Boffa Miskell

Haldon Solar Project

Landscape Effects Assessment
Prepared for Lodestone Energy Ltd

22 August 2025

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Cover photograph: View towards Te Pā-o-Kāti-Kurī / Mt Maggie across the Haldon Solar Project Site, © Boffa Miskell, 2024

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Executive Summary

Lodestone Energy Limited proposes to develop a solar farm (the Haldon Solar Project or the Project) within part of a 320 ha site (the Project Site) on Haldon Station, at the southern extent of the Mackenzie District. The Project will connect into Transpower's existing 220kV line which crosses the Site.

Landscape effects

The Haldon Solar Project is located on fluvioglacial outwash plains contained between Te Ao Marama / Lake Benmore and Te Pā-o-Kāti-Kurī / Mt Maggie in a Southern Mackenzie Sub-Basin context.

The character of the Project Site will change, comprising an increase in built form however the proposal is located in a part of Te Manahuna / Mackenzie Basin ONL that has some capacity to absorb this type of change. The relatively secluded, contained location dilutes potential landscape effects beyond the Site and immediate setting. The type of activity proposed shares characteristics with established electricity generation and transmission infrastructure in the wider landscape context.

The proposal will generate no more than **low-moderate** and minor adverse effects on the landscape at the Project Site and immediate context, reducing to **low** and less than minor effects within the Sub-Basin. Effects of the Solar Project on landscape values of the Te Manahuna Outstanding Natural Landscape (ONL) will be **neutral** when considered within the Broad Basin scale. Overall, the proposal is considered not inappropriate in terms of protecting the values of the ONL.

Visual effects

In visual terms, the Haldon Solar Project Site is well contained due to Te Pā-o-Kāti-Kurī / Mt Maggie, the large scale of Haldon Station and its relatively remote location.

The highest level of potential adverse visual effects occur from Haldon Arm Road and from Te Ao Marama / Te Ao Marama / Lake Benmore and its landward margins immediately adjacent to the Site. Potential adverse visual effects from these locations are assessed as **low-moderate** and no more than minor.

The nearest private dwellings with potential visibility of the Haldon Solar Project Site (outside Haldon Station) are between approximately 3.8km and 5km away. Potential adverse effects will be **very low** to **low** and less than minor.

Natural character effects

The Haldon Solar Project Site is partially within a Lakeside Protection Area (LPA). Te Ao Marama / Lake Benmore is also identified as a Site of Natural Significance. The Solar Project is well set back from both the lake and river margins, typically by a minimum of 200m

The existing level of natural character within the Project Site and immediate landscape setting is modified but largely void of overt built development and with low densities of At Risk-Declining plant species identified.

Overall, adverse effects on natural character values present at the Project Site and in the immediate landscape will be **low-moderate** for which ongoing maintenance and management controls within the proposed rabbit proof fencing are recommended to promote a positive trajectory for biotic aspects of natural character given the existing modified context.

1.0 Introduction

1.1 Scope of the Report

Boffa Miskell Limited (BML) has been engaged by Lodestone Energy Limited ("Lodestone Energy") to undertake a Landscape (and Visual) Effects Assessment (**LEA**) for a proposed 220 MWdc / 180 MWac solar farm within part of a 320 ha site in the Mackenzie Basin.

The proposed solar farm (the Haldon Solar Project) will be located on part of Haldon Station between Te Pā-o-Kāti-Kurī / Mt Maggie and Te Ao Marama / Te Ao Marama / Lake Benmore, 13km southeast of Twizel within the Mackenzie District and the Canterbury Region (the Haldon Solar Project Site).

This report assesses the landscape and visual effects of the proposed solar farm and associated infrastructure, including likely visual amenity effects on the surrounding viewing audience and associated landscape character.

A separate **Graphic Supplement** including visual simulations, has been prepared and is attached. The location and context of the Haldon Solar Project Site is shown in **Figure 1** of the Graphic Supplement and reproduced below.

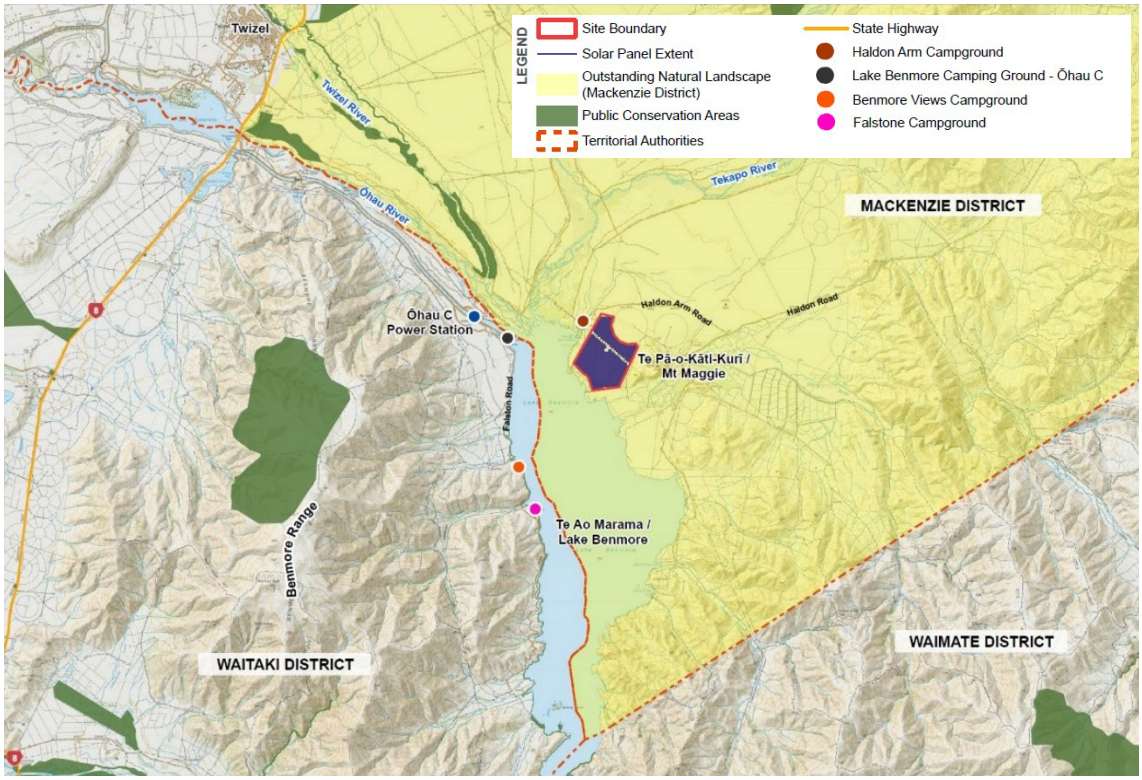


***Image 1**: Location and context of proposed Haldon Solar Project Site.*

1.2 Assessment Approach

This assessment has been undertaken and peer reviewed by New Zealand Institute of Landscape Architects (NZILA) registered landscape architects with reference to best practice guidance: following the concepts and principles outlined in *Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines*[1]. A full method is outlined in **Appendix 1** of this report. In summary, the effects ratings are based upon a seven-point scale which ranges from very low to very high.

Te Tangi a te Manu recognises the term 'landscape effects' as all-encompassing, and that visual effects and natural character effects are a subset of landscape effects. This assessment discusses landscape, visual and natural character effects separately for clarity, but the overall process is a Landscape Effects Assessment (LEA) in accordance with the Guidelines.

It is acknowledged that Kāi Tahu are the iwi who hold mana whenua over this area. It is understood that separate engagement has been undertaken by Lodestone Energy as part of seeking to understand cultural values which apply to the Haldon Solar Project Site. An understanding of Māori cultural values has been described in this report where information has been made available on the understanding that mana whenua input will be encouraged via consultation.

Boffa Miskell has worked collaboratively with Frank Boffa as a peer reviewer, and the project team, to inform mitigation and long-term rehabilitation opportunities at project completion.

1.3 Assessment Process

1.3.1 Scoping Study

Prior to conducting this assessment, a high level scoping report was undertaken to provide initial guidance on the key landscape issues and the likely nature and significance of landscape and visual effects of the Haldon Solar Project.

To assist with completing the Scoping Study, site visits were undertaken by Frank Boffa and separately by landscape planners, Rhys Girvan and Sue McManaway on 26th June 2024 to assess the existing Site within its landscape context and identify representative views. Inspection from potential publicly available viewing areas beyond the site, including from Te Ao Marama / Lake Benmore, was undertaken.

A desktop study was also completed which included a review of the relevant information relating to the landscape and visual aspects of the project. This information included:

• the statutory setting of the project area and surrounding context;

• existing landscape assessments undertaken within the receiving environment; and

• base map data (such as contours and aerial photography)

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

1.3.2 Project Shaping

A further site visit was undertaken on 21 August 2024 for the purposes of selecting and obtaining georeferenced panorama photographs in order to prepare accurate visual simulations and to further understand both the project area and the surrounding context including its likely visibility.

A preliminary site analysis was undertaken of the Project Site's existing key characteristics and potential landscape response and management opportunity to assist with the project, in part to inform this assessment as well as assist with project shaping and managing the potential for adverse landscape, natural character and visual effects. Current aerial imagery and survey data (Beca, September 2024) has assisted with this project shaping. Input into project layout has included the setback of some of the solar arrays where this has been assessed as assisting with reducing potential adverse landscape, natural character and visual effects, for example by 300m from Haldon Arm Road.

1.3.3 Preparation of Visual Simulations

Initially, a series of six draft 'wireframe' visual simulations were prepared to understand the extent of visibility of the project and the potential impact on the surrounding viewing audiences. These also informed and assisted with project shaping. Four final viewpoints were selected and final visual simulations developed to provide representative views from the available viewing audiences located at a range of viewing distances and locations. Visual simulations have been prepared in accordance with NZILA best practice[2] and adhere to Boffa Miskell's internal Visualisation Guidelines to assist with an accurate understanding of the proposed magnitude of visual change.

Visual simulations are detailed in **Section 5.2** of this report and included in the Graphic Supplement appended to this report.

1.3.4 Relevant Technical Reports

In preparing this assessment, the following technical report has been reviewed and relied upon:

Haldon Solar Project Ecological Impact Assessment. Prepared for Lodestone Energy prepared by AgScience Ltd, 31 July 2025

2.0 Haldon Solar Farm

2.1 Site Location

The Haldon Solar Project Site is located on fluvioglacial outwash plains at the southern edge of the Mackenzie District within the Canterbury Region. The location is approximately 13km southeast of Twizel and 40km southwest of the intersection of Haldon Road and State Highway 8 (SH8) at Dog Kennel Corner. SH8 is the key route through the Mackenzie District.

[2] NZILA Best Practice Guide Visual Simulations BPG 10.2

The Project Site comprises approximately 320 ha within Haldon Station. The Station totals some 22,000 ha of land, extending east from Te Ao Marama / Lake Benmore to the Kirkliston Range.

The Project Site is broadly contained by the margins of Te Ao Marama / Lake Benmore and the confluence of the Pukaki and Tekapo Rivers to the west; Haldon Arm Road and Haldon Station farmland to the north; the abruptly rising, glacial landform of Te Pā-o-Kāti-Kurī / Mt Maggie (524m) and the Haldon Station homestead area to the east; and the Stony River delta / Haldon Station farmland to the south.

The Project Site is set well back from the margins of the lake and rivers with minimum buffers of 200m from the southern and western extents of Te Ao Marama / Lake Benmore and 300m from Haldon Arm Road.

The wider Haldon Station boundary extends to the water's edge of Te Ao Marama / Lake Benmore in places and encompasses the lower Stony Creek area adjacent to the Site as shown in **Image 2** below.

Image 2: *Haldon Station boundary (blue line) extends to lake edge in places (LINZ Property Titles)*

Access to the Project Site is via Haldon Road and Haldon Arm Road. Haldon Road is sealed for the first 15km from the intersection with SH8, after which it, and then Haldon Arm Road, are gravel.

Both these roads act substantially as no-exit roads however other informal access to the Site is possible via tracks that generally follow the Tekapo and Pukaki Rivers.

Lodestone Energy are seeking consent for a solar farm with a capacity of 220MWdc / 180MWac at Haldon Station near Te Ao Marama / Lake Benmore in the Mackenzie Basin. The proposed solar farm will connect into Transpower's existing 220kV line which crosses the northern half of the Haldon Solar Project Site.

The key features of the Haldon Solar Project will comprise solar arrays, a substation and supporting electrical infrastructure/equipment, underground cabling, telecommunications equipment, buildings, lighting, internal access tracks, and fencing. The development area will be enclosed with rabbit proof fencing and grazing by stock will cease.

The layout of the Haldon Solar Project is shown in **Image 3** below.

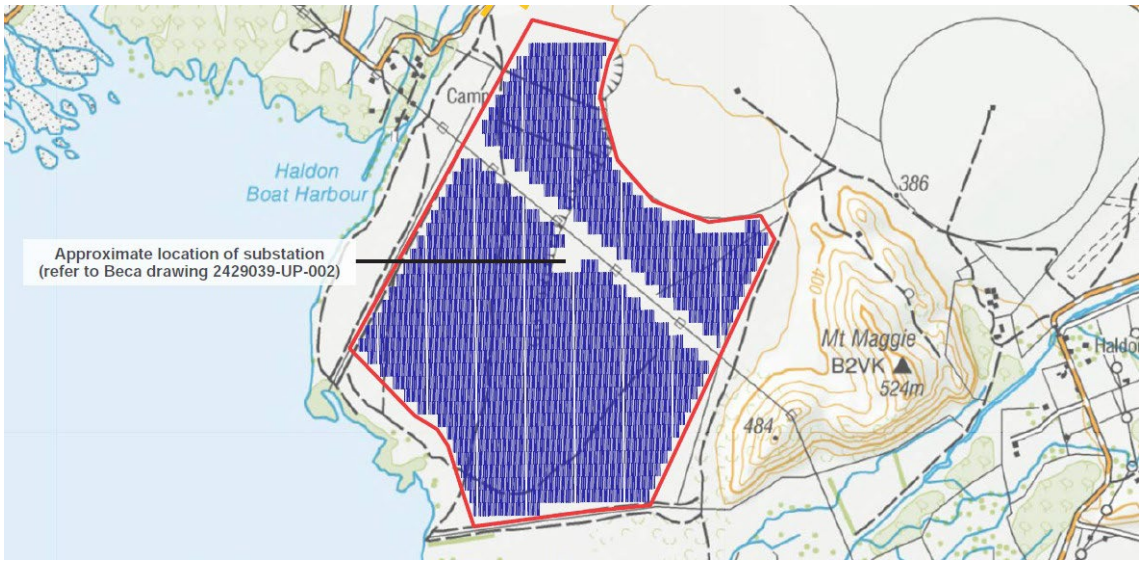


***Image 3**: Haldon Solar Project Layout*

2.2 Project Description

There will be a total of approximately 13 ha of disturbance required to undertake all the works, including access, associated with the Project. A summary of the key infrastructure is set out below:

Solar arrays

The solar array will comprise:

- Approximately 360,000 solar photovoltaic (PV) modules (panels), mounted on single-axis tracking tables, that are supported by piles driven into the ground.
- The configured PV modules will be ~2.6 m above ground level (depending on the undulations in topography) when tilted to the maximum angle;
- Piling depth is estimated to be 1.5-2.5m;
- The proposed development design comprises a ground cover ratio of approximately 40% when tracking tables are horizontal and less when inter array areas are included.

Power stations

- Approximately 48 power stations (containing inverters, transformers and associated switchgear) with a similar footprint to a 20-foot shipping container (approximately 6.5m W/ 2.2m H/ 2.0m D);

Substation and grid connection (refer to Beca drawings 2429039-UP-002, UP-004 and UP-006 appended to the AEE)

- A 33 kV – 220 kV substation to facilitate connection to the National Grid within the Site;
- Contained within a fenced area ~12,000m2;
- Equipment/components to include a control building, facilities building, and 2x containerised switchrooms, 2 x power transformers, circuit breakers, gantries, buswork, disconnectors, surge arrestors, and other equipment;
- A new transmission tower is proposed to be installed approximately midway between the existing towers at a height of approximately 34m.
- Height of most equipment within will range between approximately 4-12m with taller gantry structures (20m) and lightning spikes (24m).

Other elements include underground electrical and communications cabling, combiner boxes, telecommunications equipment and weather stations. There will also be a site perimeter fence that will be a deer-style fence approximately 2m in height) and will include rabbit proof construction.

Access

- The Site will be accessed via a single access point off Haldon Arm Road. Construction traffic will access the Site from the northeast via State Highway 8 and Haldon Road;
- Internal access tracks throughout the project area will be approximately 4 m wide with a compacted metal surface.

Earthworks

Earthworks will be required for:

- Localised cut and fill activity as required to optimise the solar PV arrays;
- Internal access tracks;
- Equipment laydown, carparking and office areas for use during construction;
- Installing the piles;
- Ground preparation for any concrete foundation pads required for substation and power stations;
- Trenching of cable network;
- Construction of fencing.

2.3 Construction, Operation and Decommissioning

Construction is expected to take between 14-18 months. During construction, facilities will be provided within the Site for construction staff by temporary portacom buildings (or similar). Once

construction is complete, these temporary facilities will be removed and no additional infrastructure will be required.

Once the Haldon Solar Project is operational, activity will be limited to on-site maintenance activities, typically during normal working hours. Activities include inspections, vegetation management, maintenance, repairs and drone inspections of equipment. This would typically be limited to a maximum of three or four personnel. Agricultural activity will cease on the Project Site.

It is proposed that detail of decommissioning, including site rehabilitation, be addressed via a decommissioning plan.

3.0 Relevant Planning Framework

The Project Site is located within the Mackenzie District and the Canterbury Region.

3.1 Resource Management Act

The assessment of landscape, natural character and visual effects primarily addresses the following relevant RMA matters:

- Section 6(a): Preserving the natural character of wetlands, streams, rivers and their margins.
- Section 6 (b) – the protection of outstanding natural features and landscapes from inappropriate subdivision, use and development.
- Section 7(c): Maintain and enhance amenity values.
- Section 7(f): Maintain and enhance the quality of the environment.

3.2 Canterbury Regional Policy Statement (RPS)

The Mackenzie Basin is identified as an Outstanding Natural Landscape in the Canterbury Regional Policy Statement (RPS). The landscape evaluation (Appendix 4) describes the Mackenzie Basin as having “Areas of exceptional legibility, aesthetic, transient, shared and recognised, very high natural science and high tāngata whenua and historic landscape values.”

Objective 12.2.1 is relevant to the Region’s outstanding natural features and landscapes. Under this objective, Policies 12.3.1, 12.3.2, and 12.3.4 require the identification, protection and management of outstanding natural features and landscapes.

Also of relevance are objectives and policies (Chapter 12) that require the natural character values of wetlands, lakes and rivers and their margins be preserved and protected from inappropriate subdivision, use and development and where appropriate, restored or enhanced.

3.3 Mackenzie District Plan (MDP)

Under the Mackenzie District Plan (**MDP**), the Haldon Solar Project Site is within or partly within:

- The Rural Zone,
- Te Manahuna/Mackenzie Basin Outstanding Natural Landscape (**ONL**) area,
- A Lakeside Protection Area,
- 'High' and 'Medium' Visual Vulnerability Areas
- A Site and Area of Significance to Māori

And adjacent to:

- Additional Sites and Areas of Significance to Māori
- Statutory Acknowledgement Area encompassing Te Ao Marama / Lake Benmore; and
- Sites of Natural Significance

The following objectives and policies relating to the General Rural Zone, Natural Character, and to Natural Features and Landscapes are taken from the EPlan[3] and provide guidance as to the outcomes expected regarding rural character and amenity, outstanding natural landscapes and the natural processes and elements which contribute to the district's overall character and amenity.

Objective GRUZ-O2 is relevant to managing potential adverse effects of activities and built form within the Project Site in a way that:

1. *Maintains a rural character consisting of a low overall building density with a predominance of open space and vegetation cover;*

2. *Supports, maintains, or enhances the function and form, character, and amenity values of the zone*

Objectives and Policies NATC-O1, O2, P1 and P2 are relevant to the natural character of the margins of Te Ao Marama / Lake Benmore and the rivers in the immediate setting of the Project Site, including the relationship of mana whenua.

Objectives NFL-O1 and NFL-O2 and Policies NFL-P1 and P2 are relevant to the outstanding natural landscape of Te Manahuna / the Mackenzie Basin ONL, including recognising and providing protection for identified values in Sites and Areas of Significance to Māori.

Policy NFL-P1 states:

Recognise the values of the identified ONF and ONL overlays on the Planning Maps and protect these values from adverse effects by:

1. *avoiding inappropriate subdivision, use and development in those parts of outstanding natural features and landscapes with limited capacity to absorb such change;*

2. *avoiding inappropriate use and development that detracts from extensive open views, or detracts from or damages the unique landforms and landscape features;*

3. *managing building density, scale and form to ensure it remains at a low level, maintains a predominance of vegetation cover and sense of low levels of human occupation;*

[3] Incorporated from Plan Change 23 which is under Stage 3 of the Mackenzie District Plan Review

4. *avoiding buildings and structures that break the skyline;*

5. *ensuring buildings and structures are designed to minimise glare and the need for earthworks, and are mitigated by plantings to reduce their visual impact where appropriate;*

6. *recognising and providing protection for identified values in Sites and Areas of Significance to Māori; and*

7. *recognising the existence of working pastoral farms and their contribution to the outstanding natural features and landscapes of the Te Manahuna/Mackenzie District.*

Policy NFL-P2 relates to the protection and enhancement of the outstanding natural landscape of Te Manahuna / the Mackenzie Basin ONL, 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, Te Manahuna/the Mackenzie Basin; and*

f. *undeveloped lakesides and State Highway 8 roadside*.

Policy NFL-P5 is relevant to the Lakeside Protection Area identified over part of the Project Site, in particular:

1. *To recognise the significance of the lakes of Te Manahuna/the Mackenzie Basin, their margins and settings to Kāi Tahu and to recognise the special importance of Te Manahuna/the Mackenzie Basin's lakes, their margins, and their settings in achieving NFL-O2.*

2. *Subject to 3, to avoid adverse impacts of buildings, structures and uses on the landscape values and character of Te Manahuna/the Mackenzie Basin lakes and their margins.*

Visual Vulnerability is a measure of the capacity of the landscape to absorb development. Under NFL-P2 (3), as part of an assessment of the suitability of an area for a change in use for development, there is a requirement:

a. *To identify whether the proposed site has high, medium or low ability to absorb development according to the visual vulnerability areas shown on the Planning Maps.*

The location of the Lakeside Protection Area and Areas of Visual Vulnerability are shown in the **Figure 2**, in the Graphic Supplement. Sites and Areas of Significance to Māori encompass SASM9: Tauwhrekura, SASM19: Te Ao Marama / Lake Benmore, SASM48: Te Pā-o-Kāti-Kurī / Mt Maggie and SASM68: Lake Benmore Hohoaka are illustrated in **Figure 3** of the Graphic Supplement.

3.4 Non- statutory Documents

The Waitaki Iwi Management Plan (2019) notes that the entire landscape of the Waitaki is of great significance. Many interconnecting issues and management responses associated with aspects of landscape are identified, including the following broad strategic objective:

> *'Wāhi tūpuna are protected and the relationship Manawhenua have with these landscapes is enhanced'*

More specifically, the site is in the vicinity of a contemporary nohoaka, a camping site at Haldon Arm allocated to support mahika kai activities:

> '*The Manawhenua vision for nohoaka is that they are highly desirable and easily accessible places for whanau to gather to experience the landscape as their tupuna did; and to rekindle the traditional practices of gathering food and other natural resources.'*[4]

4.0 Landscape Context

Current best practice landscape guidance in New Zealand[5] conceptualises landscape as having overlapping physical, associative, and perceptual dimensions. 'Physical' means both natural and human features, and the action (and interaction) of natural and human processes over time. 'Associative' refers to intangible attributes that influence how places are perceived—such as history, identity, customs, narratives, tāngata whenua associations, and activities specifically associated with the qualities of a landscape. 'Perceptual' means both direct sensory experience and broader interpretation through the senses.

This assessment has considered these dimensions while also recognising that it is the interaction of these dimensions that is key to a landscape's character and values.

Photographs **(Site Appraisal Photographs A-D** and **Site Context Photographs 1 - 16)** were taken from on and around the Site to illustrate the landscape character of the existing environment including visibility of the Project Site. The locations of these photographs are shown in **Figure 3** of the Graphic Supplement.

4.1 Broad Context - Mackenzie Basin ONL

For the purpose of this assessment, the Mackenzie Basin definition provided in the 2007 Mackenzie Basin Landscape Study is adopted:

'Mackenzie Basin' refers to the area of Mackenzie District west of the Two Thumb Range, Dalgety Range and Rollesby Range watersheds, and west of Burke, Mackenzie and Hakataramea Passes. This forms the bulk of the high country part of the District.[6]

[4] Waitaki Iwi Management Plan (2019), p120

[5] Te Tangi a Te Manu

[6] Graham Densem Landscape Architects Ltd, The Mackenzie Basin Landscape Study: Character and Capacities (November 2007), p7

The Mackenzie Basin was first identified as an Outstanding Natural Landscape (ONL) in the 1993 (Regional) Canterbury Landscape Study, and this status was confirmed by the Environment Court in 2011. The Canterbury Regional Landscape Study Review (Canterbury Landscape Study) updates the original 1993 study.

Today, the Basin is identified as an ONL at both regional and district scales. The Canterbury Landscape Study, the RPS and the MDP identify similar key characteristics and values such as the formative glacial landforms, vast, open and largely coherent landscape with enclosing mountain ranges, tussock grasslands and a lack of structures, undeveloped lakesides, the area's importance for tourism and recreation, numerous Department of Conservation managed reserves, the particularly clear views of the night sky, as well as tangata whenua and historic landscape values. An expanded description of these values is provided in the RPS[7] and MDP[8].

The Mackenzie Basin ONL is also acknowledged as a modified and managed landscape[9]. Land use has involved high country extensive leasehold grazing since the mid-1850s while hydroelectric land use has been a characteristic activity and modification in the Basin since the 1950s.

The main route and access through the Mackenzie Basin is via SH8. The canal and power station access roads are private but typically open to the public and popular routes with tourists and recreational visitors to the area.

As seen in **Figure 1** above, and in the Graphic Supplement, the Haldon Solar Project Site is located at the southern extent of the Mackenzie District and the southeast edge of the Mackenzie Basin ONL, boundaries comprising Te Ao Marama / Lake Benmore and the layers of hills and peaks that rise to the Kirkliston Range.

4.2 Sub Basin Context - Southern Mackenzie Character Areas

The extent of the Sub Basin landscape context of the Haldon Solar Project Site is represented within the area covered in **Figure 1** of the Graphic Supplement and comprises the Benmore Character Area and parts of the neighbouring South, Central and East Basin Character Areas identified in the Densem Landscape Study[10]. Densem's map showing these Character Areas is reproduced below.

[7] See the Canterbury Regional Policy Statement, Appendix 4, pp310-312

[8] See the Mackenzie District Plan, Policy NFL-P2

[9] Canterbury Landscape Study, p142

[10] Densem Study (2007), Map 4, p16

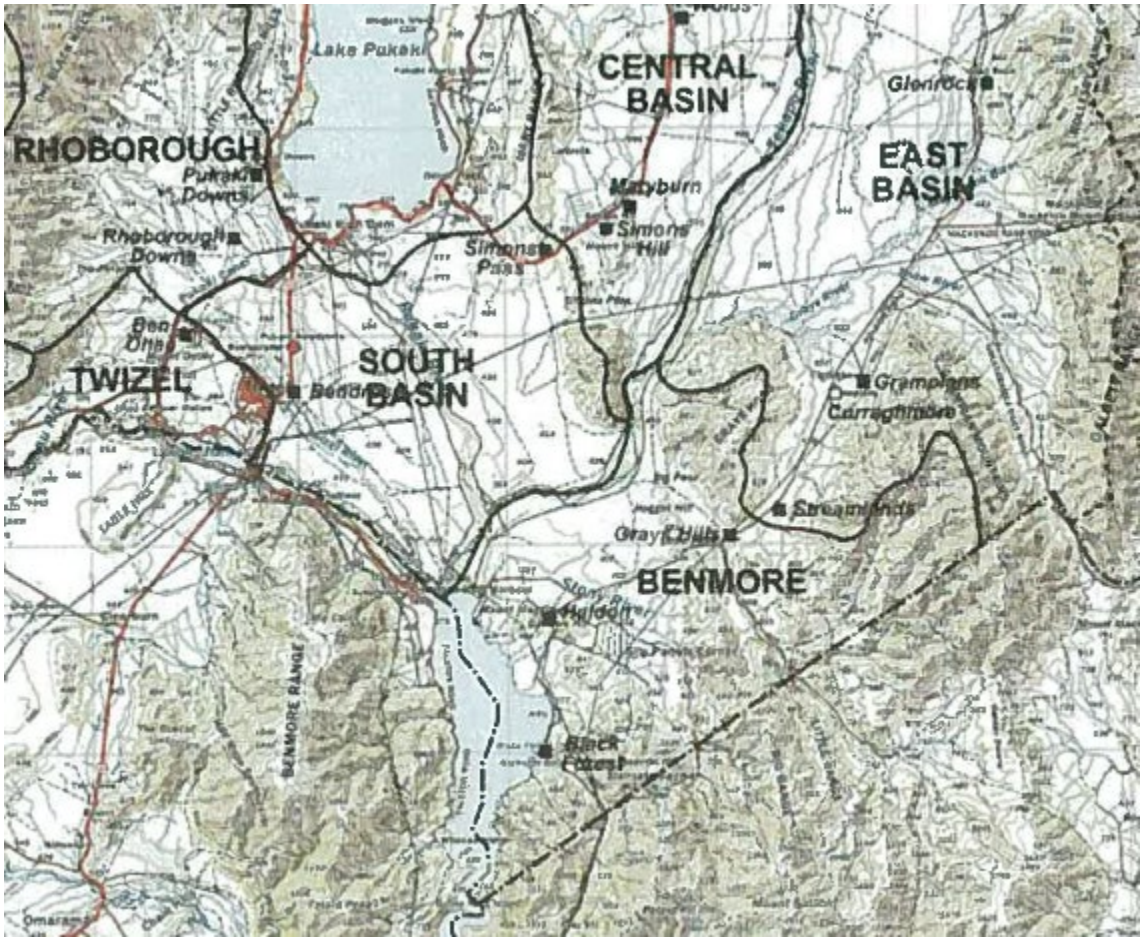


Image 4: *Landscape Character Areas in the Southern Mackenzie (source: Mackenzie Landscape Study, Graham Densem, 2007)*

The steep slopes of the Benmore Ranges (1894m) in the neighbouring Waitaki District contain the wider context of the Project Site to the west of Te Ao Marama / Lake Benmore. Lower hills and ranges in the vicinity of Beacon Hill (1196m) to Grays Hills (943m) contain this landscape to the south and east. The landscape to the north comprises outwash plains, river flats and terraces associated with the Tekapo, Pukaki, Twizel and Ōhau Rivers.

4.2.1 Physical Attributes and Values

The wider landscape encompasses the dryland outwash plains and terraces of the Basin floor with Te Ao Marama / Lake Benmore and the Tekapo, Ōhau, Twizel, and Pukaki Rivers comprising key landscape features.

The Mackenzie Basin supports distinctive plants and animals adapted to its stony, low-fertility soils and marked climatic extremes. The Haldon Solar Project Site lies within the Pukaki Ecological District, representative of basin-floor environments where semi-arid dryland vegetation occurs on fluvioglacial outwash under a climate of cold winters, warm summers, and very low annual rainfall (around 350 mm)[11].

[11] AgScience Ltd, Haldon Solar Project Ecological Impact Assessment (March 2025)

While these ecosystems have been modified, they continue to support a diverse range of indigenous species, including Threatened or At Risk plant species and provide habitats for native fauna species[12].

Within the Densem Study, the Benmore Character Area is described as the least typical of the Mackenzie: '*the driest and lowest part of the basin, 20-40km from the SH on a no-exit road*'.[13]

The Ōhau River, Tekapo/Pukaki Rivers and Te Ao Marama / Lake Benmore are identified as Sites of Natural Significance in the District Plan. Attributes noted against these locations in the District Plan Schedule (Appendix I) largely note the provision of important habitat for birds, insects and native and introduced fish species. The rivers are under active restoration as part of 'Project River Recovery'.

Exotic vegetation including willows, poplars and pines occupy the rivers and line the shore of Te Ao Marama / Lake Benmore including groupings associated with the campgrounds on both sides of the lake.

Twizel is the closest sizeable town to the Haldon Site, approximately 13 km to the northwest. Elsewhere, land use on these plains surrounding the Site is predominantly extensively grazed and also characterised by hydroelectricity both in the form of large scale, built structures and land modification. Within this landscape context, water is channelled through a canal from the Ōhau B power station to Ōhau C, both on the south bank of the Ōhau River, west of the Site. The Ōhau C power station, dam and penstocks is a noticeable feature approximately 3.5km to the west, the man-made Te Ao Marama / Lake Benmore is immediately adjacent and the National Grid transmission line crosses through the Site.

The Haldon Station homestead area with its associated cluster of buildings and well-established trees is approximately 1.3km directly east of the Site but physically and visually separated by the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie.

4.2.2 Associative Landscape Attributes

It is understood that three papatipu rūnanga are mana whenua of Te Manahuna / Mackenzie: Te Runanga o Arowhenua, Te Runanga o Waihao and Te Runanga o Moeraki and the entire basin is of value to tangata whenua.

The Haldon Solar Project Site is within SASM9: Tauwharekura and adjoins SASM19: Teo Ao Marama / Lake Benmore and SASM48: Te Pā-o-Kāti-Kurī / Mount Maggie which form Sites and Areas of Significance to Māori identified through Plan Change 24 to the Mackenzie District Plan in 2024.

SASM9: Tauwharekura covering the Haldon Solar Project Site is categorised as a kainga / Mahika Kai Area and holds Wai taoka[14], Wai tapu[15] and Wāhi taoka and Wāhi tūpuna [16] cultural values. SASM-SCHED 1 of the District Plan includes the following description with respect to this area:

[12] https://www.mackenzie.govt.nz/__data/assets/pdf_file/0013/514210/Appendix-W-Threatened-and-At-Risk-Plants.pdf

[13] Densem Study (2007), p24, paragraph 3.59

[14] Resources, places and sites treasured by Manawhenua. Wāhi taoka is the term used to refer to such places where they are land-based and wai taoka is used to refer to waterways (MDP)

[15] Places sacred to takata whenua (MDP)

[16] Broader geographical areas/ cultural landscapes that hold significant value to Kāi Tahu due to the concentration of wāhi tapu or taoka values, or the importance of the area to cultural traditions, history or identity (MDP)

> *Tauwharekura/Grays Hills is a short mountain range located near Takapō/Tekapo River in Te Manahuna/Mackenzie District where mahika kai were gathered. Rūnaka moved around Te Wai Pounamu hunting and gathering resources. The movements were according to the seasons following lifecycles of animals and plants. Te Manahuna/Mackenzie District was a significant place in the systematic seasonal food gathering pattern. The majority of foods that were traditionally harvested by hapū and whānau are no longer available for harvest. Although this may be the case now, it does not mean that these areas are no longer of cultural significance. The area of Tauwharekura was a traditional place where ancestors used to work and hold the memories, stories, and traditions of rūnaka tūpuna.*

SASM19: Te Ao Marama / Lake Benmore adjoining the Haldon Solar Project Site is also recorded as a Statutory Acknowledgement Area. Cultural values in this area encompass Wāhi tapu[17], Wāhi taoka, Wāhi tūpuna, Wai taoka and Wai tapu. This area includes the following description derived from the Ngai Tahu Claims Settlement Act 1998:

> *While the man-made Te Ao Mārama is obviously a comparatively recent creation on the landscape, it overlays the path of the Waitaki River, which is very significant to Kāi Tahu as the pathway of the waters from Aoraki to the sea. Kāi Tahu whānui always recognise and pay respects to Waitaki as a significant element of their being, and identity, a creation of the atua, further moulded by Tū Te Rakiwhānoa and his assistants, one of whom was Marokura who stocked the waterbodies. Many wāhi tapu and wāhi taoka were also drowned by Te Ao Mārama, including a number of rock art sites, while others still survive. Urupā associated with the nohoanga in the area also lie under the lake. These are the resting places of Kāi Tahu tūpuna and, as such, are the focus for whānau traditions. These are places holding the memories, traditions, victories and defeats of Kāi Tahu tūpuna, and are frequently protected by secret locations.*

SASM48: Te Pā-o-Kāti-Kurī /Mt Maggie also adjoins the Haldon Solar Project Site and holds Wai taoka and Wāhi taoka cultural values. SASM-SCHED 1 of the District Plan includes the following description with respect to this area:

> *Te Pā-o-Kāti-Kurī/Mount Maggie is situated by the north-eastern shore of Te Ao Mārama/Lake Benmore in Te Manahuna/Mackenzie District. Mauka play an important role in the spiritual and cultural beliefs of mana whenua. Mauka in the high country served as memory maps to the many Ngāi Tahu trails that spread across Te Wai Pounamu. Mauka are an important identity and are referred to during formal speeches on the marae. Te Pā-o-Kāti-Kurī is a kāinga mahika kai where weka, tuna, and kōareare were gathered during the seasonal and annual trips to Te Manahuna/Mackenzie District.*

As part of the wider Mackenzie Basin, this southern edge is also recognised as an iconic South Island high country landscape including Haldon Station's connection to New Zealand's farming history.

The Canterbury Landscape Study notes that Te Ao Marama / Lake Benmore, while a man-made feature, has high aesthetic, shared and recognised and tangata whenua values, '*which*

[17] Places sacred to takata whenua. Wāhi tapu is the term used to refer to such places where they are land-based and wai tapu is used to refer to waterways (MDP)

warrant its identification as outstanding'[18]. However, the study also notes that '*the shoreline within Mackenzie District is gentler and less dramatic than much of the rest of the lake'*[19].

There are several campgrounds around the northern arm of Te Ao Marama / Lake Benmore in the vicinity of the Haldon Solar Project Site (Lake Benmore – Ōhau C, Benmore Views, Falstone and Haldon Arm) with the lake and canals well-used for water-based activities.

Te Ao Marama / Lake Benmore is popular for a wide range of recreation activities - boating, fishing, kakaying, water-skiing, swimming – and camping. The nearby canal contains a salmon farm, café and 'catch-a-fish' experience.

4.2.3 Perceptual Landscape Attributes

Perceptual attributes represented in the wider landscape context of the Haldon Solar Project Site include those attributed to the whole Mackenzie Basin such as its openness and vastness of land and sky, the long open views to distant mountains and large scale of the landforms. The legibility of river terraces and glacial features such as roche moutonnée and outwash plains are also evident.

The arid character of this particularly dry southern edge of the Basin landscape is generally experienced through a tawny-brown colouring of the ground however there are seasonal changes in colouring and vegetation.

Te Ao Marama / Lake Benmore is a key feature in this context, New Zealand's largest artificial lake with a high level of scenic amenity due to the openness provided by the lake surface, the fringe of mature vegetation around the lake edge and enclosing mountain ranges. The northern end of the lake, in the vicinity of the Haldon Solar Project Site is also characterised by hydro electricity modifications including the canal, dam and power station, and by the National Grid transmission infrastructure that traverses the Solar Project Site and wider landscape.

Figure 2 of the Graphic Supplement identifies the areas of visual vulnerability - Low, Medium and High – mapped in the Operative District Plan. The landscape surrounding Haldon Solar Project Site is predominantly identified as having High Visual Vulnerability but also contains Low and Medium areas. This is described further in the following sections.

4.3 Site Description and Immediate Landscape Setting

Site Appraisal photographs were taken during the site visit and a selection (**A-D**) provided below and in the Graphic Supplement to assist in understanding the attributes and character of the Haldon Solar Project Site. A map showing the location of the photograph viewpoints is also provided in **Figure 3** of the Graphic Supplement and in Image 5 below.

[18] Canterbury Landscape Study, p142

[19] Ibid, p142

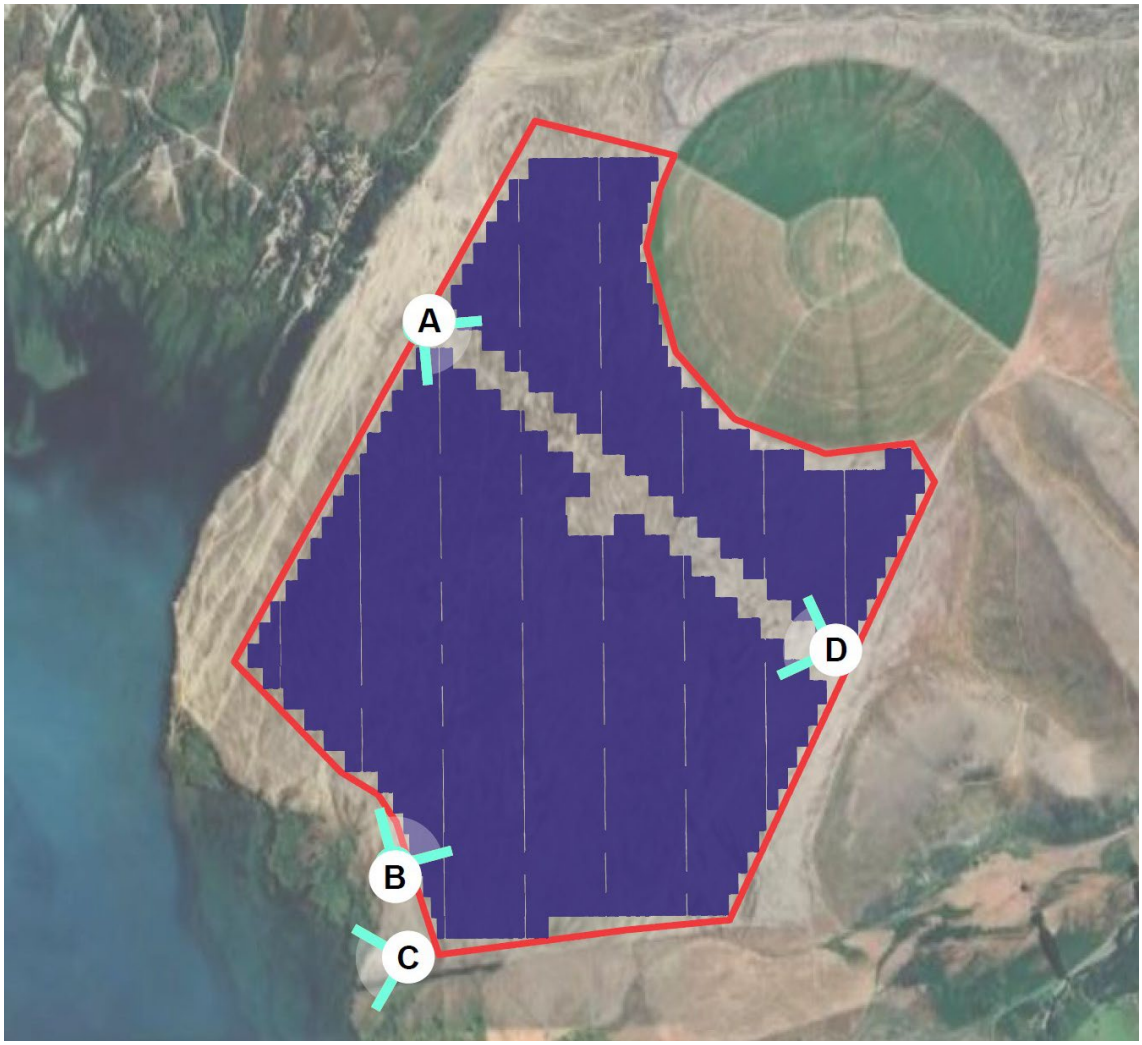


Image 5: *Site Appraisal photograph viewpoints*

4.3.1 Physical Attributes and Values

The Haldon Solar Project Site is contained to the east by Te Pā-o-Kāti-Kurī / Mt Maggie, to the west and south by Te Ao Marama / Lake Benmore and Stony Creek and to the north by Haldon Arm Road and the margins of Tekapo River.

The landform at the Haldon Solar Project Site and in the immediate landscape comprises a fluvioglacial outwash surface with terracing and former braided stream channels with very shallow (<20 cm) and stony silt loam to sandy loam soils.[20]

The topography (approximately 360-380 masl) slopes broadly downwards from Te Pā-o-Kāti-Kurī / Mt Maggie, southwest towards Te Ao Marama / Lake Benmore. Te Pā-o-Kāti-Kurī / Mt Maggie (524m) is an abruptly rising, rounded glacial landform immediately to the north of the Site. An elevation map is provided in **Figure 4** of the Graphic Supplement.

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

Site Appraisal Photograph A showing the topography of the Site with Te Pā-o-Kāti-Kurī / Mt Maggie in the distance

A comparatively steeper terrace/scarp of some 5-6m in height separates the Haldon Solar Project Site from the lake and river delta to the northwest. The change in elevation reduces to the south so that in the vicinity of the southwest corner where the site boundary is closest to the lake waters, the land slopes very gradually upwards away from the lake.

The patterns of drainage on the Haldon Solar Project Site are recognisable in an aerial view. On the ground, the landscape appears generally flat but slight changes in elevation due to low terraces can be discerned.

Site Appraisal Photograph B showing the low terraces and land cover across the Site

The vegetation on the Haldon Solar Project Site is introduced low-fertility grassland[21]. The Ecological Assessment identifies that the solar site is mostly bare ground and introduced plants. The dominant cover is mouse-ear hawkweed (*Hieracium pilosella*) and Chewing's fescue (*Festuca rubra*), with smaller amounts of other naturalised herbs. Moss (12.6%) and lichen (8.3%) are also common, while indigenous vascular plants make up only 0.1% of the cover. Shrubs are sparse, with sweet briar present at low density and matagouri only at trace levels. The Ecological Assessment also notes that no rare or acutely threatened indigenous plant species were observed, although four vascular native plant species and the lichen (*Xanthoparmelia semiviridis)* were recorded as 'At Risk – Declining'[22] which triggers RPS criteria for significant indigenous vegetation.

[21] AgScience Ltd (March 2025), page 3.

[22] Ibid, page 32

The introduction of exotic flora and fauna expresses a dryland exposed and tawny character which is widely recognised for its open expansive values. This semi-arid grassland is also characteristic of the immediate and wider landscape however, immediately north and northeast of the Project Site are circles of centre pivot irrigated pasture. Exotic trees are also a key characteristic of the immediate landscape setting, particularly in the form of the willows and occasional poplars and pines that line the rivers and the shore of Te Ao Marama / Lake Benmore including groupings associated with the campgrounds on both sides of the lake.

A tall, pine shelterbelt extends approximately 420m inland from the lake at the southwest corner of the Haldon Solar Project Site. A band of largely exotic riparian trees (willows and poplars) occupies the strip between the lake and Project Site, ranging from a single layer of trees to multiple dense layers, up to approximately 140m wide in places and visually separating the Haldon Solar Project Site from the lake.

Site Appraisal Photograph C showing the shelterbelt at the southwest corner of the Site with Te Ao Marama / Lake Benmore beyond

The Haldon Solar Project Ecological Impact Assessment ('Ecological Report') provides detail regarding vegetation and ecological values surveyed at the Haldon Solar Project Site.

The Ecology Report also observed a number of bird species of which one, the Black Fronted Tern, is classified as at risk Nationally Endangered. No native species were observed nesting, or with young, in the Haldon Solar Project Site. No herpetofauna, lizards, geckos or skinks were observed during the survey, or were captured in pitfall monitoring, or recorded on sand strips. Invertebrates were not formally assessed[23].

In regard to built modifications and land use, structures at the Site and in the immediate vicinity include fencing, gravel roads, water tanks, pivot irrigators and electricity transmission infrastructure. The Haldon Solar Project Site is fenced but it is understood that it is not currently stocked or actively farmed. Pivot irrigators are used by Haldon Station immediately to the north of the Project Site where the green pasture grass is evident. The BEN-ISL-A 220 kV transmission line and pylons, part of the National Grid, crosses the Site from the northwest to southeast.

The Haldon Station homestead area with its associated cluster of buildings and well-established trees is approximately 1.3km directly east of the Site although physically and visually separated by the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie.

[23] Ibid, page 4

Site Appraisal Photograph D showing the transmission line and pylons crossing the Site

The Haldon Arm campground sites and boat harbour are approximately 300m west of the nearest site boundary. It is also understood that informal camping occurs on the edge of the lake at the southwest corner of the Haldon Solar Project Site with landowner permission. As previously noted, access to the Site and to Haldon Arm campground and boat harbour is via Haldon Arm Road, a formed gravel road.

4.3.2 Associative Attributes and Values

At the local scale, the Site is included as part of Tauwharekura where ancestors used to work and hold the memories, stories, and traditions of rūnaka tūpuna.

More widely shared and recognised attributes and values with the Project Site are largely related to those in the immediate setting including the nearby shore of Te Ao Marama / Lake Benmore and Haldon Arm Campground which are valued for camping and access to recreational water activities including a boat launching facility.

The lake and the transmission line that crosses the Project Site also cue to the history of hydro-electric generation in the area, including the nearby canal and power stations.

The Haldon Solar Project Site is also in the vicinity of a contemporary nohoaka at Haldon Arm, SASM 68, a camping site allocated to support mahika kai activities, identified in the Waitaki Iwi Management Plan (2019)**:**

> ‘*The Manawhenua vision for nohoaka is that they are highly desirable and easily accessible places for whanau to gather to experience the landscape as their tupuna did; and to rekindle the traditional practices of gathering food and other natural resources.’*[24]

It is understood that initial engagement with Runanga has occurred on site with representatives from Lodestone Energy and Haldon Station and this engagement is ongoing.

Additional associative attributes and values at the Project Site pertain to the history of the development of Haldon Station and its connection to New Zealand’s iconic high country landscape and farming history.

[24] Waitaki Iwi Management Plan (2019), p120

4.3.3 Perceptual Attributes and Values

Under the District Plan, there is a Lakeside Protection Area (LPA) over a large part of the Project Site and areas of both Medium and High Visual Vulnerability**.** These categories are represented in the District planning maps as 'Areas of Visual Vulnerability' as shown in **Figure 2** of the Graphic Supplement.

In regards to the Lakeside Protection Area, it is understood that the purpose is to retain the 'natural' character of the lake margins.[25]

In regards to the areas of Medium and High Visual Vulnerability, the Densem Study notes that some 'limited development opportunities exist back from the shoreline' in this area[26].

The Project Site is remote with limited close viewing opportunities. However, the Site does form part of the midground, generally backdropped by Te Pā-o-Kāti-Kurī / Mt Maggie, in wider views from the more accessible, popular western side of Te Ao Marama / Lake Benmore. Due to the elevation of the Project Site and viewing opportunities in this western area, where visible, the Site typically appears compressed as a thin strip of land, contained by existing features in the landscape.

4.3.4 Site Characteristics

A high level analysis of the Haldon Solar Project Site's key characteristics was undertaken to assist with the project scoping and shaping stage. This is illustrated and summarised below.

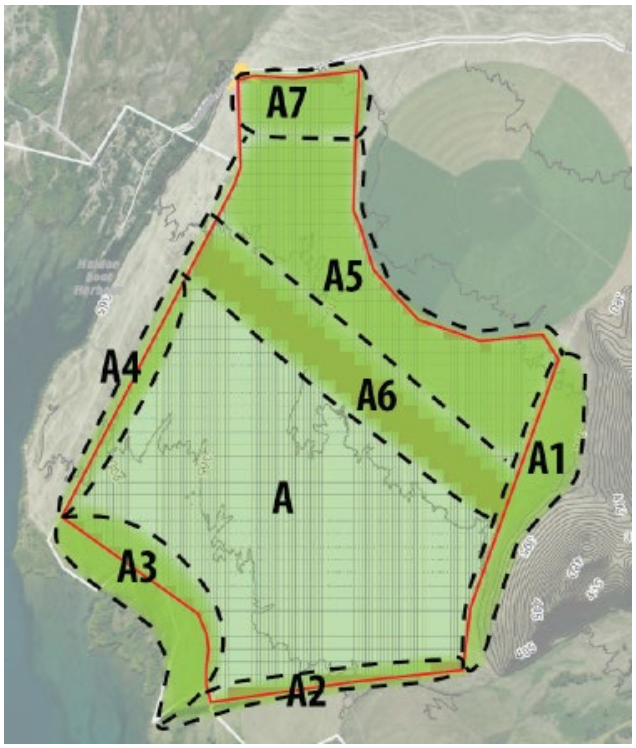


Image 6: *Site Characteristics (source: Boffa Miskell)*

[25] Maryburn Conservation Resources Report 27 June 2002

[26] Mackenzie Landscape Study, p39

A: Underlying shared site characteristics - open, relatively flat outwash plains and terraces rising gradually upwards from lake towards Te Pā-o-Kāti-Kurī / Mt Maggie. The Ecological Report finds that the principal vegetation is not indigenous and is highly modified. Set back from, but relatively open to views from nearest publicly accessible viewpoints.

A1: Toe of landform - change in slope that contributes to legibility / coherence of landform feature. Set back from nearest publicly accessible viewpoints, acts as backdrop in some key views, higher elevation increases potential visibility.

A2: Southern edge of open, outwash dryland plains. Shelterbelt provides partial screening of solar modules from some lake views. Largely set back from lake edge.

A3: Southwest edge of outwash plains and lake margins. Dominated by riparian willows and poplars. Proximity to lake increases sensitivity to natural character effects however vegetation provides considerable screening.

A4: Open, elevated northwest edge of outwash dryland plains. Steep change in elevation at lake edge lined with exotic riparian/terrace edge vegetation. Development set back and visually separated from Haldon Arm campground. Terrace landform and lake edge vegetation provides some screening, primarily from close lake views.

A5: Northeast edge of outwash plains located between pivot irrigated pasture and transmission corridor. Provides an existing modified landscape context in some views. Largely set back from nearest publicly accessible viewpoints. Dense riparian vegetation at river confluence provides some screening from Ōhau C viewpoints.

A6: Central area of outwash plains. Presence of pylons and transmission line prominent, providing an existing modified context in some views. Pylons are considerably taller structures but visually permeable.

A7: Northern edge of outwash dryland plains. Close proximity to Haldon Arm Road, adjacent pivot irrigated pasture, providing a modified context. Potential for close viewing opportunities from Haldon Arm Road.

4.4 Visual Catchment and Viewing Audience

During the site visit, a series of site context photographs were taken from outside the Haldon Solar Project Site including from representative viewpoints. A selection of these photographs **(Site Context Photographs 1-16**) and a viewpoint location plan is provided in the graphic supplement.

In many respects, the Haldon Solar Project Site is visually well contained due to Te Pā-o-Kāti-Kurī / Mt Maggie, the large scale of Haldon Station and its location on the edge of Te Ao Marama / Lake Benmore, towards the southern edge of the Mackenzie Basin.

The nearest private dwellings with potential visibility of the Site (outside Haldon Station) are on the west side of Te Ao Marama / Lake Benmore near the Benmore Views Campground, approximately 3.8km west across the lake (see representative **Site Context Photograph 12**) and at Black Forest, more than 5km to the south (see representative Site Context Photograph **14**).

The nearest publicly accessible views are from Haldon Arm Road, approximately 100m from the Site (see **Site Context Photographs 1 and 2**) and from Te Ao Marama / Lake Benmore and its landward margins (see **Site Appraisal Photographs A-C** and **Site Context Photographs 3-5)** which are immediately adjacent to the Haldon Solar Project Site. The viewing audience from these areas is likely to primarily represent campers, recreational visitors, particularly those involved in water sports and fishing, and occasional tourists, and 4WD enthusiasts.

Views from the waters of Te Ao Marama / Lake Benmore are from a slightly lower elevation (limiting close views) with considerable screening provided by established vegetation dominated by willows along the lake shore and the pine shelterbelt on the southeast corner.

From desktop analysis and on-site investigations, other potential representative publicly accessible viewpoints include:

- Limited viewpoints within the Pukaki, Ōhau and Tekapo Rivers including the associated 4WD tracks, primarily at the delta/confluence with Te Ao Marama / Lake Benmore (approximately 600m to the closest point). See representative **Site Context Photograph 3**.

  Potential views from these areas will largely be screened due to the change in elevation and by intervening trees. The potential viewing audience is likely to be extremely limited due to the roughly formed nature of the 4WD tracks and river crossings required. The character of the environment and views is of a wild, dynamic and relatively remote area however this is tempered by an awareness of the hydroelectricity infrastructure in the vicinity and the presence of weedy exotic vegetation in the riverbed and margins.

- Falston Road and the campgrounds at Te Ao Marama / Lake Benmore – Ōhau C (2.3km), Benmore Views (3km), and Falstone (4km). See representative **Site Context Photographs 7-12**.

  Views across the lake to the Haldon Solar Project Site are available from locations in the vicinity of these viewpoints. The trees along the eastern lake shore will partially screen lower portions of the Site. The viewing audience will typically experience a high degree of amenity from these locations with a lake setting and open views to the surrounding mountains.

- McAughtries Road, parts of the adjacent canal and dam above Ōhau C (3.7km). See representative **Site Context Photograph 8**.

  It is understood that McAughtries Road is a private road but is publicly accessible. Open views to the Haldon Solar Project Site will be available from locations in the vicinity of these elevated viewpoints. The character of the environment is modified and strongly influenced by the context of the hydroelectricity infrastructure. Nevertheless, the viewing audience will experience the vast openness of the basin and amenity of the lake.

- State Highway 8 to the northwest in the vicinity of Lake Ruataniwha and Pukaki Airport (13km). See representative **Site Context Photograph 14-16**.

  Potential views from the vicinity of State Highway 8 are very distant. The potential viewing audience is large and the road is an important scenic route, providing views of the vast, open, basin. Viewers will typically be travelling at speeds up to 100km per hour.

- A section of the Alps to Ocean Trail between Pukaki and Twizel (13km). See representative **Site Context Photograph 16**.

  Potential views to the Project Site from this cycle trail are very distant with the high amenity of the landscape and views experienced similar to those from State Highway 8 however the viewing audience will be travelling more slowly. Slower speeds can provide opportunities to observe more detail in the surroundings however cycling on trails also requires a level of concentration on the immediate environment.

- Haldon Road in the vicinity of Black Forest (4.5km). See representative **Site Context Photograph 13**.

  Potential views may become available for a short section where the road becomes more elevated, just north of Black Forest. Some screening will be provided by intervening trees. The public road ends at Black Forest and the potential viewing audience is relatively small.

- The Benmore Range (Elevated points along the Benmore Range Easement Track – 6.8km).

  The Benmore Range Easement Track provides access up and along the Benmore Range ridgeline. While the track has not been visited, it is considered likely to provide open views across Te Ao Marama / Lake Benmore to the Haldon Solar Project Site from some locations. The potential viewing audience is considered likely to be extremely small. The viewing audience will experience expansive views over much of the Basin

5.0 Assessment of Effects

Landscape and visual impacts occur as a result of natural or induced change in the components, character or quality of the landscape. Usually these are in the form of landform or vegetation modification or the introduction of new structures, facilities or activities. These impacts are assessed to determine their effects on character, quality and amenity including public and private views.

In this study, the assessment of potential effects is based on a combination of the landscape's sensitivity and visibility together with the nature and scale of the development proposal.

Particular effects considered relate to the following:

- Physical effects on the landscape and effects on landscape character.
- Visual effects from public and private locations.
- Natural character effects.
- Potential cumulative effects.

The main elements of the Haldon Solar Project that have potential to give rise to landscape and visual effects are:

- New access tracks.
- Earthworks and movement of vehicles and machinery during the construction process.

- The overall scale of built form.
- The linear patterning of the solar arrays.
- Fencing.
- Visibility of tall elements such as the substation and power stations.
- Glint and glare.

5.1 Landscape Effects

Assessing landscape effects of the Haldon Solar Project considers the extent and significance of change to the existing landscape characteristics and values that make up the Project Site, including its relationship to the landscape values and characteristics of the wider landscape context.

As noted in the landscape planning guidance document, Te Tangi a Te Manu, change in a landscape and 'visibility' of a proposal does not of itself, constitute an adverse landscape or visual effect.[27]

Landscape context

The Haldon Solar Project is proposed within an Outstanding Natural Landscape, a broad overlay encompassing the vast majority of the Mackenzie Basin. The Project Site is in a relatively remote location, towards the southeast extent of the ONL and Mackenzie District.

Elements of many of the key values of this broader outstanding landscape are also represented at the Site and immediate landscape such as the openness of the outwash plains, the legible glacial landform of Te Pā-o-Kāti-Kurī / Mt Maggie adjacent to the Site, importance to tangata whenua, the large scale of the landforms and ongoing recreation values associated with Te Ao Marama / Lake Benmore.

These values also occur in a landscape that is currently utilised for and modified by electricity generation and transmission activities. While the RPS schedule of outstanding values notes that 'the basin as a whole retains its openness and largely coherent character despite substantial modification by residential, hydro and agricultural development'[28], the Solar Project will occur within a Sub-Basin landscape context that has experienced substantial modification by hydro development, including the formation of Te Ao Marama / Lake Benmore.

The Project Site is also in the vicinity of the Haldon Station farm base and adjacent to pivot irrigated land as well as existing, well established exotic vegetation.

Landscape Change

The appearance of the Haldon Solar Project Site will change as a result of the development as it progresses through the removal of some areas of vegetation and earthworks to the construction of the solar arrays and other structures and finally, use of the Site as it becomes operational.

There will be a moderate level of physical change on landform and landcover within the Haldon Solar Project footprint. While the existing landcover is highly modified semi-arid exotic

[27] Te Tangi a Te Manu, p241

[28] Canterbury Regional Policy Statement, Appendix 4 Landscape Schedule, p311

grassland, At Risk-Declining plant species have been identified which trigger the RPS criteria for significant vegetation.

The construction process avoids widespread smoothing of the terrain on the Site however vegetation will be disturbed with approximately 13 ha of clearance for cable trenching, and construction of the substation and access roads.

The Solar Project will change the land use of the Site, primarily comprising a considerable increase in built form of electricity generating infrastructure; an activity that is characteristic of the Sub Basin – Southern Mackenzie context as well as a part of the wider Mackenzie landscape. The proposed scale and density of built form has the potential to appear as a high level of contrast with the broad basin-wide values of openness and lack of structures, including, more specifically, an increase in development to the lakeside.

However, the maximum ground coverage at the Project Site will be 40% (when modules are horizontal) and will be less when inter array areas are included and the Te Ao Marama / Lake Benmore lakeside is not currently without modification, particularly in the vicinity of the Project Site. While the MD Planning Maps identify areas within the Project Site with both medium and low ability to absorb development, overall, it is considered that the Project Site is well contained by existing elements, largely internalising changes.

Access to the campground and Te Ao Marama / Lake Benmore and the ability to undertake recreational activities on the lake or access for mahika kai activities will not change.

Effects on landscape character and values

The change to the Haldon Solar Project Site is primarily a change in the scale and coverage of built form in a predominantly open landscape.

The level of activity will be most noticeable during the construction phase due to the level of activity and large machinery likely to be required at the Site. Changes will be temporary with the overall project to be developed over approximately 18 months.

On completion, the scale of the Solar Project will fit relatively well within the Benmore Landscape Character Area, contained by the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie, the adjacent rivers and Te Ao Marama / Lake Benmore.

Keeping the modules (panels) off the toe of the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie was a key recommendation in the site analysis and project shaping stage to ensure the layout appears well integrated. This recommendation was adopted and the visual coherence of the glacial slopes and the relationship between the plains and its surrounding hills will remain clearly legible.

The proximity of the modules to existing, well established exotic vegetation, avoiding the lower (toe) slopes of Te Pā-o-Kāti-Kurī / Mt Maggie, a legible glacial landform feature will assist with integrating the mass of the modules into the landscape setting.

At Risk-Declining (and significant) plant species contribute to the biological diversity of the basin floor and its natural landscape character across the whole Te Manahuna / Mackenzie Basin ONL[29]. While vegetation will be impacted through construction of the Solar Project, it is understood that indigenous species and habitat present will be maintained on the solar site due

[29] NFL-SCHED2 Ecological Components of the Natural Landscape Character, MDP[30] AgScience Ltd, Haldon Solar Project Ecological Impact Assessment (March 2025), page 45.

to the areas between solar arrays and possible enhancements due to rabbit control within the Solar Project Site[30].

Rabbit proof fencing is part of this proposal. Ongoing maintenance and management controls within the proposed fencing are also recommended (refer to **section 6.0**).

The proposal will generate **low-moderate** and minor adverse effects on the landscape at the Project Site and immediate setting, reducing to **low** and less than minor effects within the Sub-Basin context. Most effects are reversible in the longer term in the event the Solar Project is decommissioned and removed. Effects of the Solar Project on landscape values will be **neutral** when considered within the Broad Basin ONL scale. Overall, the Haldon Solar Project is in a part of Te Manahuna / Mackenzie Basin ONL that has some capacity to absorb this type of change and adverse effects that are at the low end of the assessment scale. The proposal is therefore considered not inappropriate in terms of protecting the values of the ONL.

5.2 Visual Effects

To assess the overall nature and level of visual effects, the potential visual sensitivity of identified viewing audiences was considered together with the overall magnitude of change resulting from the proposed development.

When assessing visual effects, it is important to highlight that views of a development do not necessarily equate to adverse visual effects. Visual impact is not always negative and a change in view is not automatically unacceptable.

In regard to this Project, it is also important to note that the appearance of the solar farm development will change throughout the day as the modules tilt to follow the sun. The focus of the visual assessment is on the modules at their maximum tilt and therefore greatest height above ground.

5.2.1 Effects from public vantage points

The Project Site is relatively remote and visually well-contained, particularly from the east. There is just one public road nearby (Haldon Arm Road) which provides access to Haldon Arm Campground. Beyond the campground, Haldon Arm Road connects with a network of other unsealed tracks largely limited to 4WD enthusiasts.

Close, publicly accessible, open views to the Haldon Solar Project will be available from this road as it passes near the Project Site. As part of the project shaping process, the closest modules have been deliberately set back from Haldon Arm Road and the Project Site Boundary.

Close, open views will also be available from sections of the northeast shoreline adjacent to the Site but not via a formed road. Some close views will be available from Te Ao Marama / Lake Benmore however the lake edge embankment and riparian vegetation provide considerable screening.

Longer distance views from public vantage points are also available from Te Ao Marama / Lake Benmore, as viewers move around the lake. The other key publicly accessible, albeit distant views, occur from the western side of the lake including McAughtries Road (particularly from the vicinity of the dam above Ōhau C) as well as Falston Road and the three campgrounds. There

[30] AgScience Ltd, Haldon Solar Project Ecological Impact Assessment (March 2025), page 45.

is potential for views towards the Haldon Solar Project from short sections of SH8, however distances are more than 13km and the terrain mostly obscures sightlines.

Views from Haldon Arm Road

The eastern end of Haldon Arm Road is arrived at via Haldon Road, 40km from SH8 at Dog Kennel corner. Potential views to the Project will be largely screened by Te Pā-o-Kāti-Kurī / Mt Maggie as visitors approach from the east.

Once on Haldon Arm Road, visibility of northern parts of the Solar Project will become increasingly available from distances of approximately 3.5km (refer to **Site Context Photograph 1**, approximately 1.9km from the Site) and typically viewed obliquely to the left. The topography slopes down from the northeast towards Te Ao Marama / Lake Benmore (see **Figure 5** in the Graphic Supplement) compressing visibility of the Project Site in these views.

Approaching the Project Site, there will be opportunities for close views however these will be limited to distances up to approximately 300m from the nearest modules (panels) (see **Site Context Photograph 2** and **Visual Simulation 1**). Setting the modules back within the Site from Haldon Arm Road was a key recommendation in the project shaping stage to reduce visual effects for viewing audiences using this road.

Once the viewer descends below the terrace embankment to Haldon Arm campground, the Solar Project will no longer be visible. When leaving the campground to travel east, these views of the Project Site will become increasingly oblique and then behind the viewer, as the viewer moves away.

A summary of available views obtained from Haldon Arm Road is set out in further detail below.

Haldon Arm Road (East): Site Context Photograph 1, approximately 1.9km from the Site

From here, the foreground of views from the eastern end of Haldon Arm Road predominantly comprises open, modified pasture with Te Pā-o-Kāti-Kurī / Mt Maggie the main feature to the left in the middle distance. The exotic, predominantly willow, riparian vegetation forms a dark band with the steep slopes of the Benmore Range rising immediately behind.

Transmission towers traverse the lower slopes of the Benmore Range and cross the Site and are noticeable but can be difficult to discern at these distances. The penstocks and associated dam landforms and infrastructure can be seen in the distance to the right of the Site. Pivot irrigators and fencing are located in the middle distance, forward of the Site. The Solar Project will occur in the context of these existing structures.

The proposed development will not compromise lake views from this vicinity as there is very limited visibility of Te Ao Marama / Lake Benmore from Haldon Arm Road, being largely screened by the existing intervening outwash plain and riparian vegetation along its margins. Where there are views such as in small gaps in the vegetation, the visible ‘slivers’ of lake will remain difficult to distinguish.

From this viewpoint, the solar arrays will appear as a narrow (vertically) dark band along the base of the Benmore Range, backdropped by existing riparian vegetation along the basin floor this broader mountain range beyond. The southern/eastern extents of the proposed development will be partially obscured by the toe of Te Pā-o-Kāti-Kurī / Mt Maggie. This screening will reduce as the viewer travels west. It is considered that the layers of solar modules

will be perceptible but not obvious and will largely visually recede into the vegetation and hill backdrop.

The height of substation equipment (4m-24m) and the transmission tower (34m) will be visible above the solar arrays. These components are located internally, set back within the Project Site and will be seen in the context of the existing transmission corridor. They will not be readily discernible from this distant viewpoint due to visually permeable construction, particularly of the taller infrastructure, and the recessive backdrop.

The visual coherence of the landscape will remain in these views, as will the legibility of its formative, glacial processes.

Any potential adverse visual effects of the Haldon Solar Project from views in the vicinity of **Site Context Photograph 1** on Haldon Arm Road are considered to be **low**, primarily due to the limited visibility of the Solar Project as a result of the compressed vertical scale of the rows of solar modules, the recessive backdrop and transitory nature of the viewing audience.

Haldon Arm Road (West): Visual Simulation 1 and 1a - approximately 215m from the Site, 300m from the nearest modules

From here, the foreground of views are open and comprise largely bare, stony ground. Exotic, riparian vegetation and a pine shelterbelt form a band across the middle of the view, with the slopes of distant mountains rising above. A small, fenced compound comprising small scale utility elements such as water tanks and a shipping container, is a visible feature to the west of the Project Site with the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie to the east. Transmission lines and towers cross the middle of the Project Site, noticeable but not prominent, and add to the general sense of a loose modified horizontal band which extends across the centre of the view, in a landscape that otherwise remains highly legible.

Where visible along this section of Haldon Arm Road, the rows of solar modules will form an apparent increase in the density of structures integrated within mid ground views. The perception of density will be greatest when the modules are at maximum tilt (see **Visual Simulation 1**). The height of the modules will reduce as they flatten and appear more recessive (see **Visual Simulation 1a**). Associated infrastructure (e.g. the power stations and inverters) will be screened by the solar arrays.

The closest solar modules have been deliberately set back from the road and the Project Site boundary so that the perception of density and enclosure is effectively reduced and compacted. The modules will appear visible beyond this buffer but not prominent. From this distance, the top of the band of exotic vegetation will also continue to be seen above the modules and associated infrastructure in places, helping to create a visually recessive backdrop that softens the sharpness and linearity of the development. The extent of this vegetation will vary as the modules rotate with the sun and are shown as a worse case view in Visual Simulation 1 with modules tilted the maximum extent, and at their most recessive in Visual Simulation 1a in which the modules are shown flat.

The Haldon Solar Project will considerably intensify but largely fit within the existing modified interface that crosses the middle of the view without disrupting the legibility of the underlying basin landform or expansiveness of the wider landscape.

The substation and associated new transmission tower are set back some 900m from this Haldon Arm Road viewpoint and will be unobtrusive, visually absorbed by the background vegetation and ranges and seen in the context of the existing National Grid transmission line and adjacent towers. Slight changes to the position of the proposed substation and associated

transmission tower may be confirmed by detailed design, however, they will remain associated with the existing transmission corridor.

The level of visual effects will be reduced through the transitory and temporary nature of the viewing audience and the nature in which the Haldon Solar Project will appear set back and relatively contained. Views from within the adjacent official campground will be screened (which is discussed further below).

Based on the open transient views which occur, the potential for adverse visual effects of the Haldon Solar Project in the vicinity of Visual Simulation 1 on Haldon Arm Road are considered to be **low-moderate** as the new development will be noticeable but not prominent and will be seen as a compact band within a much larger landscape, typically viewed by a transitory audience.

Haldon Arm Campground: Site Context Photographs 3 and 4, approximately 330m from the Site

The Haldon Arm Campground and boat launch facilities are located several metres below the Haldon Solar Project Site, just above lake level, and set amongst established, exotic trees. Therefore, the Solar Project will be screened from views in the vicinity of the campground due primarily to the height of the steep lake edge scarp and the setback of the modules by more than 200m from the top of the scarp. The established vegetation further restricts views to the east.

No visual effects are anticipated from within the Haldon Arm Campground and boat launch facility.

Views from beyond Haldon Arm Campground - Pukaki, Ōhau and Tekapo Rivers

Visibility of the Haldon Solar Project will be very limited from the network of tracks beyond Haldon Arm Campground that provide access to and across the nearby rivers (including the continuation of Haldon Arm Road). Access along most of these tracks, particularly those that cross the rivers, is challenging and typically only suitable for 4WD users.

Viewing opportunities towards the Project Site from the west are very limited due to intervening tall vegetation in the river beds and lake margin as well as topography. Intermittent views to northernmost parts of the Project are likely to be possible from the north, for example from sections of Haldon Arm Road alongside the Pukaki and Tekapo Rivers where there is less tall vegetation. However, the elevation of the braided river plains is typically lower than the Site and intervening scarps will provide some screening. Where views are available from the vicinity of these rivers, they will typically be at distances of some 1.5km-2km and greater, with visibility limited to a narrow band, backdropped by the riparian vegetation and mountain slopes beyond.

Where viewing opportunities are available, adverse visual effects of the Solar Project from views in the vicinity of Pukaki, Ōhau and Tekapo Rivers are considered to range from very low to low primarily due to the limited visibility of the development at these distances, the recessive backdrop and typical transitory nature of the viewing audience.

Views from Te Ao Marama / Lake Benmore margins

The shoreline adjacent to the Site: Site Context Photograph 5, approximately 235m from the Site

From here, close views to the Haldon Solar Project will be possible from parts of the margins of Te Ao Marama / Lake Benmore adjacent to the Site.

While there are no formed roads, the strip of land between the northwest boundary of the Project Site and Te Ao Marama / Lake Benmore provides a public easement. Along the southern/southwest edge of the Site, much of Haldon Station extends to the lake edge and therefore access to the isolated areas of easement along this part of the shoreline requires crossing Haldon Station land.[31]

It is understood that members of the public use informal camping spots on the lake shore near the southeast corner of the Project Site (see representative **Site Context Photograph 5**) with permission from the owners of Haldon Station.

From this area of the lake margin, close views adjacent to the Haldon Solar Project will be available within which the fencing, modules and associated development may appear prominent and result in a reasonably higher magnitude of change. Notwithstanding this, proposed views will remain incidental to the lakeside activity in which observers would remain engaged, and be seen in the context of existing modifications including the existing National Grid transmission towers on the Site. While visibility of the Haldon Solar Project Site will increase the scale and intensity of structures which modify the current open character of this area of landscape, the nature of this change is primarily limited to localised adjoining areas.

The sensitivity of the camping viewing audience to change is considered to be raised by comparison to those travelling on Haldon Arm Road as their viewing experience will be from a stationary viewpoint and generally more emersed within the openness and expansive of the broader landscape. However, it is considered that their sensitivity to this proposal is also substantially restricted by the requirement to request permission to access the informal camping areas, from Haldon Station and typically to camp along the shores of Te Ao Marama / Lake Benmore in order to access the lake for recreation.

Where viewers are within Haldon Station boundaries, an assessment of effects is not applicable. Where viewers are outside the Haldon Station boundaries, i.e. primarily along the northwest boundary of the Site, the setback of the Solar Project from the lake edge means that those accessing this area have the option of staying up to some 200m away or more from the Project, where the prominence of the structures will be considerably less.

Therefore, based on the limited and largely restricted viewing areas currently available, potential for adverse visual effects on viewers from the landward margins of Te Ao Marama / Lake Benmore, adjacent to the Site are assessed as **low-moderate**.

Waters of Te Ao Marama / Lake Benmore: Site Context Photos 4, 6, 7, 13, 14, between approximately 330m and 5km from the Site

The surface of Te Ao Marama / Lake Benmore expands below the Project Site with a steep scarp and tall, riparian vegetation along much of the lake edge.

The Haldon Solar Project is typically set back some 200m or more from the lake edge with visibility most typically screened by the steep lake scarp in close views.

[31] https://data.linz.govt.nz/data/

View northeast towards Site from Te Ao Marama / Lake Benmore, close to Haldon Arm Campground, showing lake edge scarp

Where the scarp is less pronounced or views are more distant, the intervening riparian vegetation will provide considerable screening. **Site Context Photos 6** and **7** represent slightly more distant views to the southwest of the Site (approximately 500m away), illustrating the screening effects of the vegetation along the lake edge. Visibility from close locations to the south of the Project Site will be screened by the pine shelterbelt at the southeast corner.

Glimpses to the proposed development will be possible through the limited gaps in the vegetation, primarily in winter when the trees are more permeable and as the viewing location becomes increasingly distant (discussed further below).

View towards the southeast corner of the Site from Te Ao Marama / Lake Benmore where there are small gaps in the riparian vegetation

Recreational viewing audiences can have a higher sensitivity to change depending on the context, for example, where there are expectations around remote, undeveloped, scenic landscapes with high levels of naturalness for the setting of the recreational activity.

Te Ao Marama / Lake Benmore is 13-14km from SH8 and the nearest settlement with the closest boat launching facilities accessible via a largely sealed road alongside a hydro-electricity canal, dam and associated infrastructure.

Visibility of the Site and Project will change as viewers travel around the lake however the combination of lake edge topography and particularly the riparian vegetation and pine shelterbelt, will continue to provide considerable screening at long distances. See **Site Context Photos 13 and 14** in the graphic supplement.

For recreational activities such as motor-boating, jet-skiing and water-skiing on Te Ao Marama / Lake Benmore, views to the Site and Solar Project will be transitory and experienced at speed. Any views will also be seen in the context of other large-scale infrastructure at the northern end of the lake, and while scenic, the lake is man-made.

Overall, adverse visual effects of the Haldon Solar Project on views from Te Ao Marama / Lake Benmore are assessed as ranging from **very low** to **low** as viewers move around the lake with adverse effects due largely to the limited visibility of the Site and the modified recreational context.

Views from the western edge of Te Ao Marama / Lake Benmore:

McAughtries Road and the dam above Ōhau C: Site Context Photo 8, approximately 3.6km from the Site

McAughtries Road provides sealed access from SH8 near Twizel (some 13km from the Site) to the dam and power station at Ōhau C above Te Ao Marama / Lake Benmore (approximately 3.6km from the Site).

The road follows alongside the hydro-electricity canal for the Ōhau C Power Station, descending towards Te Ao Marama / Lake Benmore from approximately 460masl to 400masl, remaining elevated above the Site.

When travelling southeast towards the Power Station and the Project Site, views to the Haldon Solar Project Site are initially screened. From beyond Ōhau B Power Station, long distance views will be intermittently available, appearing as though just above the far canal embankment. At these distances and angle of view, Te Pā-o-Kāti-Kurī / Mt Maggie is a discernible landform however any glimpses of the Haldon Solar Project will be hard to perceive and a very small part of a much larger view.

Views from the lookout area above the dam are representative of the closest available open views from McAughtries Road (**Site Context Photograph 8**), approximately 3.6km away. From this location, the orientation of the canal and dam infrastructure is directed towards Te Pā-o-Kāti-Kurī / Mt Maggie and the Haldon Solar Project Site with the higher ranges beyond forming the skyline. The lake and canal waters are a key feature of the foreground and midground.

Where visible, the outwash plains of the Haldon Solar Project Site appear as a narrow strip of land between the lake and the base of Te Pā-o-Kāti-Kurī / Mt Maggie. The existing National Grid transmission towers that cross the Site are visible but difficult to discern from this distance.

In addition to the fringe of riparian vegetation between the Project Site and the lake, large areas of vegetation are visible within the river beds including in Ōhau River in the foreground. Dam and power station infrastructure is also visible in the foreground and adjacent to the viewpoint.

The Haldon Solar Project will appear as a thick dark band extending between the pine shelterbelt to the right and the edge of Te Pā-o-Kāti-Kurī / Mt Maggie to the left. The band tucks into the narrow strip of land at the foot of Te Pā-o-Kāti-Kurī / Mt Maggie, fitting with the transition in gradient.

Keeping the modules off the toe of the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie was a key recommendation in the site analysis and project shaping stage of the Project to ensure visual coherence of the glacial slopes and the relationship with the plains will remain clearly legible.

The taller substation components and transmission infrastructure will encroach above this line however the disruption will be small in scale, in the context of and in keeping with the existing National Grid transmission towers on the Site, and not obvious. The backdrop of the hill slopes and vegetation will assist with visually integrating the band of modules and associated infrastructure.

The fringe of lake edge vegetation immediately forward of the Project Site will not screen the Haldon Solar Project from these elevated views, however, it will be seen in the context of the contrasting colours and textures of the existing vegetation which will assist to visually anchor and contain the development.

The Haldon Solar Project, including the substation and associated transmission infrastructure, will be noticeable due to the elevation of the viewpoint but not obtrusive due to the distances of more than 3km. While there will be a noticeable increase in built form within the Project Site, at these distances and angle of view, the scale of the overall footprint will comprise a small part of the landscape and key values of the Mackenzie Basin such as openness will remain legible.

The Solar Project will also be seen in the context of considerable modification including large scale infrastructure and landform change in the vicinity of the viewpoint.

Overall, adverse visual effects on views from McAughtries Road are assessed as **low** due to the scale and visually contained appearance at these distances, seen in the context of a modified foreground landscape.

Falston Road and the campgrounds along the western edge of Te Ao Marama / Lake Benmore: between approximately 2km to 10km from the Site

Falston Road is a no-through gravel road providing public access along the western edge of Te Ao Marama / Lake Benmore as far as Shepherds Creek, including to three privately run campgrounds: Lake Benmore – Ōhau C, Benmore Views, and Falstone. There are other locations along this lake edge that are utilised informally for camping. Travellers must drive alongside the canal and pass the dam and power station infrastructure in order to reach Falston Road and the campgrounds.

The road becomes increasingly windy travelling south beyond the first campground and is typically elevated several metres above the lake surface.

Views will be available towards the Haldon Solar Project from much of the public road.

Views from Falston Road above Lake Benmore – Ōhau C Campground (2.3km): Visual Simulation 3

The initial straight stretch of road (approximately 1.5km) is orientated southeast so that the Haldon Solar Project Site will appear slightly oblique and to the left when travelling south from the dam.

Open views towards the Haldon Solar Project Site will be available from this part of the road above the Lake Benmore – Ōhau C Campground, approximately 2.3km away. From this location, the campground, canal and lake and associated exotic trees are a key feature of the foreground and midground. Dam and power station infrastructure are close to the viewpoint.

In existing views from this elevated Falston Road viewpoint, the outwash plains of the Haldon Solar Project Site appear partially visible as a narrow strip of land contained by the lake and fringe of riparian vegetation and the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie. The existing National Grid transmission towers that cross the Site are visible but unobtrusive from this distance.

The Haldon Solar Project will be no more than partially visible within the Haldon Solar Project Site. The fringe of lake edge vegetation will screen the northern and southern extents of the Project however a central band of development will be visible above the vegetation. The Project will appear contained by the line of vegetation and tucked against the break in slope between the Haldon Solar Project Site and the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie. The taller substation components and associated transmission infrastructure will encroach above this line however the disruption will be small in scale, and typically not apparent, seen adjacent to the existing towers on the Site and backdropped by the hill slopes. Visual coherence of the glacial slopes and the relationship with the plains will remain clearly legible.

From this northern end of the road, views will be seen in the context of or having passed by considerable large-scale infrastructure.

As travellers move along Falston Road and elevations, orientation, vegetation and sightlines change, visibility of the Solar Project will change. Moving south, where parts of the development are visible, views will typically be increasingly oblique and distant, directed away from the Haldon Solar Project Site. When travelling northwards, views will be orientated more towards the Site.

Overall, adverse visual effects on views from Falston Road are assessed as **very low** to **low** depending on the viewpoint.

Views from near the shoreline at Lake Benmore – Ōhau C Campground (2km): Visual Simulation 2

Lake Benmore – Ōhau C Campground is the closest of the three campgrounds, just over 2km to the Project Site. The viewpoint at the end of the groyne was selected as it comprises a large open gravelled area with the most open views available towards the Project Site. The campsites are largely set below the outer groyne edge, amongst exotic trees. The boat launch area is tucked into an inlet on the inside of the groyne.

Views towards the Project Site from the campsites and boat launch are limited by the step up to the higher part of the groyne and by the campsite vegetation. Views to the Site from the open end of the groyne are largely screened by the fringe of lake edge vegetation just forward of the Site.

The Haldon Solar Project will be partially visible but not obvious from this low viewpoint. The fringe of lake edge vegetation will screen the northern and southern extents of the Project. A central line of development will be visible but well broken up by the vegetation making it hard to

perceive in places. The Project will appear contained by this line of vegetation and tucked against the break in slope between the Project Site and the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie which remains legible. The taller substation components and transmission infrastructure will be evident and may draw the eye to the wider Project. However, at this distance they will be seen adjacent to the existing National Grid transmission towers on the Site and backdropped by the hill slopes which provide some visual absorption.

Views will be experienced in the context of being on a modified landform, adjacent to considerable large-scale dam and power infrastructure.

Adverse visual effects on western shoreline views such as those from the Lake Benmore – Ōhau C Campground are assessed as **low**.

Views from near Benmore Views Campground (3.2km): Visual Simulation 4

Benmore Views Campground is approximately 4km further south of Lake Benmore – Ōhau C Campground along Falston Road and approximately 3.2km from the Project Site. The Campground comprises multiple paddocks offering a range of campsite locations. The Main Camp and Lake-Front Camping areas provide a well-treed setting which will limit visibility beyond the camping ground. The Airstrip Paddock and Honeypot Paddock comprise more open, elevated slopes orientated towards the lake.

Where open views are available from the vicinity of the Benmore View Campground such as from Falston Road as represented in Visualisation Simulation 4, the Haldon Solar Project will be almost entirely screened from view by the intervening fringe of lake edge vegetation just forward of the Project Site.

Where more elevated views are available such as from the open elevated slopes of the Airstrip Paddock, visibility of the Solar Project will increase. However, at these distances, the portion of the development that is visible will be barely distinguishable from the intervening screening vegetation and slopes that will backdrop it.

Adverse visual effects on views from the vicinity of Benmore Views Campground are assessed as **very low**.

Views from near Falstone Campground (4km): Site Context Photograph 13, approximately 4.2km from the Site

Falstone Campground is the most southern of the three campgrounds along the western shore of Te Ao Marama / Lake Benmore. Campsites are largely tucked in amongst established trees which are predominantly tall conifers. Boat access is located within a narrow inlet where views to the Project Site are largely screened by the northern headland.

Overall, visibility of the Haldon Solar Project will be very limited from Falstone Campground, largely screened by vegetation both at the viewpoint and in the vicinity of the Project Site including by the pine shelterbelt at the southwest corner. Where views are available, the Solar Project will be difficult to distinguish from the intervening screening vegetation and slopes that will backdrop it.

Overall, adverse visual effects on views from the vicinity of Falstone Campground are assessed as **very low**.

Haldon Road in the vicinity of Black Forest:

Site Context Photograph 14, approximately 5km from the Site.

There are potential viewing opportunities to the Haldon Solar Project from the section of Haldon Road between the Haldon Station farm base and Black Forest. The public road ends at Black Forest and the potential viewing audience along this road is considered likely to be small.

Much of this section of Haldon Road is at a similar elevation to the Project Site and substantial screening of views is provided by Te Pā-o-Kāti-Kurī / Mt Maggie and by intervening established vegetation along the margins of Stony River and the edge of Te Ao Marama / Lake Benmore. The pine shelterbelt on the southeast corner of the Site also provides screening. Improved pasture and pivot irrigators will typically be visible in the foreground of views towards the Project Site.

Should partial views of the Solar Project be available they are likely to be glimpses which, at these distances of between 2km-4.5km will not be obtrusive and not readily distinguishable from the intervening vegetation.

Adverse visual effects on views from Haldon Road in the vicinity of Black Forest are assessed as **very low** due to the limited visibility from this area and transient viewing audience.

Views from elevated points along the Benmore Range Easement Track (6.8km)

The track along the Benmore Range ridgeline (up to approximately 1,756 masl) has not been visited at the time of writing this assessment and information appears limited. There will be opportunities for expansive views over the Mackenzie Basin, including the Haldon Solar Project Site from the track. The potential viewing audience is considered likely to be very small.

Despite the viewing distances, a greater extent of the Solar Project will be visible compared with most other publicly accessible viewpoints, due to the considerably elevated, oblique viewing angle. The dark modules will appear as a broadly diamond-shaped dark mass, contained by the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie to the east and separated from the surface of Te Ao Marama / Lake Benmore by the vegetation along the lake edge and up the river margins. A circular pattern of pivot-irrigated ground will be legible bordering the Site to the north. The open corridor along the existing National Grid transmission line route will be discernible from some angles as a gap between the blocks of modules. The development setbacks mean there will be a legible separation between the Solar Project and the lake.

The extent and density of structures will reduce the Project Site's open character, however due to the containment of the Site by existing elements and patterns in the landscape, effects of this change are localised and largely internal to the Site. From these distances, the Solar Project will appear as a small part of a vast landscape with a panoramic outlook beyond the Project and over much of the wider Basin available. Existing patterns of modification will also comprise part of these broad views from roads and pivot irrigators to the canal and dam modifications proximate to the Solar Project.

Adverse visual effects of the Haldon Solar Project from elevated views along the Benmore Range Easement Track are considered to be **low**.

Potential views from SH8 and Alps to Ocean Trail

There are viewing opportunities from short sections of SH8 and the Alps to Ocean Trail towards the vicinity of the Haldon Solar Project Site. These locations are at distances of 13km and more and at elevations of approximately 460 masl, which is slightly higher than the Site in the context of the broader intervening open expanse of the Mackenzie Basin.

Travellers on SH8 and the Alps to Ocean Trail typically experience a high degree of amenity. In places, such as in the vicinity of Twizel, large scale hydro-electricity infrastructure is also

characteristic of the landscape (see **Site Context Photographs 14-16).** These images also show that while Te Pā-o-Kāti-Kurī / Mt Maggie can be identified from these viewpoints due to its scale and distinctive form, the Haldon Solar Project Site cannot be readily distinguished due to the distance and topography. The 80-100 metre elevation difference occurs over 13 kilometres and incorporates low undulations so that in reality, the terrain mostly obscures sightlines and generally appears part of the expansive basin floor.

Based on the extremely limited available views over substantial viewing distances, the Haldon Solar Project is not considered to result in any adverse effects on these views or visual amenity from these areas.

5.2.2 Effects from private vantage points

The Haldon Solar Project Site is isolated from residential areas. The nearest private dwellings with potential visibility of the Project Site (outside Haldon Station) are located on Totara Peak Station on the west side of Te Ao Marama / Lake Benmore near the Benmore Views Campground (approximately 3.8km west across the lake), and at Black Forest (5km to the south).

Totara Peak

Representative view from Falston Road: Visual Simulation 4

An accommodation unit is set amongst trees on the edge of Camp Creek approximately 80m inland from Falston Road and slightly elevated (approximately 380 masl). The same driveway provides access the farm dwellings and associated farm sheds and yards further on, some 600m from Falston Road, at a higher elevation (approximately 400 masl) and also in a treed setting.

Similar views are represented in Visual Simulation 4, a nearby publicly accessible view from Falston Road. This viewpoint is closer to the Haldon Solar Project Site than the private dwellings however it is also at a lower elevation whereby the fringe of lake-edge vegetation on the northeast shore substantially screens views to the Project Site.

It is considered that the trees in the vicinity of the elevated Totara Peak properties will limit visibility to the Haldon Solar Project Site however visibility will change as viewers move around and some open, elevated views may be available.

Where visible over distances of between 3.5 km-4 km, the Haldon Solar Project will be perceptible but indistinct. Where visible, it will be perceived as a dark band contained by existing lines of riverbed and lake edge vegetation, the slopes of Te Pā-o-Kāti-Kurī / Mt Maggie to the right and more distant plains and slopes to the northeast. The taller substation components and transmission infrastructure may also be distinguishable but will not be obtrusive, visually absorbed by the hill slopes, similar to the existing National Grid transmission towers. Visual coherence and the sense of scale and vastness of this landscape will remain clearly apparent.

Adverse visual effects on views from these Totara Peak properties are assessed as **low** and less than minor.

Black Forest

Representative view from Te Ao Marama / Lake Benmore: Site Context Photograph 13, approximately 5km from the Site.

There are potential viewing opportunities to the Haldon Solar Project from the dwellings located at Black Forest. A southern group of dwellings, yards and farm-related structures associated with Black Forest Station are located south of Black Forest Stream and set largely amongst established trees. A second group of dwellings are located north of the Stream, in a more open setting around the perimeter of the grassy Black Forest Station airstrip.

Much of this section of Haldon Road is at a similar elevation to the Project Site. Substantial screening of views is provided by intervening established vegetation along the margins of Stony River and the edge of Te Ao Marama / Lake Benmore and by the pine shelterbelt on the southeast corner of the Site. The trees in the vicinity of the southern group of dwellings will also limit viewing opportunities. Improved pasture and pivot irrigators will be visible in the foreground of views towards the Project Site.

Should partial views of the Solar Project be available they are likely to be glimpses which, at these distances of approximately 5km and more will not be obtrusive and likely to be difficult to distinguish from the intervening vegetation.

Adverse visual effects on views from private dwellings in the vicinity of Black Forest are assessed as **very low** due to the distance and limited visibility from this area.

5.2.3 Glint and Glare

A Glint and Glare analysis of the Haldon Solar Project has been undertaken. The method and findings are attached as **Appendix 2** to this LEA.

A total of 13 Observer Points (OPs) were identified to represent the range of available potential views. No more than 'low potential' for glare (green glare) has been identified which means a low potential to cause an after-image. Short windows of 'green glare' are recorded from 8 of the 15 OPs which will occur for no greater than a few minutes first thing in the morning or towards the end of the day and for a maximum of 3.7 hours per year.

A brief summary from each of the 8 Ops where potentiial glare has been identified is provided below.

Views for travellers from OP 2 – Haldon Arm Road will be oblique with potential for a few minutes of glare occurring towards the end of the day on a few months of the year, totalling 219 minutes over the year.

Viewers at OP 4 – Ōhau C lookout (and representative of travellers on McAughtries Road) will be aligned directly with the area of glare at times. There is potential for a few minutes of glare occurring at around 5am from the end of November into December and totalling 120 minutes over the year. The level of glare is green (low potential to cause an after image), from a small proportion of the solar modules and at distances of more than 3.5km.

Views from OP 5 – Ōhau C campground will be oblique with potential for a few minutes of glare occurring in the early hours of the morning between 5am and 6am on a few months of the year, totalling 220 minutes over the year.

Views for travellers in the vicinity of OP 6 – Falston Road north will be oblique with potential for a few minutes of glare occurring in the early hours of the morning from October and into November, totalling 149 minutes over the year.

Views from OP 7 – Lake Benmore will vary as boat users move around the lake. From this representative viewpoint, there will be potential for a few minutes of glare occurring in the morning around June/July and October/November, totalling 106 minutes over the year.

Views for travellers in the vicinity of OP 8 – Falston Road central will be oblique with potential for up to a few minutes of glare in the mornings for periods between May and July, totalling 54 minutes over the year.

Existing trees in the vicinity of the elevated Totara Peak properties will limit visibility to the Haldon Solar Project Site, together with the lakeside vegetation adjacent to the Site however visibility will change as viewers move around. Where views are available or should intervening vegetation be removed, views for residents at OP 11 – Private dwelling at Totara Peak will be oblique with potential for less than 10 minutes of glare during some mornings in July, totalling 57 minutes over the year.

Views towards the Haldon Project Site for travellers on sections of SH8 such as OP 13, will be geometrically possible. There is potential from this viewpoint for oblique views with up to a few minutes of glare occurring at around 5am from the end of November into December, totalling 188 minutes over the year. However, it is noted that views are at a distance of 13km and the modelling tool does not take into account any intervening or surrounding landform or vegetation which in reality, mostly obscures sightlines.

Overall, where potential glare is recorded, views are identified as having potential for less than 10 minutes per day and less than 10 hours per year of green glare. Overall, these results are consistent with a negligible effect which will have no material impact on the identified nature or level of visual effects and no mitigation is considered necessary.

5.2.4 Summary of Visual Effects

The Haldon Solar Project Site is in a relatively remote location distant from main settlements, SH8 and private neighbouring viewpoints. The public access road adjacent to the Site is a minor, gravel, no exit road, except via rough tracks. The potential viewing audience is limited.

Views to the Haldon Solar Project Site are contained by existing landscape elements and patterns of modification which assist with screening, providing a visually absorbent context and limiting the nature and level of effects on visual amenity.

The nearest private dwellings with potential visibility of the Haldon Solar Project Site (outside Haldon Station) are on Camp Creek on the west side of Te Ao Marama / Lake Benmore near the Benmore Views Campground, (approximately 3.8km west across the lake) and at Black Forest (more than 5km to the south). The level of potential adverse visual effects from these locations is reduced through distance and the level of existing intervening vegetation.

The nearest publicly accessible views are from Haldon Arm Road (approximately 200m from the Project Site) and from Te Ao Marama / Lake Benmore and its landward margins which are immediately adjacent to the Site. The level of adverse visual effects will be reduced through the transitory and temporary nature of the viewing audience and the setback of the modules from the road (approximately 300m).

Key findings regarding potential visual effects of the Haldon Solar Project are summarised in the table below:

Table 1: Visual assessment summary

Viewing Area	Nature of view/Approx Distance (to Project Site)	Rep. Visual Sim or Photo	Nature of Effect	Level of Adverse Effect (max):
Haldon Road East	1.9km	SC 1	Adverse	Very low to Low
Haldon Road West	200m	SC 2, VS 1	Adverse	Low-Moderate
Haldon Arm Campground	330m	n/a	Neutral	
Rivers			Adverse	Very Low to Low
Te Ao Marama / Lake Benmore shoreline adjacent Site	Adjacent	SC 5	Adverse	Low-Moderate
Te Ao Marama / Lake Benmore		SC 4,6,7,13,14	Adverse	Very low to Low
McAughtries Road	3.6km	SC 8	Adverse	Low
Falston Road	2km	SC 9,10, VS 3	Adverse	Very Low to Low
Lake Benmore Ōhau C Campground	2km	SC 11, VS 2	Adverse	Low
Benmore View Campground	3.2km	SC 12, VS 4	Adverse	Very Low
Falstone Campground	4km	SC 13	Adverse	Very Low
Haldon Road (Black Forest)	5km	SC 14	Adverse	Very Low
Benmore Easement Track	6.8km	None	Adverse	Low
SH8 and Alps to Ocean trail	13km	SC15 &16	Neutral	
Totara Peak	4km	VS 4	Adverse	Low (less than minor)
Black Forest	5km	SC 14	Adverse	Very Low

5.3 Natural Character Effects

Natural character is the term used to describe the degree of naturalness in an area, and encompasses the natural elements, patterns, processes including experiential characteristics and qualities within a coastal or freshwater environment, including lakes, rivers and wetlands, and their margins. As noted in Section 3.1, s.6(a) of the RMA considers the preservation of natural character as a matter of national importance along with the protection of natural character areas from inappropriate subdivision, use, and development. Natural character is comprised of a number of key attributes which include:

- Abiotic systems - physical processes, geomorphology, topography, landform, and water quantity/quality;
- Biotic systems - species, communities, habitats, and ecological processes;
- Experiential attributes - the ways in which people, including tangata whenua, experience the natural elements, patterns and processes.

The degree of natural character present in an area is commonly described on a continuum from areas of very high natural character occurring where there is a lack of human induced modification, to other areas where there may be low natural character remaining due to extensive human modification.

Clearance of vegetation and establishment of structures such as the proposed solar modules and existing hydro electricity infrastructure at the Site and in the adjacent riparian margins, can adversely change and alter the natural character of an area. The significance of this effect is dictated by the size, location and sensitivity of the receiving environment and the nature and magnitude of change proposed.

Natural character forms part of this assessment because of the proximity of the Haldon Solar Project Site to the margins of Te Ao Marama / Lake Benmore and confluence of the Ōhau and Tekapo/Pukaki Rivers. The Haldon Solar Project Site is set back from the lake and rivers, typically by 200m-300m.

The existing level of natural character within the Sub Basin - Southern Mackenzie landscape context has been modified by land management, through grazing, irrigation and hydro-electric land use having altered abiotic and biotic systems and the experiential aspects of natural character at the Site and in the immediate landscape setting.

The vegetation along Te Ao Marama / Lake Benmore, a man-made lake, and along the lake and river margins, predominantly comprises exotic grassland, willows, poplars and pines. The Ecology Report notes that while fescue tussock grassland was once the principal post-Polynesian / early European grassland community on the Haldon outwash flats, including the solar site, it has now been almost completely transformed into introduced vegetation[32].

The Ecology Report has also identified low densities of At Risk species within the Site which are considered significant under the RPS criteria and contribute to natural character. ‘At risk and threatened flora’ is identified in NFL-SCHED 2 of the District Plan among a list of ecological features which contribute to natural landscape character across the whole Te Manahuna / Mackenzie Basin ONL.

The existing National Grid transmission towers at the Site are large in scale however the density of built form is low and a sense of openness remains a key characteristic that contributes to natural character at this location. Similarly, a larger pivot irrigator is located within an adjoining area of outwash plain next to the Haldon Solar Project Site and which exhibits a largely open, albeit modified and distinctly more verdant agricultural character.

On balance, it is considered that that there are **low-moderate** levels of natural character currently present at the Project Site.

The adjacent lake and rivers contain valued natural character attributes, particularly when considered at the wider context, including supporting important wildlife habitat and for high experiential values such as scenic qualities and recreational water use. The Ōhau River, Tekapo/Pukaki Rivers and Te Ao Marama / Lake Benmore are identified as Sites of Natural Significance in the District Plan and the rivers are under active restoration as part of Project River Recovery.

During construction, effects on natural character at the Site are assessed as **low-moderate**, reducing to **very low** to **low** in the wider context due to potential for largely temporary, localised levels of activity in proximity to but set back from riparian margins. No margins will be disturbed and due to the proposed setback buffers and fencing, any disturbance will be minimised.

[32] AgScience Ltd, Haldon Solar Project Ecological Impact Assessment (March 2025), p37

While subtle, formative drainage patterning within the Site remains, the construction process largely avoids smoothing of these subtle landforms. Approximately 13 ha of vegetation clearance is likely to occur as part of the Haldon Solar Project development. The Ecology Report finds that as the vegetation is so highly modified, the Haldon Solar Project will have minimal effect on indigenous species, particularly given the invasion of other weed species already present.[33] It is understood that the rabbit proof fence and clear areas within the Site (primarily the 16 ha central corridor under the existing transmission line (**Area 6** in the Site Characteristic Areas) provide potential for an increase in indigenous biodiversity in the solar site.[34]

In experiential terms, aspects of the existing openness within the Project Site will also be modified with an increase in built form within the identified Lakeside Protection Area. These effects will largely be internalised to the Site and not on the nearby riparian margins or the more open and more expansive character of the Sub Basin - Southern Mackenzie landscape.

During the construction process, experiential attributes associated with the natural character of the Haldon Solar Project Site will reduce due to the presence of vehicles and machinery. Following completion, experiential aspects of natural character will remain localised to the more immediate context within which the increased presence of built form adjacent to a riparian landscape is apparent. From the lake, the steep terrace form of the riparian margin will largely obscure close views to the Haldon Solar Project. Where some partial views may be available, they will typically be experienced in the modified natural character context of the existing National Grid transmission infrastructure on the Site and in the surrounds, including the large-scale change that has created the adjacent lake.

Overall, effects on natural character values will be **low-moderate**, largely due to a reduction in experiential aspects, reducing levels of natural character to low at the Project Site and in the immediate landscape.

Rabbit proof fencing is part of this proposal. Ongoing maintenance and management controls within the fencing are also recommended to provide an opportunity for positive effects on biotic aspects of natural character at the Project Site.

6.0 Recommendations

The Haldon Solar Project Site is in a relatively remote location with a limited viewing audience and contained by existing landscape features which partially screen the Site, assist with visual integration and dilute potential landscape and visual effects beyond the immediate setting.

During the Site characterisation and analysis process, it was determined that perimeter screen planting in this landscape, which is predominantly characterised by and valued for its dryland outwash plains and terraces, would create a new vegetation pattern and not form an appropriate or necessary landscape response.

Opportunities to shape the design of the Solar Project have been recommended and adopted, including:

[33] Ibid, p33

[34] P. Espie, pers comm by email (09/04/2025) and AgScience Ltd, Haldon Solar Project Ecological Impact Assessment (March 2025), page 45

- Minimising earthworks to reduce ‘smoothing’ of landforms on the Site
- Avoiding development on the toe of Te Pā-o-Kāti-Kurī / Mt Maggie
- A development setback from the lake edge and Haldon Arm Road

A further recommendation is made to ensure the fencing and power stations within the Project Site are a recessive colour in a shade of tawny brown, green or grey with an RV less than 36%.

Very low populations of At Risk-Declining native plant species have been identified at the Project Site which have adapted to the open, low fertility, rocky and exposed semi-arid grassland basin encountered within the Site.

It is understood that the rabbit proof fence and clear, open areas proposed within the Site (particularly the 16 ha central corridor under the existing transmission line (**Area 6** in the Site Characteristic Areas) provide a potential opportunity for indigenous biodiversity in the Project Site. Therefore, the ongoing maintenance of the rabbit proof fencing and control of rabbits within, is recommended as part of an ongoing programme of monitoring and management at the Site, to improve biotic aspects of natural character.

7.0 Conclusions

Lodestone Energy Limited proposes to develop a solar farm within part of a 320 ha site on Haldon Station on fluvioglacial outwash plains between Te Ao Marama / Lake Benmore and Te Pā-o-Kāti-Kurī / Mt Maggie in the Mackenzie District.

The Haldon Solar Project will occur within the Benmore Character Area, in a Sub-Basin context at the edge of the Mackenzie District, and towards the southeast extent of the Mackenzie Basin Te Manahuna ONL overlay.

The District Plan also identifies the Site as partially within a Lakeside Protection Area (LPA) and containing areas of both High and Medium Visual Vulnerability. The Site is also within an Area of Significance to Māori. The Project Site is adjacent to a lake popular for recreational activities and identified as Site of Natural Significance. Within this context, the Haldon Solar Project Site is dominated by highly modified vegetation with some At Risk-Declining plant species also present. These species also trigger the criteria for significance under the RPS.

The character of the Project Site will change the land use and primarily comprises an increase in built form. The relatively secluded, contained location dilutes potential landscape effects beyond the Site and immediate setting. The type of activity proposed shares characteristics with established electricity generation and transmission infrastructure in the wider Sub Basin landscape context.

The proposal will generate no more than **low-moderate** and minor adverse effects on the landscape at the Project Site and immediate setting, reducing to **low** and less than minor effects within the Sub-Basin. Effects of the Solar Project on landscape values will be **neutral** when considered within the Broad Basin ONL scale. Overall, the Haldon Solar Project is in a part of Te Manahuna / Mackenzie Basin ONL that has some capacity to absorb this type of change and adverse effects that are at the low end of the assessment scale and no more than minor. The proposal is therefore considered not inappropriate in terms of protecting the values of the ONL.

In visual terms, the Haldon Solar Project Site is well contained due to Te Pā-o-Kāti-Kurī / Mt Maggie, the large scale of Haldon Station and its relatively remote location. The highest level of potential adverse visual effects occur from Haldon Arm Road and from the parts of Te Ao Marama / Lake Benmore and its landward margins that are immediately adjacent to the Site. Potential adverse visual effects from these locations are assessed as **low-moderate** and no more than minor. Visual effects from all other publicly accessible viewing areas are assessed as ranging from very low to low.

The nearest private dwellings with potential visibility of the Haldon Solar Project Site (outside Haldon Station) are between approximately 3.8km and 5km away. Potential adverse effects will be **very low** to **low** and less than minor.

The existing level of natural character within the Project Site and immediate landscape setting is modified but largely void of overt built development. The Solar Project is well set back from both the lake and river margins, with minimum buffers of 200m from the southern and western extents of Te Ao Marama / Lake Benmore and 300m from Haldon Arm Road.

Low densities of At Risk-Declining plant species have been identified within the Site.

Overall, adverse effects on natural character values present at the Project Site and in the immediate landscape will be **low-moderate**, for which ongoing maintenance and rabbit management controls at the Site are recommended to promote a positive trajectory for biotic aspects of natural character in the context of existing landcover modification.

Appendix 1:

Method Statement

22 November 2023

This assessment method statement is consistent with the methodology (high-level system of concepts, principles, and approaches) of 'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines', Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022. The assessment provides separate chapters to discuss landscape, visual and natural character effects where relevant, but is referred to throughout as a Landscape Effects Assessment in accordance with these Guidelines. Specifically, the assessment of effects has examined the following:

- *The existing landscape;*
- *The nature of effect;*
- *The level of effect; and*
- *The significance of effect.*

The Existing Landscape

The first step of assessment entails examining the existing landscape in which potential effects may occur. This aspect of the assessment describes and interprets the specific landscape character and values which may be impacted by the proposal alongside its natural character where relevant as set out further below. The existing landscape is assessed at a scale(s) commensurate with the potential nature of effects. It includes an understanding of the visual catchment and viewing audience relating to the proposal including key representative public views. This aspect of the assessment entails both desk-top review (including drawing upon area-based landscape assessments where available) and field work/site surveys to examine and describe the specific factors and interplay of relevant attributes or dimensions, as follows:

Physical – relevant natural and human features and processes;

Perceptual – direct human sensory experience and its broader interpretation; and

Associative – intangible meanings and associations that influence how places are perceived.

Engagement with tāngata whenua

As part of the analysis of the existing landscape, the assessment should seek to identify relevant mana whenua (where possible) and describe the nature and extent of engagement, together with any relevant sources informing an understanding of the existing landscape from a Te Ao Māori perspective.

Statutory and Non-Statutory Provisions

The relevant provisions facilitating change also influence the consequent nature and level of effects. Relevant provisions encompass objectives and policies drawn from a broader analysis of the statutory context and which may anticipate change and certain outcomes for identified landscape values.

The Nature of Effect

The nature of effect assesses the outcome of the proposal within the landscape. The nature of effect is considered in terms of whether effects are positive (beneficial) or negative (adverse) in the context within which they occur. Neutral effects may also occur where landscape or visual change is benign.

It should be emphasised that a change in a landscape (or view of a landscape) does not, of itself, necessarily constitute an adverse landscape effect. Landscapes are dynamic and are constantly changing in both subtle and more dramatic transformational ways; these changes are both natural and human induced. What is important when assessing and managing landscape change is that adverse effects are avoided or sufficiently mitigated to ameliorate adverse effects. The aim is to maintain or enhance the environment through appropriate design outcomes, recognising that both the nature and level of effects may change over time.

The Level of Effect

Where the nature of effect is assessed as **'adverse'**, the assessment quantifies the level (degree or magnitude) of adverse effect. The level of effect has not been quantified where the nature of effect is neutral or beneficial. Assessing the level of effect entails professional judgement based on expertise and experience provided with explanations and reasons. The identified level of adverse natural character, landscape and visual effects adopts a universal seven-point scale from **very low** to **very high** consistent with Te Tangi a te Manu Guidelines and reproduced below.

Landscape Effects

A landscape effect relates to the change on a landscape's character and its inherent values and in the context of what change can be anticipated in that landscape in relation to relevant zoning and policy. The level of effect is influenced by the size or spatial scale, geographical extent, duration and reversibility of landscape change on the characteristics and values within the specific context in which they occur.

Visual Effects

Visual effects are a subset of landscape effects. They are consequence of changes to landscape values as experienced in views. To assess where visual effects of the proposal may occur requires an identification of the area from where the proposal may be visible from, and the specific viewing audience(s) affected. Visual effects are assessed with respect to landscape character and values. This can be influenced by several factors such as distance, orientation of the view, duration, extent of view occupied, screening and backdrop, as well as the potential change that could be anticipated in the view as a result of zone / policy provisions of relevant statutory plans.

Natural Character Effects

Natural Character, under the RMA, specifically relates to *'the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development'*. Therefore, the assessment of natural character effects only involves examining the proposed changes to natural elements, patterns and process which may occur in relevant landscape / seascape contexts.

As with assessing landscape effects, the first step when assessing natural character effects involves identifying the relevant physical and experiential characteristics and qualities which occur and may be affected by a proposal at a commensurate scale. This can be supported through the input of technical disciplines such as geomorphology, hydrology, marine, freshwater, and terrestrial ecology as well as input from tāngata whenua. An understanding of natural character considers the level of naturalness and essentially reflects the current condition of the environment assessed in relation to the seven-point scale. A higher level of natural character means the waterbody and/or margin is less modified and vice versa.

A natural character effect is a change to the current condition of parts of the environment where natural character occurs. Change can be negative or positive. The resultant natural character effect is influenced by the existing level of naturalness within which change is proposed; a greater level of effect will generally occur when the proposal reduces the naturalness of a less modified environment. In short, the process of assessing natural character effects can be summarised as follows:

- Identify the characteristics and qualities which contribute to natural character within a relevant context and defined spatial scale(s), including the existing level of naturalness;
- Describe the changes to identified characteristics and qualities and the consequent level of natural character anticipated (post proposal); and
- Determine the overall level of effect based on the consequence of change.

The Significance of Effects

Decision makers assessing resource consent applications must evaluate if the effect on individuals or the environment is less than minor[35] or if an adverse effect on the environment is no more than minor[36]. For non-complying activities, consent can only be granted if the s104D 'gateway test' is satisfied, ensuring adverse effects are minor or align with planning objectives. In these situations, the assessment may be required to translate the level of effect in terms of RMA terminology.

This assessment has adopted the following scale applied to relevant RMA circumstances[37] (refer to diagram below), acknowledging low and very low adverse effects generally equate to 'less than minor' and high / very high effects generally equate to significant[38].

[35] RMA, Section 95E

[36] RMA, Section 95E

[37] Seven-point level of effect scale. Source: Te tangi a te Manu, Pg. 15

[38] The term 'significant adverse effects' applies to specific RMA situations, including the consideration of alternatives for Notices of Requirement and AEEs, as well as assessing natural character effects under the NZ Coastal Policy Statement.

Appendix 2: Solar Glint and Glare Analysis

Method Statement

INTRODUCTION

Glint is defined as a small flash of bright light, especially a reflected one. An example of glint is a momentary solar reflection from the windscreen of a moving car. Glare is a sustained reflection of strong and dazzling light. An example of this is direct reflected sunlight off a stationary object. The difference between glint and glare is duration.

The objective of this methodology is to assess the effects of solar glint and glare associated with solar energy installations and their potential impact on the surrounding environment.

IDENTIFYING GLINT AND GLARE EFFECTS

The duration of glint and glare effects can be calculated using the geographical location and layout of the proposed solar farm, the geometry of the solar panels and the relative locations of the panels, the viewer and the sun. The likelihood of the effect occurring, and the duration and intensity of such an effect depends upon several factors:

- the distance from the solar panels
- the orientation relative to the solar panels
- the area of the solar panels, their angle and whether they are static panels or part of a solar tracking system
- the time of day and time of the year
- the nature of the intervening terrain between dwelling/road and panels; and
- the impact of any intervening vegetation and/or structures.

Boffa Miskell uses Forge Solar as a modelling tool to undertake Glint and Glare modelling for analysis. Forge Solar employs an interactive Google map where the user can quickly locate a site, draw an outline of the proposed PV array(s), and specify observer locations or paths. Latitude, longitude, and elevation are automatically queried from Google, providing necessary information for sun position and vector calculations. Additional information regarding the orientation and tilt of the PV panels, reflectance, environment, and ocular factors are entered by the modeller.

IDENTIFYING THE VIEWING AUDIENCE AND OBSERVER POINTS

The Landscape Effects Assessment will identify the areas from which the solar farm may be visible and the specific viewing audience(s) which may be subjected to visual effects. For the purposes of identifying private and public views of the proposed solar site, and therefore may be impacted by glint and/or glare, the assessment has defined specific Observer Points from which an understanding of the duration and extent of potential glint and glare may occur.

The potential for Glint and Glare from identified Observer Points does not take into account any changes in weather conditions including cloud cover and represents a worse case scenario without taking into account any intervening or surrounding landform or vegetation.

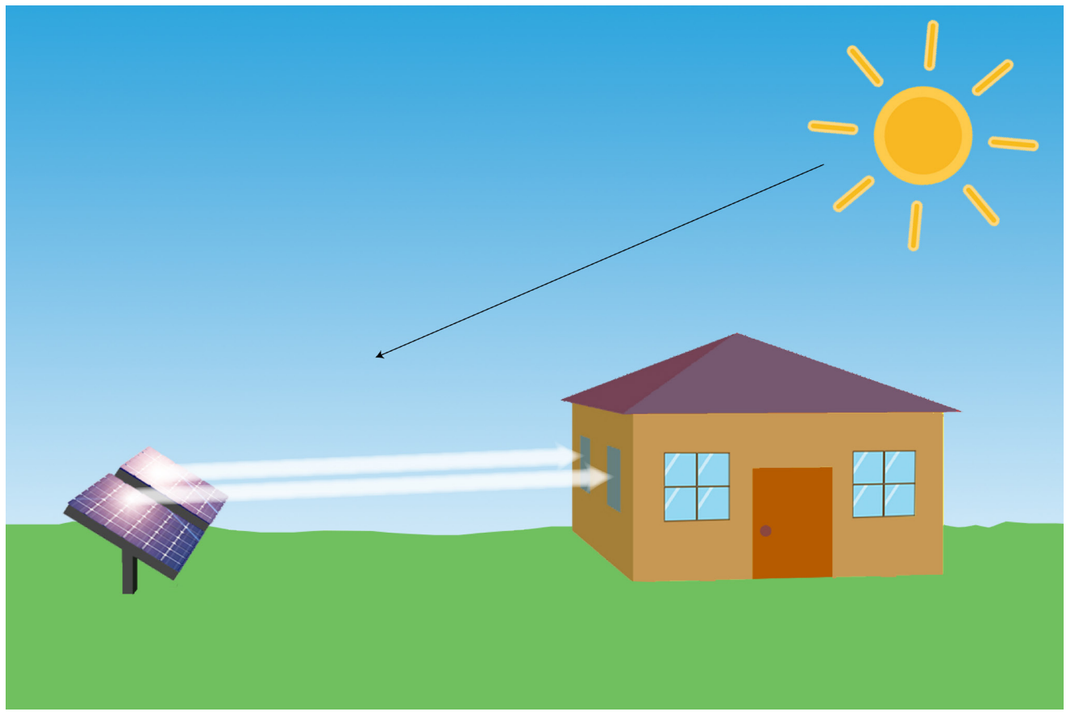


Image above: Glint and Glare from solar panels have the potential to affect local residents.

Solar Glint and Glare Analysis - Method Statement

IDENTIFYING GLARE AND LIMITS

If glare is found, the Forge Solar tool calculates the retinal irradiance and subtended angle (the size/distance) of the glare source. This can be used to inform the potential for glare in the assessment.

Forge Solar identifies two potential levels of glare:
Green: Low Potential for glare
Yellow: Potential for glare

For other areas outside these, it is identified that glare is not geometrically possible.

The limit for glint/glare which creates unreasonable nuisance has been defined in several international guidelines. In Germany the Light-Guideline (Licht-Leitlinie) issued by the Ministry of Environment defines the limits for glare duration at 30 minutes per day and 30 hours per year. In Austria the same values were determined in their national guidelines OVE R11-3. Australian guidance[1] defines glare of high impact as that which is greater than 30 minutes per day and 30 hours per year. Table 1 has been adapted from these guidelines with reference to effects of solar glare.

In the United Kingdom, photovoltaic glint and glare guidance[2] states that if visible glint and glare is predicted for a surrounding dwelling for longer than 60 minutes per day, for three or more months of the year, then the impact should be considered significant with respect to residential amenity. For the purposes of this assessment, limits for glare duration greater than 30 minutes per day and 30 hours per year have been defined as high impact. This duration of effect has been chosen as it is in line with international best practice for solar glare, but also aligns with the limits defined by international guidelines for addressing the effects of shadow flicker caused by wind turbines. Table 1 below outlines the level of impact in relation to glare for residential dwellings.

Table 1: Glare Impact in relation to residential dwellings

High glare impact	Moderate glare impact	Low glare impact
> 30 minutes per day > 30 hours per year	< 30 minutes & > 10 minutes per day < 30 hours & > 10 hours per year	< 10 minutes per day < 10 hours per year
Significant amount of glare that should be avoided by solar layout and/or mitigation measures.	Implement mitigation measures to reduce impacts as far as practicable.	No mitigation required.

SOLAR GLARE FOR ROAD USERS

A review of international best practice guidance for assessing effects of solar glare from roads finds that reflections which originate in front of the road user require mitigation. Internationally, local roads are generally considered to not require mitigation, however as the majority of roads in New Zealand would qualify for what internationally would be considered a 'local road', the assessment has considered all roads.

A road user travelling on surrounding roads where a solar reflection is geometrically possible would experience a solar reflection that is fleeting in nature. The nature of the view is dependent on the speed of the road user travelling past the solar farm at a time when a solar reflection is geometrically possible. Therefore, the location of the solar reflection is more significant than its duration because the road user is moving. Because of this, the length of time a solar reflection is present is not considered when determining its significance. Instead, the location of the solar reflection and road type are considered. Major roads such as State Highways would be considered more sensitive to the effects of glare than local roads where the speed of travel is reduced.

Mitigation is considered necessary for all roads where the road user is aligned directly with the area of glare. For glare which is oblique to the road user's direction of travel, mitigation can also be considered, but is not necessary.

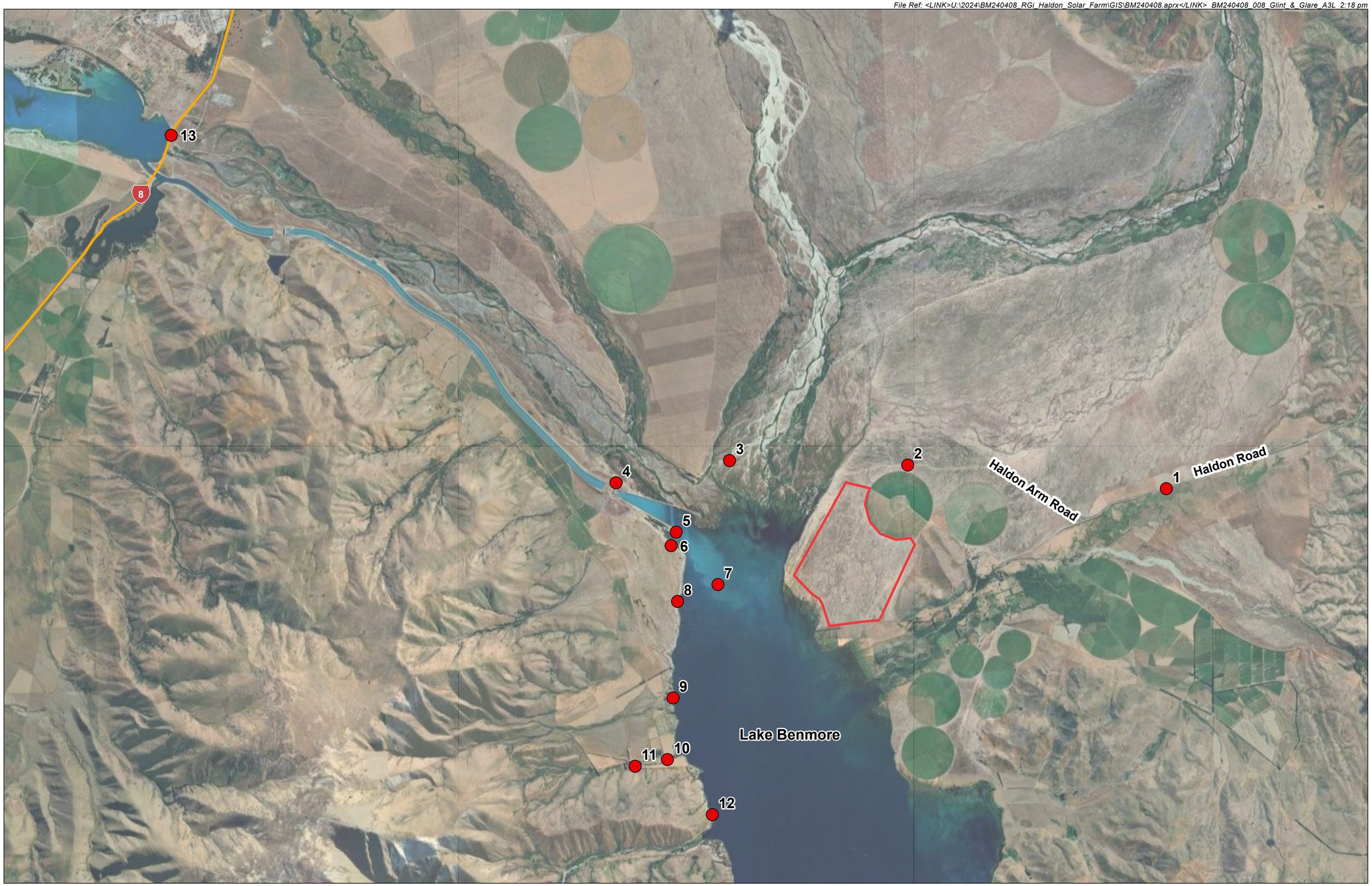
MITIGATION MEASURES

If the assessment reveals potential glint and/or glare, the following mitigation measures can be considered to reduce or remove these effects:

- Layout adjustment and programming: Removal of panels from layout, adjustments to panel layout or programming of the panels to adjust tilt angles to minimise the potential for glint/glare (such as removal of backtracking). This mitigation is effective immediately.
- Vegetation screening: Planted mitigation to screen views of potential glint/glare. This mitigation is effective once planting has been established.
- Communication/warning systems: Installation of signage or warning systems to warn people of potential glint/glare hazards. This form of mitigation does not remove the hazard, but provides an alert system.

[1] New South Wales Department of Planning and Environment. Large-Scale Solar Energy Guidelines, August 2022.

[2] Pager Power Ltd. Solar Photovoltaic and Building Development Glint and Glare Guidance, Fourth Edition, September 2022.



Boffa Miskell

www.boffamiskell.co.nz

0 1,500 m

1:60,000 @ A3

Data Sources: Google, LINZ Data Service, Forge Solar

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Site Boundary (PV Array 1)
- OP 1 - 13
- State Highway

HALDON SOLAR FARM

Observation Point Receptors

Date: 07 March 2025 | Revision: 0

Plan prepared for Lodestone Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: RGi

Figure 1

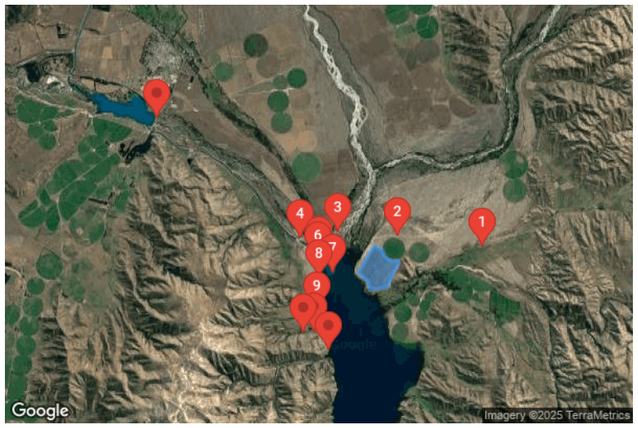
FORGESOLAR GLARE ANALYSIS

Project: **Haldon Solar Farm**
Site configuration: **Haldon Solar Farm**

Client: Lodestone

Created 12 Feb, 2025
Updated 12 Feb, 2025
Time-step 1 minute
Timezone offset UTC12
Minimum sun altitude 0.0 deg
DNI peaks at 1,000.0 W/m^2
Category >1 GW
Site ID 141137.23870

Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad
PV analysis methodology V2



Summary of Results

Glare with low potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	1,113	18.6	0	0.0	-

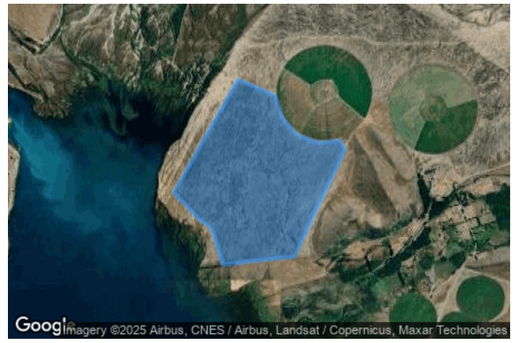
Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 1	0	0.0	0	0.0
OP 2	219	3.6	0	0.0
OP 3	0	0.0	0	0.0
OP 4	120	2.0	0	0.0
OP 5	220	3.7	0	0.0
OP 6	149	2.5	0	0.0
OP 7	106	1.8	0	0.0
OP 8	54	0.9	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	57	0.9	0	0.0
OP 12	0	0.0	0	0.0
OP 13	188	3.1	0	0.0

Component Data

PV Arrays

Name: PV array 1
Axis tracking: Single-axis rotation
Backtracking: Shade
Tracking axis orientation: 0.0°
Max tracking angle: 60.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.5
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-44.344001	170.231029	371.72	1.50	373.22
2	-44.345820	170.236740	371.49	1.50	372.99
3	-44.348220	170.237823	374.57	1.50	376.07
4	-44.350045	170.240011	373.79	1.50	375.29
5	-44.351004	170.243429	373.95	1.50	375.45
6	-44.350737	170.246655	375.52	1.50	377.02
7	-44.351784	170.247503	375.45	1.50	376.95
8	-44.363534	170.239655	365.79	1.50	367.29
9	-44.363778	170.235783	365.29	1.50	366.79
10	-44.364396	170.228725	362.64	1.50	364.14
11	-44.363108	170.228151	362.73	1.50	364.23
12	-44.360817	170.227172	362.52	1.50	364.02
13	-44.360073	170.226498	362.84	1.50	364.34
14	-44.359456	170.225112	362.00	1.50	363.50
15	-44.356456	170.221136	364.41	1.50	365.91

Discrete Observation Point Receptors

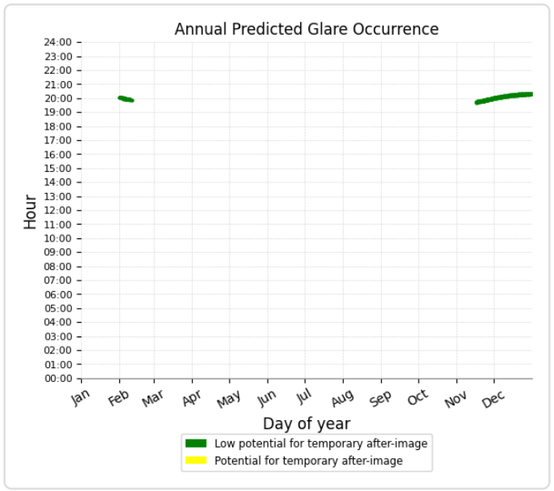
Name	ID	Latitude (°)	Longitude (°)	Elevation (m)	Height (m)
OP 1	1	-44.344355	170.302700	396.98	1.80
OP 2	2	-44.339323	170.246552	381.77	1.80
OP 3	3	-44.337682	170.207799	362.79	1.80
OP 4	4	-44.340542	170.182931	377.54	1.80
OP 5	5	-44.348570	170.195649	362.00	1.80
OP 6	6	-44.350652	170.194448	376.06	1.80
OP 7	7	-44.356983	170.204361	361.00	1.80
OP 8	8	-44.359401	170.195430	373.84	1.80
OP 9	9	-44.374444	170.193732	369.55	1.80
OP 10	10	-44.384038	170.192043	375.61	1.80
OP 11	11	-44.384909	170.184956	394.42	1.80
OP 12	12	-44.392885	170.201415	375.20	1.80
OP 13	13	-44.283862	170.088759	462.88	1.80

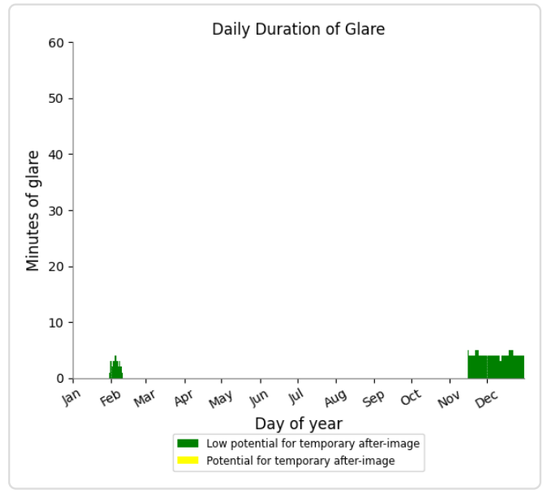
OP 1

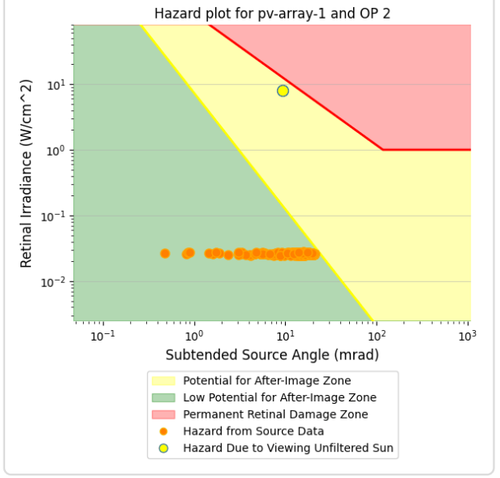
No glare found.

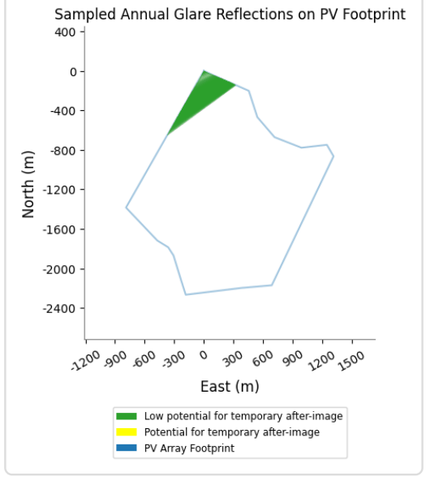
OP 2

Yellow glare: none
Green glare: 219 min.







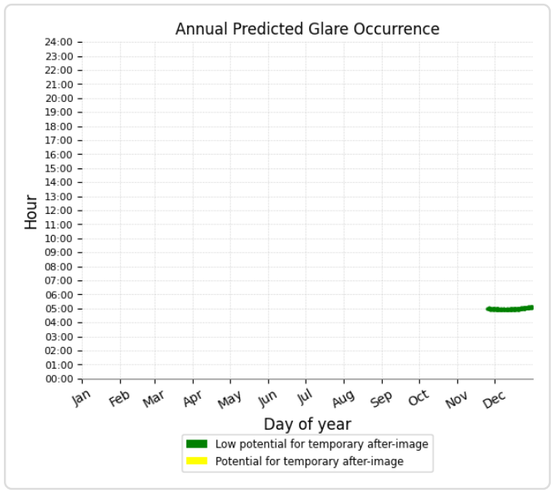


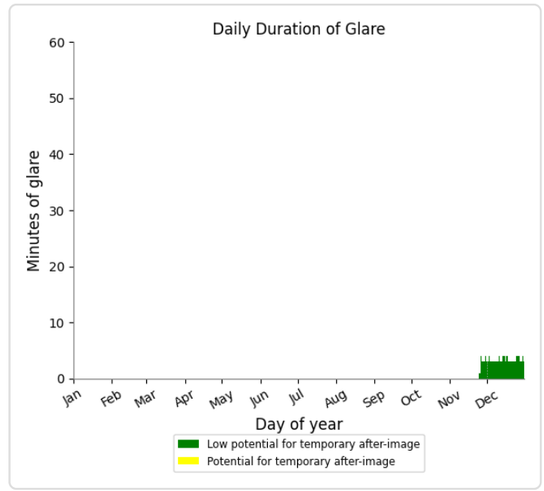
OP 3

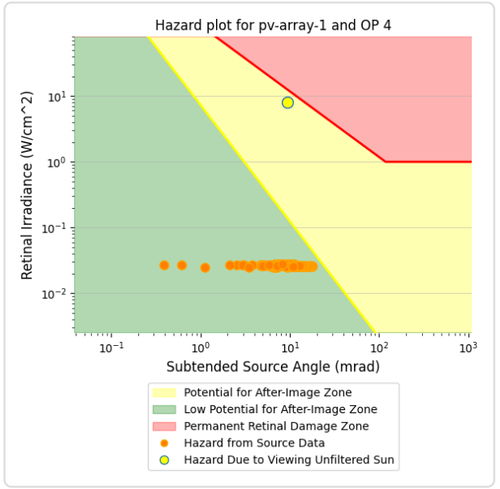
No glare found.

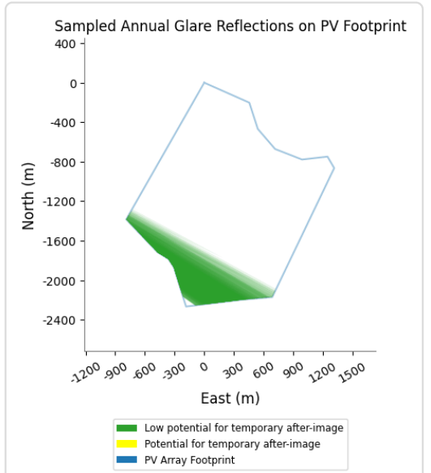
OP 4

Yellow glare: none
Green glare: 120 min.



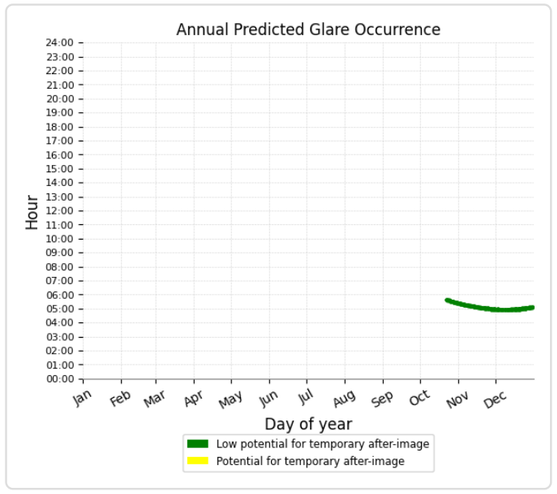


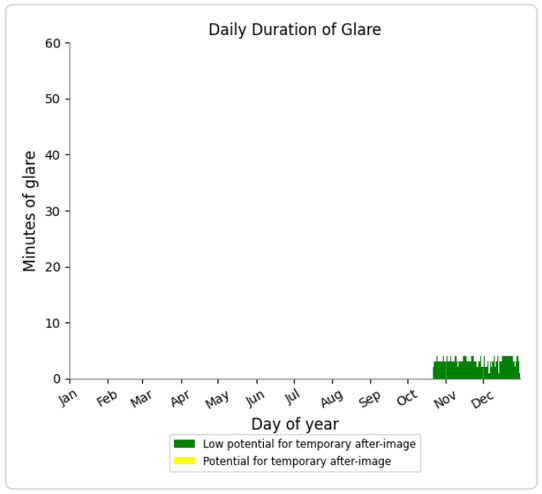


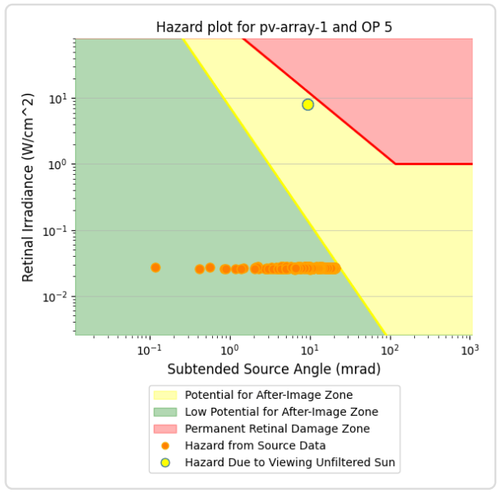


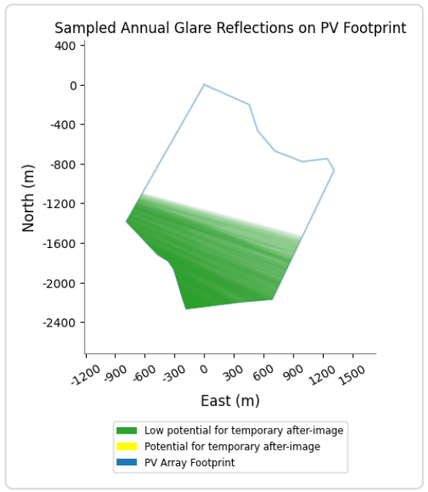
OP 5

Yellow glare: none
Green glare: 220 min.



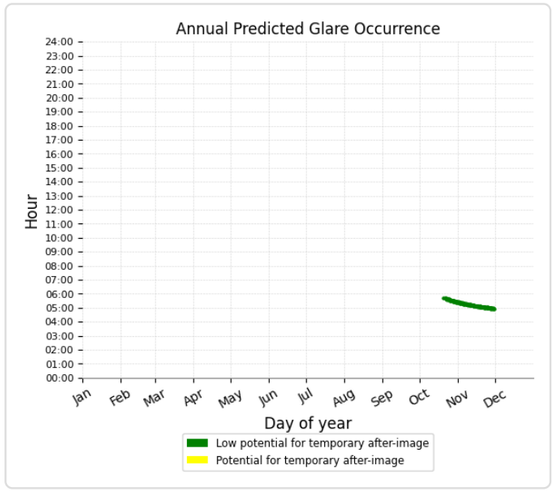


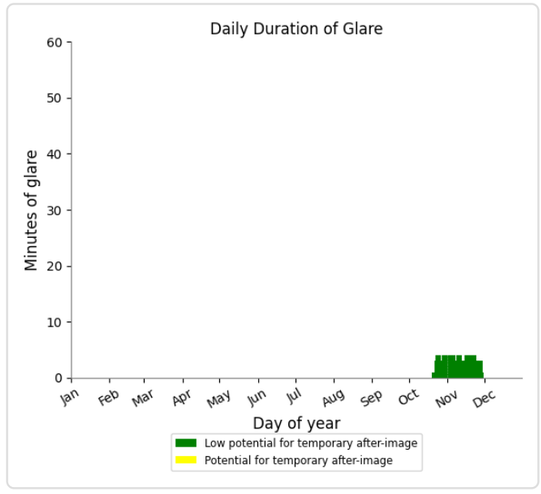


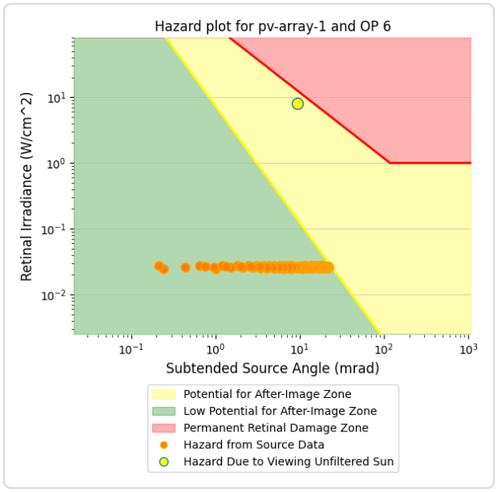


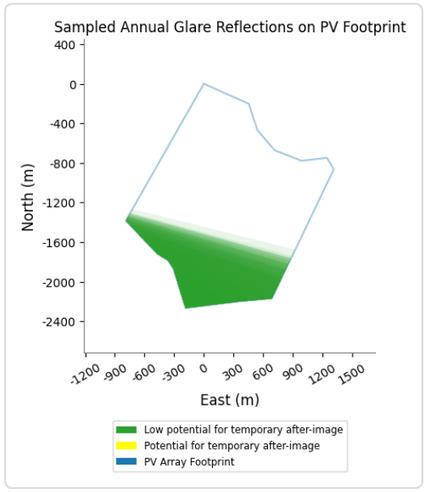
OP 6

Yellow glare: none
Green glare: 149 min.



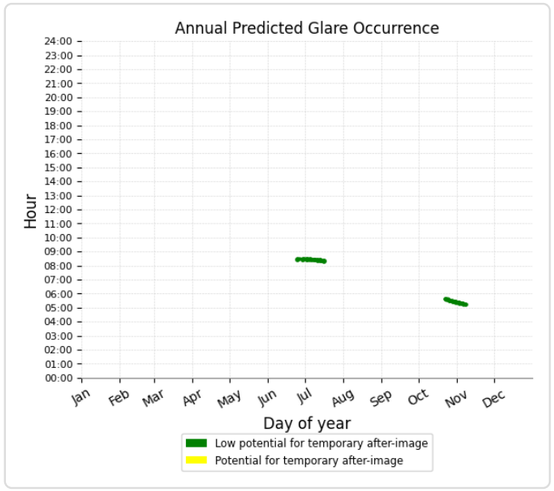


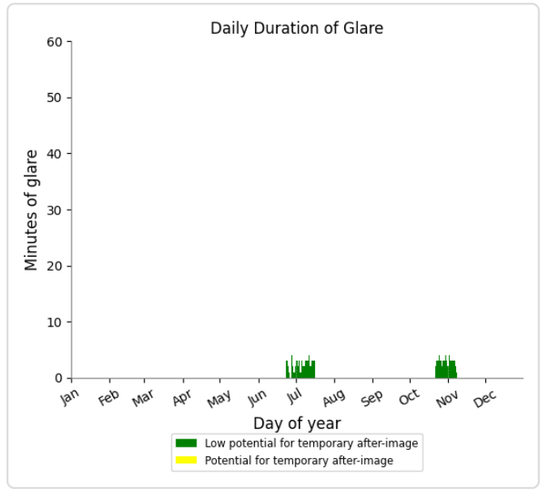


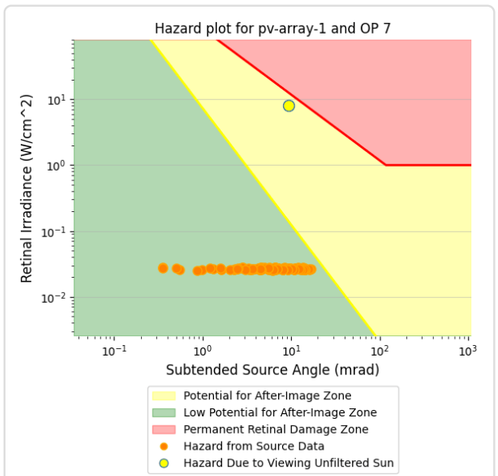


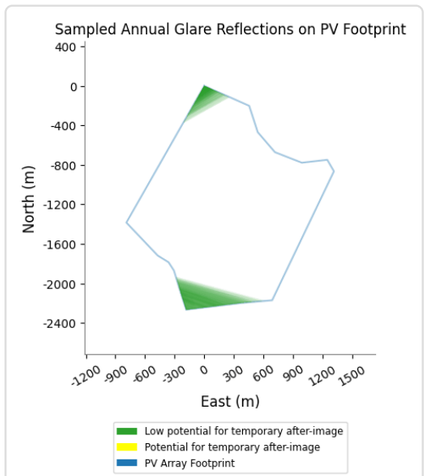
OP 7

Yellow glare: none
Green glare: 106 min.



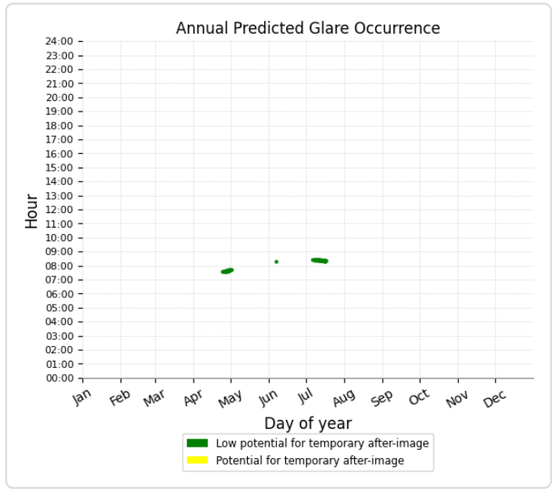


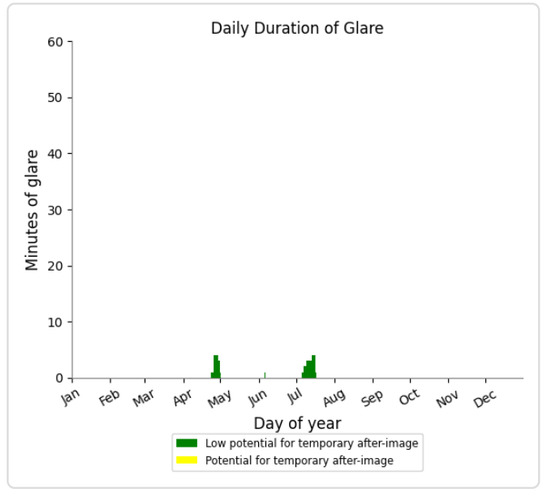


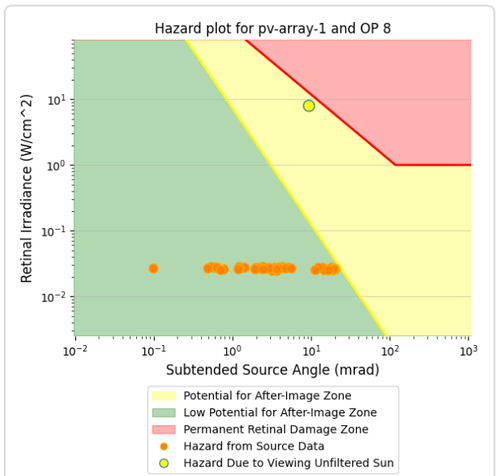


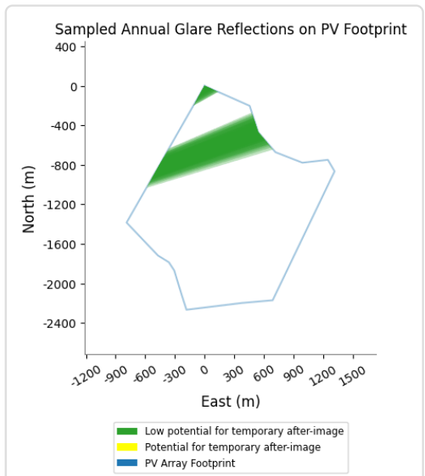
OP 8

Yellow glare: none
Green glare: 54 min.









OP 9

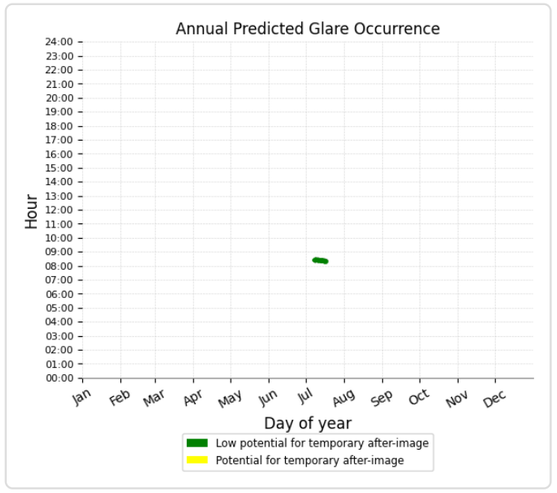
No glare found.

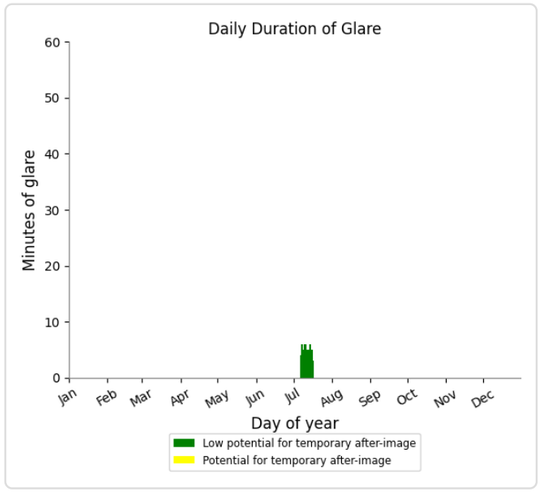
OP 10

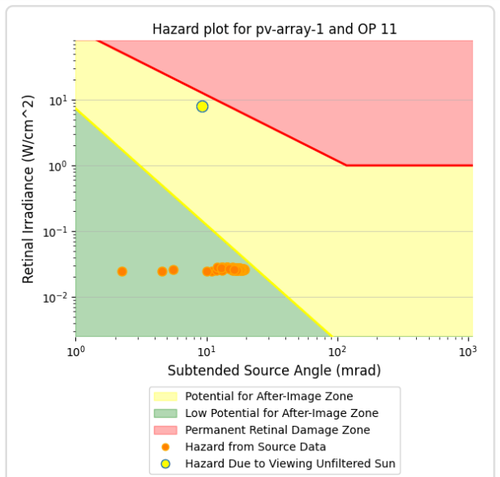
No glare found.

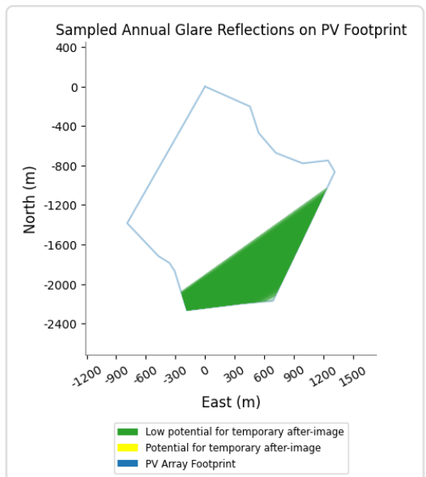
OP 11

Yellow glare: none
Green glare: 57 min.







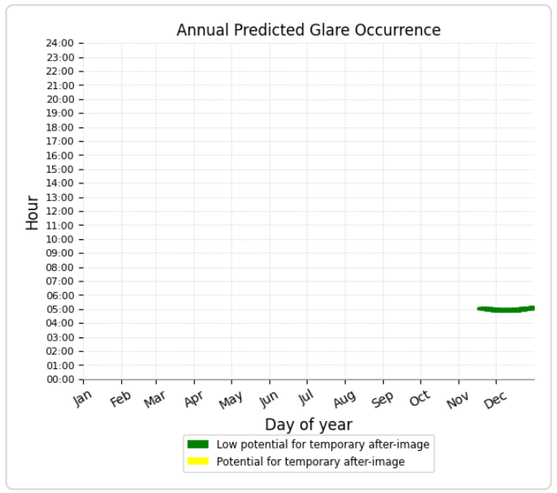


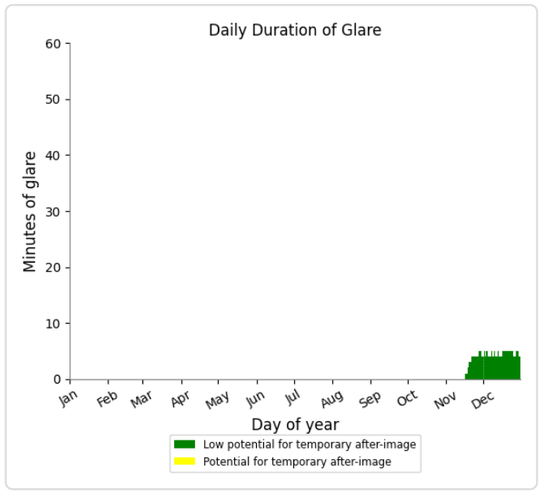
OP 12

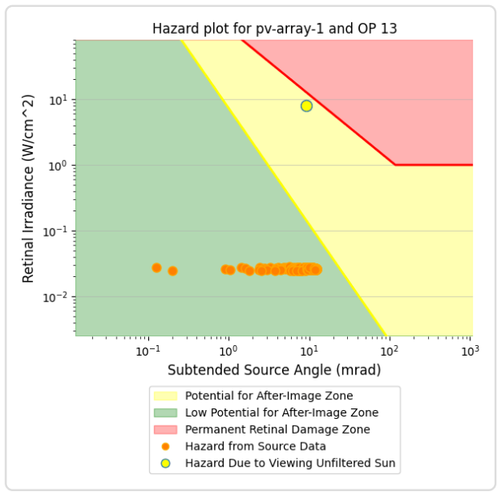
No glare found.

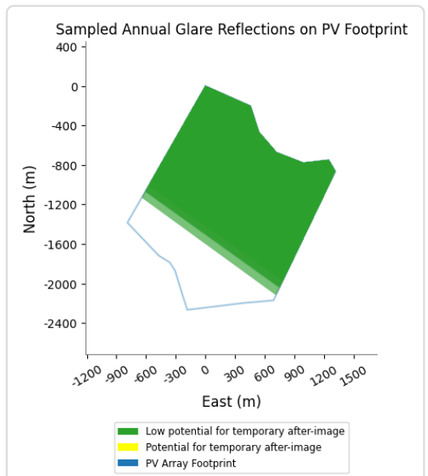
OP 13

Yellow glare: none
Green glare: 188 min.









Assumptions

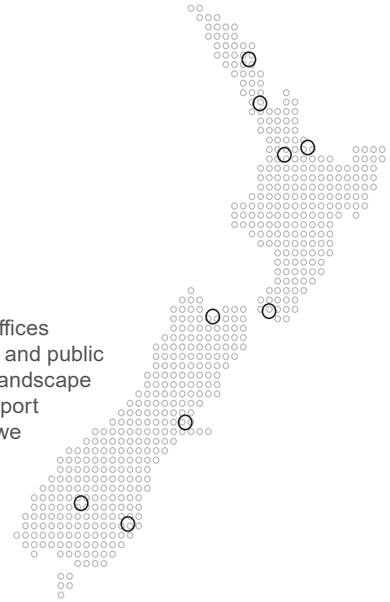
"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

Together. Shaping Better Places.

Boffa Miskell is a leading New Zealand environmental consultancy with nine offices throughout Aotearoa. We work with a wide range of local, international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, Te Hīhiri (cultural advisory), engagement, transport advisory, climate change, graphics and mapping. Over the past five decades we have built a reputation for creativity, professionalism, innovation and excellence by understanding each project's interconnections with the wider environmental, social, cultural and economic context.



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HALDON SOLAR FARM

GRAPHIC SUPPLEMENT

4 APRIL 2025

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Twizel
Twizel River
Pukaki River
Tekapo River
Ōhau River
MACKENZIE DISTRICT
Haldon Arm Road
Haldon Road
Ōhau C
Power Station
Te Pā-o-Kāti-Kurī /
Mt Maggie
Falston Road
Benmore Range
Te Ao Marama /
Lake Benmore
WAITAKI DISTRICT
WAIMATE DISTRICT

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0 2,500 m
1:100,000 @ A3

Data Sources: Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors., Eagle Technology, Land Information New Zealand, Mackenzie District Council, Operative Mackenzie District Plan
Projection: NZGD 2000 New Zealand Transverse Mercator

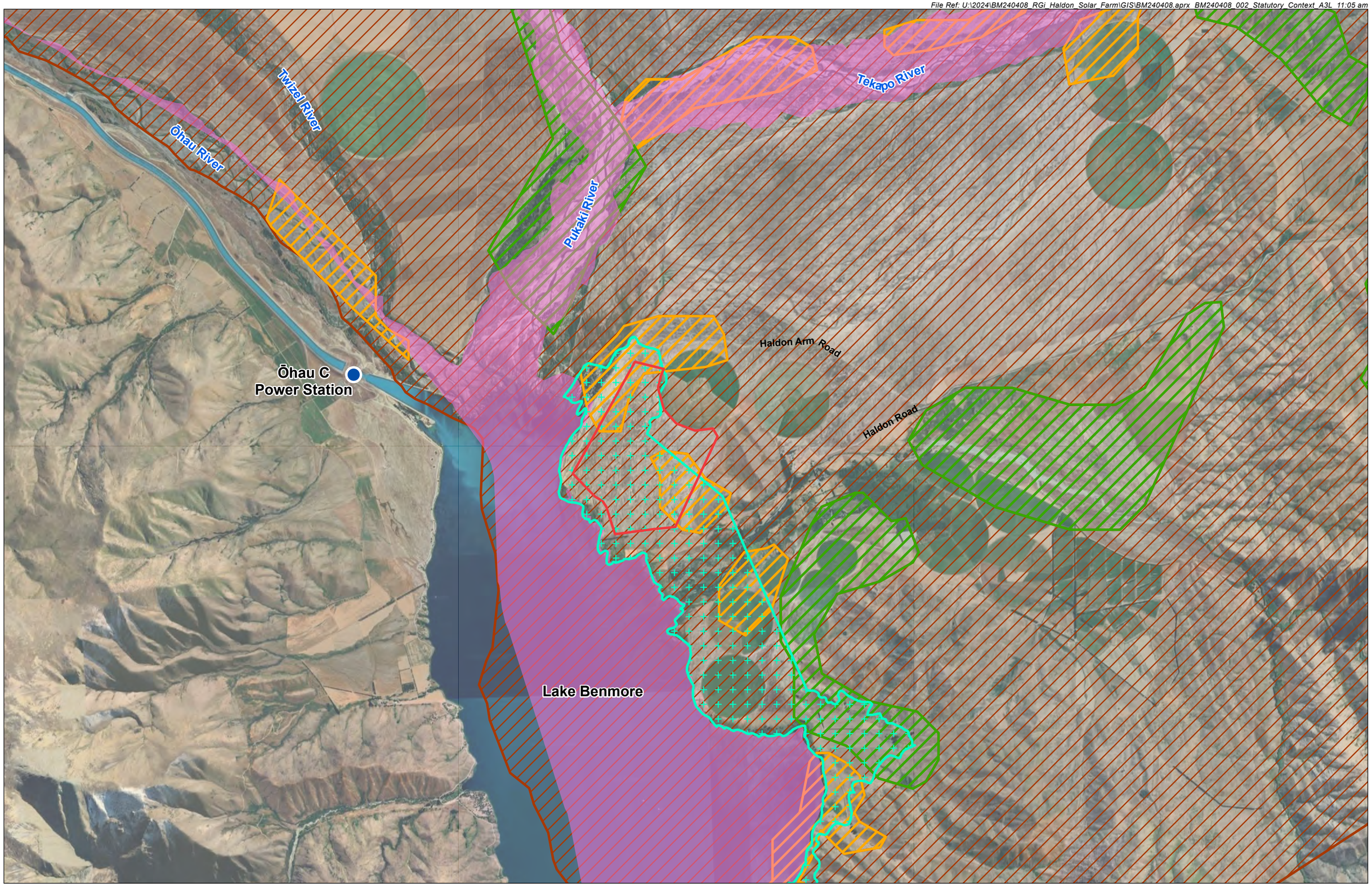
LEGEND
- Site Boundary
- Solar Panel Extent
- Outstanding Natural Landscape (Mackenzie District)
- Public Conservation Areas
- Territorial Authorities
- State Highway
- Haldon Arm Campground
- Lake Benmore Camping Ground - Ōhau C
- Benmore Views Campground
- Falstone Campground

HALDON SOLAR FARM

Landscape Context

Date: 02 April 2025 | Revision: 1
Plan prepared for Lodestone Energy by Boffa Miskell Limited
Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Figure 1



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0 1,240 m

1:50,000 @ A3

Data Sources: Google, LINZ Data Service, Mackenzie District Council, Operative Mackenzie District Plan

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Site Boundary
- Operative Mackenzie District Plan
- Lakeside Protection Areas
- Sites of Natural Significance

Areas of Visual Vulnerability (Operative District Plan)

- High
- Medium
- Low

HALDON SOLAR FARM

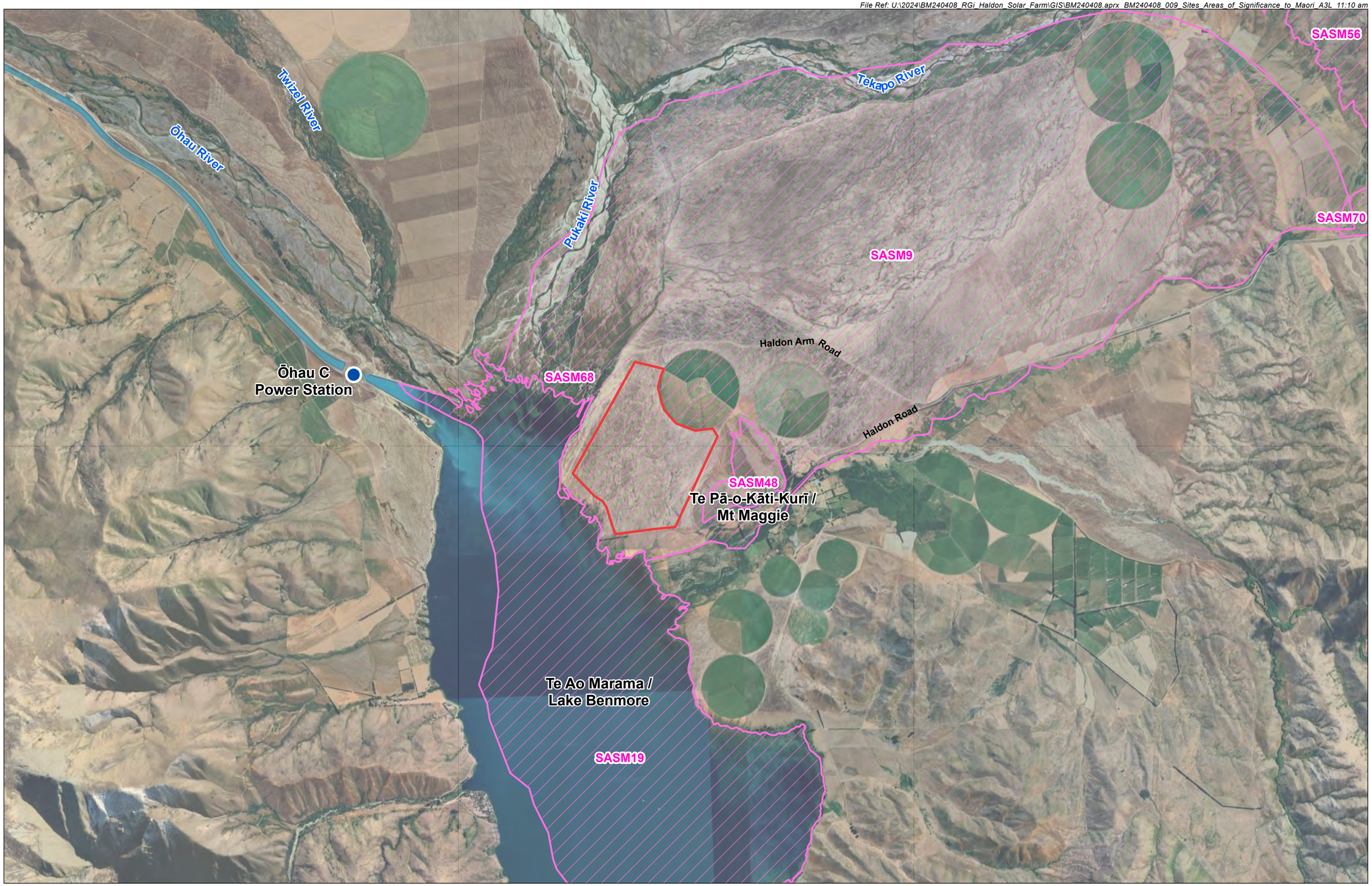
Statutory Context

Date: 02 April 2025 | Revision: 1

Plan prepared for Lodestone Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: RGi

Figure 2



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0 1,240 m

1:50,000 @ A3

Data Sources: Google, LINZ Data Service, Mackenzie District Council, Operative Mackenzie District Plan

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Site Boundary
- Operative Mackenzie District Plan
- Sites and Areas of Significance to Māori

HALDON SOLAR FARM

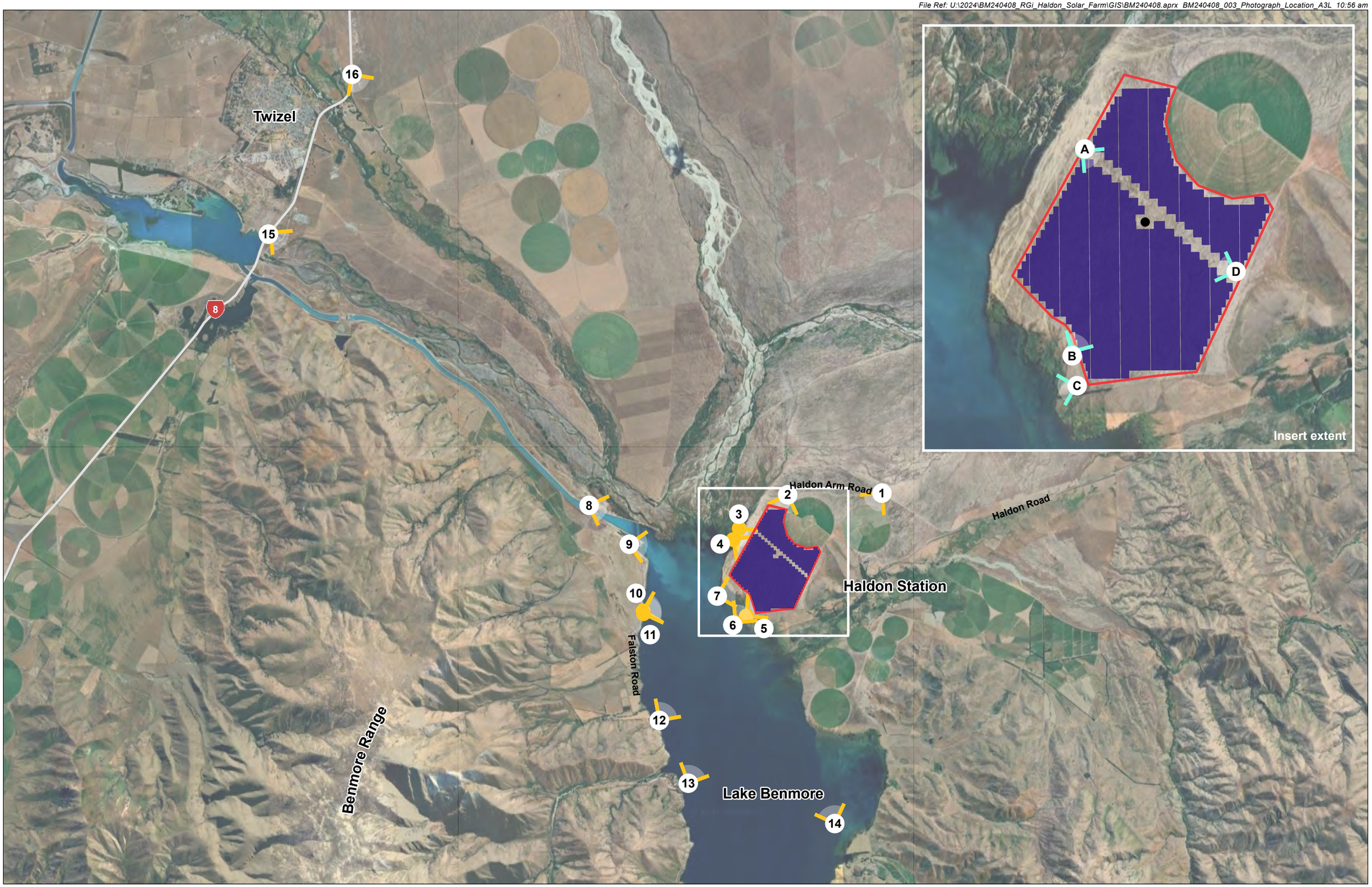
Statutory Context Plan: Sites and Areas of Significance to Māori

Date: 02 April 2025 | Revision: 1

Plan prepared for Lodestone Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: RGi

Figure 3



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0 2,000 m

1:80,000 @ A3

Data Sources: Google, LINZ Data Service

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Site Boundary
- Solar Panel Extent
- Site Appraisal Photographs A - D
- Site Context Photographs 1 - 16
- State Highway
- Approximate Location of Substation

HALDON SOLAR FARM

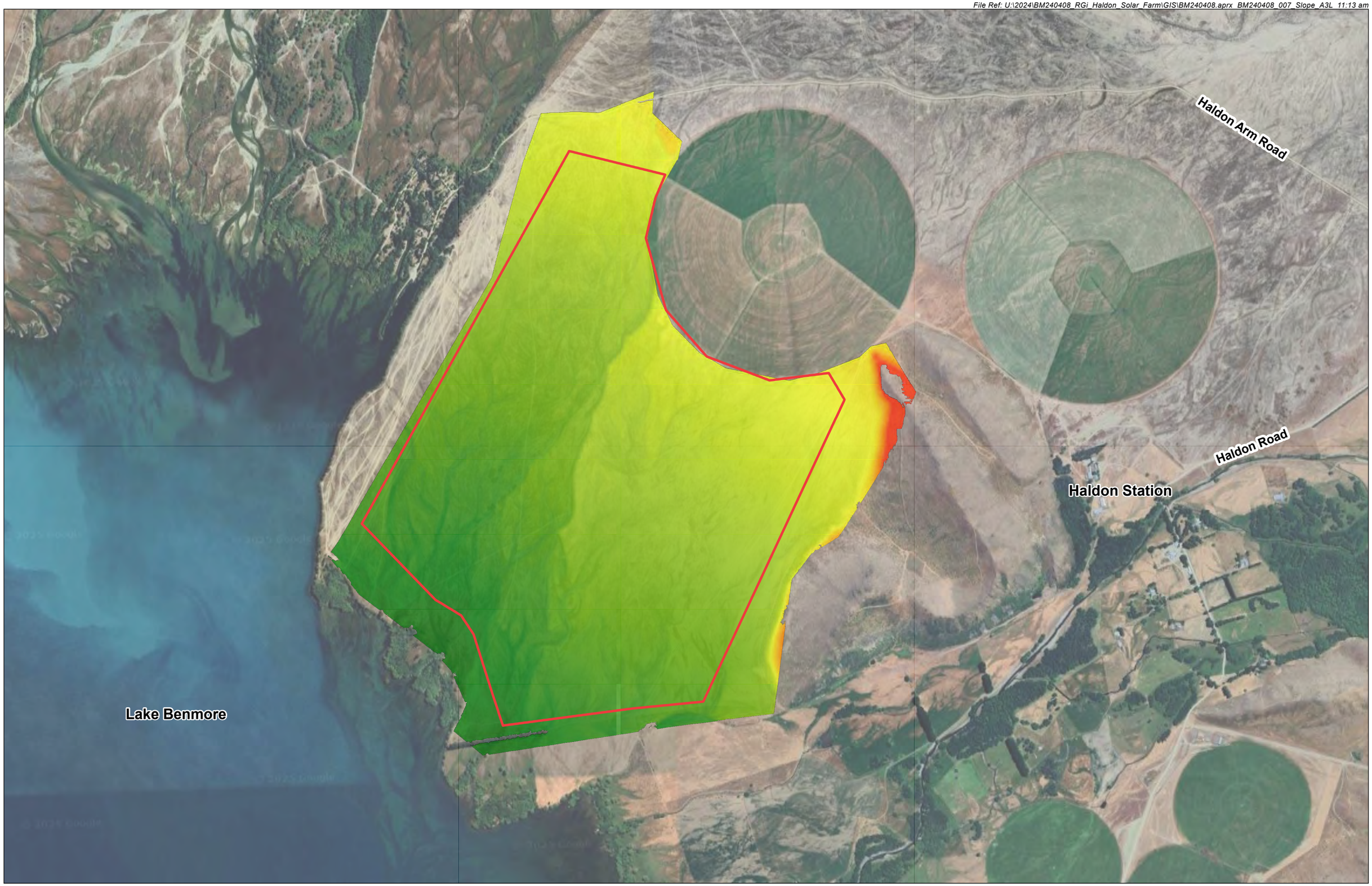
Photograph Location

Date: 12 March 2025 | Revision: 1

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Figure 4



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0 360 m

1:15,000 @ A3

Data Sources: Google, BECA, LINZ Data Service

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Site Boundary

Value

409

360

HALDON SOLAR FARM

Elevation

Date: 12 March 2025 | Revision: 1

Plan prepared for Lodestone Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Figure 5

Site Appraisal Photograph A: View from the western boundary of the Site, looking in a southeasterly direction.

Site Appraisal Photograph B: View from the southwestern boundary of the Site, looking in a northeasterly direction.

Boffa Miskell

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Viewpoint Details

Horizontal Field of View : 90°
Vertical Field of View : 30°
Projection : Rectilinear
Image Reading Distance @ A3 is 20 cm

Data Sources:
Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

HALDON SOLAR FARM

Site Appraisal Photographs A - B

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Site Appraisal Photograph C: View from the southwestern corner of the Site, looking in a southwesterly direction.

Site Appraisal Photograph D: View from the eastern boundary of the Site, looking in a northwesterly direction.

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

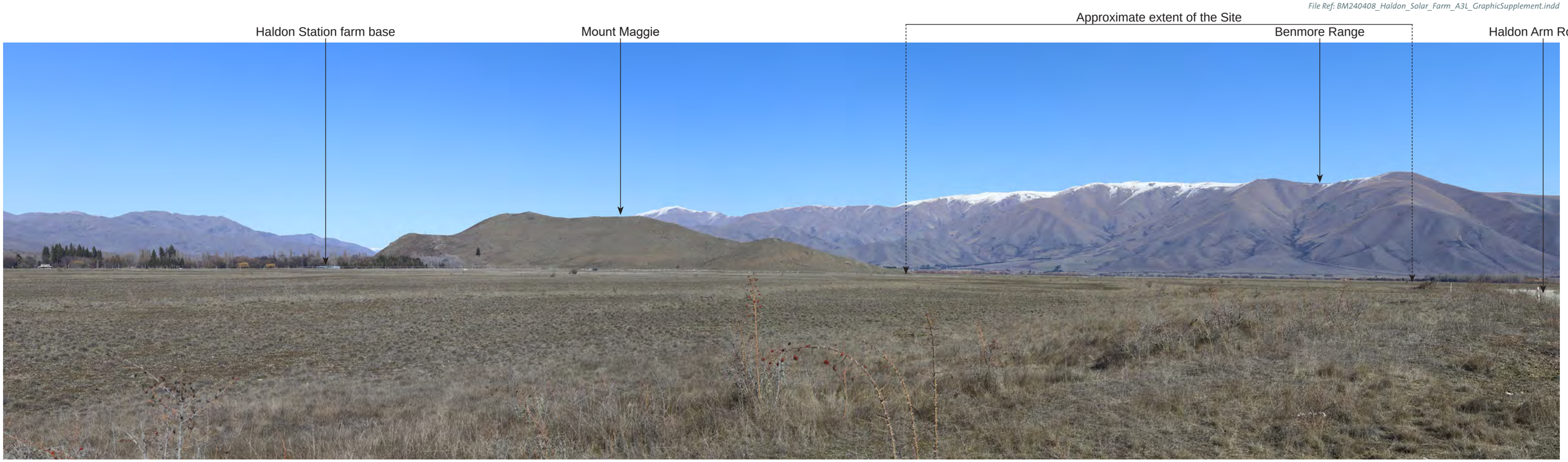
HALDON SOLAR FARM

Site Appraisal Photographs C - D

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc



Site Context Photograph 1: View from Haldon Arm Road, approximately 1.9 kilometres northeast of the Site, looking in a southwesterly direction.

Site Context Photograph 2: View from Haldon Arm Road, approximately 345 metres north of the Site, looking in a southwesterly direction.

Boffa Miskell

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

HALDON SOLAR FARM

Site Context Photographs 1 - 2

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Approximate extent of the Site

Lake Benmore

Site Context Photograph 3: View from Haldon Arm Campground, approximately 330 metres northwest of the Site, looking in a southeasterly direction.

Approximate extent of the Site

Mount Maggie

Lake Benmore

Site Context Photograph 4: View from the access road to Haldon Boat Harbour, approximately 330 metres southwest of the Site, looking in a southeasterly direction.

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

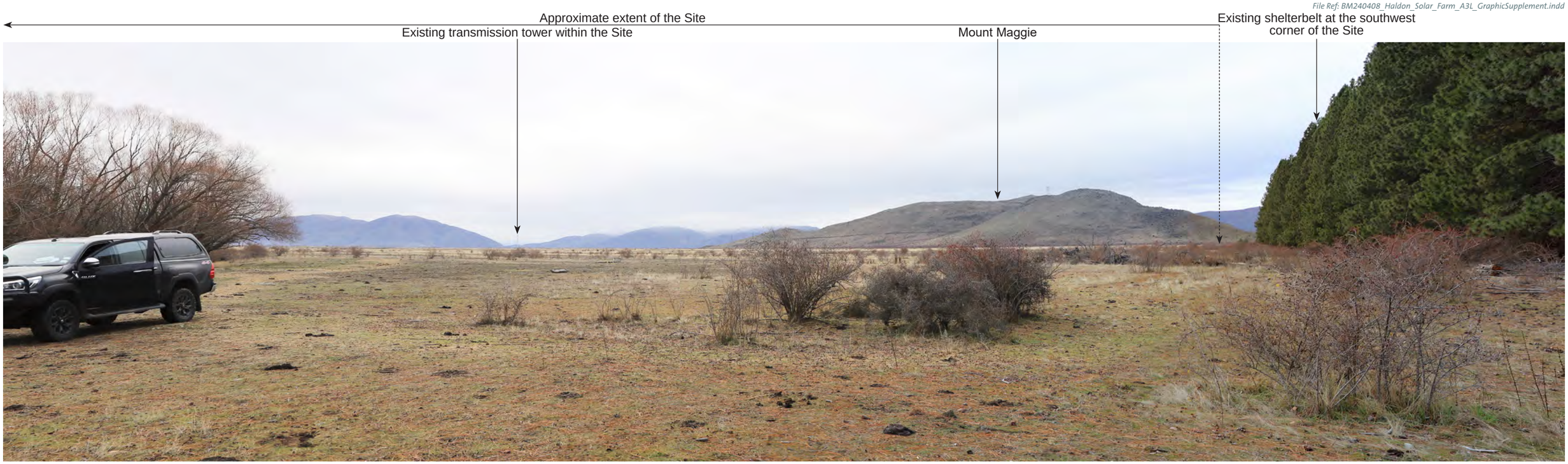
HALDON SOLAR FARM

Site Context Photographs 3 - 4

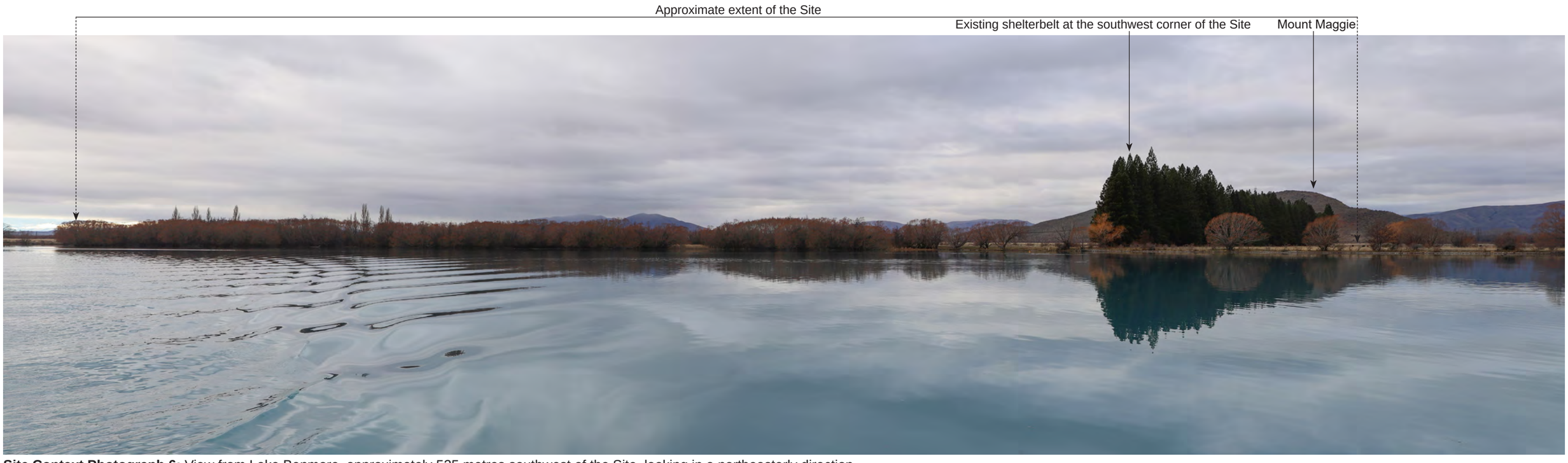
Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc



Site Context Photograph 5: View from a location close to southwestern corner of the Site, approximately 235 metres southwest of the Site, looking in a northeasterly direction.



Site Context Photograph 6: View from Lake Benmore, approximately 525 metres southwest of the Site, looking in a northeasterly direction.

Boffa Miskell

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:
Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

HALDON SOLAR FARM

Site Context Photographs 5 - 6

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Site Context Photograph 7: View from Lake Benmore, approximately 540 metres west of the Site, looking in a northeasterly direction.

Site Context Photograph 8: View from Ōhau C Power Station, approximately 3.6 kilometres west of the Site, looking in a southeasterly direction over Lake Benmore towards the Site.

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

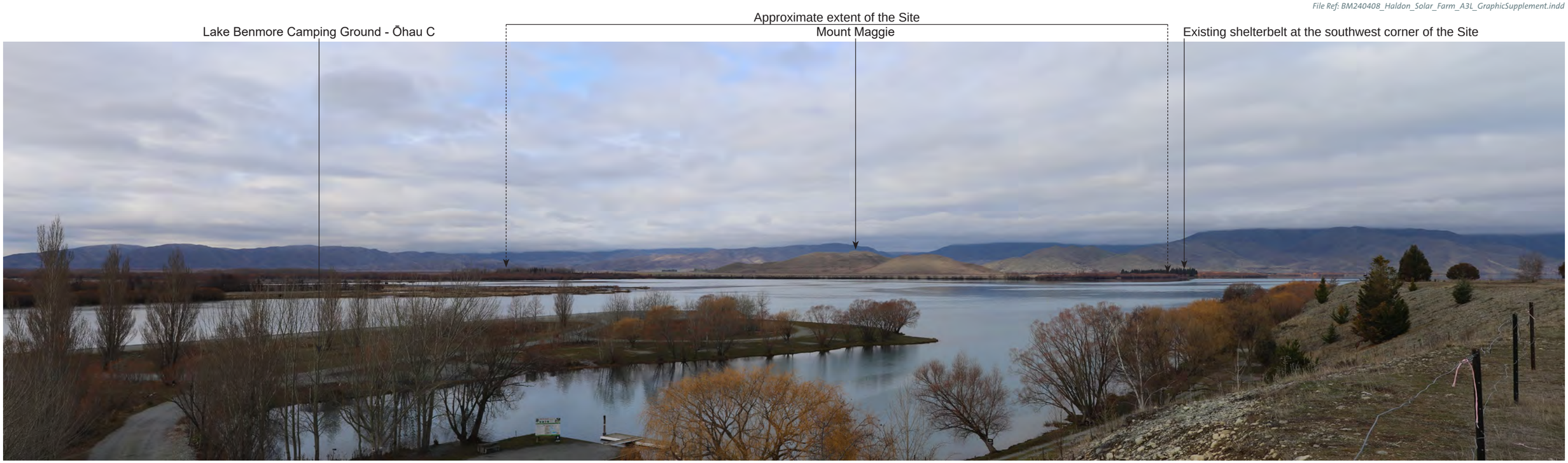
HALDON SOLAR FARM

Site Context Photographs 7 - 8

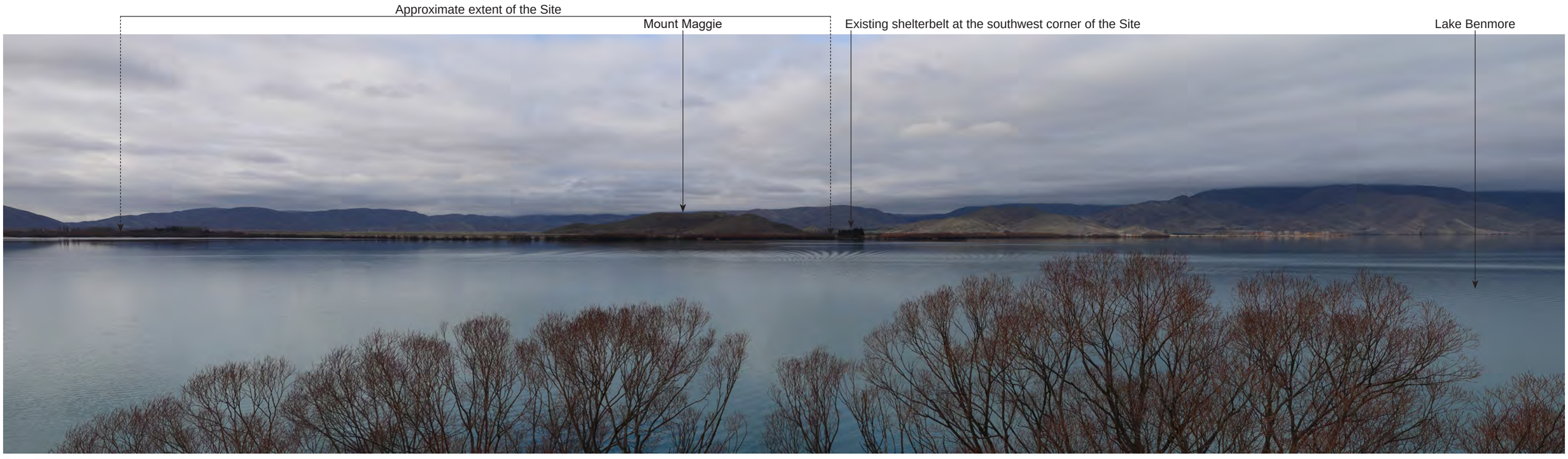
Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc



Site Context Photograph 9: View from elevated ground on Falston Road, approximately 2.4 kilometres west of the Site, looking in an easterly direction.



Site Context Photograph 10: View from elevated ground on Falston Road, approximately 2.1 kilometres southwest of the Site, looking in a northeasterly direction.

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:
Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

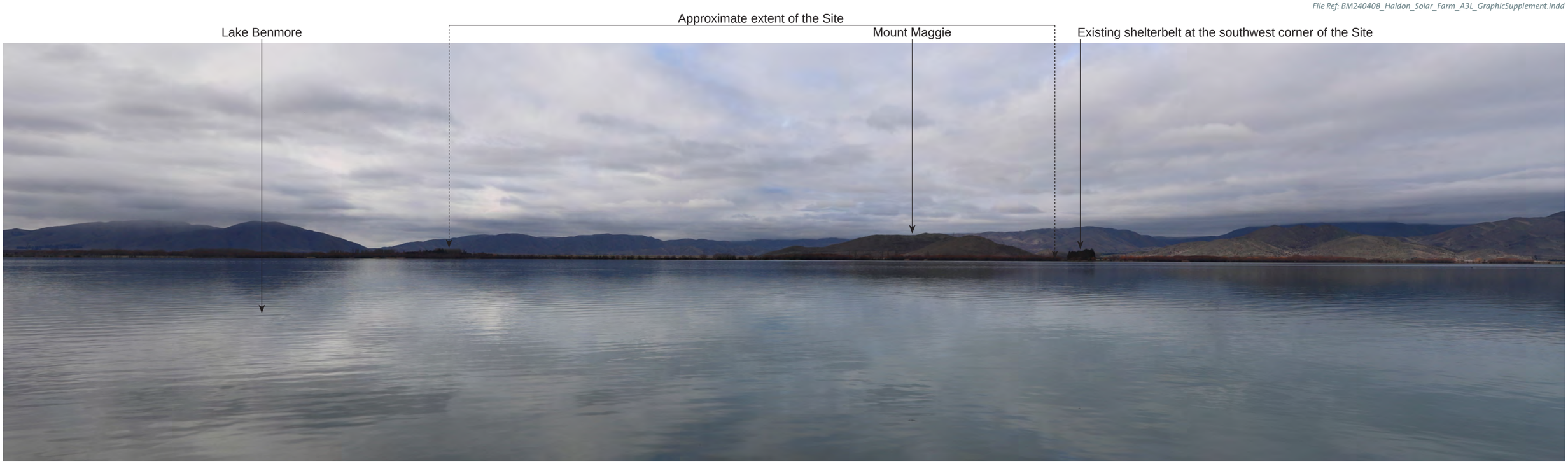
HALDON SOLAR FARM

Site Context Photographs 9 - 10

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc



Site Context Photograph 11: View from near lake shore below Falston Road, approximately 2.1 kilometres southwest of the Site, looking in a northeasterly direction.

Site Context Photograph 12: View from Benmore Views Campground, approximately 3.3 kilometres southwest of the Site, looking in a northeasterly direction.

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

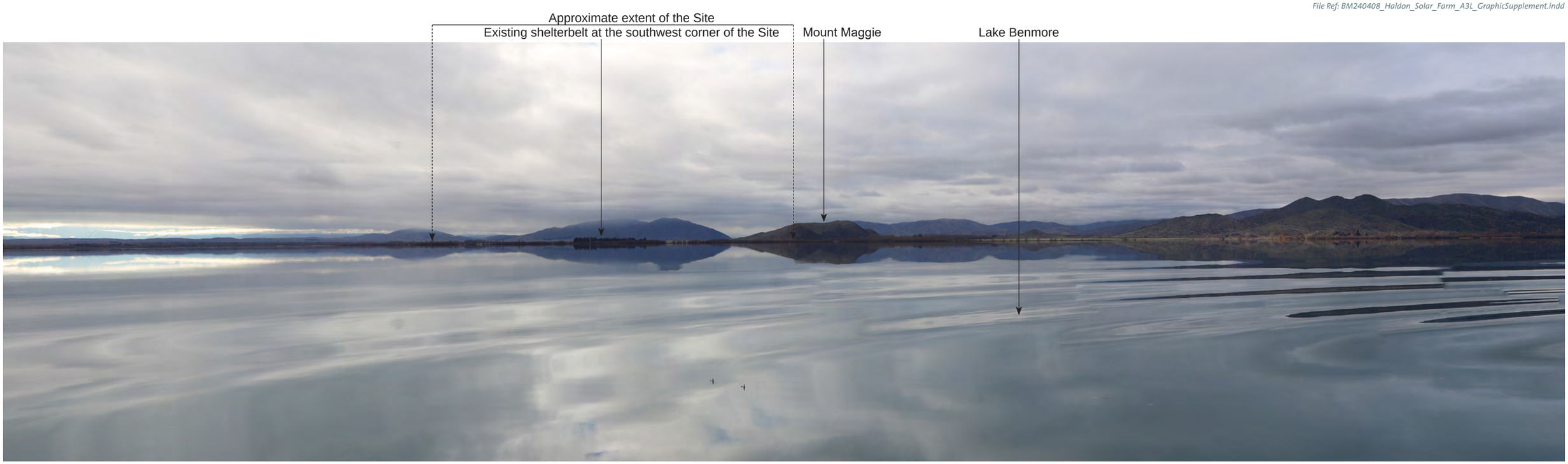
HALDON SOLAR FARM

Site Context Photographs 11 - 12

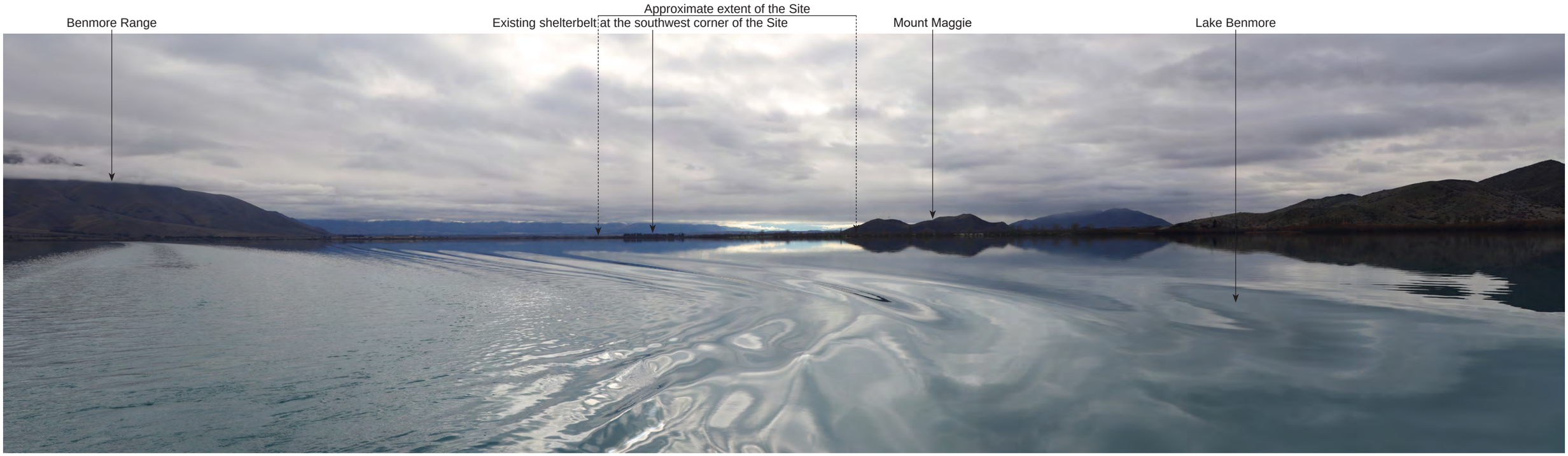
Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc



Site Context Photograph 13: View from Lake Benmore near Falstone Campground, approximately 4.2 kilometres southwest of the Site, looking in a northeasterly direction.



Site Context Photograph 14: View from near the eastern shore of Lake Benmore, approximately 5 kilometres southeast of the Site, looking in a northwesterly direction.

Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:
Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

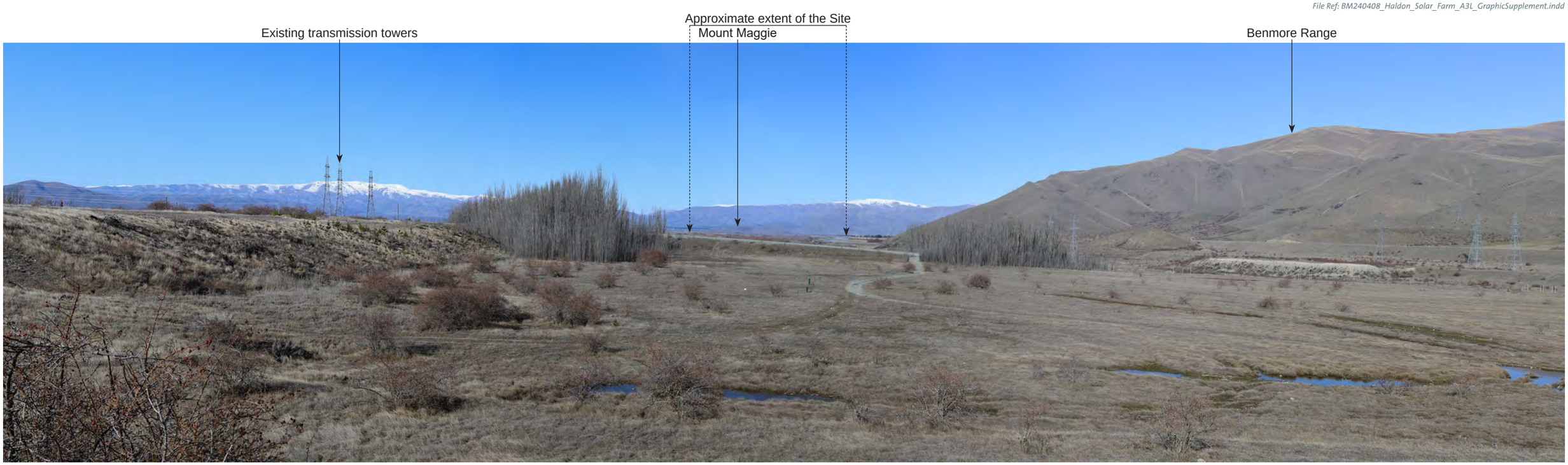
HALDON SOLAR FARM

Site Context Photographs 13 - 14

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc



Site Context Photograph 15: View from SH8 / Tekapo-Twizel Road near Lake Ruataniwha, approximately 13 kilometres northwest of the Site, looking in a southeasterly direction.

Site Context Photograph 16: View from SH8 / Tekapo-Twizel Road, approximately 13 kilometres northwest of the Site, looking in a southeasterly direction.

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Viewpoint Details

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

Photographs taken on 26th June 2024 between 9:30am-3:30pm and 21st August 2024 between 10:30am-4:30pm.

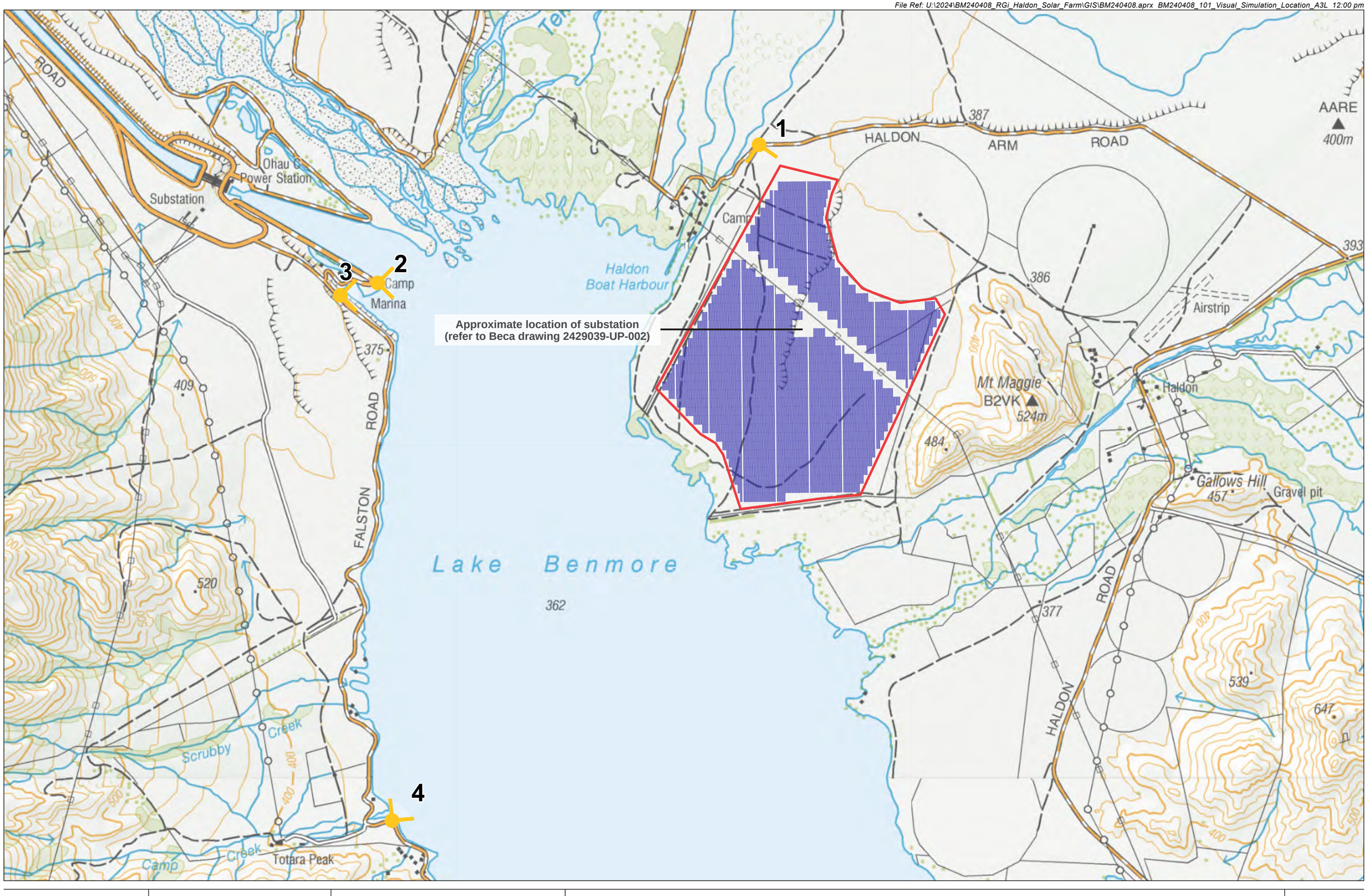
HALDON SOLAR FARM

Site Context Photographs 15 - 16

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc



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0 640 m

1:25,000 @ A3

Data Sources: Eagle Technology, Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Visual Simulation 1 - 4

Solar Panel Extent

Site Boundary

HALDON SOLAR FARM

Visual Simulation Locations

Date: 12 March 2025 | Revision: 1

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Figure 6

Existing View

Proposed View

Note: Solar panels shown at 60 degree tilt facing west

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Viewpoint Details

NZTM Easting	: 1 379 277.8 mE
NZTM Northing	: 5 086 600.4 mN
Elevation/Eye Height	: 373.1m / 1.6m
Date of Photography	: 11:22am 21 August 2024 NZST

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 1 90° - Haldon Arm Road

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: CMu | Checked: SMc

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Viewpoint Details

NZTM Easting	: 1 379 277.8 mE	Horizontal Field of View	: 40°
NZTM Northing	: 5 086 600.4 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 373.1m / 1.6m	Projection	: NA
Date of Photography	: 11:22am 21 August 2024 NZST	Image Reading Distance @ A3 is 50 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 1 40° - Haldon Arm Road

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

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Viewpoint Details

NZTM Easting	: 1 379 277.8 mE	Horizontal Field of View	: 40°
NZTM Northing	: 5 086 600.4 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 373.1m / 1.6m	Projection	: NA
Date of Photography	: 11:22am 21 August 2024 NZST	Image Reading Distance @ A3 is 50 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 1 40° - Haldon Arm Road

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

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Viewpoint Details

NZTM Easting	: 1 379 277.8 mE	Horizontal Field of View	: 40°
NZTM Northing	: 5 086 600.4 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 373.1m / 1.6m	Projection	: NA
Date of Photography	: 11:22am 21 August 2024 NZST	Image Reading Distance @ A3 is 50 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 1a 40° - Haldon Arm Road

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Existing View

Proposed View

Note: Solar panels shown at 60 degree tilt facing west

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Viewpoint Details

NZTM Easting	: 1 376 509.2 mE
NZTM Northing	: 5 085 596.9 mN
Elevation/Eye Height	: 362.8m / 1.6m
Date of Photography	: 14:42pm 21 August 2024 NZST

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 2 90° - Lake Benmore Camp Ground (lower)

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: CMu | Checked: SMc

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Viewpoint Details

NZTM Easting	: 1 376 509.2 mE	Horizontal Field of View	: 40°
NZTM Northing	: 5 085 596.9 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 362.8m / 1.6m	Projection	: NA
Date of Photography	: 14:42pm 21 August 2024 NZST	Image Reading Distance @ A3 is 50 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 2 40° - Lake Benmore Camp Ground (lower)

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

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Viewpoint Details

NZTM Easting	: 1 376 509.2 mE	Horizontal Field of View	: 40°
NZTM Northing	: 5 085 596.9 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 362.8m / 1.6m	Projection	: NA
Date of Photography	: 14:42pm 21 August 2024 NZST	Image Reading Distance @ A3 is 50 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 2 40° - Lake Benmore Camp Ground (lower)

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Existing View

Proposed View

Note: Solar panels shown at 60 degree tilt facing west

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Viewpoint Details

NZTM Easting	: 1 376 238.4 mE	Horizontal Field of View	: 90°
NZTM Northing	: 5 085 506.9 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 377.2m / 1.6m	Projection	: Rectilinear
Date of Photography	: 14:58pm 21 August 2024 NZST	Image Reading Distance @ A3 is 20 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 3 90° Lake Benmore Camp Ground (upper)

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: CMu | Checked: SMc

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Viewpoint Details

NZTM Easting	: 1 376 238.4 mE
NZTM Northing	: 5 085 506.9 mN
Elevation/Eye Height	: 377.2m / 1.6m
Date of Photography	: 14:58pm 21 August 2024 NZST

Horizontal Field of View	: 40°
Vertical Field of View	: 30°
Projection	: NA
Image Reading Distance @ A3 is 50 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 3 40° - Lake Benmore Camp Ground (upper)

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

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Viewpoint Details

NZTM Easting	: 1 376 238.4 mE
NZTM Northing	: 5 085 506.9 mN
Elevation/Eye Height	: 377.2m / 1.6m
Date of Photography	: 14:58pm 21 August 2024 NZST

Horizontal Field of View	: 40°
Vertical Field of View	: 30°
Projection	: NA
Image Reading Distance @ A3 is 50 cm	

Data Sources:

HALDON SOLAR FARM

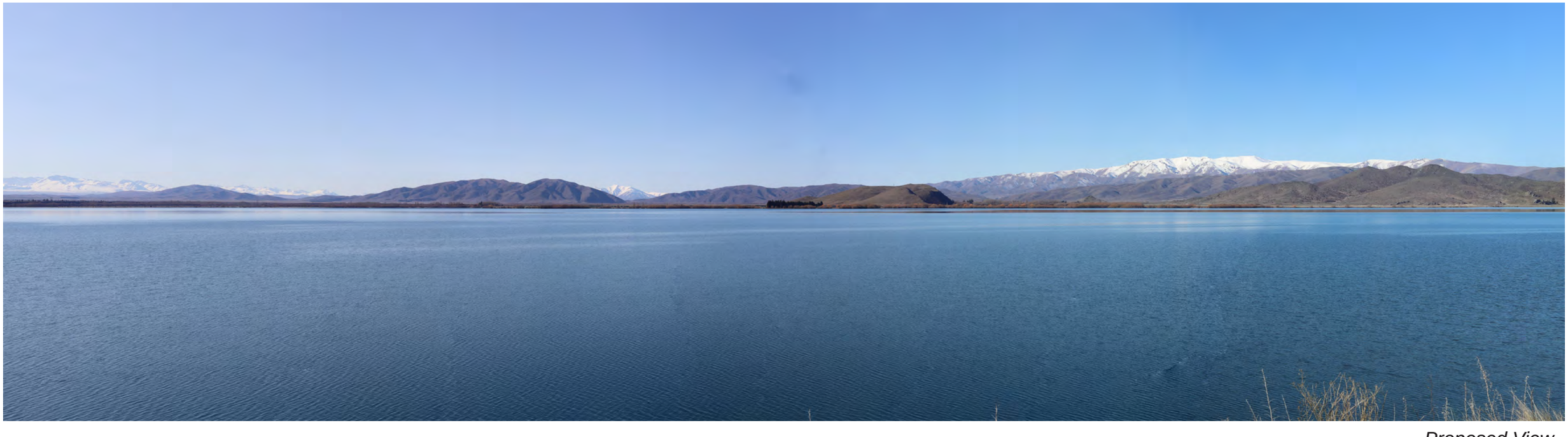
Visual Simulation 3 40° - Lake Benmore Camp Ground (upper)

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

Existing View



Proposed View

Note: Solar panels shown at 60 degree tilt facing west

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Viewpoint Details

NZTM Easting	: 1 376 612.4 mE	Horizontal Field of View	: 90°
NZTM Northing	: 5 081 692.1 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 368.9m / 1.6m	Projection	: Rectilinear
Date of Photography	: 15:17pm 21 August 2024 NZST	Image Reading Distance @ A3 is 20 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 4 90° - Falston Road

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: CMu | Checked: SMc

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Viewpoint Details

NZTM Easting	: 1 376 612.4 mE	Horizontal Field of View	: 40°
NZTM Northing	: 5 081 692.1 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 368.9m / 1.6m	Projection	: NA
Date of Photography	: 15:17pm 21 August 2024 NZST	Image Reading Distance @ A3 is 50 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 4 40° - Falston Road

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

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Viewpoint Details

NZTM Easting	: 1 376 612.4 mE	Horizontal Field of View	: 40°
NZTM Northing	: 5 081 692.1 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 368.9m / 1.6m	Projection	: NA
Date of Photography	: 15:17pm 21 August 2024 NZST	Image Reading Distance @ A3 is 50 cm	

Data Sources:

HALDON SOLAR FARM

Visual Simulation 4 40° - Falston Road

Date: 9 April 2025 | Revision: 0

Plan prepared for Lodestones Energy by Boffa Miskell Limited

Project Manager: Rhys.Girvan@boffamiskell.co.nz | Drawn: SCh | Checked: SMc

VISUALISATIONS - METHODOLOGY

SITE VISIT & PHOTOGRAPHY

Site photographs were taken with a Canon digital SLR camera fitted with a 50mm focal length lens, mounted on a tripod and panoramic head. A series of photos were taken at predetermined viewpoints, situated on public land. The locations of each viewpoint were fixed using an EMLID Reach 2 GPS Rover Unit.

NZILA GUIDELINES & PANORAMA PREPARATION

The visualisations have been produced in accordance with the Tuia Pito Ora New Zealand Institute of Landscape Architects (NZILA) Best Practice Guidelines for Visual Simulations (BPG 10.2) and also adhere to Boffa Miskell's internal Visualisation Guidelines.

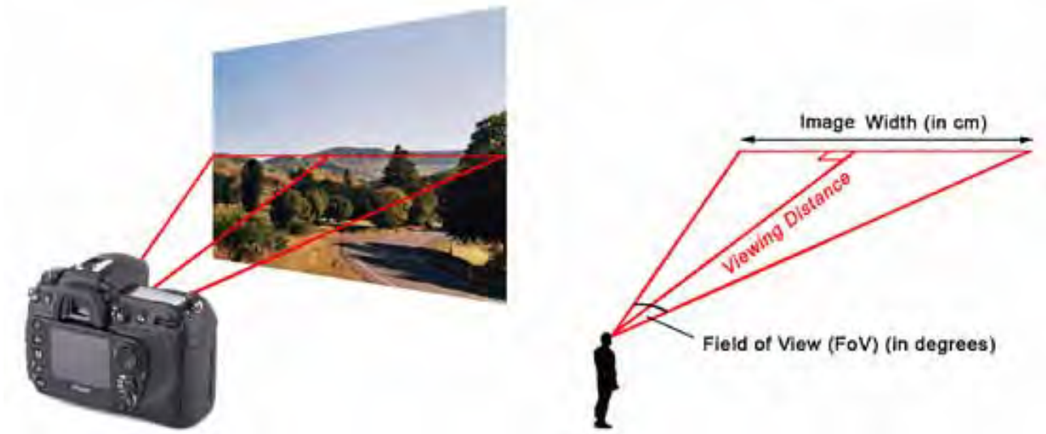
Camera lenses with different focal lengths capture images with differing fields of view. As can be seen below (derived from Fig 9 of the NZILA BPG), a photo taken with a 28mm lens provides a horizontal field of view of 65º. A 50mm lens will provide a cropped (40º) version of the same view. So panoramas can be created by taking multiple 28mm or 50mm photos (in "portrait" mode), and using digital stitching software to merge and crop to create a single panorama. The panoramas used in these visualisations have a field of view of 40° and 90°.

3D MODELLING

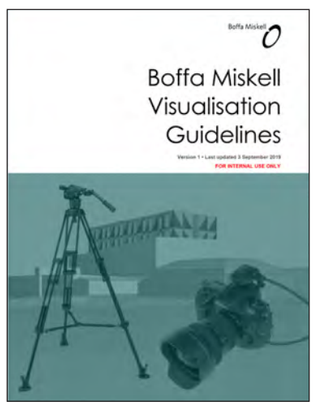
Virtual camera views were then created in 3D modelling software, and 3D terrain data and architectural modelling were imported. These views were then registered over the corresponding photographic panorama, using identifiable features in the landscape and the characteristics of the camera to match the two together. The visualisations were then assembled using graphic design software.

IMAGE READING DISTANCES

These visualisations have a field of view of 40º and 90º and so should be viewed from a distance of 50cm and 20cm respectively when printed at A3. This will ensure that each simulation is viewed as if standing on-site at the actual camera location, and is in accordance with Section 7.11 of the NZILA BPG. Users are encouraged to print these pages on A3 transparency, go to the viewpoint and hold at the specified reading distance in order to verify the methodology.

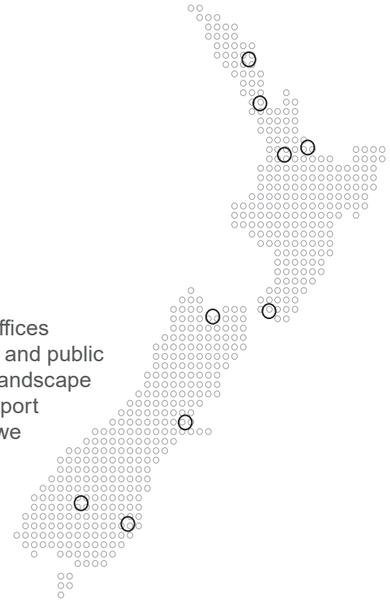


Geometry of Image Reading Distance



Together. Shaping Better Places.

Boffa Miskell is a leading New Zealand environmental consultancy with nine offices throughout Aotearoa. We work with a wide range of local, international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, Te Hīhiri (cultural advisory), engagement, transport advisory, climate change, graphics and mapping. Over the past five decades we have built a reputation for creativity, professionalism, innovation and excellence by understanding each project's interconnections with the wider environmental, social, cultural and economic context.



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