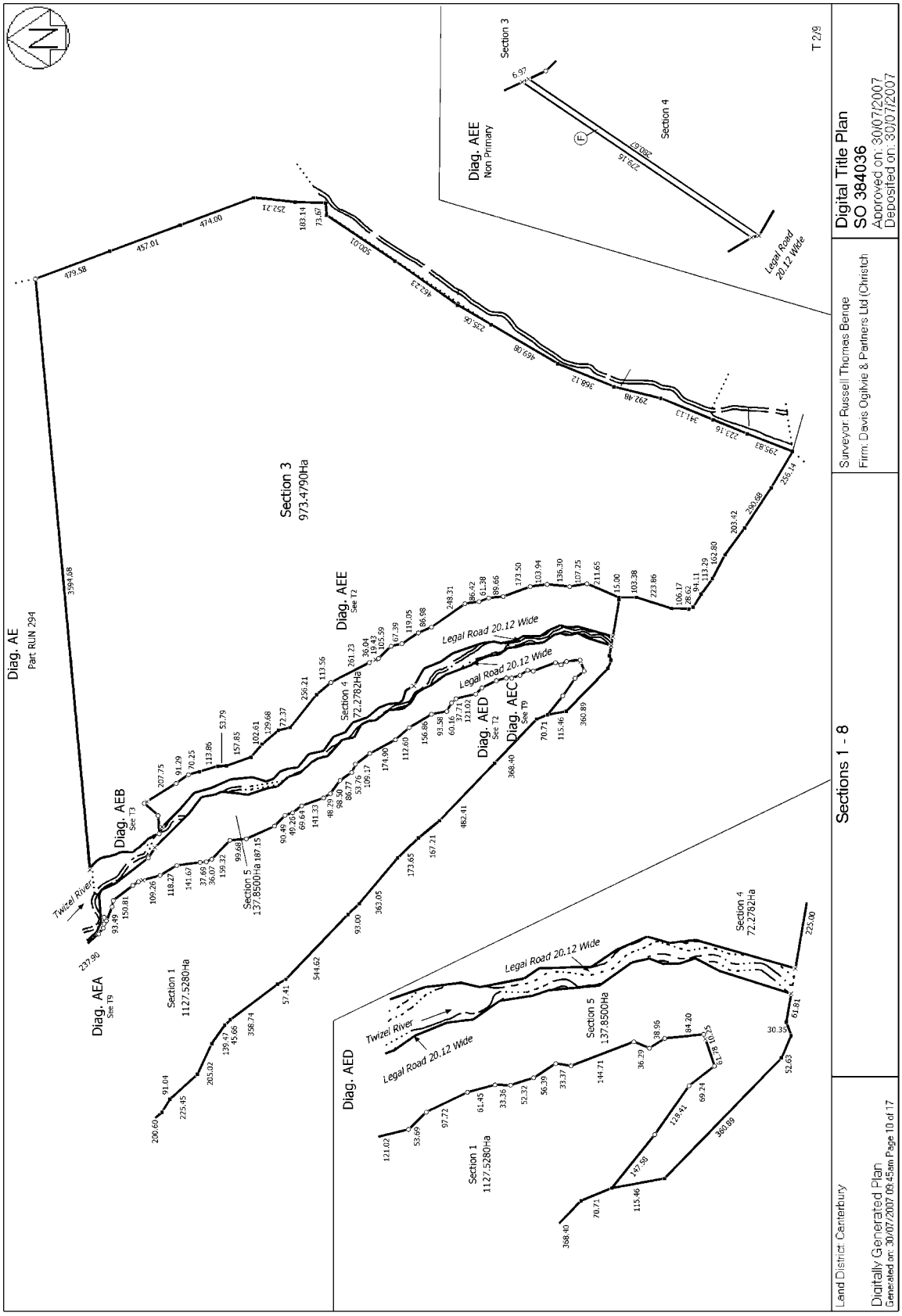
Section 8
4.4056Ha
Section 7
6.3531Ha
Diag. AB
See T5
Section 6
2.3303Ha
Section 1 SO 18355
TEKAPO-TWIZEL ROAD (SH 8)
Legal Road 40.23 Wide
Lot 1 DP 341333
Section 13 SO 325181
Section 2
78.2610Ha
Diag. AA
See T14
TWIZEL RIVER
Diag. AD
See T5
Section 1
1127.5280Ha
Section 5
137.8500Ha
Diag. AF
See T9
Part RUN 294
Diag. AE
See T2
Section 3
973.4790Ha
Section 4
72.2782Ha
TEKAPO RIVER
OHAU RIVER
T 1/8
Notes
1. Pursuant to Section 96(1) Crown Pastoral Land Act 1998 this survey is not a subdivision of land for the purposes of the Resource Management Act 1991.
2. This plan is exempt from Section 348 of the Local Government Act 1974, as pursuant to Section 27 of the Interpretation Act 1999 the Crown is not bound by that Act.
3. Marginal Strips Reserved: Sections 1, 3 and 8 hereon are subject to Part IVA Conservation Act 1987.
4. Part IVA Conservation Act 1987 applies to the Twizel River marked A - B, E - F - G and H- I within the boundaries of Sections 1 and 8 hereon.
5. The beds of all rivers and streams shown hereon adjoining marginal strips are excluded from Sections 1 and 8.
6. The definition of Sections 4 and 5 is inadequate for the issue of a Computer Freehold Register.
Land District Canterbury
Sections 1 - 8
Digitally Generated Plan
Generated on: 30/07/2007 09:45am Page 9 of 17
Surveyor Russell Thomas Benge
Firm: Davis Ogilvie & Partners Ltd (Christch
Digital Title Plan
SO 384036
Approved on: 30/07/2007
Deposited on: 30/07/2007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See T9
Diag. AEB
See T3
Diag. AEC
See T9
Diag. AED
See T2
Diag. AEE
See T2
Diag. AED
Diag. AEE
Non Primary
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Section 3
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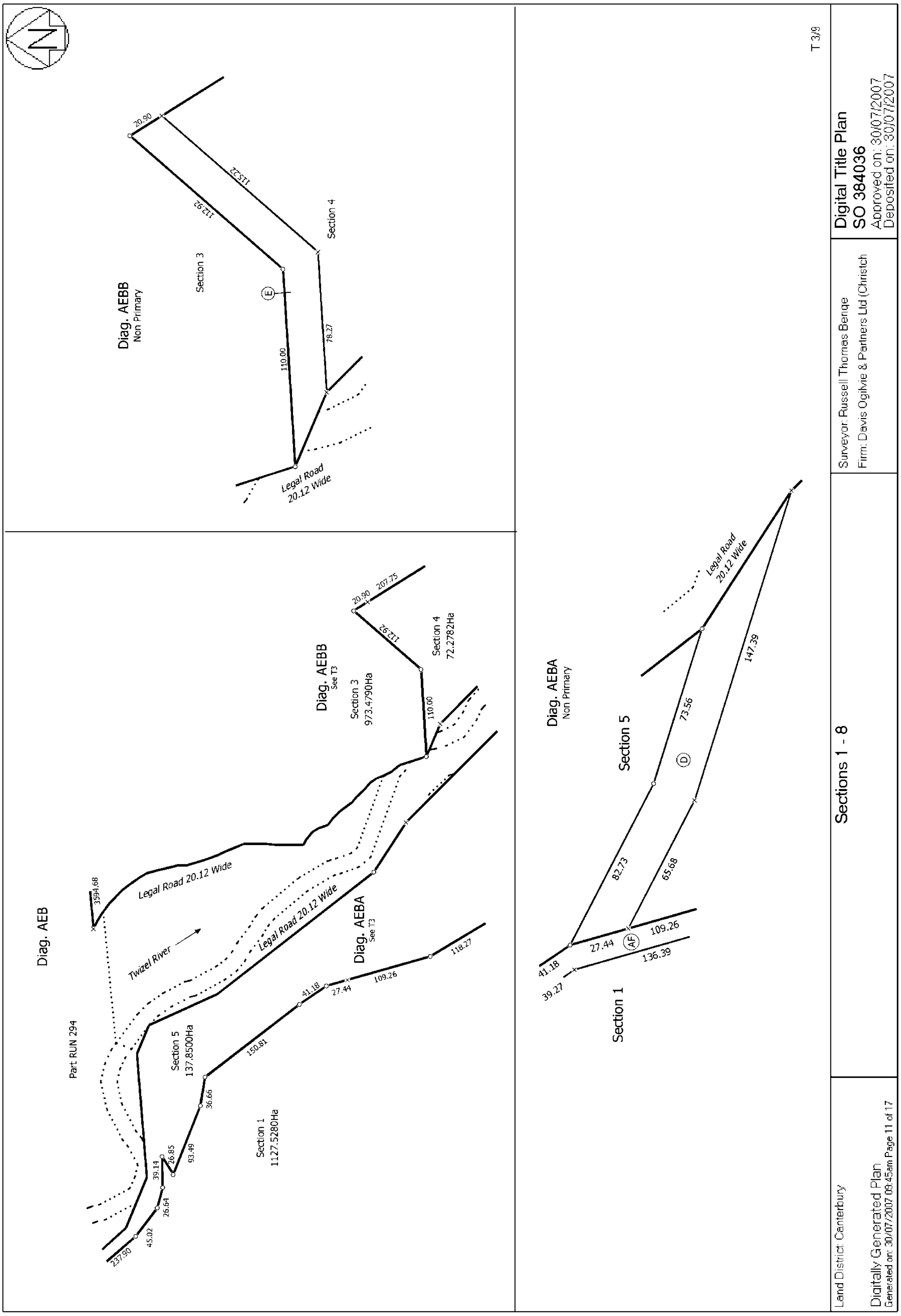
Section 4
72.2782Ha
Section 5
137.8500Ha
Legal Road 20.12 Wide
Twizel River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Section 3
Section 4
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112.92
110.00
78.27
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20.12 Wide
Diag. AEB
Part RUN 294
Twizel River
Legal Road 20.12 Wide
Diag. AEBB
See T3
Section 3
973.4790Ha
Section 4
72.2782Ha
20.90
207.75
112.92
110.00
3594.68
Diag. AEBA
See T3
Section 5
137.8500Ha
Section 1
1127.5280Ha
150.81
41.18
27.44
109.26
118.27
36.66
93.49
26.85
39.14
26.64
45.02
237.90
Diag. AEBA
Non Primary
Section 5
Section 1
Legal Road
20.12 Wide
73.56
147.39
82.73
65.68
27.44
109.26
136.39
41.18
39.27
T 3/9
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SO 384036
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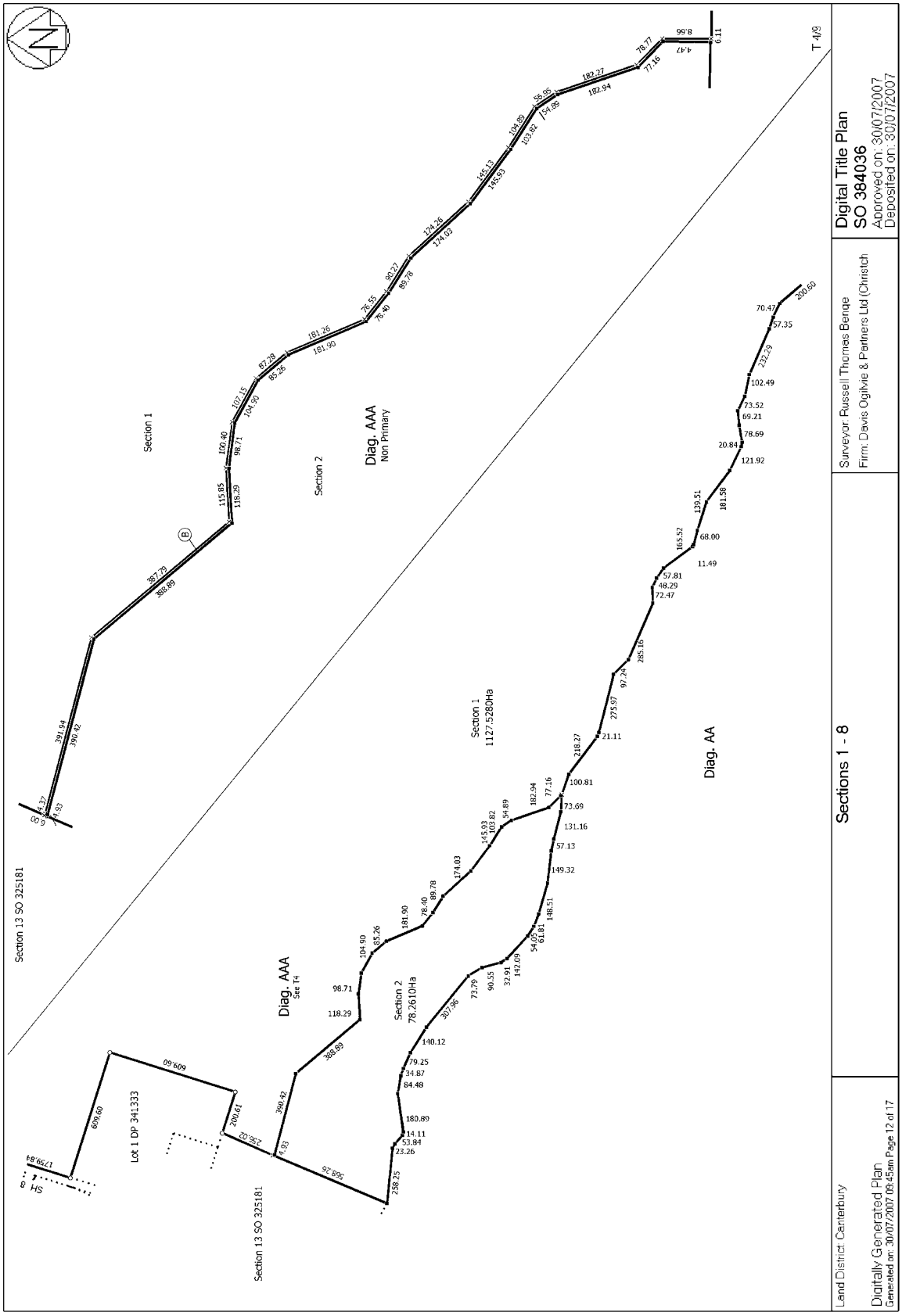
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Land District Canterbury
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Section 2
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Diag. AAA
Set 14
Diag. AA
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Section 2
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Section 13 SO 325181
Section 13 SO 325181
Lot 1 DP 341333
T 4/9
B
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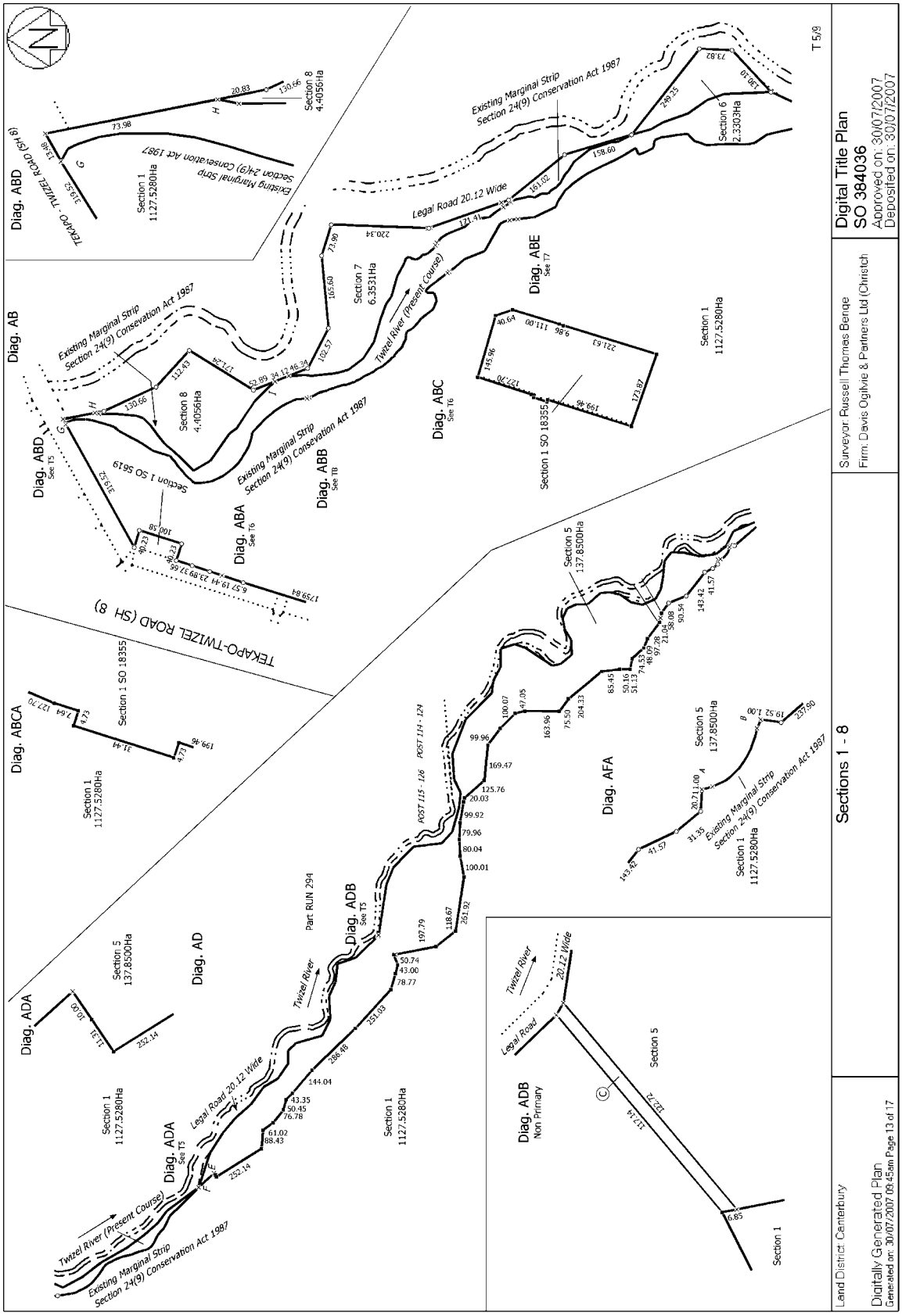
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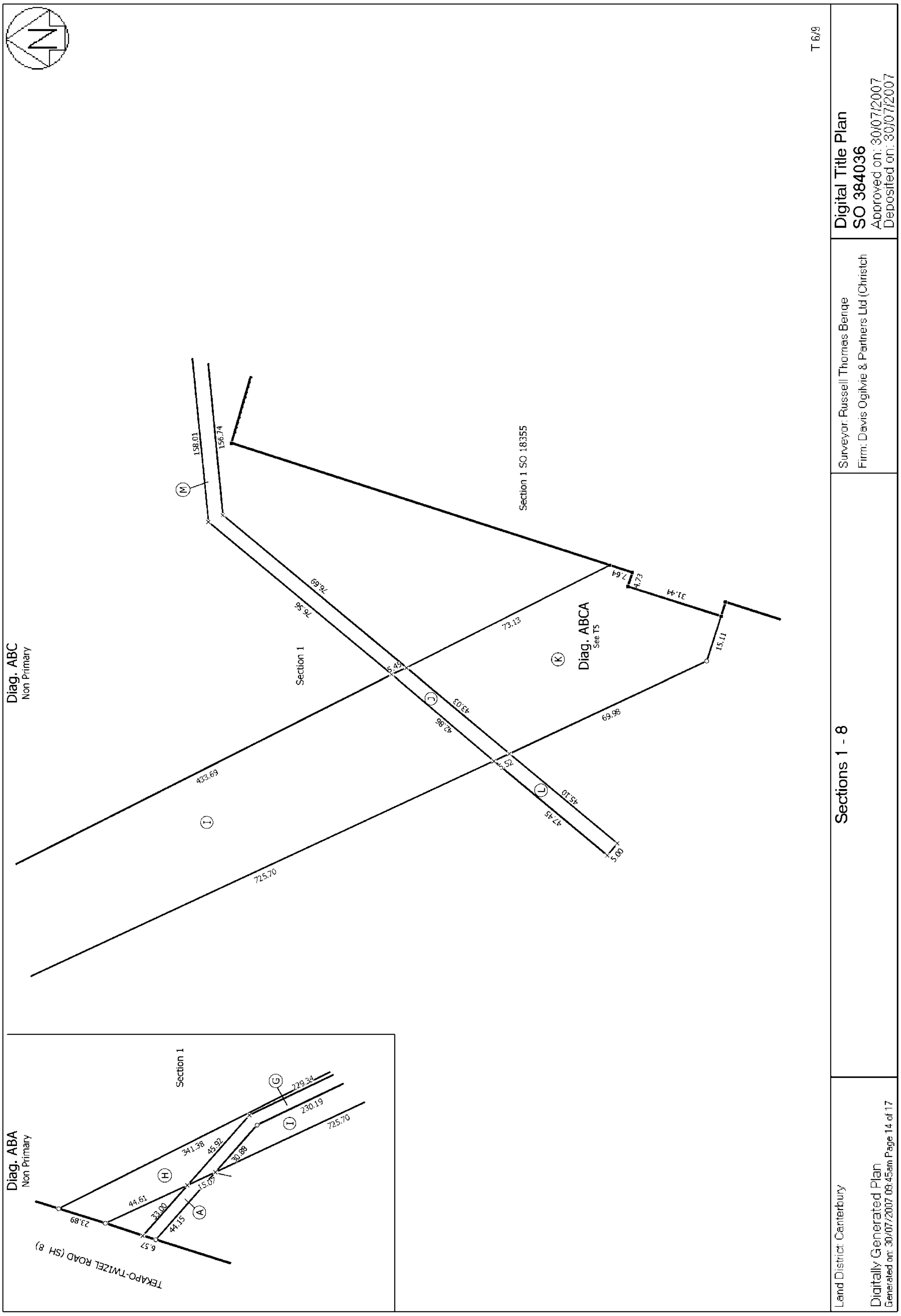
Diag. AB
Diag. ABD
See T5
Diag. ABA
See T6
Diag. ABB
See T8
Diag. ABC
See T6
Diag. ABE
See T7
Diag. ABCA
Diag. ADA
Diag. AD
Diag. ADB
See T5
Diag. AFA
Diag. ADB
Non Primary
TEKAPO-TWIZEL ROAD (SH 8)
Existing Marginal Strip
Section 24(9) Conservation Act 1987
Legal Road 20.12 Wide
Twizel River (Present Course)
Twizel River
Part RUN 294
Section 1 SO 18355
Section 1 SO 5619
Section 1
1127.5280Ha
Section 5
137.8500Ha
Section 6
2.3303Ha
Section 7
6.3531Ha
Section 8
4.4056Ha
POST 115 - 126
POST 114 - 124



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Sections 1 - 8
Land District: Canterbury
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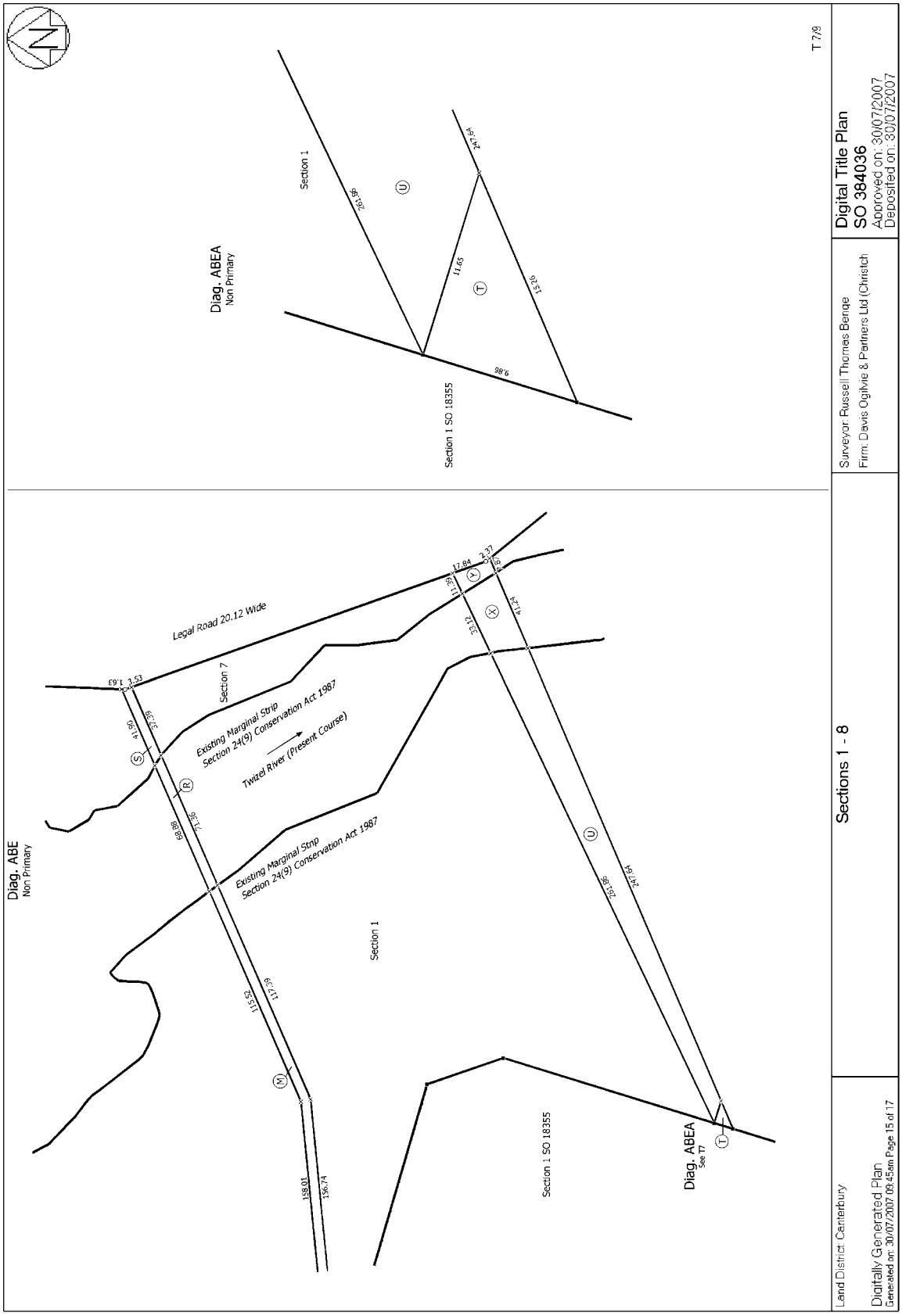
T 6/9
Diag. ABC
Non Primary
Diag. ABCA
See T5
Section 1 SO 18355
Section 1
Diag. ABA
Non Primary
TEKAPO-TWIZEL ROAD (SH 8)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T 7/9
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Section 7
Existing Marginal Strip
Section 24(9) Conservation Act 1987
Twizel River (Present Course)
Existing Marginal Strip
Section 24(9) Conservation Act 1987
Section 1
Section 1 SO 18355
Diag. ABEA
See T7
Sections 1 - 8
Land District Canterbury
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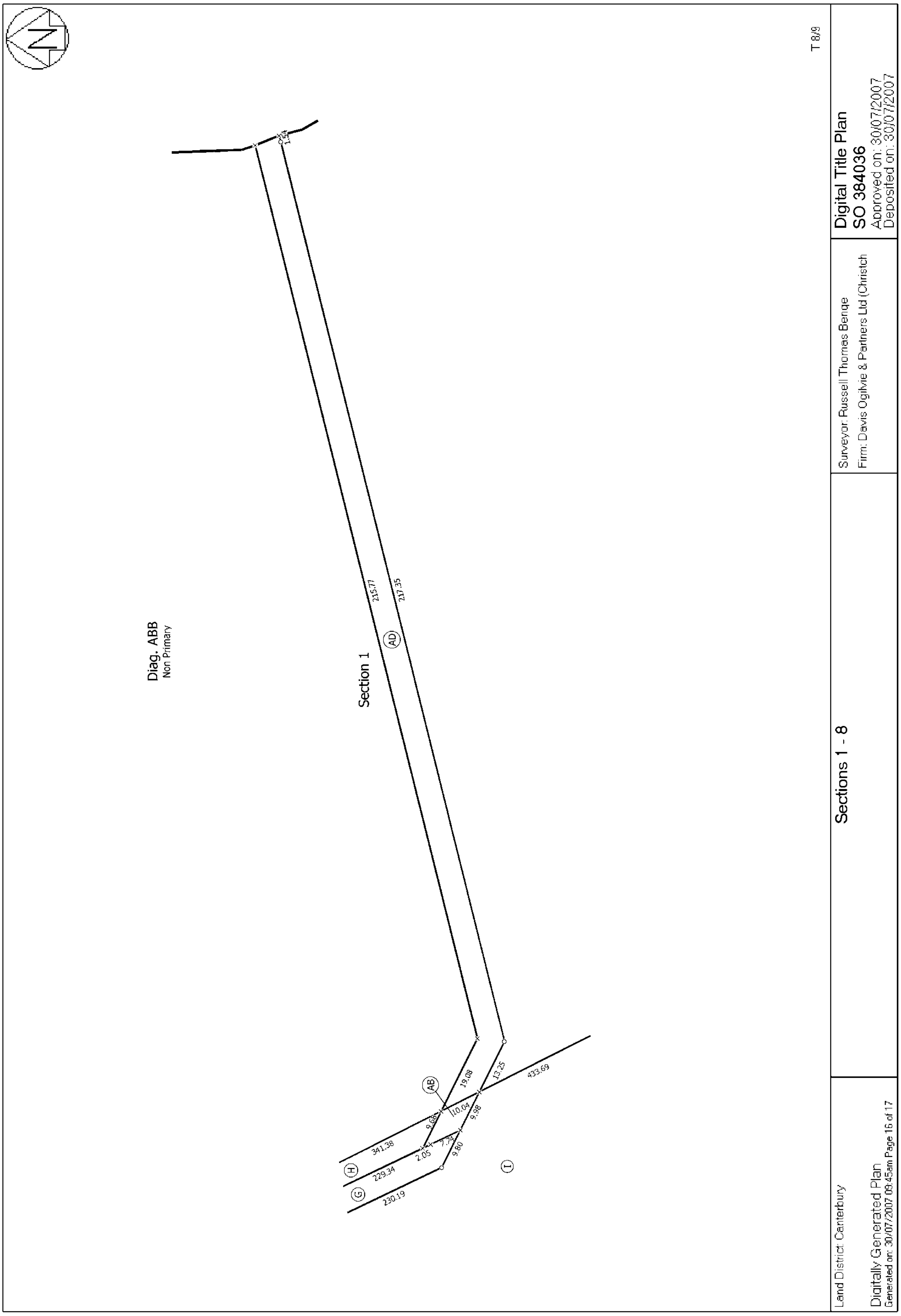

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Non Primary
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217.35
AB
19.08
13.25
433.69
10.04
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9.68
7.38
9.80
2.05
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229.34
230.19
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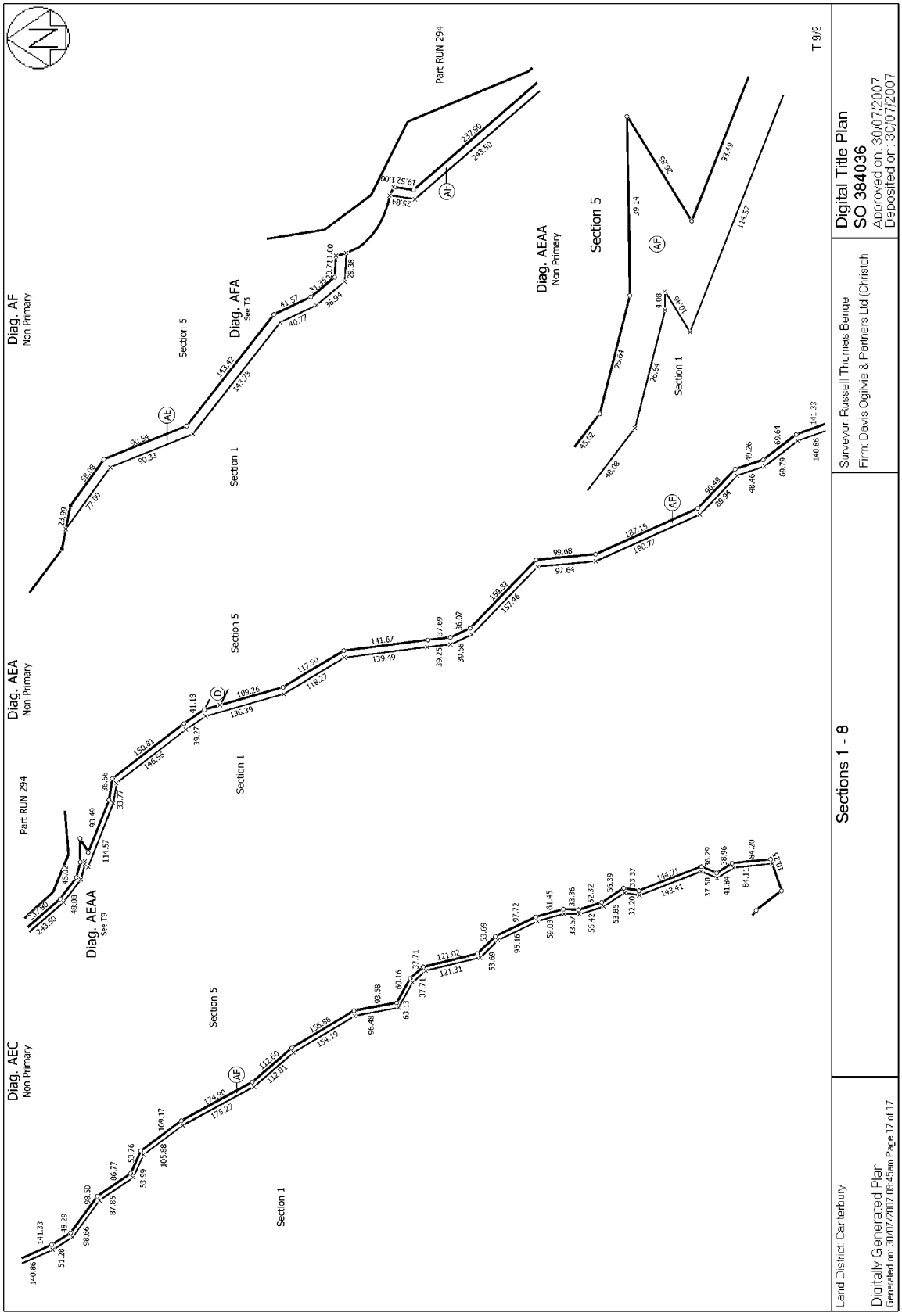
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Part RUN 294
Part RUN 294
Section 1
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Appendix B: Application Forms

APPLICATION FOR RESOURCE CONSENT

FORM 9: GENERAL APPLICATION

Under Section 88 of the Resource Management Act 1991

Mackenzie DISTRICT COUNCIL

APPLICANT

Applicant's Full Name/Company/Trust: Far North Solar Farm Ltd	
Contact Name:	
Email address*: s 9(2)(a)	
Postal Address*:	**Tick if postal address is preferred method of correspondence*:** ☐ **Tick if this is the address for invoicing purposes:** ☐
Phone numbers: Day	**Mobile** s 9(2)(a)

*** Our default method of corresponding with you is by email and phone. Alternatively, if you wish to receive correspondence by post (including any decision) please provide a postal address and tick the relevant box above.**

ADDRESS FOR SERVICE *(if different from the applicant)*

Company:	
Contact Name:	
Email address*: s 9(2)(a)	
Postal Address*: s 9(2)(a) s 9(2)(a)	**Tick if postal address is preferred method of correspondence*:** ☐ **Tick if this is the address for invoicing purposes:** ☐
Phone numbers: Day	**Mobile** s 9(2)(a)

*** Our default method of corresponding with you is by email and phone. Alternatively, if you wish to receive correspondence by post (including any decision) please provide a postal address and tick the relevant box above.**

DETAILS OF SITE

Street Address:
Legal Description:
Certificate of Title:
Valuation Number:

CONSENT(S) APPLIED FOR – *Identify all consents sought from Mackenzie District Council*

- ☐ **Land Use Consent**
- ☐ **Subdivision Consent**
- ☐ **Change/Cancellation of Consent Conditions or Consent Notice (s127)**
- ☐ **Extension of Lapse Period of Consent (s125)**
- ☐ **Existing Use Right Certificate**
- ☐ **Certificate of Compliance**
- ☐ **Outline Plan Approval (s176A)**

APPLYING FOR FAST-TRACK RESOURCE CONSENT PROCESS

I am applying for a Controlled Activity Land Use Consent: Yes : ☐ No: ☐

I have supplied an electronic address for service: Yes: ☐ No: ☐

DESCRIPTION OF THE PROPOSAL

OTHER CONSENTS

Is consent required under a National Environmental Standard (NES)?

- **NES for Assessing and Managing Contaminants in Soil to Protect Human Health 2012**
  You can address the NES for Soil Contaminants by selecting **ONE** of the following (tick):

  ☐ This application does not involve subdivision (excluding production land), change of land use or removal of (part of) a fuel storage system. Any earthworks will meet section 8(3) of the NES (including volume not exceeding 25m² per 500m³). Therefore the NES does not apply.

  ☐ I have undertaken a comprehensive review of District and Regional Council records and I have found no record suggesting an activity on the HAIL has taken place on the piece of land which is subject to this application.

  ☐ I have included a Preliminary Site Investigation undertaken by a suitably qualified person.

☐ I have addressed the NES requirements in the Assessment of Environmental Effects.

- **Any other National Environmental Standard (tick):**

Yes ☐ **N/A** ☐

Details:

Any additional consent(s) that have been applied for separately (tick)?

- **Environment Canterbury**

Yes ☐ **N/A** ☐

Details:

INFORMATION REQUIRED TO BE SUBMITTED

To be accepted for processing, your application **must** include the following (tick):

☐ **Computer Freehold Register (Certificate of Title) for the site (no more than 3 months old) and copies of any consent notices and covenants**
(Can be obtained from www.linz.govt.nz)

☐ **A description of the proposed activity, and a description of the site at which the activity is to occur**

☐ **A site plan/s at a convenient scale showing:**
- **Location of all existing and proposed buildings and distances to boundaries;**
- **Location of landscape features including trees and waterways;**
- **Existing and proposed access points and internal roading;**
- **Existing and proposed carparking areas;**
- **Location of existing septic tanks and effluent drainage lines;**
- **Details of existing and proposed landscaping;**
- **Location of existing and proposed signs;**
- **Areas and dimensions of property;**
- **Roads onto which the property has frontage.**

☐ **Other plans necessary to detail the proposal e.g. elevations, floor plans, servicing plan.**

☐ **Consideration of any person/s who may be adversely affected by the granting of the consent**

☐ **A description of any other activities that are part of the proposal to which the application relates**

☐ A description of any **other resource consents required** for the proposal to which the application relates

☐ An **assessment of the activity against any relevant provisions of the Mackenzie District Plan**

☐ An **Assessment of Environmental Effects** (Please see the separate Resource Consent Application Guide provided by the Mackenzie District Council to determine the information requirements that apply to your application).

Please note that additional information requirements may apply. Please refer to the separate Resource Consent Application Guide provided by the Mackenzie District Council in the first instance. For further enquiries, please contact the Planning staff.

PAYMENT – *A deposit fee must be paid prior to or at the time of the application as per Council's Fees and Charges*

I/We confirm payment by (tick):

☐ **Bank transfer** to account **03 0887 0226851 02** reference **R10821** and the **first five letters of applicant name**

☐ **Cheque payable to Mackenzie District Council** attached

☐ **Manual payment at reception** – receipt number:

DECLARATION

I hereby certify that, to the best of my knowledge and belief, the information given in this application is true and correct. I undertake to pay all actual and reasonable application costs incurred by the Mackenzie District Council.

Richard Homewood — ***Signature****

7/6/2023 — ***Date***

Richard Homewood — ***Full Name***

*If signing on behalf of a trust or company, please provide additional written evidence that you have signing authority.

IMPORTANT

You must include all the information required by this form. The information must be specified in sufficient detail to satisfy the purpose for which it is required.

You may apply for two or more resource consents that are needed for the same activity on the same form.

When your application is accepted, you will receive a letter from the Planning team informing you of the application's acceptance. This letter will contain the contact details of the planner who is processing your consent.

The fee paid at the time of lodgement is a deposit fee only. Further costs may be incurred and all actual and reasonable costs will be passed onto the applicant.

Under the fast-track resource consent process the application must be processed in 10 working days, unless the applicant opts out of that process at the time of lodgement.

A fast-track application may cease to be a fast-track application under section 87AAC(2) of the Resource Management Act 1991.

Non- fast track, non-notified resource consents must be processed within 20 working days.

Planning staff will contact you if the status of your application changes, or if further information is required.

Appendix C: Landscape and Visual Assessment

RMM

ROUGH MILNE MITCHELL
LANDSCAPE ARCHITECTS

rmmla.co.nz

Landscape Assessment Report

Proposed Solar Farm The Point, Mackenzie Basin 25 May 2023

+64 3 366 3268
info@rmmla.co.nz

rmmla.co.nz

Level Two
69 Cambridge Terrace
Christchurch 8013
PO Box 3764
Christchurch 8140

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Prepared for: Far North Solar Farm Ltd

Prepared by:

……
Paul Smith
Senior Landscape Architect – NZILA (Registered)

Reviewed by:

……
Nikki Smetham
Senior Landscape Architect – NZILA (Registered)

Rough Milne Mitchell Landscape Architects Limited
Level Two
69 Cambridge Terrace
Christchurch 8013
PO Box 3764
Christchurch 8140
Ph: 03 366 3268

Use and Reliance

Contents

1 Introduction

1.1 Purpose and Scope

Rough Milne Mitchell Landscape Architects (**RMM**) has been engaged by Far North Solar Farm Ltd (**the Applicant**) to assess the actual and potential landscape and visual effects of a proposed 670ha solar farm, located within Section 3 SO384036 (**the site**), which is approximately 973ha in area.

The site is accessed via a 7km gravel track off State Highway 8 (**SH8**), within the Mackenzie Basin, immediately north of the confluence of the Ōhau, Twizel, Pukaki and Tekapo Rivers, Lake Benmore and the Ōhau C Power Station.

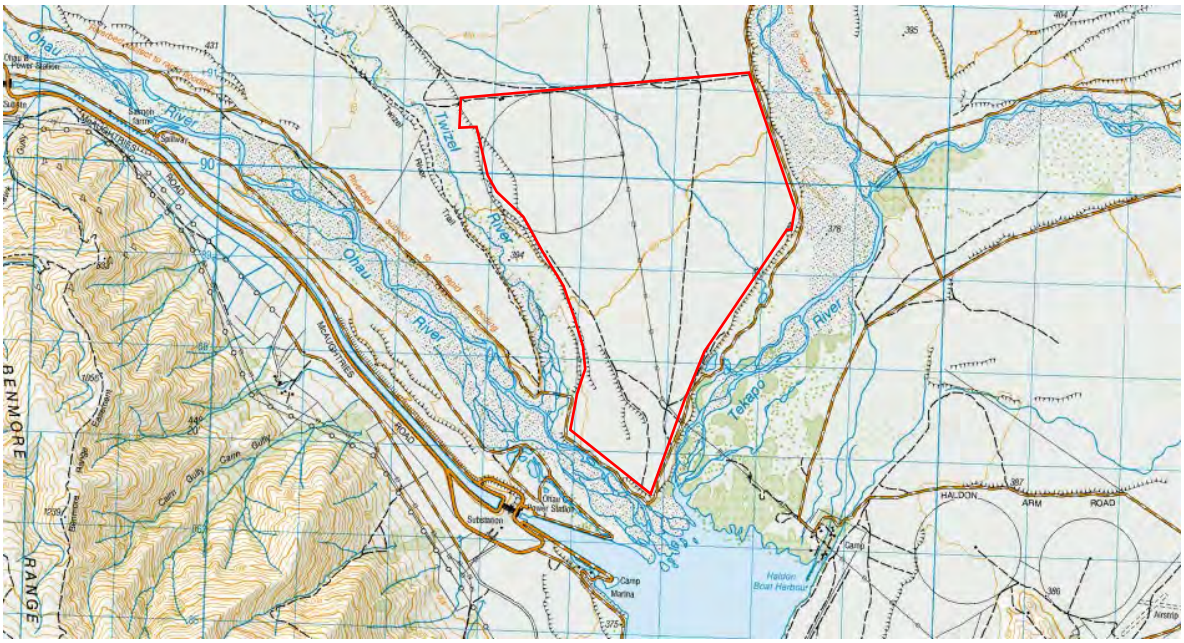

Figure 1. The site's location within the Mackenzie Basin is highlighted in red.

The site is located within the Mackenzie District, is zoned Rural and forms part of the Mackenzie Basin which is identified as an Outstanding Natural Landscape (**ONL**).

Under the Mackenzie District Plan (**District Plan**) the proposed solar farm is a *non-complying activity* because it breaches *Rule 3.4.5 - Non-farm buildings and extensions of these buildings outside of a defined Farm Base Area within the Mackenzie Basin Subzone High Visual Vulnerability area.*

Other consent requirements apply to the proposal, which are identified in the Assessment of Environmental Effects (**AEE**) Report.

The landscape assessment report is formatted as per the following:

- A description of the proposal.
- An outline of the relevant policy provisions within the Mackenzie District Plan.
- The identification and description of the receiving environment, including the site. The receiving environment is described in terms of the landscape's landform, land cover and land use and

how those landscape attributes contribute to the receiving environment's physical, perceptual and associative landscape values.

- An assessment of the actual and potential landscape, natural character and visual effects.
- An assessment against the relevant statutory provisions.
- A conclusion.

This report is accompanied by:

- Appendix 1 – Graphic Attachment (**GA**). The GA contains maps and aerial images of the site location, the relevant District Plan planning maps, plans of the proposed solar farm, solar panels and ancillary structures, exemplar images of similar solar farms in Aotearoa New Zealand and Australia, photographs of the site from within the site, and photographs of the site taken from the surrounding public places.
- Appendix 2 – Visual Simulations prepared by Virtual View Ltd, a company that specialise in preparing 3D visualisations. Eight visual simulations have been prepared which directly correspond the viewpoint location photographs in Appendix 1.

1.2 Methodology

The methodology and terminology used in this report has been informed by the Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines[1]. The site and its surrounds were visited on the 8th and 9th of November 2022.

This site visit was undertaken to assist in understanding the landscape character and values within the receiving environment and assessing the proposed solar farms actual and potential landscape and visual effects.

This report is tailored to suit the nature of the project and its context including the framework of the governing legislation. The statutory documents containing provisions relevant to the proposal are found in the Resource management Act 1991 (**RMA**), the National Environmental Standard for Renewable Electricity Generation (**NES-REG**), and the District Plan. The District Plan gives effect to the RMA within the context of the site and provides the policy framework against which this landscape assessment has been evaluated.

As a non-complying activity under RMA s104D the proposal must either satisfy the objectives and policies of the District Plan or adverse effects must be no more than minor. A decision maker, before granting consent must be satisfied that either the adverse effects of the activity on the environment will be less than minor, or minor (s104D(1)(a)), or the proposed activity will not be contrary to the objectives and policies of the District Plan (s104D(1)(b)).

The table included in Figure 1 outlines the rating scales that are referred to in this report. The table included in Figure 2 is a comparative scale between the seven-point scale and the RMA s104D non-complying gateway test.

[1] 'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines'. Tuia Pita Ora New Zealand Institute of Landscape Architects, July 2022.

Very Low	Low	Low - Moderate	Moderate	Moderate - High	High	Very High

Figure 1. The seven-point landscape and visual effects rating scale.

Very Low	Low	Low - Moderate	Moderate	Moderate - High	High	Very High
Less than Minor	Minor		More than Minor		Significant	

Figure 2. The comparative scale of degree of effects.[2]

[2] 'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines'. Tuia Pita Ora New Zealand Institute of Landscape Architects, July 2022. Page 151.

2 The Proposal

2.1 Description of the Proposal

It is proposed to locate an approximate 670ha solar farm within the 973ha site, as illustrated on **GA Sheet 9**. The solar farm will generate 420 megawatts peak (MWp), which is approximately the equivalent to the power used by 100,000 homes.

Site Selection

In terms of Aotearoa New Zealand's energy transition, the proposal poses a unique opportunity to generate power during the day, thereby allowing the hydro lakes to store more water during the day, and subsequently provide more capacity at night. Given the global warming crises, as the climate changes and droughts become more common, there is a higher risk that the nearby hydro lakes will not be able to provide continuous power and power outages will become more likely / increasingly frequent. Therefore, the proposed solar farm's co-location with the hydro power scheme will assist with providing a more resilient power generation system.

This site has been chosen as a suitable location for a solar farm because the National Grid transmission lines run through the site and provide the ability to accommodate an increased power generation sourced from the solar farm. The power generated by the 670ha solar farm can be accommodated by this transmission line, but it cannot accommodate any further power.

In addition, the site receives above average sunlight hours / irradiance and is co-located with the extensive Hydro Power Scheme within the Mackenzie Basin, which contributes to its character. Also, the site is relatively flat, therefore minimal land disturbance / earthworks is required to install the panels and associated development.

Solar Farm

The details of the proposal are set out in the documents that accompany the resource consent application. Those details are not repeated here other than to summarise the following points that are relevant to an assessment of landscape and visual effects.

The solar farm will consist of the following structures. Images of these structures, including exemplar images have been included in **GA Sheets 9 - 14** to assist in understanding what is proposed.

- An approximate 670ha solar farm will be situated within the site.
- The solar farm will consist of 736,866 solar panels situated on 28,341 solar tables extending north to south in a grid pattern, throughout the site.
- Each solar table will consist of 26 bi-facial solar panels. The solar panels measure 2.3m long by 1.1m wide and the solar tables measure approximately 2.3m wide by 30.5m long. Refer to **GA Sheet 13.**
- The solar tables are steel structures, and each table is attached to the ground by eight steel poles, centralised along its length. Each table structure is designed to move so the solar panels pivot east to west towards the sun's rays as the sun moves through the sky. In the morning the solar panels will face east, at mid-day the solar panels will be more or less horizontal and at the end of the day the solar panels will face west.

- The top of the solar table, when parallel with the ground stands approximately 1.5m above ground level. When the solar tables are tilted as far east or west as possible the top of the solar table will stand 2.2m above ground level with the bottom approximately 1.0m above ground level.
- The solar table is designed to avoid internal shading which means the pivot is restricted to prevent the solar panels facing as far east or west as possible. Instead, each table will start and finish the daily cycle in a semi-tilted position rather than full tilt to prevent shading.
- The centre of the rows of solar tables are approximately 6.0m apart. When the solar tables are parallel to the ground, there is a 3.8m gap between the rows of solar tables. When the solar tables are at their maximum eastern or western tilt, there will be a 4.0m gap between the rows of solar tables.
- The solar tables will cover approximately 33% of the 670ha area, within the 973ha site, due to spacings between each of the solar tables, space for existing transmission lines, roads, landscaping etc. Regarding this, the panels sit above the ground, and will not result in a net loss to existing landcover.
- 82 inverters will be located within the site, as illustrated on **GA Sheet 14**. The inverters convert the DC current from the solar panels to an AC current so the solar power can be transferred into the grid.
- Each inverter is situated within a 20-foot shipping container frame which is approximately 6.0m long, 2.4m wide and 2.9m high. The container frames and all parts of the inverter that can be painted will be finished in the colours black, sandstone grey, gull grey, or similar.
- Inverters have been clustered within specific parts of the site, so they are as efficient as possible. Also, they have been situated within the central part of the site where the solar tables assist in visually screening them from view. In particular, when potentially seen from the west.
- A main control room will be located within the north-west quadrant of the site and will house the switch gear, controls and other associated electrical monitoring equipment with the solar farm. The design for this building has not been prepared. However, the building will be similar in size to two shipping containers, will be finished in dark recessive colours, will be situated to allow the solar tables to assist in screening it from views.
- Thirty-one 30,000L water tanks will be located in strategic fire fighting locations throughout the site. These tanks will be partially buried, so the stand 1.5m above ground level. This means they will be the same height as the solar panels, when they are parallel to the grounds surface.
- Upgrades to the existing farm tracks may occur if the current tracks will be inaccessible in inclement weather. Upgrades to the tracks will likely consist of a compacted gravel surface.
- Earthworks will consist of trenching for the cables associated with the solar panels and inverters. All excavated material will remain on site. For reference, the solar tables will be attached to poles that are driven into the earth, therefore no earthworks are required for the poles.
- The exact location of the point of connection into the National Grid is to be determined, but it will not result in any additional power lines or the like.
- The current farm fence demarcating the boundary line will be upgraded to rabbit and hare-proof fence.
- A 1.8m tall wire-mesh security fence, with three barb wires along the top will be situated around the perimeter of the solar farm. This fence will be located ‘inside’ the proposed vegetation.

Landscape Mitigation

As outlined in the body of the report, the solar farm may be seen from several nearby public places to the east, south and west. The majority of these public places will be appropriately screened by way of proposed native shrub vegetation that will be located around the perimeter of the solar farm. This will consist of the following and is illustrated on **GA Sheet 9**.

- A 40m wide landscape strip around the perimeter of the solar farm.
- The vegetation within this landscape strip will consist of the following species:
    - *Plagianthus regius* subsp. *regius* – ribbonwood/mānatu
    - *Discaria toumatou* – Matagouri
    - *Olearia lineata*
    - *Corokia cotoneaster*
    - *Kunzea robusta* – Kānuka
    - *Coprosoma propinqua*
    - *Phyllocladus alpinus*
    - *Sophora microphylla*
- Further information on these plant species is included on **GA Sheet 10**.
- Plants will be of a root trainer grade or larger.
- Planting of all vegetation will start within the first or second planting season following the granting of the resource consent.
- The landscape area will be fenced off by either the rabbit and hare-proof fence around the perimeter of the site and the 2.0m tall mesh security fence around the solar farm. Additionally, all plants will be planted with pest protective sleeves.
- A slow-release fertiliser will be included with every plant, at the time of planting.
- All vegetation will be implemented with mulch, to suppress weeds and retain moisture.
- An automatic irrigation system will be set up and will be used for the first five years following the implementation of the vegetation. This is likely to be by way of a dripline or K-line sprinkler, which will utilise the existing water that is consented for the site.
- Any plant that becomes diseased or dies, will be replaced within the next planting season.

Land Management

Wildlands Ecological Report has concluded that an Ecological Enhancement Plan (**EEP**) will be prepared, including its content, and how it is implemented on site as to reduce the potential adverse effects of the solar farm on the biodiversity and ecological values of the site and Mackenzie Basin. In brief:

- The EEP will be developed and implemented to restore ecological functions and improve biodiversity, which will emphasise the restoration of indigenous vegetation and result in an increase habitat for indigenous fauna.
- The 89ha of land bordering the Tekapo, Pukaki, Twizel and Ōhau Rivers will be enhanced via the initial planting of 500,000 individual plants, with the scope for this to increase up to 890,000 plants over the project life.
- This 89ha area will include the 40-metre-wide landscape mitigation strip of planting and the plant species listed above.

- Beyond the 40-metre-wide landscape mitigation strip this 89ha area will be characterised by indigenous shrubs, tussocks, and herbs, with exposed stony gravel. This will be representative of a restored outwash plain and will also provide habitat for Threatened and At-Risk indigenous lizard and invertebrate species.
- The 670ha of land under the solar panels will no longer be irrigated, sprayed with pesticides, ploughed, drilled or fertilised for cropping or dairy grazing. Rather it will be managed, with the inclusion of light grazing to restore the indigenous vegetation throughout this area.
- Implementation of the plan will involve the use of mechanical methods for invasive species, soil cultivation, and weed control. Ongoing monitoring will be undertaken to assess the success of the restoration project.

3 Relevant Policy Provisions

3.1 National Environmental Standard for Renewable Electricity Generation.

The National Environmental Standard for Renewable Electricity Generation 2011 (**NES-REG**) sets out one objective and eight policies to enable the sustainable management of renewable electricity generation under the RMA. The NES-REG objective, as included below is relevant to the proposed solar farm.

Objective

"*To recognise the national significance of renewable electricity generation activities by providing for the development, operation, maintenance and upgrading of new and existing renewable electricity generation activities, such that the proportion of New Zealand's electricity generated from renewable energy sources increases to a level that meets or exceeds the New Zealand Government's national target for renewable electricity generation solar farm.*"

3.2 Mackenzie District Plan

The Mackenzie District Plan gives effect to the RMA, in particular Section 6(b), as the site is located within an ONL.

As outlined on District Planning Map 38 the site is zoned Rural and is within the Mackenzie Basin ONL which extends across the majority of the basin, refer to **GA Sheet 6**.

The District Plan Rural Zone objectives and policies, which are included in Section 7 of this report seek the protection of the outstanding natural landscape values and of the natural processes and elements which contribute to the district's overall character and amenity. To protect these values, proposals are to be designed and located where they avoid or mitigate their potential adverse effects which may otherwise modify or detract from areas with a high degree of naturalness, visibility, and aesthetic value.

Regarding the proposal, Ms Laila Alkamil of Williamson Water and Land Advisory has advised RMM that the proposal will be a *non-complying* activity. This is because under the District Plan the activity is to establish and operate an electricity generating facility, will exceed earthworks limits, and discharge stormwater into natural wetlands / surface waterbodies. Also, the colour of the solar panels and steel structures will not accord with the Mackenzie District Colour Palette, which also results in the proposal being a *non-complying* activity.

The District Plan objectives, policies and assessment matters that are relevant to the proposed solar farm and an assessment against them is included in Section 7 below.

3.2.1 Mackenzie District Plan - Plan Change 20

Mackenzie District Council (**Council**) is currently working through a staged District Plan Review Process to update the current District Plan.

Plan Change 20 was the first stage in this process to realise the higher-level Strategic Direction Chapter. The Natural Environment Strategic Objective gives effect to Section 6(b) of the RMA, is relevant to this assessment of landscape and visual effects and is included below.

Chapter: NE – Natural Environment

NE-O1 Natural Environment

The values of the natural environment, including those that make the District unique, contribute to its character, identity and well-being, or have significant or outstanding intrinsic values, are recognised and provided for, and where appropriate protected and enhanced. This includes, but is not limited to, values associated with the following important natural resources:

1. mahika kai resources;
2. night sky darkness;
3. outstanding natural features and landscapes;
4. significant indigenous biodiversity; and
5. water bodies and their margins

4 Landscape Description

4.1 Description of the Receiving Environment

The site and the receiving environment, as illustrated on **GA Sheet 3** are situated within and form part of the Mackenzie Basin, the largest intermontane basin in New Zealand. With reference to Mr Graham Densem's Landscape Character Maps, the receiving environment is comprised of 'South Basin', 'Twizel', and 'Rhoborough', the southern end of 'Pukaki' and the western half of 'Benmore', as illustrated on **GA Sheet 5**.

The basin is a glacially derived landscape composed of fluvioglacial outwash deposits of the Otira glaciation. Google earth and Canterbury Maps Aerial imagery illustrates that the underlying outwash plain landform remains relatively intact. The soils within this wider area vary between moderately deep to shallow with varied thicknesses of loess over alluvial gravels on the outwash terraces.

Remnant vegetation on the outwash plains within the South Basin would have included short tussock and matagouri scrub.[3] The present land use includes extensive grazing, including one pivot irrigator. Today the predominant land use is grazing and traditional farming practices including topdressing and pivot irrigation. The increase in exotic pasture and reduction in dryland vegetation over the past 30 years has been identified as impacting on the landscape character of the outwash plain.[4]

The site is located on the outwash plain between the Ben Ōhau Range and Lake Pukaki to the north, and the Benmore Range and Lake Benmore to the south. At a broad scale, this outwash plain is a recognisable, very large and relatively flat area of land, despite the large-scale modifications to the basin created by the Upper Waitaki hydro-electric power scheme. The Tekapo, Pukaki, Twizel and Ōhau Rivers[5] traverse the outwash plain flowing south to feed into Lake Benmore and then into the Waitaki River.

At a smaller scale, the site is situated on the outwash plain that is bounded by the incised Pukaki and Twizel Rivers, and at the very southern point, the Ōhau and Tekapo Rivers, with three of these four rivers and Lake Benmore being Sites of Natural Significance. These braided rivers are some 10 – 20m below the outwash plain the site is situated on, separated by steep escarpment faces or small terraces stepping down to the rivers.

The ecological context of the site is described in detail in the Wildlands Report. In brief, the Wildlands Report outlines that:

- pasture now occupies much of the Pukaki Ecological District,
- the adjacent braided riverbeds have been identified as a historically rare ecosystem type and are naturally uncommon on a national basis, the rivers provide important habitat to a number of bird species and rare insects, and are under active restoration as part of "Project River Recovery", and

[3] Graham Densem Landscape Architects Ltd. November 2007. The Mackenzie Basin Landscape Study: Character and Capacities.

[4] Graham Densem Landscape Architects Ltd. November 2007. The Mackenzie Basin Landscape Study: Character and Capacities.

[5] The District Plan has identified the Tekapo / Pukaki Rivers and the Ōhau River as Sites of Natural Significance. The District Plan has not identified the Twizel River as a Site of Natural Significance.

- the site is classified entirely as a 'critically under protected' land environment, with more than 30% indigenous vegetation left and less than 10% indigenous vegetation protected.[6]

The Wildlands Report concludes that "*the Ecological features and values adjacent to the site, associated with the rivers and their margins, are extremely high*."[7]

The water flow along these four braided rivers is relatively low, as it is controlled by spillways at Lake Tekapo, Pukaki and Ruataniwha, with most water being diverted along the Ōhau and Pukaki Canals.

The Ōhau and Pukaki Canals, which form part of the wider Upper Waitaki hydro-electrical scheme, flow from Lake Pukaki and Lake Ōhau into Lake Ruataniwha and then extend south along the toe of the Benmore Range into Lake Benmore, the largest man-made lake in Aotearoa New Zealand. The Twizel Power Station is located at the top end of the Ōhau Canal, just off SH8 and southeast of Twizel. The Ōhau B and Ōhau C Power Stations, consisting of the large dams, orange pipes, buildings and substations are located along this canal. The hydro power scheme contributes to the character of the Mackenzie Basin landscape and is an identifiable element within this ONL.

Twizel township, which was created to house the workers constructing the hydro-electrical scheme is situated on the outwash plain immediately north of Lake Ruataniwha. Twizel is accessed from SH8 and since the construction of the hydro-electrical scheme, Twizel township has become a service and tourist town. It is the largest town within the Mackenzie District and has a growing population.

The Mackenzie Basin is experienced primarily from SH8, which traverses the basin past the hydro lakes and townships at Tekapo and Twizel. It is an important scenic tourist route affording extensive views across the basin.

Twizel and the numerous campgrounds (Lake Benmore – Ōhau C, Benmore Views, Falstone, Haldon Arm) within the receiving environment are well situated as a base for the large number of the recreational opportunities in its vicinity.

Recreational activities include camping / caravanning, rowing and water skiing on Lake Ruataniwha and Lake Benmore, salmon fishing in the lakes, rivers and canals, skiing at Ōhau and Round Hill Ski fields, and mountain biking on the Alps to Ocean Trail and numerous other local trails. The clean, dry and dark sky is a recognised feature of the basin and consequently the Mackenzie Basin has been designated as a Dark Sky Reserve.

Additionally, between 1980 and 2010 the Mackenzie Basin received approximately 2,400 hours of sunshine annually[8] and in 2022 it received 2,464 hours of sunshine[9]. It was the fifth sunniest place in Aotearoa New Zealand in 2022 and is commonly thought of as one of the sunniest places in the South Island, along with Blenheim and Nelson.

[6] Wildlands Ecology and Restoration Ltd. Assessment of Ecological Effects for the Proposed Ōhau C Solar Farm Between the Lower Reaches of the Tekapo and Twizel Rivers, Mackenzie District. May 2023. Pages 3 – 6.

[7] Wildlands Ecology and Restoration Ltd. Assessment of Ecological Effects for the Proposed Ōhau C Solar Farm Between the Lower Reaches of the Tekapo and Twizel Rivers, Mackenzie District. May 2023. Page 23.

[8] https://niwa.co.nz/education-and-training/schools/resources/climate/sunshine

[9] https://niwa.co.nz/sites/niwa.co.nz/files/2022_Annual_Climate_Summary_FINAL_v3.pdf

4.2 Description of the Site

The site is located at the southern point of the outwash plain bordered by the incised Pukaki and Twizel Rivers, and at the very southern point, the Ōhau River. The site is accessed off SH8, east of the Twizel River and via a 7km long gravel farm track through the Bendrose Station.

The landform within the site is generally flat, with the topography gradually descending north to south, with an approximate 30m elevation difference. The very western edge of the site contains a small scarp, separating the main outwash plain from a small terrace as the overall landform steps down to the willow lined Twizel River.

The site is predominantly used for agricultural purposes, including cropping and grazing stock. Unlike the grassland areas within the Mackenzie Basin, the site has a more verdant green colour as the grass / crops are irrigated via a pivot and / or K-line sprinklers. Based on on-site investigation the site is starkly 'green' in contrast to the dry tawny coloured grassland areas within the Bendrose Station, to the immediate north. However, the more intensive land management processes have kept the site free of wilding pine trees, unlike the Bendrose Station to the north, and many other large-scale properties within the basin which contain wilding pines.

A detailed description of the vegetation cover within the site has been included in the Wildlands Report, including outlining what small remnants of indigenous dryland and shrubland communities around the margins. In brief, the Wildlands Report outlines that:

- there are no wetlands on site, but there are several wetlands within 100 metres of the site boundary,
- the main vegetation types consist of two areas of sweet briar-matagouri shrubland, predominantly cocksfoot grassland, brassica cropland, brome-hawkweed-sheep's sorrel grassland/herbfield and Stonefield drylands,
- the site is part of an area classed as "improved pasture" by the DoC, and
- indigenous vegetation on the site is mostly confined to small pockets and scattered individual plants. The only At-Risk plant species observed within the site is tūmatakuru, which is present in the Stonefield drylands, which is considered to be ecologically significant.[10]

Overall, the "*ecological values on-site vary considerably subject to the character of the vegetation and habitat types that are present. Most of the site has a cover of exotic pasture and part of it is irrigated and cropped. These areas have low value for indigenous plants but are nevertheless utilised by Threatened or At Risk indigenous birds and it is possible that lizards may also be present, albeit these types are unlikely to provide significant habitat for lizards. Undeveloped gullies on the margins of the site are important habitat for indigenous plants, avifauna, lizards, and invertebrates*." [11]

Other farming infrastructure within the site includes water tanks and sheds associated with the pivot irrigator, sheds, water tanks, containers for storage along the northern boundary of the site, temporary storage of hay bales, farm fences and farm tracks.

[10] Wildlands Ecology and Restoration Ltd. Assessment of Ecological Effects for the Proposed Ōhau C Solar Farm Between the Lower Reaches of the Tekapo and Twizel Rivers, Mackenzie District. May 2023. Pages 8 and 23.

[11] Wildlands Ecology and Restoration Ltd. Assessment of Ecological Effects for the Proposed Ōhau C Solar Farm Between the Lower Reaches of the Tekapo and Twizel Rivers, Mackenzie District. May 2023. Page 23.

As mentioned above, a National Grid Transmission Line and its transmission towers extend north to south through the approximate centre of the site. This transmission line extends north from the Benmore Dam Power Station and extends northeast up Te Waipounamu/ the South Island.

The site, much like the majority of the land within the Mackenzie Basin is privately owned and views of and access to the site and from its perimeter are difficult to gain. The exception to this is a gravel four-wheel drive track which wraps around the east, south and western boundary of the site and affords users views over the site and the braided Tekapo, Ōhau and Twizel Rivers alongside.

Due to this, the site forms part of the expansive views over the Mackenzie Basin. As the site is predominantly devoid of built form, it contributes to the Mackenzie Basin's unspoiled openness and vastness and the long open views to the Southern Alps and other mountains encircling the basin.

From desktop analysis and on-site investigations, the site is visible from the below mentioned public places.

- State Highway 8.
- The Alps to Ocean Trail.
- McAughtries Road.
- Falston Road.
- Haldon Road.
- Haldon Arm Road.
- Pukaki, Tekapo, Ōhau Rivers.
- Lake Benmore.
- Ben Ōhau.
- The Benmore Range.

Additionally, it may be seen from numerous large farming properties located alongside these public places and the Lake Benmore – Ōhau C, Benmore Views, and Falstone Campgrounds.

Regarding the above list, as the site is relatively flat and has a very limited amount of verticality (built from or trees) it is evident that the site is not overly prominent from these locations.

The amenity experienced when travelling along the public roads and within these private places are described below in Section 6 of this report.

4.3 Landscape Values of the Receiving Environment

The landscape values of the site and the receiving environment (physical, perceptual and associative) form the baseline, along with the policy provisions, for an assessment of landscape and visual effects. The landscape values of the site and the receiving environment stem from its past and present landscape attributes (landform, landcover and land use). The landscape values that are relevant to an assessment of the proposed solar farm are listed below.

The receiving environment, which forms part of the southern extent of the Mackenzie Basin subzone in which the site is situated has been identified as an ONL. Its distinct landscape character stems from its uniqueness, wildness, colouring, openness of the vast basin landscape enclosed by the encompassing mountain ranges, and legibility (sense of formative processes). These outstanding physical, perceptual and associative values stem from:

- Its distinctive Mackenzie Country landscape character with its unique, natural, and visual qualities of the high-mountain basin environment.
- Its unspoiled openness and vastness and the long open views to the Southern Alps and other mountains encircling the basin.
- The highly legible landscape features throughout the basin, including the moraines, roche moutonnée, valleys, terraces, fans, glacial erratic and outwash plains.
- The high degree of aesthetic and experiential values afforded by the highly legible, glacially derived basin and expansive sky, large scale of the landforms including the river valleys and enclosing mountains, the scenic outlook over Lake Pukaki and Lake Tekapo to the distant mountains including Aoraki Mt Cook, the vivid turquoise blue water colour of the glacial lakes, the golden tussock-laden slopes which surround the basin and transient values contributed by the strong seasonal changes and seasonal vegetation colour.
- The high degree of shared and recognised values that are evident through inspiration works by artists and writers inspired by the landscape, being nationally important for tourism, astronomy and the plentiful recreational opportunities that are provided.

At a local scale, the site adds to most of above-mentioned landscape values. However, the outwash plain that the site is situated on is not unspoiled. This is because the land cover consists of a pivot irrigator, and is cultivated for cropping and grazing stock e.g. the greening effect has occurred on site. Also, it contains the National Grid transmission lines running north to south through the site. Positively, this existing development within the site is sparse, low lying or somewhat transparent (transmission towers) and continues to provide for long open views over the basin to the enclosing mountain ranges.

4.4 Mackenzie District Plan – Landscape Values

In addition to the above, the Appendix I, J and V in the District Plan outline the Sites of Natural Significance, Scenic Viewing Areas and Scenic Grassland Schedules and areas Visual Vulnerability. The relevant parts of these Appendices to the District Plan are included below.

4.4.1 Appendix I - Sites of Natural Significance

Appendix I of the District Plan identifies the Sites of Natural Significance[12].

The site is not identified as a site of Natural Significance.

The adjacent Ōhau River, Tekapo/Pukaki Rivers and Lake Benmore have been identified as Sites of Natural Significance. The below inserts describing these Sites of Natural Significance are from the District Plan.

"11 - Ōhau River (Tekapo, Pukaki, Ōhau riverbeds); SSWI (Lake Ruataniwha), (Ruataniwha Springs), (Ōhau River); WERI: Ruataniwha area includes an artificial lake with shallow margins planted with shrubs for common bird species and a spring fed stream. Parts of lake heavily used for recreation. Both areas used for cross-fostering of black stilt chicks. Springs provide excellent waterfowl habitat,

[12] Mackenzie District Plan. Appendix I – Sites of Natural Significance: Mackenzie District.

with Australasian bittern, black stilt and other waders breeding. The Ōhau is a braided river of gravel flats and islands. Wrybill breeding area and black stilt feeding and wintering area."[13]

"*45 - Tekapo/Pukaki Rivers (Tekapo/Pukaki and Ōhau Riverbeds); SSWI (Tekapo River); (Pukaki River Ponds); WERI: Wide, braided alluvial riverbeds providing important habitat for waterfowl, waders, passerines and aquatic and terrestrial insect fauna. Breeding areas for black stilts, banded dotterels, black fronted terns, black backed gulls and wrybills. Native and introduced fish species occur in high numbers. A series of artificial ponds on margin of Pukaki River also provide a habitat for waterfowl and waders.*

46 - Lake Benmore - Largest artificial lake in New Zealand. Deltas of Ōhau, Twizel, Pukaki and Tekapo Rivers provide important wildlife habitat. The shallow margins, mudflats and willows are also important to waterbirds. The area is important as an overwintering and feeding area for black stilt and heavily utilised by many other waterbird species. Some islands are habitats for threatened lizards and plants."[14]

4.4.2 Appendix J - Scenic Viewing Areas and Scenic Grassland Schedules

Appendix J of the District Plan[15], along with the District Plan Maps identify the location, extent and describe the Scenic Viewing Areas and Scenic Grassland within the district.

The site is not located adjacent to or in proximity of a Scenic Viewing Area, therefore it does not interfere with the views gained from these identified areas. Also, the site is not within a Scenic Grassland Area.

4.4.3 Appendix V - Visual Vulnerability

The site forms part of the South Basin which has been identified as having a high degree of visual vulnerability[16].

High Visual Vulnerability:

Areas of high visual vulnerability can be summarised as:

- *the wide basins;*
- *lakes and lakesides, including shorelines and lakeside hill and mountain flanks;*
- *raised mountain ranges, hills and isolated mountains;*
- *river corridors;*
- *extensive areas and intact sequences of native plant communities particularly areas of continuous natural grassland, low development levels and visual vividness.*

The visual vulnerability mapping dates back to Mr Graham Densem's 2007 Landscape Study. Through Plan Change 13, Mr Densem prepared the "Intensification and Outstanding Natural

[13] Mackenzie District Plan. Appendix I – Sites of Natural Significance: Mackenzie District. Page 3.

[14] Mackenzie District Plan. Appendix I – Sites of Natural Significance: Mackenzie District. Page 7.

[15] Mackenzie District Plan. Appendix J - Scenic Viewing Areas and Scenic Grassland Schedules.

[16] Graham Densem Landscape Architects Ltd. November 2007. The Mackenzie Basin Landscape Study: Character and Capacities.

Landscape: Landscape Management of the Mackenzie Basin in Light of Court Decisions"[17] Report that provides further assistance in understanding the areas and values of areas of high visual vulnerability and how to maintain the ONL values of these areas.

The 2015 Report focused on pastoral intensification, subdivision and rural residential development at a Plan Change level to assist in understanding where such activities would be more appropriate to maintain the ONL values of the Mackenzie Basin. Noting that the site is already predominantly used for cropping, an activity that is "*likely to erode ONL natural science and aesthetic values*." [18]

[17] Mackenzie District Plan Change 13. In Intensification and Outstanding Natural Landscape: Landscape Management of the Mackenzie Basin in Light of Court Decisions. Mr Graham Densem. November 2015 (updated).

[18] Graham Densem Landscape Architects Ltd. November 2007. The Mackenzie Basin Landscape Study: Character and Capacities. Page13.

5 Potential Issues

The proposed solar farm is a *non-complying activity*. It will result in an approximate 670ha solar farm, which is slightly smaller in area when compared with Twizel township, which is approximately 730ha in area.

It will consist of long low-lying lines of solar panels running north to south through the site and their associated inverters, water tanks and control room, within the ONL of the Mackenzie Basin's, immediately north of Lake Benmore, Aotearoa New Zealand's largest manmade lake and between Tekapo, Ōhau, Pukaki and Twizel Rivers.

The potential adverse landscape and visual effects arising from the proposed solar farm may include the following:

- Effects on the openness and vastness of the Mackenzie Basin, including the long open views.
- Effects on the sense of naturalness given by the golden-brown vegetation.
- Effects on the legibility of the outwash plain and the sense of landform continuity.
- Effects on the high degree of visual coherence, apparent naturalness and spectacular nature in views, in particular when from SH8.

6 Assessment of Landscape and Visual Effects

6.1 Assessment of Visibility and Visual Effects

"A visual effect is a kind of landscape effect. It is a consequence for landscape values as experienced in views. Visual effects are a subset of landscape effects. A visual assessment is one method to help understand landscape effects." [19]

The significance of the visual effect is influenced by the visibility, distance, duration of the view, the scale, nature and duration of the proposal, its overall visual prominence, the context in which it is seen, and the size of the viewing audience.

Whether the proposal is considered appropriate is in part determined by the visual effects on the receiving environment and whether the landscape values attributed to this setting are retained or whether, if adversely affected, effects can be satisfactorily avoided, remedied or mitigated. In general, landscape values experienced visually include rural scenic outlook (views over rural landscape), the legibility, visual coherence of the landscape and the views to the distant mountains.

6.1.1 State Highway 8

Viewpoint Location Photographs 1 – 5 on **GA Sheets 21 – 23** represent the views over the Mackenzie Basin towards the site and the proposed solar farm that are gained from SH8. A visual simulation from Viewpoint Location 3 has been prepared to assist in understanding how visible the proposed solar farm will be from SH8.

These five viewpoint locations representing the view from SH8 are from:

- Viewpoint 1 - Lake Ruataniwha Dam – 7.5kms from the solar farm.
- Viewpoint 2 - Twizel Substation – 7kms from the solar farm.
- Viewpoint 3 - Pukaki Canal Bridge – 12kms from the solar farm
- Viewpoint 4 - Pukaki River Spillway – 13kms from the solar farm
- Viewpoint 5 - Pukaki Moraine – 12.5kms from the solar farm

A high degree of amenity is experienced when travelling north and south, through the Mackenzie Basin along SH8. This is due to the broad, open, and relatively uninterrupted sweeping views over the glacially fed lakes, including the memorable turquoise blue colour, the seasonal presence of flowering lupins, and the predominately dryland grass clad outwash plains contained by the distant ring of steep often snow-capped mountains.

When travelling along the highway the townships of Tekapo and Twizel, the Pukaki Airport, the hydro canals, dam infrastructure and substations, and the National Grid power lines reduce the naturalness of the Mackenzie Basin as perceived by a road user. However, these elements remain subservient to the vastness and openness of the basin that is experienced.

[19] 'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines'. Tuia Pita Ora New Zealand Institute of Landscape Architects, July 2022. Page 135.

Extent of Visibility and Visual Effects

The northern edge of the solar farm standing 1.5 – 2.2m tall will be seen at a distance of 7.5 to 13kms away and in all situations on the far side of foreground and midground vegetation and/or rolling topography. When travelling at 100km/h along the state highway the solar farm will appear as a very thin sliver of solar panels which will be difficult to distinguish and therefore will not be a prominent element.

Glint or glare will not highlight the visibility of the panels from the road. This is because the site slopes away from the highway, and the panels tilt following the movement of the sun in which any reflectance is shone back at the source, being the sun. This is unlike a static solar panel, in which glint and glare effects may occur in the morning and evening when the sun's rays can 'skim' across the panels affecting a receptor on the opposite side of the source.

Due to the solar farm being difficult to see from SH8 and glint and glare not being of concern, it will not detract from the current outlook and amenity that a road user currently experiences. Therefore, it will have a **no to a very low degree** of adverse visual effects.

6.1.2 Alps 2 Ocean Trail

Viewpoint Location Photographs 6 and 7 on **GA Sheet 24** represent the views over the Mackenzie Basin towards the site and the proposed solar farm when travelling south along the Alps 2 Ocean trail. For reference, most people travelling the entire length of the Alps 2 Ocean trail travel in this direction. Additionally, a visual simulation from Viewpoint Location 7 (the closer of the two locations) has been prepared to assist in understanding how visible the proposed solar farm will be from this stretch of trail.

A description of how visible the solar farm will be from these two viewpoint locations representing the view from this relevant stretch of the Alps to Ocean trail is below.

- Viewpoint 6 - Pukaki Canal Road – 12.5kms from the solar farm.
- Viewpoint 7 - Pukaki / Twizel Airport – 7.3kms from the solar farm.

Similar to a SH8 road user, a high degree of amenity is experienced when travelling southeast, through the Mackenzie Basin along the Alps 2 Ocean Trail. This is due to the broad, open, and relatively uninterrupted sweeping views over Lake Pukaki's memorable turquoise blue colour, and the predominately dryland grass clad outwash plains contained by the steep enclosing mountain slopes.

When travelling along the trail, Twizel township, the hydro canals, power and sub stations and the National Grid transmission lines reduce the perceived naturalness of the Mackenzie Basin. However, they also contribute to a trail user's understanding of the power generating landscape in which they are located. However, these elements remain subservient to the vastness and openness of the basin that is experienced.

Extent of Visibility and Visual Effects

The solar farm will be visible to a similar extent as experienced from SH8. The northern edge of the solar farm standing 1.5 – 2.2m tall will be seen at a distance of 7.3 to 12.5kms away and will be seen on the far side of an existing shelterbelt in the midground of the view which screens approximately half of it. When travelling along this gravel trail, at 20 – 40km/h the very thin sliver of solar panels will be difficult to distinguish and therefore will not be a prominent element in this landscape.

Similar to the above, as the site slopes away from a trail user, glint or glare will not highlight the visibility of the panels or add to the potential degree of adverse visual effects.

Due to the solar farm being difficult to see from this stretch of trail and glint and glare not being of concern, it will not detract from the current outlook and amenity that a trail user currently experiences. Therefore, it will have a **no to a very low degree** of adverse visual effects.

6.1.3 McAughtries Road

Viewpoint Location Photographs 8 – 10 on **GA Sheets 25 – 26** represent the views over the Ōhau Canal towards the site and the proposed solar farm that are gained from McAughtries Road. Visual simulations from Viewpoint Location 8 and 9 have been prepared to assist in understanding how visible the proposed solar farm will be from this road.

These three viewpoint locations representing the view from McAughtries are from:

- Viewpoint 8 - Alongside the Canal – 1.2kms from the solar farm.
- Viewpoint 9 - Immediately Upstream of Ōhau C Power Station – 1.0km from the solar farm.
- Viewpoint 10 - Downstream of Ōhau C Power Station within close proximity of Lake Benmore Ōhau C Campground and its associated boat ramp – 1.0km from the solar farm.

McAughtries Road is not a public road as it is located within a private parcel of land associated with the Ōhau Canal which is owned by Meridian Energy Ltd. However, this road appears and is publicly accessible as it has a street sign and does not have any gates at its access point off SH8 to deter the public. Also, it provides access the only vehicle access to Falstone Road (a public road), and Lake Benmore - Ōhau C, Benmore Views and Falston Campgrounds. Therefore, for the purpose of this assessment is considered a public place.

A high degree of amenity is experienced when travelling south along McAughtries Road, alongside the Ōhau Canal. This is due to the broad, open, and relatively uninterrupted views over the Mackenzie Basin, including the tranquil and reflective Ōhau Canal, albeit a man-made structure all of which is contained by the steep and enclosing mountain backdrop of the Grampian Mountains and Kirkliston Range.

When travelling along McAughtries Road, the nearby Twizel township, the hydro canal and the two large power stations, dam infrastructure and associated substations, and the National Grid transmission lines contribute to the power generating landscape in which they are located and reduce the perceived naturalness of the Mackenzie Basin. However, these elements remain subservient to the vastness and openness of the basin that is experienced. Also, the open and irrigated paddock land immediately west of McAughtries Road and the verdant green and intensively managed grass within the site does not contribute to dryland land cover and the perceptual values of the ONL.

Extent of Visibility and Visual Effects - Viewpoint 8 and 9

Firstly, the proposed solar farm will be most readily visible from the upper stretch of McAughtries Road, north of the Ōhau C Power Station represented by Viewpoint Locations 8 and 9 when compared with the remainder of this road. This is because this stretch of road is elevated above the site allowing clear views over parts of the solar farm. Also, because this stretch of road is more frequented by the public when compared with the top of Ben Ōhau, the Benmore Range and the gravel track around the perimeter of the site.

The expansiveness of the solar farm and the amount of built form it will introduce to the landscape will draw the eye and a road users' attention away from the wider basin. It will also reduce the perceived naturalness of the basin from this stretch of road, which will adversely affect the visual amenity that a road user currently experiences. Albeit, the naturalness within the site has already been modified by intensive cropping which has reduced the naturalness of the site.

A road user will also notice the extensive native revegetation around the perimeter of the solar farm, which varies between 20m and approximately 200m wide, but mostly 70m – 100m wide. This native vegetation will positively contribute to the perceived naturalness of the basin, will visually highlight the edges of the outwash plain and in doing so will visually contain the solar farm to this defined area. As such, this 89ha area of native vegetation will be seen as contributing to the naturalness of the basin and will assist with offsetting the potential adverse visual effects.

The low-lying nature of the solar panels means that the entire solar farm will not be seen from any one vantage point, and in most instances will appear as a thin sliver of development on this outwash plain. Regarding this the solar farm will not interfere with views over the site of the wider Mackenzie Basin and the surrounding mountains, to the point that the willow trees that line the Pukaki / Tekapo Rivers are seen. Additionally, all associated structures will be placed, and in some instances partly buried to stand no taller than the panels, so the solar panels assist in screening them from view. The purpose of this is to reduce potential visual clutter that may result from these associated structures and water tanks.

The solar farm will only form part of the view from this road, and it will not interrupt the view to the south or west towards Lake Benmore or the Benmore Range. Also, the extent of the solar farm is well contained to this outwash plain, and therefore it will not be perceived as expanding beyond the site, to the east, west and south, being the more visible part of the farm.

At a wider scale, the proposal will be seen alongside the Ōhau Hydro Canal, its associated power stations dams and substations, an array of National Grid transmission lines extending across the basin and Lake Benmore, being Aotearoa New Zealand's largest dammed lake. These power generating elements, along with the associated knowledge of Mackenzie Basin being one of the sunniest locations in the country will visually assist with contextualising the solar farm in this location at a national level. This will assist with reducing the degree of potential adverse visual effects.

Overall, the proposed solar farm will have a **moderate degree** of adverse visual effects on road users travelling along the upper stretch of McAughtries Road.

Extent of Visibility and Visual Effects - Viewpoint 10

When seen from the lower stretch of McAughtries Road, represented by Viewpoint Location 10, the site is predominately screened by willows and other mature trees that line Lake Benmore. This vegetation cannot be entirely relied upon for screening purposes as it is outside the site, in which it may be removed in the future. However, clearing these trees and their seed source along Lake Benmore and the four rivers that feed into the lake would be a significant undertaking that may not realistically occur. If this were to occur though, it is likely to happen once the landscape mitigation vegetation has matured, which will visually screen the solar farm. Therefore, the proposed solar farm **will not result in adverse visual effects** when experienced from the lower stretch of McAughtries Road.

In addition to this this, the Lake Benmore Ōhau C Campground is located at the same elevation as this stretch of road, being some 300m away from this viewpoint photo. Based on the above, the proposal will not be seen from Lake Benmore Ōhau C Campground.

6.1.4 Falston Road

Viewpoint Location Photographs 11 – 13 on **GA Sheets 27 – 28** represent the views over Lake Benmore towards the site and the proposed solar farm that are gained when travelling north along Falston Road. This stretch of road is relatively flat, therefore a visual simulation from Viewpoint Location 12 has been prepared to assist in understanding how visible the proposed solar farm will be from this road.

These three viewpoint locations representing the view from McAughtries are from:

- Viewpoint 11 - McAughtries Road and Falston Road Intersection – 1.2kms from the solar farm.
- Viewpoint 12 - 45 Degree Corner along Falston Road – 1.4kms from the solar farm.
- Viewpoint 13 - Falston Road North of Shelterbelt – 1.9kms from the solar farm.

Falston Road is accessed off the southern end of McAughtries Road and provides access to Benmore Views and Falston Campgrounds, and Peak Valley Station.

A high degree of amenity is experienced when travelling north along Falston Road, alongside Lake Benmore. This is due to the lakeside setting, including the boating activities that take place on its surface and the sense of openness of the Mackenzie Basin provided by distant and enclosing mountain backdrop, including views to Aoraki Mount Cook.

Similar to when travelling along McAughtries Road, the nearby hydro canal, the Ōhau C Power Station and the National Grid transmission lines contribute to the power generating landscape in which a road user is located and reduce the perceived naturalness of the Mackenzie Basin. However, these elements remain subservient to the vastness and openness of the basin and the amenity provide by the lake.

Extent of Visibility and Visual Effects

The very southern edge of the site is seen, with the majority of the site not being seen due to lower down viewing angle.

As illustrated on Visual Simulation 12 – Year 2 (prior to mitigation vegetation maturing), the very southern extent of the solar farm will be seen. As it is seen from a relatively close location, the rows of solar tables extending north to south will be recognisable. The size and extent of the solar farm will not be perceived from this location as a road user is situated at a lower elevation to the site, which assists with mitigating the potential adverse effects. Prior to the proposed vegetation maturing, the solar farm will be seen with a midground landform backdrop and the distant mountains. Therefore, it will not be seen on skyline, which reduces its potential prominence. Also, similar to all other viewpoints, the low-lying nature of the soar farm will not interfere / screen the views to the surrounding mountains, therefore it will impact on these views or reduce to the perceived vastness of the Mackenzie Basin.

The proposed mitigation vegetation along the southern boundary of the site is estimated to reach approximately 3m tall after five years of growth. This screening vegetation will incrementally screen the lower parts of the solar farm as it matures and when 3m tall will screen the solar farm from view.

The proposed native shrub vegetation will appear as a relatively low-lying line of vegetation on the edge of the terrace, alongside the large swathes of mature vegetation at the northern edge of Lake Benmore and the confluence of the Ōhau and Tekapo Rivers. This existing mature vegetation will assist with blending the proposed vegetation into this view, to the point that it will not appear prominent or out of place.

As mentioned, the applicant wants to work with Council and Department of Conservation (**DoC**) to re-establish native vegetation on the scarp face, including where some four-wheel drive tracks are located. If this does occur, this vegetation will remedy the areas of modified soil and will assist in protecting the exiting soil structure from further erosions. In doing so, the vegetated escarpment will positively contribute to the amenity experienced from Falston Road.

In addition to the above, the topography surrounding the location of the Benmore Views and Falston Campgrounds and internal vegetation assists in screening the proposed solar farm from these locations. Therefore, once the mitigation vegetation has matured, the potential views to the solar farm that may be gained will be screened from view.

Overall, the proposed solar farm will have a **low to low-moderate degree of temporary adverse visual effects** prior to the mitigation vegetation reaching 3m tall. **Once screened**, the solar farm and mitigation vegetation **will not result in adverse visual effects**.

6.1.5 Haldon Road

Viewpoint Location Photographs 14 and 15 on **GA Sheet 29** represents the views over the 'South Basin' towards the site and the proposed solar farm, Lake Benmore and the Benmore Range that are gained when travelling west along Haldon Road.

A visual simulation from Viewpoint Location 16, located along Haldon Arm Road, which is closer to the site than Haldon Road, has been prepared to assist in understanding how visible the proposed solar farm will be from both of these roads.

The two viewpoint locations that represent the view from the southern end of Haldon Road, south of Little Pass are from:

- Viewpoint 14 - West of Little Pass – 9.8kms from the solar farm.
- Viewpoint 15 – The intersection of Haldon and Haldon Arm Road – 6.3kms from the solar farm.

Haldon Road is a relatively narrow gravel road that is accessed off Dog Kennel Corner as a road user enters the Mackenzie Basin from the east, via Burkes Pass. It is approximately 40kms long, prior to reaching Haldon Arm Road, and includes travelling over Little Pass where views over the South Basin are first gained.

A moderate-high to high degree of amenity is experienced when traveling along Haldon Road. The higher degree of amenity is gained when traveling along the edge of the 'East Basin' and 'South Basin' due to the broad, open, and relatively uninterrupted sweeping views over the predominately dryland grass clad outwash plains and views to the distant and enclosing mountains. This amenity is reduced when travelling over Little Pass, including to its north, due to the enclosed nature of this area and its intensively cropped land cover.

Extent of Visibility and Visual Effects

The site and proposed solar farm are not seen from the 35km stretch of Haldon Road north of Little Pass.

Prior to the proposed mitigation vegetation maturing, the proposed solar farm will be very difficult to see when travelling south along the southern 5km stretch of this road. This is because it will be seen at a distance of 6 – 10kms away, where a road user is at a very similar elevation to the site in which the solar farm will be seen as a dark and very thin sliver or line on the outwash plain. This dark line of development will also be broken up by existing vegetation located along the adjacent rivers, that reduces the amount of built form that is potentially seen and further reduces its prominence.

Due to the difficulty to see the solar farm from this location, albeit being theoretically visible, the current views and the amenity provided by the broad, open, and relatively uninterrupted sweeping views over the predominately dryland grass clad outwash plains and the views to the distant and enclosing mountains will remain.

The solar farm will not be seen once the proposed mitigation vegetation has matured.

Overall, the proposed solar farm will have a **very low to low degree** of adverse visual effects on a road user of Haldon Road. **Once screened**, the solar farm and mitigation vegetation **will not result in adverse visual effects.**

6.1.6 Haldon Arm Road

Viewpoint Location Photographs 16 and 17 on **GA Sheet 30** represents the views over the 'South Basin' towards the site and the proposed solar farm, small parts of Lake Benmore, the Benmore Range and the southern alps that are gained when travelling west along Haldon Arm Road.

A visual simulation from Viewpoint Location 16 has been prepared to assist in understanding how visible the proposed solar farm will be from this road.

The two viewpoint locations that represent the view from Haldon Arm Road are from:

- Viewpoint 16 – Dryland Outwash Plain – 3.3kms from the solar farm.
- Viewpoint 17 - Tekapo River Terrace Edge – 2.2kms from the solar farm.

Haldon Arm Road and the amenity experienced when travelling along it is very similar to the southern end of Haldon Road, being of a high degree.

Extent of Visibility and Visual Effects

Similar to Haldon Road, prior to the mitigation vegetation maturing the solar farm will be seen as a dark and very thin sliver or line on the outwash plain. This thin sliver of visible built form is broken up by the existing vegetation located along the adjacent rivers, which reduces the amount of built form that is potentially seen and further reduces its prominence. Its prominence is also further reduced by the dark colouring of these trees as at times, the thin dark sliver of solar tables, including afternoon shading will render sections of the solar farm difficult to distinguish.

Due to the difficulty to see the solar farm from this middle stretch of Haldon Arm Road, the current views and the amenity provided by the broad, open, and relatively uninterrupted sweeping views over the predominately dryland grass clad outwash plains and the views to the distant and enclosing mountains will remain.

As a road user gets closer the site, the less elevated the road is and subsequently the less visible the site is. This is because the midground vegetation along the Tekapo River effectively screens the solar farm from view. The solar farm is also entirely screened from view by the vegetation that surrounds the stretch of Haldon Arm Road that descends the scarp face to Haldon Arm Campground. Regarding this it will not be seen from the Haldon Arm Campground.

Once the proposed mitigation vegetation has matured the solar farm will not be seen.

Overall, the proposed solar farm will have a **low degree** of adverse visual effects on a road user travelling along the central stretch of Haldon Arm Road. As they travel further west, these adverse effects reduce to **very low**. **Once screened**, the solar farm and mitigation vegetation **will not result in adverse visual effects**.

6.1.7 Pukaki, Tekapo and Ōhau Rivers

A network of gravel four-wheel drive tracks are located alongside both sides of the Pukaki and Tekapo Rivers, refer to Viewpoint Location photographs 18 – 21, on **GA Sheets 31 - 32** and along the true left bank of the Ōhau River. These roughly formed tracks are not entirely within public land as the Tekapo River and head of Pukaki River are within land parcels owned by Meridian Energy, albeit they are accessible to the public. Also, at times the gravel tracks sit within the privately owned Stations. Due to this it is likely that it is a relatively small user group who users these tracks as they are not public places and are not advertised by DoC[20] as a place for four-wheel driving.

The amenity experienced when travelling along these four-wheel drive tracks is very similar to the more distant part of Haldon Arm Road, being of a high degree.

Extent of Visibility and Visual Effects

The majority of these four-wheel drive tracks are located alongside the braided rivers, on the gravel riverbed and beside their willow lined banks. In most instances these four-wheel drive tracks are situated where they are at a lower elevation to the site where topography screens the solar farm from view.

The exception to this, is the 17km gravel track located along the true right bank of the Pukaki River, with the southern 6.5kms adjacent to the sites eastern and southern boundaries.

When travelling south towards the site, from the initial 8.5kms of track, the proposed solar farm and juvenile mitigation vegetation will appear as a dark line in the midground of the view, similar to the distant locations along the state highway and the Alps to Ocean Trail. At this distance the solar farm will not be a prominent element in this landscape and will have a **very low - low degree** of effect on the amenity of a four-wheel drive track user.

When traveling along the remaining 8.5kms of track, including the 6.3kms of track adjacent to the site and prior to the proposed vegetation maturing, the solar farm will be a noticeable element within the landscape. In particular, when adjacent to the site, it will be seen at approximately 100m – 200m away and will be seen on the far side of the native mitigation vegetation that will cover this entire 100m – 200m area.

The solar farm and native planting will draw the eye and will be visually prominent due to its size, scale and the proximity it is seen from. In doing so it will detract from the current open character that is afforded by the pastoral use of the site and how this contributes to the openness of the South Basin area within the Mackenzie Basin. However, the low-lying nature of the solar farm, which is 1.5m tall (below eye level) it will not interfere / screen the views to the Benmore Range to the west or the surrounding mountains. As such, the expansiveness of the site will continue to be perceived, and it will have little impact on the views to the enclosing mountains.

As the proposed mitigation planting matures, the solar farm will become more difficult to see, with the majority of the solar farm being screened from view when the mitigation vegetation is more than 2.5m tall. In the mid to long term, only the north-west corner of the solar farm may be seen when travelling from south along this gravel four-wheel drive track, which will be seen at more than 1.8kms away when travelling alongside Bendrose Station. In the mid to long term, at this distance, the north-west corner of the solar farm will be difficult to distinguish and when seen will form a very small part of the overall view.

[20] https://www.doc.govt.nz/globalassets/documents/parks-and-recreation/activity-finder/four-wheel-driving/4wd-in-mackenzie-waitaki.pdf

Overall, the proposed solar farm will have a **moderate degree of temporary adverse visual effects** when seen from the nearby stretch of the four-wheel drive track. As the proposed mitigation planting matures these adverse effects will reduce and **once screened**, the solar farm and mitigation vegetation **will no to a very low degree of adverse visual effects**.

6.1.8 Lake Benmore

Visual Simulations 12 on Falston Road and 25 from the surface of the lake assists with understanding how visible the proposed solar farm and the mitigation vegetation will be at years 2 and 5.

Visual Simulation 25 has been taken from the centre of the lake, approximately 3kms from the site.

A high degree of amenity is experienced when on the surface of Lake Benmore. This is due to the lakes setting by the open mountainside to the east and the Benmore Range enclosing the lake and the long ranging views to the Southern Alps and Aoraki Mt Cook to the north. The sense of openness of the Mackenzie Basin is perceived and contributes to a lake users' amenity by the distance at which the mountains to the north are seen.

Extent of Visibility and Visual Effects

As illustrated on Visual Simulation 25 – Year 2, the proposed mitigation vegetation will screen the majority of the solar farm. There are only a few instances where the panels will be able to be seen above this vegetation. At this distance, it will be difficult to distinguish this development. Once the proposed vegetation matures, it will screen the entire solar farm from view, as illustrated on Visual Simulation 25 – Year 5.

Overall, the proposed solar farm will have a **very low degree of temporary adverse visual effects** prior to the mitigation vegetation reaching 3m tall. **Once screened**, the solar farm and mitigation vegetation **will not result in adverse visual effects**.

6.1.9 Ben Ōhau – Greta Track

The Greta Track is a 16km loop track providing access to the top of Ben Ōhau (1522masl), on the northern side of Lake Ōhau. This track is used by people walking (6-7 hours) and mountain biking (4-5 hours).[21]

There is no firm data on the number of people who walk or cycle this trail. However, when comparing it to other nearby trails, Strava heat map[22] illustrates it as being used half as much as the Alps to Ocean Trail, more similar to the number of people walking the Te Araroa Trail west of Lake Ōhau.

A high degree of amenity is experienced from the top of Ben Ōhau, including the ridgeline that the Greta Track extends along. This is due to the elevated and expansive views gained over the South Basin within the Mackenzie Basin, including Twizel, Lake Ruataniwha, the canal system, Lake Ōhau and the open plains within the Waitaki District. All of which is visually enclosed by the distant Mountain Ranges.

Extent of Visibility and Visual Effects

[21]https://www.doc.govt.nz/parks-and-recreation/places-to-go/canterbury/places/ruataniwha-conservation-park/things-to-do/tracks/greta-track/

[22] https://www.strava.com/heatmap#12.19/169.95178/-44.24283/hot/all

Visual Simulation 23 is taken from the eastern and elevated end of the Greta Track, where a trail user ascending the gully reaches the ridgeline and is able to appreciate the view. This visual simulation illustrates that the majority of the solar farm will be seen from this elevated point along the trail. Visibility of the southern half of the solar farm becomes screened from view as a trail user ascends the track to the west toward the Ben Ōhau Peak, in which some foreground screening is also afforded by adjacent topography. Only the northern half of the solar farm is visible prior to going around the peak of Ben Ōhau. The solar farm is not seen once beyond this approximately 3km stretch of trail.

When seen at 20.5kms away, the solar farm will replace the verdant green grass within the site and appear as a large dark rectangular object / singular mass sitting on top of the landscape. This colour change is apparent on Visual Simulation 23, when comparing it to the pivot irrigated circle within the site. Regarding this, the solar farm will not result in a loss of dryland grass colour due to the cropping activities that it will replace. The solar farms size and extent will draw the eye when facing east. However, it will form a relatively small part of the overall view gained to the southeast from this trail. Also, it will not impact on the views gained to the southwest or west, which are as memorable.

Similar to most other surrounding public places, the proposal will be seen alongside the hydro power scheme, and the National Grid transmission lines extending across the basin. These power generating elements, along with the associated knowledge of Mackenzie Basin being one of the sunniest locations in the country visually assist with contextualising the solar farm in this location at a national level.

The key mitigation factors that reduce the potential degree of adverse visual effects resulting from the solar farm are the modest number of people who gain this view, distance in which the solar farm is seen, the solar farm forming a relatively small part of the overall view, it being seen from short stretch of the overall trail, and it being seen in conjunction with the other large scale hydro power scheme.

Overall, the proposed solar farm will have a **moderate degree** of adverse visual effects when seen from this elevated 3km stretch of Greta Track situated on Ben Ōhau.

6.1.10 Benmore Range Easement Track

The Benmore Range Easement Track, accessed south of the Wairepo Arm provides access up and along the Benmore Range ridgeline to 1756masl. The below assessment from this track is based on desktop research and on-site investigations, but not first-hand experience of the trail.

Information found on the DoC website describe this track as difficult, infrequently used and is not listed on any DoC brochures as an advertised walk to do. Information regarding Benmore Range Easement Track appears relatively limited. Information on Strava and Strava Heat Map illustrates that less than 10 people have recorded their use of the trail, and does not show up as a 'Strava Segment'[23] being a common way to illustrate a popular track.

Similar to the elevated view from Ben Ōhau, a high degree of amenity is experienced from the elevated ridgeline along the Benmore Range. This is due to the elevated and expansive views gained over the majority of the Mackenzie Basin and part of open plains within the Waitaki District, including Lake Ōhau, straight down Lake Pukaki to Aoraki Mt Cook, Lake Tekapo, Lake Benmore, Twizel township and the majority of the canal system and its hydro power scheme, Tekapo, Pukaki, Twizel

[23] www.strava.com

and Ōhau Rivers, and the outwash plains they separate. All of which is visually enclosed by the surrounding mountain ranges.

Extent of Visibility and Visual Effects

The proposed 670ha solar farm will be clearly seen at the toe of the mountainside and at a distance of approximately 5kms from a relatively small part of the elevated stretch of the Benmore Range Easement Track.

Similar to the view from Ben Ōhau, the solar farm will replace the verdant green grass within the site and appear as a large, dark rectangular object / singular mass on the landscape. It will not result in a loss of dryland grass colour due to the cropping activities that it will replace. However, unlike the distance views from the Greta Track, in this instance, as it is seen from closer proximity a person will understand the more nuanced details and layout of the solar farm, including the 89ha of native revegetation.

The size and extent of built form will draw the eye when facing east and downwards in which it will detract from the open character of the Mackenzie Basin. However, its location in this view, being at the toe of the mountainside assists in mitigating its potential effects. This is because a person will easily look over the solar farm when enjoying the more broad, open and distant views to the north and east over the basin.

When seen at the toe of the slope, the solar farm will be seen alongside the hydro power scheme, with the majority of the canals, dams and power generating infrastructure being seen from this elevated area. extending across the basin. When seeing the proposal alongside these power generating elements, along with the associated knowledge of Mackenzie Basin being one of the sunniest locations in the country will visually assist with contextualising the solar farm in this location at a national level.

When taking in the overall outlook, from this track, the solar farm will not form part of the view when facing west or south towards Lake Ōhau, Benmore Dam and Otematata.

Overall, the proposed solar farm will have a **moderate degree** of adverse visual effects when seen from the elevated section along the Benmore Range Easement Track.

6.1.11 Summary of Visual Effects

To summarise the above, the visual effects resulting from the proposed mine whilst it is operating are as follows:

- State Highway 8: **Nil to a very low degree** of adverse visual effects.
- The Alps to Ocean Trail: **Nil to a very low degree** of adverse visual effects.
- McAughtries Road – Upper Stretch: A **moderate degree** of adverse visual effects.
- McAughtries Road – Lower Stretch: **No** adverse visual effects.
- Falston Road - A **low to low-moderate degree** of temporary adverse visual effects. Once screened, the proposal will **not result in adverse visual effects.**
- Haldon Road - A **very low to low degree** of adverse visual effects. Once screened, the proposal will **not result in adverse visual effects.**
- Haldon Arm Road - A **very low to low degree** of adverse visual effects. Once screened, the proposal will **not result in adverse visual effects.**

- Pukaki, Tekapo, Ōhau Rivers – A **very low to moderate degree** of temporary adverse visual effects. Once screened, the proposal will **no to a very low degree of adverse visual effects.**
- Lake Benmore - A **very low degree** of temporary adverse visual effects. Once screened, the proposal will **not result in adverse visual effects**.
- Ben Ōhau - Greta Track - A **moderate degree** of adverse visual effects.
- Benmore Range Easement Track - A **moderate degree** of adverse visual effects.

6.2 Assessment of Landscape Effects

"A landscape effect is an outcome for a landscape value. … Change itself is not an effect: landscapes change constantly. It is the implications of change on landscape values that is relevant." [24]

6.2.1 Physical Effects

The proposed solar farm is situated over 670ha of land within the Mackenzie Basin and will inevitably introduce elements of built form within the site replacing the rural character within the site with a semi-industrial and renewable power generation character.

The solar farm will be situated on the relatively flat topography of the outwash plain. Earthworks associated with the solar farm will consist of creating new access tracks throughout the site, placing cables underground in which the land cover will be immediately reinstated, and pile driving the supporting pole structures of each solar table into the ground. These changes to landform are relatively small, to the point that the legibility of the outwash plain will not be affected by these earthworks. Also, when seen, the low-lying nature of the solar farm will be in keeping with the outwash plains flat topography, therefore the landforms legibility will remain evident and intact from beyond the site.

The solar farm, as its name suggests, is a method of farming a readily available resource within the Mackenzie Basin being the 5th sunniest place within Aotearoa New Zealand[25]. Much like the current agricultural land use of the site and neighbouring station, it will specialise in its task. Similar to a farm and the way paddocks and stock-lanes are carefully arranged, the solar farm has been arranged to optimise the best yield from the site. The grid like pattern is not a natural pattern, however it is consistent with the way in which the agricultural land cover has been manipulated within the site to maximise productivity.

The point of difference with this proposed solar farm, unlike other solar farms in Aotearoa New Zealand, is it will reduce the amount of stock grazing within the site, with the long-term task of re-establishing native vegetation throughout the entire site. There are a number of positives associated with this. With regard to landscape character, the current greening effect that the intensive agricultural land use has had on the Mackenzie Basin will be remedied. Furthermore, the solar farm will not compromise the ability to undertake agricultural or other land management activities on the neighbouring station or on the banks of the rivers.

The proposal, along with the EEP that will be prepared and implemented by Wildlands will include the planting native vegetation within 89ha, approximately 10% of the entire site. This vegetation will be located around the perimeter of the site where the ecological values of the site have been less

[24] 'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines'. Tuia Pita Ora New Zealand Institute of Landscape Architects, July 2022. Page 135.

[25] https://niwa.co.nz/sites/niwa.co.nz/files/2022_Annual_Climate_Summary_FINAL_v3.pdf

disturbed by the current agricultural activities. Additionally, the EEP will include a strategy to maintain the landcover under the solar panels with the long-term intent to re-establish native vegetation throughout this area.

The Wildlands Report has assessed the proposal with and without the proposed EEP and has concluded that "*Accurate prediction of the levels of effect with mitigation in place is difficult, but the table [Table 7] gives a broad picture of how effects can be reduced significantly with mitigation measures in place.*

There are numerous ways by which indigenous biodiversity could be adversely affected and the ecological effects of this development could be substantial if the project is not designed appropriately…But… most of these impacts can be avoided or greatly reduced if the project is implemented thoughtfully." [26]

Additionally, that "*The site would benefit from ecological enhancement, as most of it is currently highly disturbed and cultivated. Without development, it is likely to remain in a degraded state. However, development of a solar farm provides an opportunity to enhance the ecosystem and restore parts of it to be more representative of an indigenous-dominant outwash plain. The creation of shelter and basking areas for invertebrates is likely to result from the proposed development, which will provide limited benefits for some invertebrate species.*

The applicant's intent is to design the project to avoid adverse ecological effects, and to achieve a net gain for local indigenous biodiversity. Sensitive design of the solar farm, combined with appropriate ecological management and enhancement, can achieve positive benefits for indigenous biodiversity at this site." [27]

Regarding this, the EEP, which will be prepared following the granting of this consent will positively contribute to indigenous biodiversity, ecology, ecosystems and overall natural character of the site and its surrounds. These positive effects will assist in offsetting the potential adverse effects on ONL values of the 'Southern Basin' within the Mackenzie Basin.

One of the key characteristics of the Mackenzie Basin's rural landscapes is its open character which stems from its openness, vastness, lack of built form which is mostly clustered in discreet areas and in part due to the prevalence of large farms / stations and landholdings.

Within the receiving environment, the amount of built form will reduce the open character of the 'South Basin'[28] area, which is approximately 21,500ha in area. The 670ha solar farm will be situated on approximately 2.8% of land. Even though the solar farm remains large, this is a relatively small part of the receiving environment. Also, the reduction in open character will not impact on the wider basin as it is concentrated to this area and as assessed above, it is difficult to distinguish at best, from most public places beyond 5kms away, including the state highway.

[26] Wildlands Ecology and Restoration Ltd. Assessment of Ecological Effects for the Proposed Ōhau C Solar Farm Between the Lower Reaches of the Tekapo and Twizel Rivers, Mackenzie District. May 2023. Page 41.

[27] Wildlands Ecology and Restoration Ltd. Assessment of Ecological Effects for the Proposed Ōhau C Solar Farm Between the Lower Reaches of the Tekapo and Twizel Rivers, Mackenzie District. May 2023. Pages 42 and 43.

[28] Graham Densem Landscape Architects Ltd. November 2007. The Mackenzie Basin Landscape Study: Character and Capacities. Map 4 - Page 16.

6.2.2 Associative Effects

The Waitaki Hydro Scheme is the largest hydro power scheme in Aotearoa New Zealand which contributes to the associative values and character of the Mackenzie Basin.

The solar farm will introduce another renewable energy power source to this landscape. Regarding these associative values and the solar farm being situated in close proximity to the Ōhau Canal, Ōhau C Power Station and alongside Lake Benmore, being the largest manmade lake in Aotearoa New Zealand. Therefore, in this instance, the co-locating of the solar farm within a concentrated part of the existing energy infrastructure within the basin assists in reducing its potential adverse landscape effects.

As mentioned above, the Mackenzie Basin is one of the sunniest places in the country, with over 2,400 hours of bright sunshine every year. Due to the basin's sunny nature and long summer days, a solar farm will be in keeping with this natural resource and these associative values.

At a wider scale, the solar farm will assist in retaining the aesthetic and associated values of the dammed Tekapo, Pukaki, Ōhau, Ruataniwha and Benmore Lakes and their recreational uses. This is because the solar farm will contribute as a daytime power source, relieving the full-time use of the hydro scheme. In doing so, the lake levels will be maintained at a higher level for longer, especially during the dry summer and winter months and during droughts, which are predicted to become more frequent as our climate continues to change.

6.2.3 Perceptual Effects

As outlined on Appendix V of the District Plan, the site is within an area of high visual vulnerability, in which it generally has a low capacity to absorb change. This means that any changes to the character of the landscape are likely to be easily noticed and not easily mitigated.

The visibility and resulting adverse visual effects of the proposed solar farm has been assessed above in Section 6.1 of this report. In summary, it will be very difficult to see and will not be prominent from SH8, which is the main tourist road through the basin, and it will be screened by the proposed mitigation vegetation from most other public places. The three places it will be seen from, where it will result in a moderate degree of adverse visual effects is McAughtries Road a no exit road alongside the Ōhau C canal, at a distance of 20.5kms away from the Greta Track on Ben Ōhau and from the relatively used Benmore Range Easement Track.

Regarding this, the proposal, once the mitigation vegetation has matured will be sufficiently screened from all but three public places, consisting of a relatively small viewing audience.

Unlike a dwelling or residential development, large portions of the solar farm, in particular the solar panels will be seen as sitting lightly and just above ground level at 1.5m – 2.2m tall. Within this expansive landscape this is a very low height. When visible, this is highlighted by a person's ability to see across the solar farm and see the existing vegetation on the farm side of the outwash plain, outwash plains on the far side of the site and the surrounding mountains. As such, the solar farm does not interfere with the open and long ranging views over the Mackenzie Basin.

The visible changes arising from the solar farm will result in a change of character within the site, from that of an open rural pastoral character to a predominately semi-industrial and renewable power generation character. In addition to the open character of the site, the site's aesthetic values also stem from its relatively flat topography, and the steep scarp faces that dramatically descend to the adjacent rivers. Because the solar farm sits so low on the site, the visual coherence of this landform will remain intact.

Also, the solar farm will be seen as directly associated with power generation in the fifth sunniest location in Aotearoa New Zealand[29]. Therefore, the power generation aspect of the solar farm will be perceived as in keeping with the large-scale hydro canals and the radiance of the local.

Based on the above, the proposed solar farm has been located and its associated landscape mitigation has been designed to mitigate its potential visibility from all but three public places. Unavoidably, it will be seen from McAughtries Road, Greta Track and the Benmore Range Easement Track in which its resulting adverse visual effects will be of a **moderate degree**.

Also, once the mitigation vegetation has matured, the proposal will have **no to a very low degree** of adverse visual effects on people travelling / spending time in **all other public places**. This is because the proposal will not be screened from view by the proposed vegetation or will be seen from so far away it will be difficult to distinguish.

6.2.4 Summary of Landscape Effects

In summary, the **proposed solar farm by itself**, due to its size and scale will have a **moderate-high** of adverse landscape effects on the Mackenzie Basin's outstanding natural landscape values. **These adverse landscape effects will be lessened** by the proposed landscape mitigation and ecological and biodiversity enhancement activities that will benefit the natural character landscape values of the basin.

Overall, the proposed solar farm and its associated landscape treatment, and ecological and biodiversity enhancement activities will have a **low-moderate to moderate degree** of adverse landscape effects on the Mackenzie Basin's outstanding landscape values.

[29] https://niwa.co.nz/sites/niwa.co.nz/files/2022_Annual_Climate_Summary_FINAL_v3.pdf

7 An Assessment Against the Relevant Policy Provisions

7.1 Section 7 – Rural Zone

Rural Objective 3A - Landscape Values

Protection of outstanding landscape values, the natural character of the margins of lakes, rivers and wetlands and of those natural processes and elements which contribute to the District's overall character and amenity.

Rural Policy 3A1 - Important Landscapes And Natural Features

To limit earthworks on steeper slopes, high altitude areas, and on land containing geopreservation sites to enable the landforms and landscape character of these areas to be maintained.

The site does not contain the landscape attributes mentioned in this policy. Therefore, earthworks associated with the solar farm, consisting of farm tracks, and gravel areas around the inverters will have very little impact in the landform or landscape character of the areas.

Earthworks associated with underground wires will be temporary and the land that is disturbed will be reinstated.

The poles holding the solar tables are pile driven into the ground; therefore, they do not alter landform. Also, in the long term, they could be removed without significant impact on the landform.

Rural Policy 3A2 - Scenic Viewing Areas

To limit structures and tall vegetation within scenic viewing areas to enable views of the landscape to be obtained within and from these areas.

The scenic viewing areas are illustrated on the District Planning Maps and described in Appendix J of the District Plan. As described in Section 4 above and assessed in Section 6 above, the site does not form part of or is adjacent to a scenic viewing area. Therefore, it will not interfere with the views gained from these identified areas.

Rural Policy 3A3 - Impacts Of Subdivision Use And Development

Avoid or mitigate the effects of subdivision, uses or development which have the potential to modify or detract from areas with a high degree of naturalness, visibility, aesthetic value, including important landscapes, landforms and other natural features.

The site is within the South Basin area within Mackenzie Basin's ONL, which is an important landscape at a national level.

As described in Section 4 above, the agricultural land use activities within the site and neighbouring blocks of land have reduced the naturalness of the site and the receiving environments key values that contribute to the Basin being an ONL is its openness, and the long open views gained over top of it to the enclosing mountain ranges.

The landscape and visual effects assessment in Section 6 above covers this policy and concludes that the potential adverse effects of the proposed solar farm will be mitigated and offset to a degree where overall its adverse landscape effects will be of a low-moderate to moderate degree.

In particular, the significant amount of native vegetation that will be located on the site, including the long-term reestablishment of native vegetation under the solar panels, which will be actively managed will positively contribute to the natural character of the site and the receiving environment. It will retain the legibility of the outwash plain which is an important landform within the basin. Also, once the proposed vegetation matures, only three viewing audiences, collectively being a small group of audience along McAughtries Road, Greta Track and the Benmore Range Easement Track will be adversely affected to a moderate degree. Beyond these locations all other viewing audiences will be adversely affected to a nil to very low degree.

Rural Policy 3A5 - In Harmony With The Landscape

To encourage the use of guidelines for the siting and design of buildings and structures, tracks, and roads, tree planting, signs and fences.

To encourage the use of an agreed colour palette in the choice of external materials and colours of structures throughout the district, which colours are based on those which appear in the natural surroundings of Twizel, Tekapo and Fairlie.

This policy and the Landscape Guidelines in Appendix K of the District Plan are focused on buildings, rather than solar panels but are relevant to the main control room and inverters.

The proposal will result in one main control room, 82 inverters and 31 water tanks, which are assessed in relation to the Landscape Guidelines in Appendix K below. When assessing these buildings / structures, the solar farm itself has been considered as part of the environment. This is because it alters the appearance of a large part of the immediately surrounding area, and these structures are directly associated with the solar farm, and would not be proposed or developed on their own.

Appendix K – Landscape Guidelines

Siting - The solar farm has been located within the Mackenzie Basin, an area with the fifth highest sunshine hours, situated where it will directly correct into the National Grid transmission lines and will assist with creating a more resilient power network. Rather than solely relying upon the hydro canals which struggle with sourcing water during droughts, something that is likely to occur more often with our ever-changing climate.

The solar farm has been situated and visually screened from most public places where it will only be seen from a McAughtries Road, Greta Track and the Benmore Range Easement Track, as to reduce its potential adverse visual effects, as assessed above. Within the site, the inverters and main control room have been located to reduce their visibility by surrounding them with the solar tables, rather than putting them alongside the gravel access tracks.

Design - The solar tables are a relatively low-lying structure vary in height between 1.5m tall and 2.2m tall, as the angle of the table changes following the suns movement through the sky. For the most part, the tables will be situated in a more parallel position, at a height of 1.5m which assists in maintain the long ranging views across the site to the surrounding mountains and other parts of the basin.

Materials and Colour - The colour of the solar infrastructure does not accord with these guidelines. Its dark appearance will assist in reducing its potential prominence, unlike a bright colour.

The external appearance of the inverters and main control room will consist of dark and recessive colours, as to reduce their potential prominence. These dark colours do not suit the regular tussock clad colour of the Mackenzie Basin. However, they will be in keeping and blend with the dark recessive solar panel colours.

Upgrades to access tracks and areas of exposed soil may exacerbate the visibility and visual effects arising from the proposal, although will not be appreciably different to upgrades that may occur if the site is farmed. Furthermore, the site is flat and the existing access tracks with the site are difficult to discern from most surrounding public places. It is proposed that following construction, all areas of disturbed soil, excluding access tracks will be reinstated with native vegetation.

Fences and Power Lines - Security fencing will not accord with these guidelines. However, they will only be seen from a relatively short stretch of the gravel four-wheel drive track that is located immediately east of the site. Once the proposed vegetation matures, this fence will be screened from view.

No powerlines are proposed. This is because the solar farm is well situated so it can connect to the nation grid powerlines that extend north to south through the centre of the site.

Tree Planting - The landscape mitigation plan and the 89ha of vegetation situated around the perimeter of the solar farm will substantially contribute to the enhancement of the ecological and biodiversity values within the Mackenzie Basin. This vegetation will complement the natural landform patterns around the perimeter of the outwash plain and immediately north of Lake Benmore. It will also assist with remedying visual scaring of the scarp face and protecting it from further erosion.

Signs – Small security and health and safety signs will be located on the security fence around the perimeter of the solar farm. When seen in the context of the solar farm and fence, which will only occur from the gravel track around the perimeter of the site, they will have very little impact on the amenity that is experienced.

Rural Objective 3B – Activities in the Mackenzie Basin's outstanding natural landscape

(1) Subject to (2)(a), to protect and enhance the outstanding natural landscape of the Mackenzie Basin subzone in particular the following characteristics and/or values:

(a) the openness and vastness of the landscape;

(b) the tussock grasslands;

(c) the lack of houses and other structures;

(d) residential development limited to small areas in clusters;

(e) the form of the mountains, hills and moraines, encircling and/or located in, the Mackenzie Basin;

(f) undeveloped lakesides and State Highway 8 roadside;

As assessed in Section 6 above, the openness of the site will be reduced due to the size and scale of the solar farm. However, due to the location of the solar farm, its low lying design being some 1.5m – 2.2m above ground level and its visibility being limited to a McAughtries Road, Greta Track and the Benmore Range Easement Track, the openness and vastness of the Mackenzie Basin when perceived from the surrounding public places will remain largely intact.

The Wildlands Report concludes that the 89ha of native vegetation and the long-term reestablishment of native vegetation under the solar panels will enhance the natural character of the site and the receiving environment.

The proposal will not impact on the areas of undeveloped lakesides or SH8 roadside.

(2) To maintain and develop structures and works for the Waitaki Power Scheme:

(a) within the existing footprints of the Tekapo-Pukaki and Ohau Canal Corridor, the Tekapo, Pukaki and Ohau Rivers, along the existing transmission lines, and in the Crown-owned land containing Lakes Tekapo, Pukaki, Ruataniwha and Ohau and subject only (in respect of landscape values) to the objectives, policies and methods of implementation within Chapter 15 (Utilities) except for management of exotic tree species in respect of which all objective (1) and all implementing policies and methods in this section apply;

(b) elsewhere within the Mackenzie Basin subzone so as to achieve objective (1) above.

The proposal is not directly associated with the Waitaki Power Scheme, but from an energy perspective, the proposed solar farm will benefit the Waitaki Power Scheme as it will reduce its daytime use, therefore retaining higher water levels within the lakes, in particular during drier months and droughts which in turn will maintain their aesthetic values.

Policy 3B2 – Subdivision and Building Development

To ensure adverse effects, including cumulative effects, on the environment of sporadic development and subdivision are avoided or mitigated by:

(1) Managing residential and rural residential subdivision and housing development within defined Farm Base Areas (refer to Policy 3B3);

(2) Enabling farm buildings within Farm Base Areas and in areas of low visual vulnerability subject to bulk and location standards and elsewhere managing them in respect of location and external appearance, size, separation and avoidance of sensitive environments;

(3) Strongly discouraging non-farm buildings elsewhere in the Mackenzie Basin outside of Farm Base areas.

This policy matter is focused on residential and rural residential development and its potential sprawl throughout the district. Therefore, it is not applicable to the proposed solar farm.

Policy 3B3 - Development in Farm Base Areas

(1) Within Farm Base Areas in areas of high visual vulnerability subdivision and development (other than farm buildings) shall maintain or enhance the outstanding natural landscape and other natural values of the Mackenzie Basin by:

(a) Integrating built form and earthworks so that it nestles within the landform and vegetation.

(b) Planting local native species and/or non-wilding exotic species and managing wilding tree spread.

(c) Maintaining a sense of isolation from other development.

(d) Built development, earthworks and access having a low key rural character in terms of location, layout and development, with particular regard to construction style, materials and detailing.

(e) Mitigating the adverse effects of light spill on the night sky.

(f) Avoiding adverse effects on the natural character and environmental values of waterbodies, groundwater and sites of natural significance.

(g) Installing sustainable systems for water supply, sewage treatment and disposal, stormwater services and access.

(2) Subdivision and development (other than farm buildings) in Farm Base Areas which are in areas of low or medium visual vulnerability to development shall:

(a) Restrict planting to local native species and/or non-wilding exotic species

(b) Manage exotic wilding tree spread

(c) Maintain a sense of isolation from other development

(d) Mitigate the adverse effects of light spill on the night sky

(e) Avoid adverse effects on the natural character and environmental values of waterbodies, groundwater and sites of natural significance

(f) Install sustainable systems for water supply, sewage treatment and disposal stormwater services and access.

This policy matter is focused on development within Farm Base Areas. Therefore, it is not applicable to the proposed solar farm.

Policy 3B7 – Views from State Highways and Tourist Roads

(a) To avoid all buildings and the adverse effects of irrigators in the Scenic Grasslands and the Scenic Viewing Areas;

(b) To require buildings to be set back from roads, particularly state highways, and to manage the sensitive location of irrigators to avoid or limit screening of views of the outstanding natural landscape of the Mackenzie Basin;

(c) To avoid clearance, pastoral intensification and/or agricultural conversion of Scenic Viewing Areas and Scenic Grasslands;

(d) Subject to Policy 3B13, to otherwise minimise the adverse visual effects of irrigation of pasture adjacent to the state highways or tourist roads.

An assessment of the proposed solar farm as experienced from SH8 is included in Section 6 above. To summarise, the proposed solar farm will be approximately 7 – 14kms away, due to its low-lying nature it will be difficult to distinguish and therefore will not be prominent from the

short stretches of the highway where visibility can be gained. Overall, the proposal will have a **very low to low degree** of adverse visual effects.

Policy 3B8 – Renewable Energy

To recognise and provide for the use and development of renewable energy generation and transmission infrastructure and operations within the footprint of current operations or on land owned by infrastructure operators as at 1 October 2011 while, as far as practicable, avoiding, remedying or mitigating significant adverse effects on the outstanding natural landscape and features of the Mackenzie Basin.

The proposed 420 mega-watt solar farm will provide renewable energy into the national power grid, which is equivalent to powering 75,000 homes. The solar farm is within a property that has a National Grid transmission line extending north to south through its centre, within close proximity of Ōhau C Power Station and is immediately north of Lake Benmore. However, this property was not owned by an infrastructure operator prior to 1 October 2011.

As assessed in Section 6 above, the proposed solar farm will result in adverse landscape effects that are of a **low-moderate to moderate degree**.

Rural Objective 4 - High Country Land

To encourage land use activities which sustain or enhance the soil, water and ecosystem functions and natural values of the high country and which protect the outstanding landscape values of the high country, its indigenous plant cover and those natural processes which contribute to its overall character and amenity.

Rural Policy 4B - Ecosystem Functioning, Natural Character And Open Space Values

Activities should ensure that overall ecosystem functioning, natural character and open space values of the high country are maintained by:

- Retaining, as far as possible, indigenous vegetation and habitat.

- Maintaining natural landforms.

- Avoiding, remedying, or mitigating adverse effects on landscape and visual amenity.

The proposal will enhance the amount of indigenous vegetation within the site. Subsequently, this will increase habitat areas for birds, lizards, and other animals and invertebrates on the outwash plain.

Earthworks associated with the proposal are relatively small in size and scale, in which the outwash plains landform will be maintained. It is proposed to work alongside Council and DoC to establish native vegetation on the scarp face immediately south of the site, to assist with erosion control, as to maintain the landform and further enhance biodiversity values in this area.

The landscape and visual effects have been assessed in Section 6 above. The proposal, where possible will remedy the landcover within the site and mitigate the solar farm, in which overall the proposal will result in a **low-moderate to moderate degree** of adverse landscape and visual effects.

Rural Objective 6 - Rural Amenity and Environmental Quality

A level of rural amenity which is consistent with the range of activities anticipated in rural areas, but which does not create unacceptably unpleasant living or working conditions for the District's residents or visitors, nor a significant deterioration of the quality of the general rural and physical environment.

Nationally and internationally, solar farms of this size and scale are commonly located within rural environments and represent an additional type of production activity that features a grid pattern of built form directly associated with electricity infrastructure. However, unlike farming crops which uses the land and soil for productive use, the proposal uses the sky and climate to produce energy, and in this instance the Mackenzie Basin has the fifth highest sunshine hours in Aotearoa New Zealand.

Unlike a busy housing development, the solar farm will be a relatively static operation with very few people coming and going from the site. Due to this, the proposal will not result in a busy environment, rather it will remain relatively 'quiet' similar to that of the current pastoral use of the site. As assessed above, the solar farm will be seen from a small number of public places. When seen, in particular from the McAughtries Road beside the Ōhau C Power Station where people fish, the static appearance and quiet nature of the solar farm will not result in reverse sensitivity effects on these people, and the current pleasantness will not be affected to a significant degree.

In addition to the above, the solar farm is located away from the urban area of Twizel and SH8 being a relatively busy tourist route, with limited visibility from these public areas, and due to distance will be very difficult to distinguish. Therefore, within the wider context, the proposed solar farm has been located where its potential adverse effects on rural amenity are mitigated by a lack of visibility and being clustered with existing power infrastructure.

7.2 Section 16 – Utilities

Objective 1 - Effect On The Environment

Utilities whose functioning and operation avoid, remedy or mitigate adverse effects on their surrounding environment.

Policies

1 To avoid, remedy or mitigate adverse environmental effects created by the operation of utilities through the application of performance standards to separate incompatible activities, maintain visual amenities, safety, and the quality of the environment.

As assessed in Section 6 above, the proposed solar farm is relatively static with very few people coming and going from the site and will therefore not result in a visually busy environment, like a residential development of this size and scale. Due to this, when experienced from the surrounding public places, its operations will not exacerbate the adverse visual effects.

7.3 Summary

When taken an on balanced approach to all of the above, the proposed solar farm will not be contrary to the above listed landscape related objectives and policies.

8 Conclusion

A 670ha solar farm and 89ha of native vegetation are proposed to be located with Section 3 SO384036. The site is approximately 973ha in area, is accessed via a 7km private gravel farm track off SH8, and immediately north of the confluence of the Ōhau, Twizel and Tekapo Rivers, Lake Benmore and the east of the Ōhau C Power Station.

The proposed solar farm will sit relatively lightly on the site to the point that it does not alter the landform of the outwash plain, therefore maintaining the legibility of this landform.

The size and scale of built form will impact on the open character of the South Basin, which forms part of the Mackenzie Basin which contributes to its unique and outstanding character.

The solar farm will introduce another renewable energy power source to this landscape. At a site-specific level, the solar farm will be located within close proximity of a concentrated area of the existing hydro energy infrastructure. This co-locating will assist in reducing the solar farms potential adverse landscape effects. Additionally, at a national level, the Mackenzie Basin is one of the sunniest places in the country. Due to this, a solar farm will be in keeping with this natural resource and these associative values.

Positive landscape effects resulting from the solar farm include:

- Remedying the greening effect within the site that has resulted from the current intensive agricultural land use activities.
- The significant enhancement of the ecological and biodiversity values within the site, which will also contribute to the landscape values of the Mackenzie Basin.
- Assisting with maintaining the aesthetic and associated values of the hydro lakes including Tekapo, Pukaki, Ōhau, Ruataniwha and Benmore Lakes and their recreational uses.

Regarding visibility and visual effects, the proposed solar farm is well located so it will be difficult to distinguish from SH8, the main tourist route through the Mackenzie Basin. Also, once the mitigation vegetation has matured, the proposal will be very difficult to distinguish from The Alps to Ocean Trail, Falston Road, Haldon Road, Haldon Arm Road, Pukaki, Tekapo, Ōhau Rivers, and Lake Benmore. Once the vegetation has matured, visual effects on people travelling / spending time in these locations will be **nil to a very low degree**.

Unavoidably, the solar farm will be seen from **McAughtries Road**, **Greta Track** and the **Benmore Range Easement Track** in which its resulting adverse visual effects will be of a **moderate degree**.

Overall, the proposed solar farm and its associated activities will have a **low-moderate to moderate degree** of adverse landscape effects on the Mackenzie Basin's outstanding landscape values.

RMM

ROUGH MILNE MITCHELL
LANDSCAPE ARCHITECTS

Proposed Solar Farm - The Point, Mackenzie Basin
Appendix 1: Graphic Attachment to Landscape Assessment Report

25 May 2023

Document Information

Project

Proposed Solar Farm

Address

Section 3 - SO 384036, SH6, Twizel

Client

Far North Solar Farm Ltd.

Document

Appendix 1: Graphic Attachment to Landscape Assessment Report

Status

For Resource Consent

Revision

1	For Resource Consent	25.05.2023

Prepared By

Rough Milne Mitchell Landscape Architects Ltd

Project Number: 22226

Author: Zoe Cox & Paul Smith

Peer Reviewed: Nikki Smetham

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Contents

The Receiving Environment Plan

Legend

	The Site
	Mackenzie Basin Subzone
	The Receiving Environment

Scale: Grid Square - 5km x 5km
Data Source: www.topomap.co.nz

Local Context Plan

Legend

	The Site
A	Pukaki Airport
B	Twizel Substation
C	High Country Salmon Farm
D	Ohau B Power Station
E	Ohau C Power Station
F	Lake Benmore Ohau C Campground
G	Haldon Arm Campground
H	Benmore Views Campground
I	Falston Campground

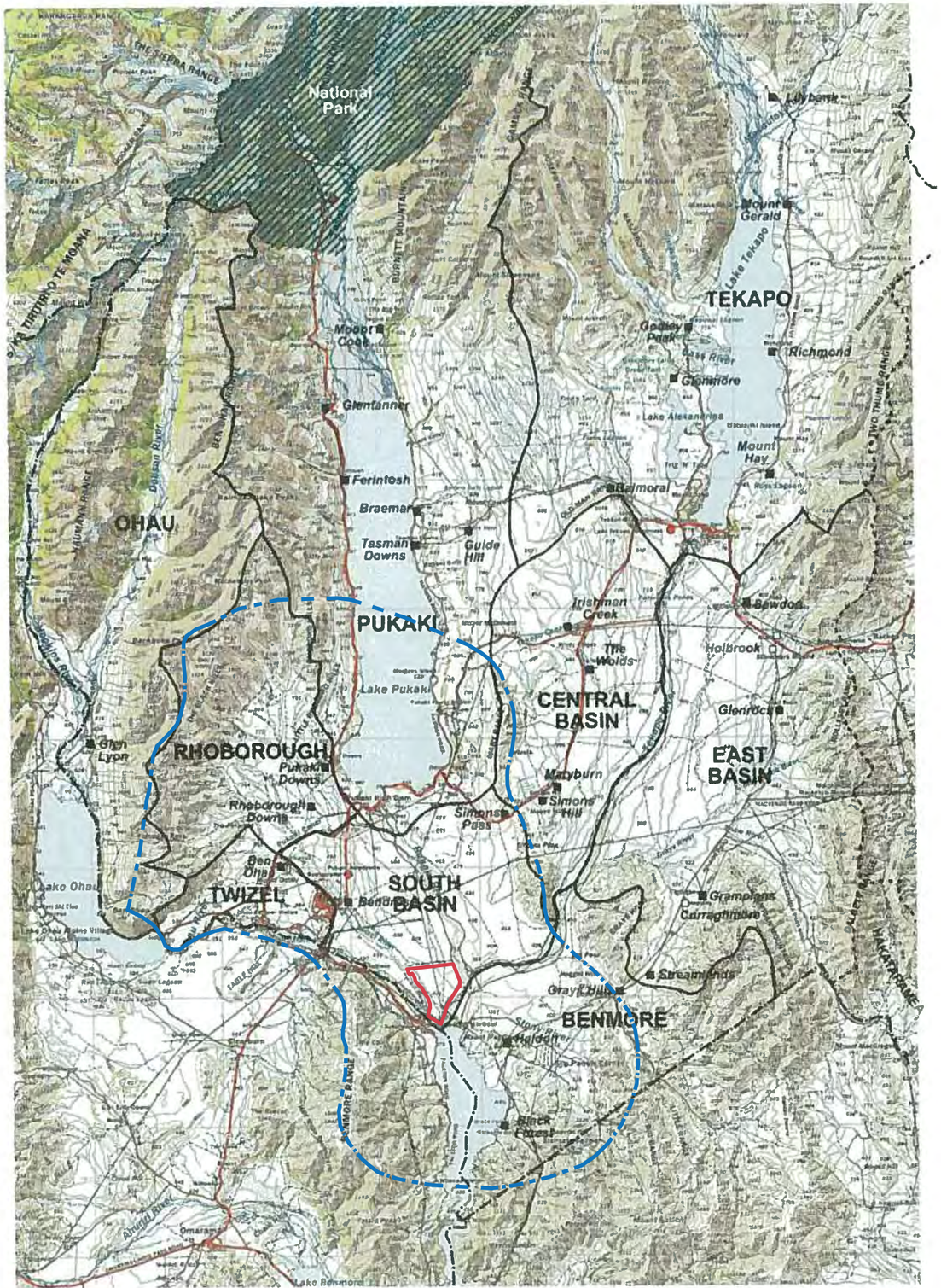
Scale 1:100,000 @ A3
Data Source: www.app.grip.co.nz

0 5000 M

Mackenzie Basin Landscape Character Areas

Legend

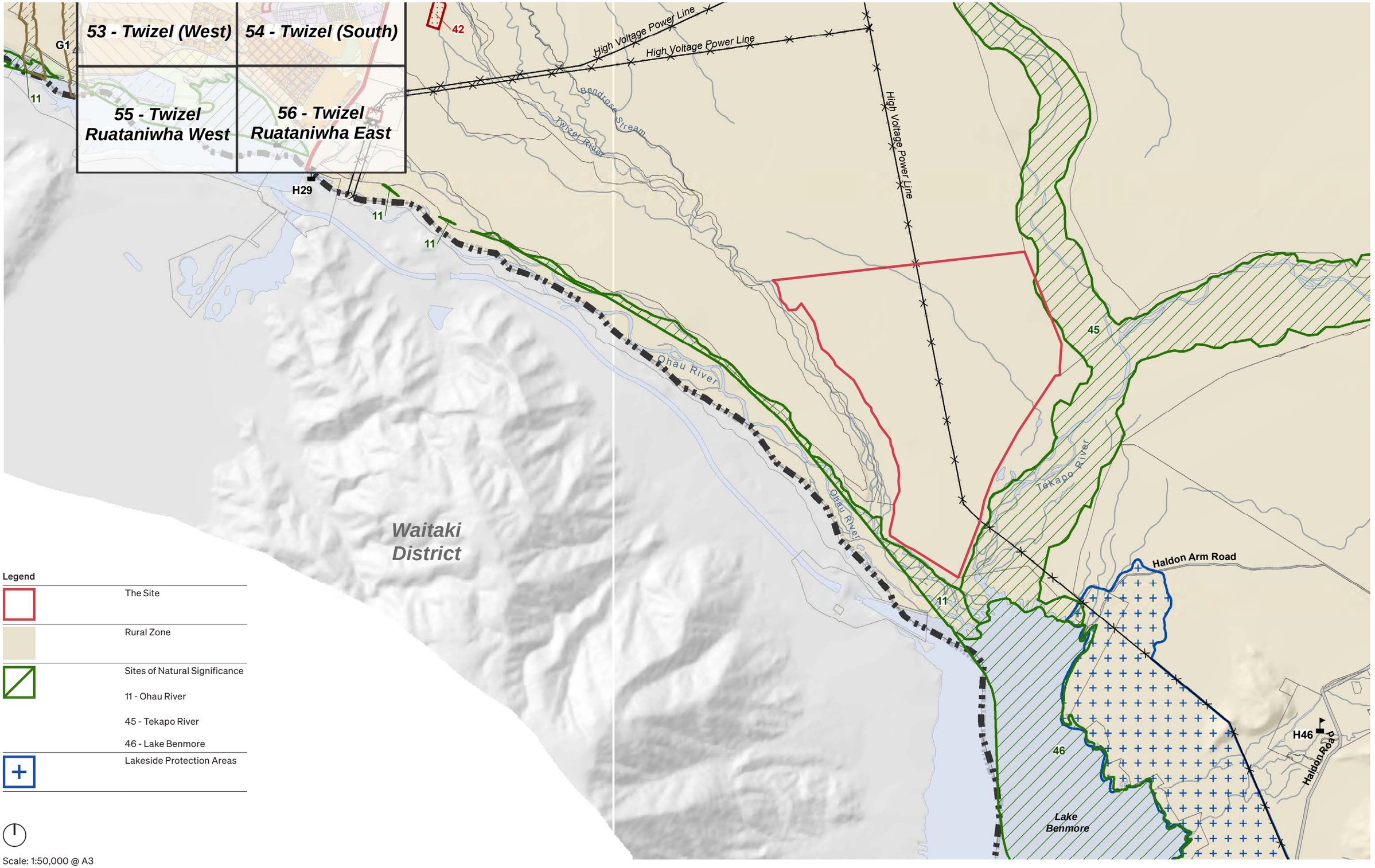
	The Site
	The Receiving Environment



Not to Scale

Data Source: The Mackenzie Basin Landscape: Character and Capabilities. Graham Densem Landscape Architects. November 2007.

Mackenzie District Planning Map 38



Legend

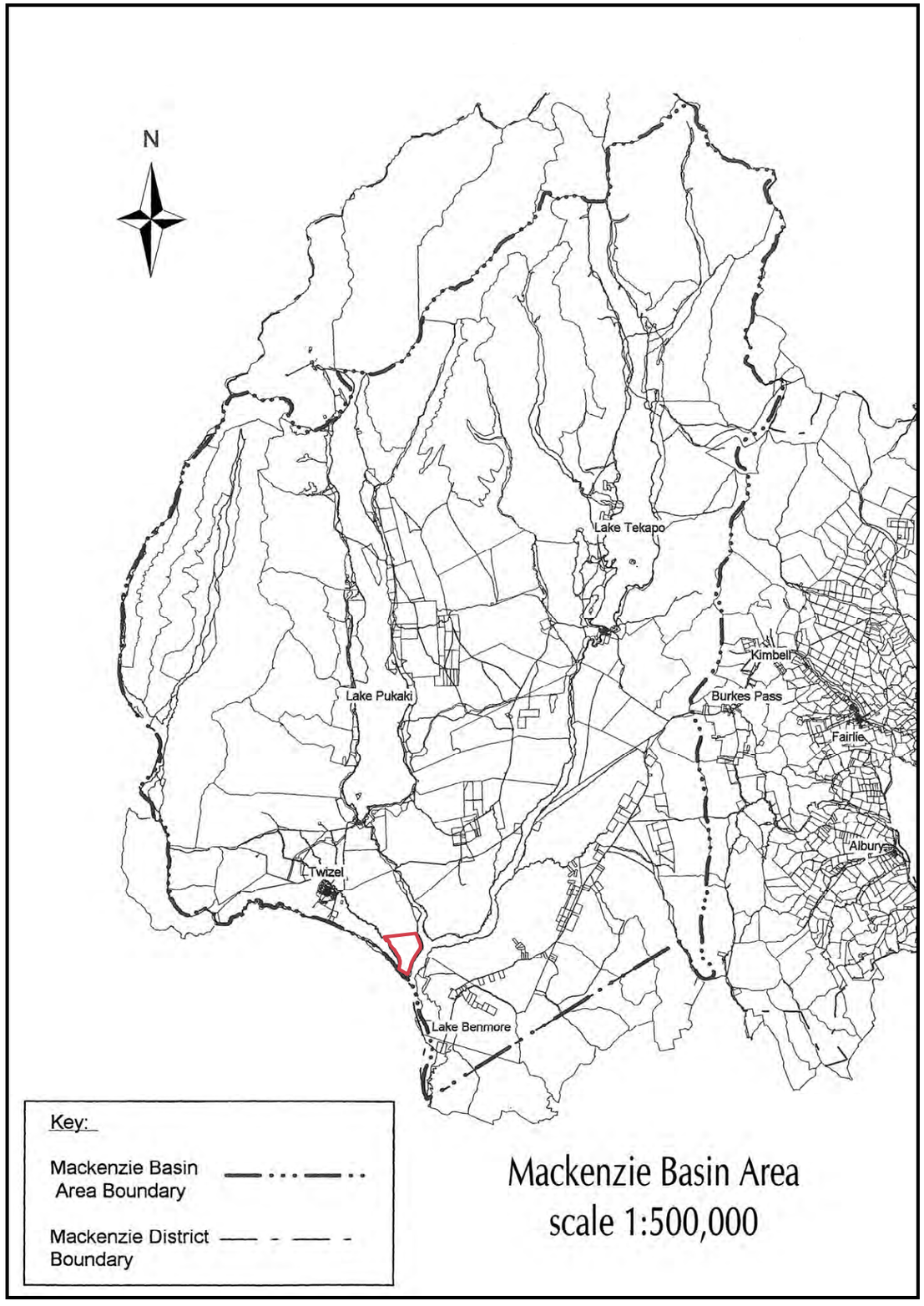
- The Site
- Rural Zone
- Sites of Natural Significance
  - 11 - Ohau River
  - 45 - Tekapo River
  - 46 - Lake Benmore
- Lakeside Protection Areas

Scale: 1:50,000 @ A3
Data Source: Mackenzie District Plan

Mackenzie District Plan: Appendix E - Mackenzie Basin Plan

Legend

The Site

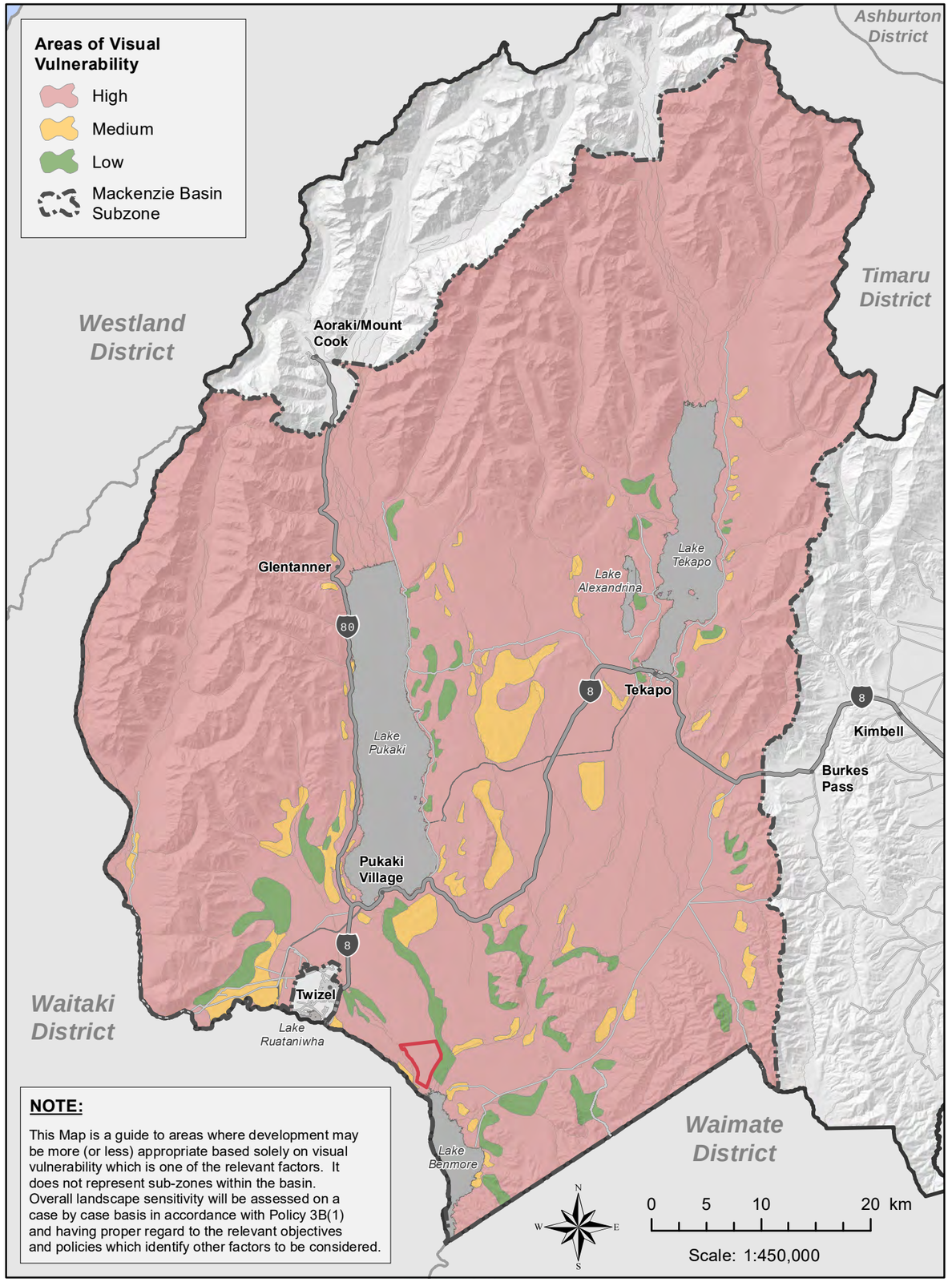


Not to Scale
Data Source: Mackenzie District Plan

Mackenzie District Plan: Appendix V - Areas of Landscape Management

Legend

The Site

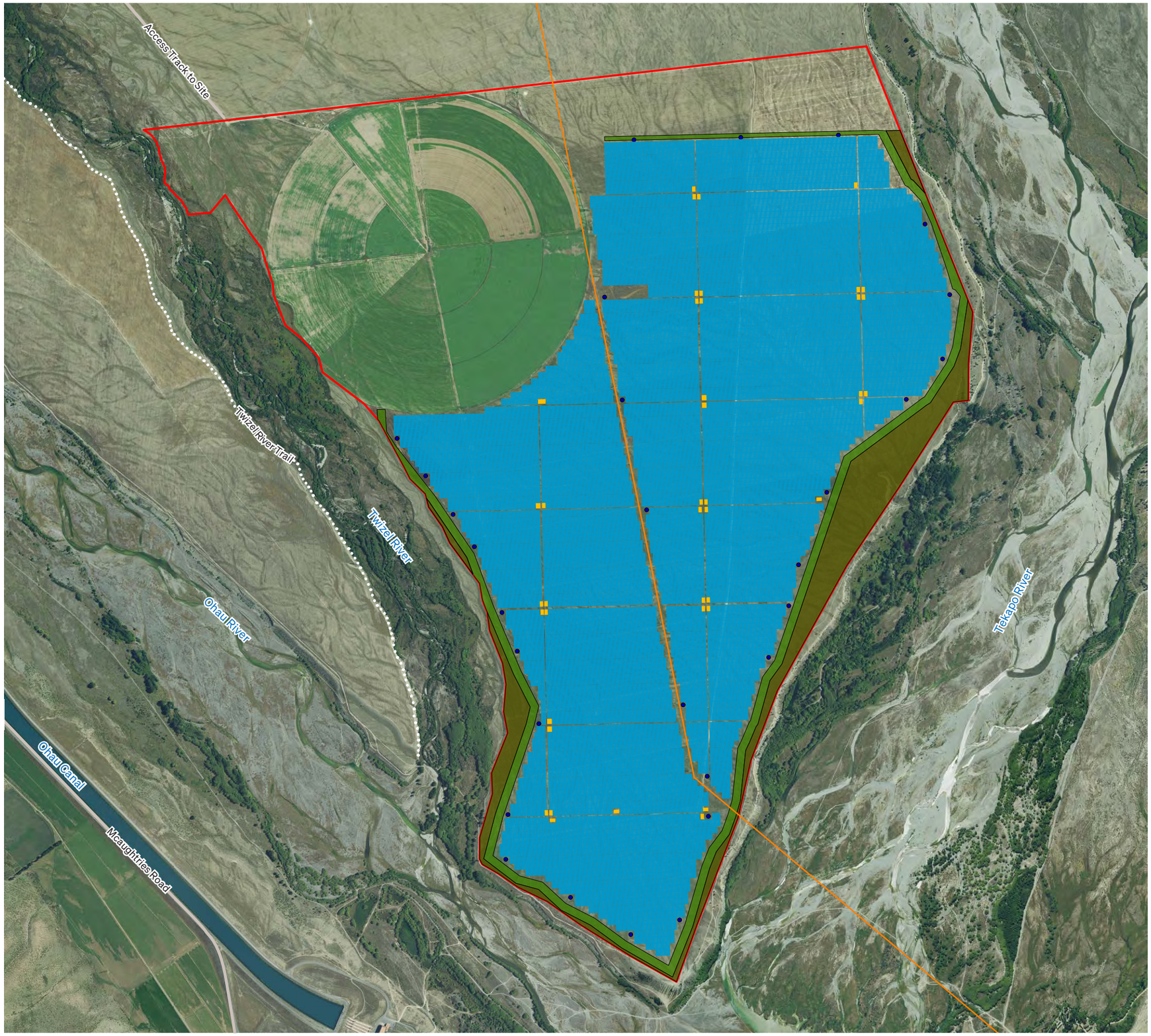


Scale: 1:450,000 @ A3
Data Source: Mackenzie District Plan

Proposed Solar Farm Plan

Legend

- Site Boundary - 973ha
- Proposed Solar Panels - 577ha
- Propsoed Landscape Mitigation Strip - 40ha
- Prosoed Low Lying Native Vegetation - 49ha
- Location of Inverters
- Water Tanks
- National Grid Transimission Line



Scale 1:5,000 @ A3

0 1000 M

Landscape Mitigation Plant Palette

Plagianthus regius
Ribbonwood/Mānatu
Mature height: 10-12m
Fast growing

Kanuka
Kunzea robusta
Mature height: 18m
Threatened

Matagouri
Discaria toumatou
Mature height: 6m
Declining

Corokia cotoneaster
Korokio
Mature height: 3m
Withstands wind

Sophora microphylla
Kowhai
Mature height: 8m
Medium growth rate

Olearia lineata
Tree Daisy
Mature height: 8m
Grows well in tussock land

Coprosoma propinqua
Mingimingi
Mature height: 3m
Most robust Coprosma

Phyllocladus alpinus
Mountain Celery Pine
Mature height: 6m
Slow growing

Solar Panel Exemplar Images

A Example of a Solar Farm in Marlborough
B - C Examples of Solar Farms in Australia

A

B

C

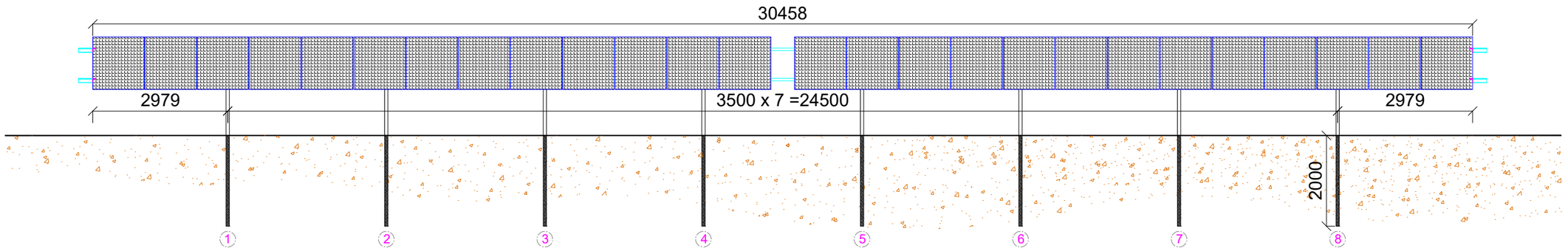
Solar Panel Exemplar Images

A-B Examples of Solar Farms in Australia

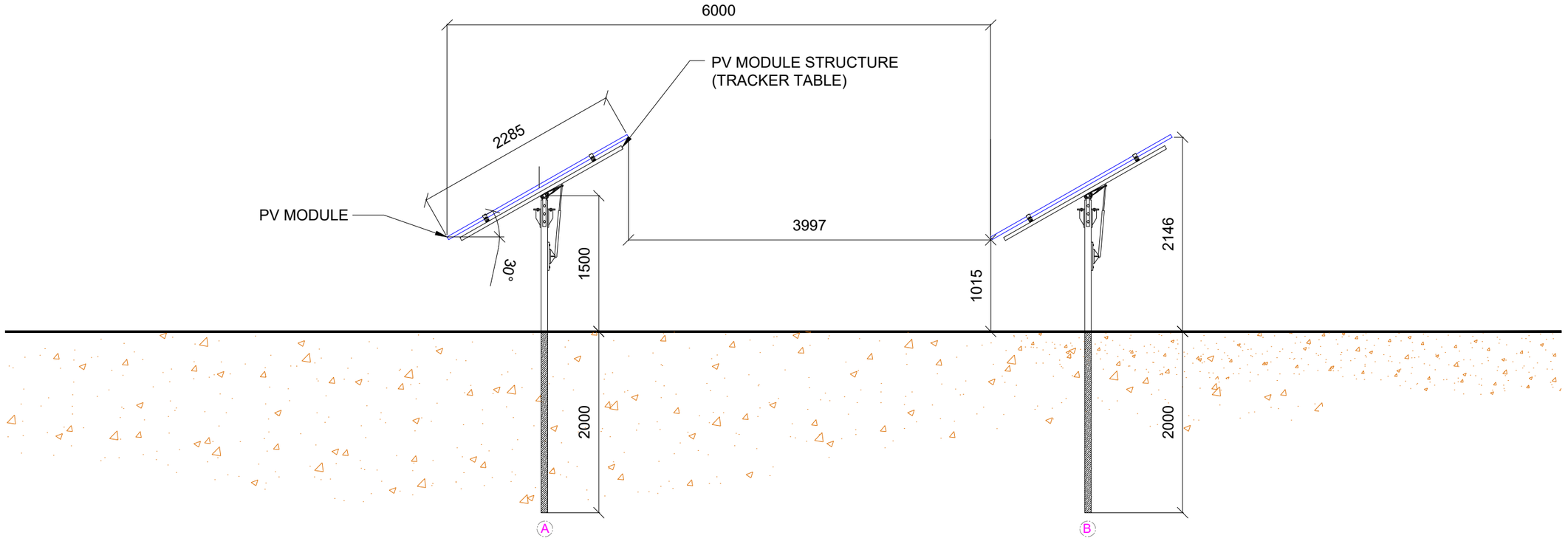
A

B

Titling Solar Table - Typical Cross Sections



Typical Cross Section Detail For Tracker Table (Front View)



Typical Cross Section Detail for Tracker Table (Side View)

Not to Scale

Data Source: Aquila Capital Renewables Asia Pte. Ltd.

Proposed Inverters

A - B Example images of the proposed inverters which are the same size a 20 foot shipping container. Source: Far North Solar Farm Ltd.

C Visual Simulation of a Proposed Inverter within the Solar Farm. Source: Virtual View

A

B

C

Site Photograph Location Plan

Legend

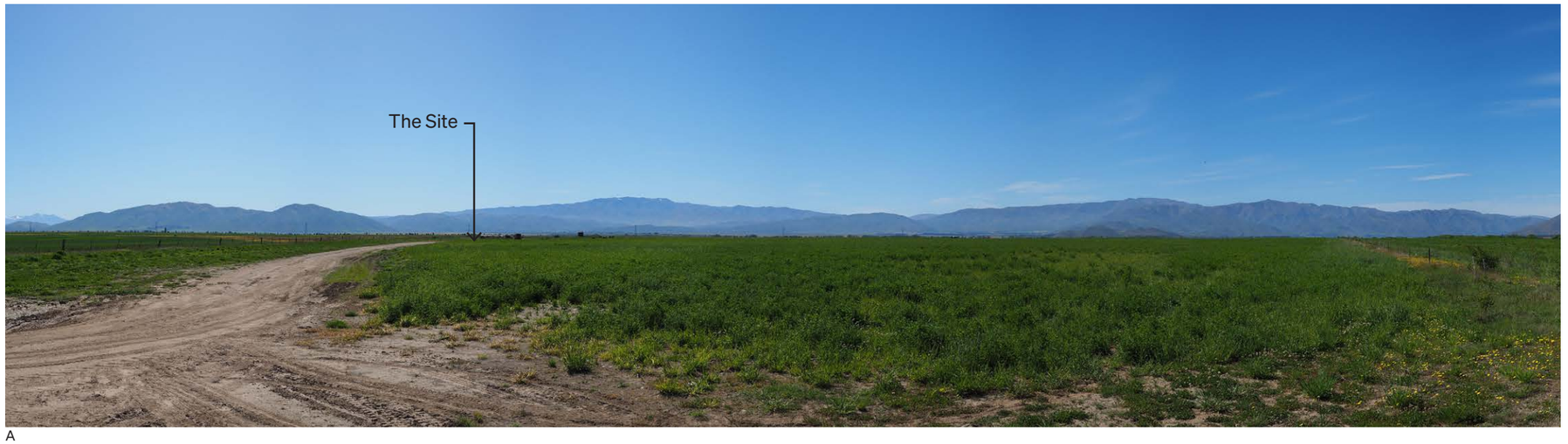
	The Site
A	Site Photograph Locations

Scale 1:5,000 @ A3

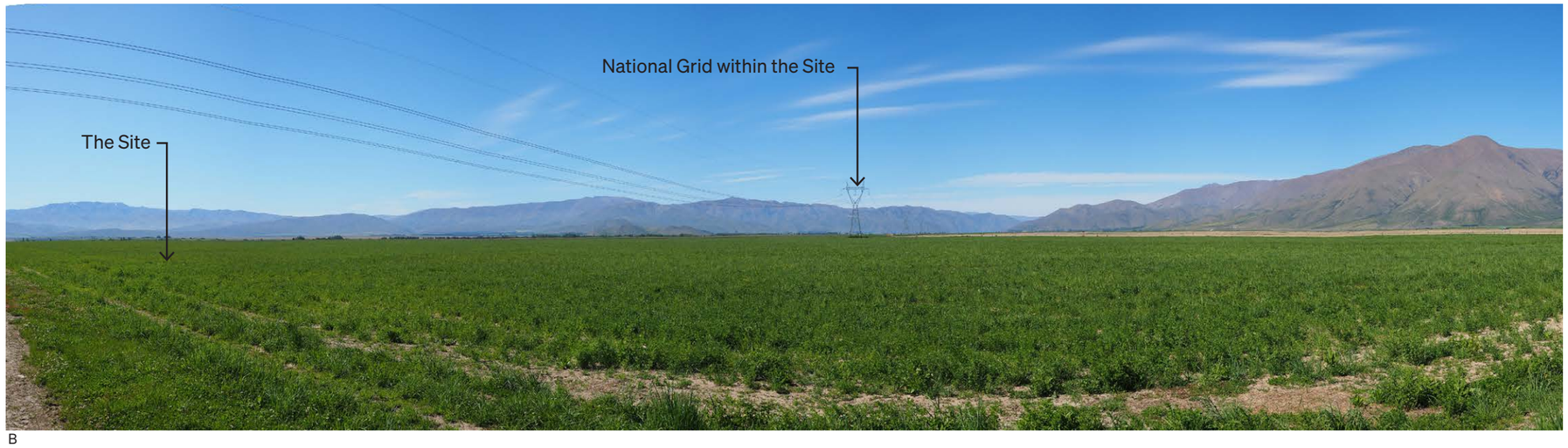
0 1000 M

Site Photographs

Photographs A - C represnt the views gained from the northern part of the site. This includes its intensive agricultural use, the neighbouring site and the wilding pines that are starting to establish, the National Grid transmission lines that extend north to south through the site and the views to the surrounding mountains enclosing the Mackenzie Basin.



A



B

C

Site Photographs

Photographs D - F represnt the views gained from the central portion of the site and its intensive agricultural use, the the National Grid transmission lines that extend north to south through the site and the views to the surrounding mountains enclosing the Mackenzie Basin.

D

E

F

Site Photographs

Photographs G - I represnt the views gained from the southern part of the site. This includes illustrating the proximity of the gravel four-wheel drive track around its perimeter, the intensive agricultural use of the site which is starkly different to outside the site and the willow lined river banks / escarpment faces. Also, the National Grid transmission lines that extend north to south through the site and the views to the surrounding mountains enclosing the Mackenzie Basin.

G

H

I

Viewpoint Location Plan

Legend

	The Site
#	Viewpoint Locations
#	Viewpoint Locations with a corresponding Visual Simulation

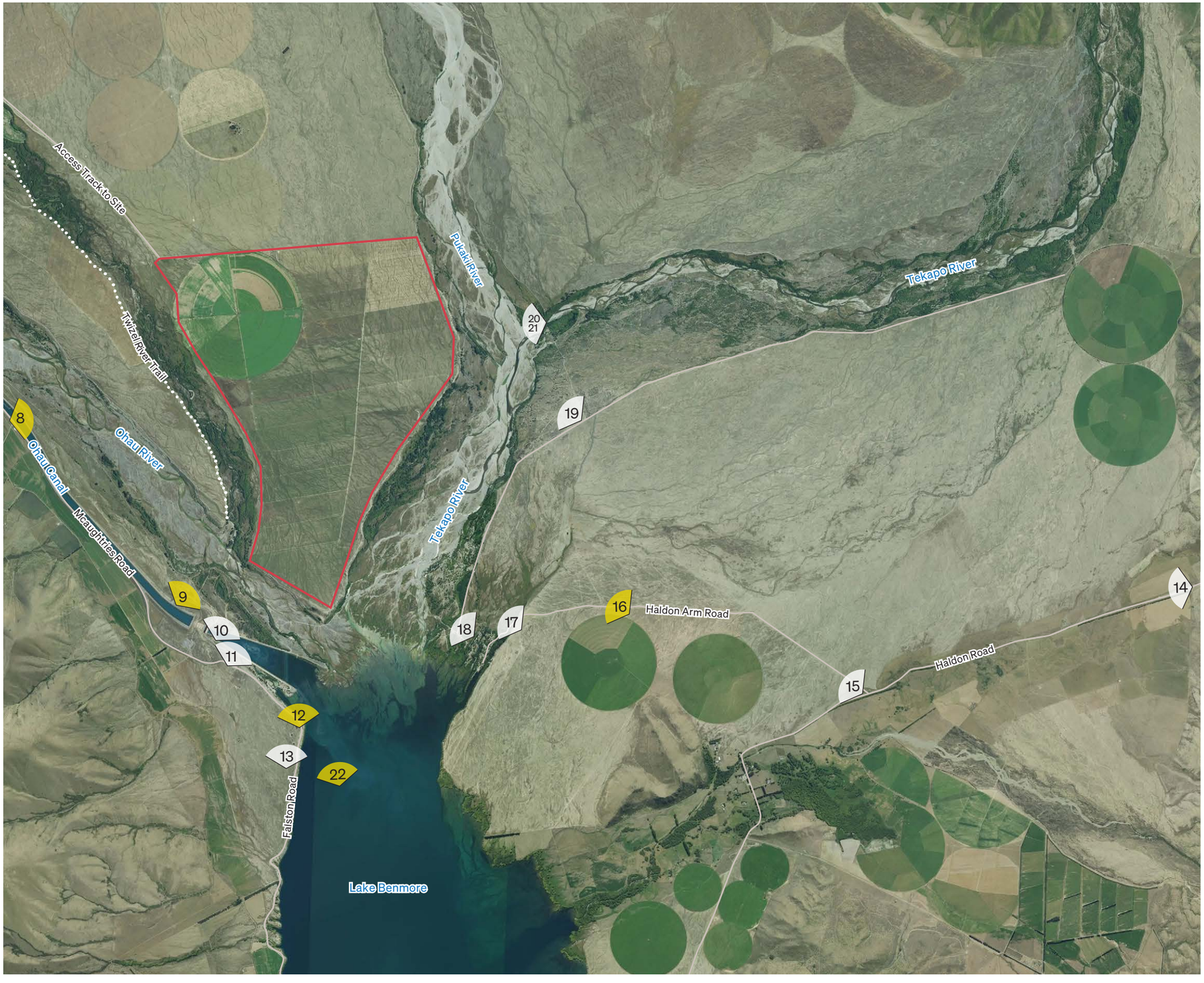
Scale 1:120,000 @ A3
Data Source: www.app.grip.co.nz

0 5000 M

Viewpoint Location Plan

Legend

	The Site
#	Viewpoint Locations
#	Viewpoint Locations with a corresponding Visual Simulation



Scale 1:50,000 @ A3
Data Source: www.app.grip.co.nz

0 2000 M

Viewpoint Location Photographs - State Highway 8

Viewpoint Location Photograph 1: Located at the Lake Ruataniwha Dam alongside SH8. This photo illustrates the view along the Ohau River and the outwash plain towards the site and surrounding mountains,, with the solar farm being 7.5kms aways.

Viewpoint Location Photograph 2: Located near the Twizel Substation alongside SH8. This photo illustrates the view over the outwash plain towards the site and surrounding mountains, with the solar farm being 7.0kms aways.

Viewpoint Location Photographs - State Highway 8

Viewpoint Location Photograph 3: Located at the Pukaki Canal Bridge alongside SH8. This photo illustrates the view over the outwash plain towards the site and surrounding mountains, with the solar farm being 12kms aways.

Viewpoint Location Photograph 4: Located at the Pukaki River Spillway alongside SH8. This photo illustrates the view over the spillway, Pukaki River, nearby plantation forest and the outwash plain towards the site and surrounding mountains, with the solar farm being 13kms aways. The view over Lake Pukaki to Aoraki Mt Cook is in the opposite direction to this view.

Viewpoint Location Photographs - State Highway 8

Viewpoint Location Photograph 5: Located at the Pukaki Moraine along SH8. This photo illustrates the view over the outwash plain towards the site and surrounding mountains, with the solar farm being 12.5kms aways.

Viewpoint Location Photographs - Alps 2 Ocean Trail

Viewpoint Location Photograph 6: Located at Pukaki Canal Road, in an elevated location to illustrate the view if the trees are removed. This photo illustrates the view over the Pukaki River, the nearby plantation forest and the outwash plain towards the site and surrounding mountains, with the solar farm being 12.5kms aways. The view over Lake Pukaki to Aoraki Mt Cook is in the opposite direction to this view.

Viewpoint Location Photograph 7: Located near Pukaki / Twziel Airport along the Alps to Ocean Trail. This photo illustrates the view over the outwash plain towards site and surrounding mountains, with the solar farm being 7.3kms aways. The view to the right (west) includes Lake Pukaki Airport and the edge of Twizel township.

Viewpoint Location Photographs - McAugtries Road

Viewpoint Location Photograph 8: Located along McAugtries Road, alongside the Ohau Canal, beside a shelterbelt on the western side of the road. This photo illustrates the view over and along the canal and the outwash plain towards site and surrounding mountains, with the solar farm being 1.2kms aways.

Viewpoint Location Photograph 9: Located along McAugtries Road, immediately upstream of Ohau C Power Station. This photo illustrates the view over the Twizel River towards site and surrounding mountains, with the solar farm being 1.0kms aways. The Ohau Canal and Ohau C Power Station is behind immediately behind this view, and Lake Benmore is to the right (south).

Viewpoint Location Photographs - McAugtries Road

Viewpoint Location Photograph 10: Located along McAugtries Road downstream of Ohau C Power Station. This photo illustrates the view over the top end of Lake Benmore towards the escarpment that wraps around the site and the surrounding mountains, with the solar farm being 1.0kms aways. Lake Benmore Ohau C Campground, and a public boat ramp is to the right (south) of this location.

Viewpoint Location Photographs - Falston Road

Viewpoint Location Photograph 11: Located near the McAugtries Road and Falston Road intersection. This photo illustrates the view over the top end of Lake Benmore towards the site and the surrounding mountains, with the solar farm being 1.2kms aways. Lake Benmore is to the right (south) of this location.

Viewpoint Location Photograph 12: Located at the 45 Degree corner along Falston Road. This photo illustrates the view over the top end of Lake Benmore towards the site and the surrounding mountains, with the solar farm being 1.4kms aways.