Boffa Miskell

Buckleys Road Solar Farm

Landscape Effects Assessment
Prepared for KeaX Energy

9 August 2023

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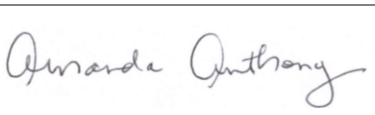
Prepared by:	Amanda Anthony Associate Principal NZILA Registered Landscape Architect Boffa Miskell Limited	
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Cover photograph: View from Branch Drain Road, looking in an easterly direction across the Site, © Amanda Anthony, 2023.

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1.0 Introduction

Boffa Miskell Limited (BML) has been engaged by KeaX Limited ("Kea Energy") to undertake a Landscape Effects Assessment (LEA) for a proposed 111 hectare (ha) solar farm located at 150 Buckleys Road, Brookside in Canterbury (otherwise referred to as 'The Site' in this report). The Site is situated approximately 5.5 kms north of Leeston and 10 kms west of Lake Ellesmere/Te Waihora. It spans across four parcels of land and contains a Wāhi Taonga Management Site (C59 consisting of ovens/middens) near the south-eastern boundary. Refer to **Image 1** below.

The Site is zoned Outer Plains under the Operative Selwyn District Plan (ODP). Under the Proposed Selwyn District Plan (PDP), the Site is zoned General Rural Zone. The proposal has been assessed as a Discretionary activity under the ODP.

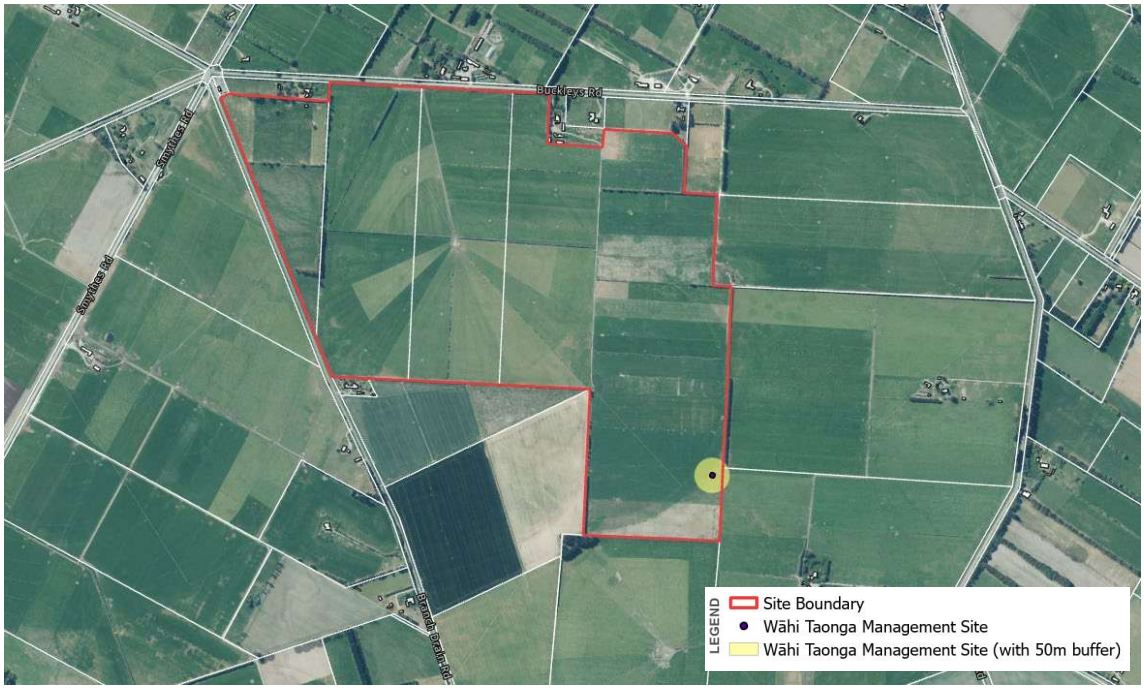

***Image 1**: The Site extent and Wāhi Taonga Management Site (C59).*

This assessment has considered the proposal in the context of the existing environment, landscape values that relate to the Site, the statutory provisions and the potential landscape effects of the proposal on the receiving environment. A full planning assessment is contained in the Assessment of Environment Effects (AEE) prepared by BML.

2.0 Assessment Methodology

This assessment follows 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, this report will assess landscape (character and values) and visual matters (including the nature of potential effects in the context of the relevant statutory planning provisions), relating to the proposed solar farm.

The effects ratings are based upon a seven-point scale, which ranges from very low to very high. A **Graphic Supplement** has been included as **Appendix 3**, which includes a context map, viewpoint map, Site photographs, and a Landscape Mitigation Plan.

2.1 Assessment Process

The assessment involved the following tasks:

- Familiarisation with the proposed solar farm area and review of background documents relating to the proposal.
- Review of technical drawings and reports relating to the Site:
    - Ecological Assessment prepared by BML, dated July 2023.
    - Drawings of the proposed solar farm prepared by Kea Energy, dated July 2023.
- Desktop analysis of the Site and surrounding landscape context, including a review of relevant information relating to landscape and visual aspects. Specifically:
    - Selwyn District Landscape Study, BML, 2018.
    - Selwyn District Rural Character Assessment, BML, 2017.
- Site visit: Amanda Anthony, a Registered Landscape Architect of Boffa Miskell visited the Site on 14 June 2023 during clear and sunny weather conditions. While on the Site visit, the immediate surrounding area was also visited to understand the area's physical and visual relationship to nearby public and private locations. Representative public viewpoints were visited, and viewpoints are included in **Appendix 3: Graphic Supplement**.
- Review of statutory provisions such as:
    - The Resource Management Act 1991 ("**RMA**")
    - Canterbury Regional Policy Statement ("**CRPS**")
    - Selwyn District Plan ("**SDP**") – Operative and Proposed
- Description of the solar farm proposal.
- Description of the existing environment including the landscape values at a local level.
- Assessment of landscape and visual effects of the proposed solar farm.
- Recommended consent conditions to mitigate adverse effects and promote positive effects.

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

3.0 The Proposal

KeaX proposes to construct a 111ha solar farm at 150 Buckleys Road, Leeston. The Site is located directly southeast of an existing Orion substation that will facilitate connections into the local lines network. The overall capacity of the solar farm will be able to generate energy for approximately 11,200 homes in Canterbury annually, equating to 100GWh on completion. It is proposed to construct the solar array in its entirely and not stage the works. The proposed solar farm will take approximately 12 months to construct.

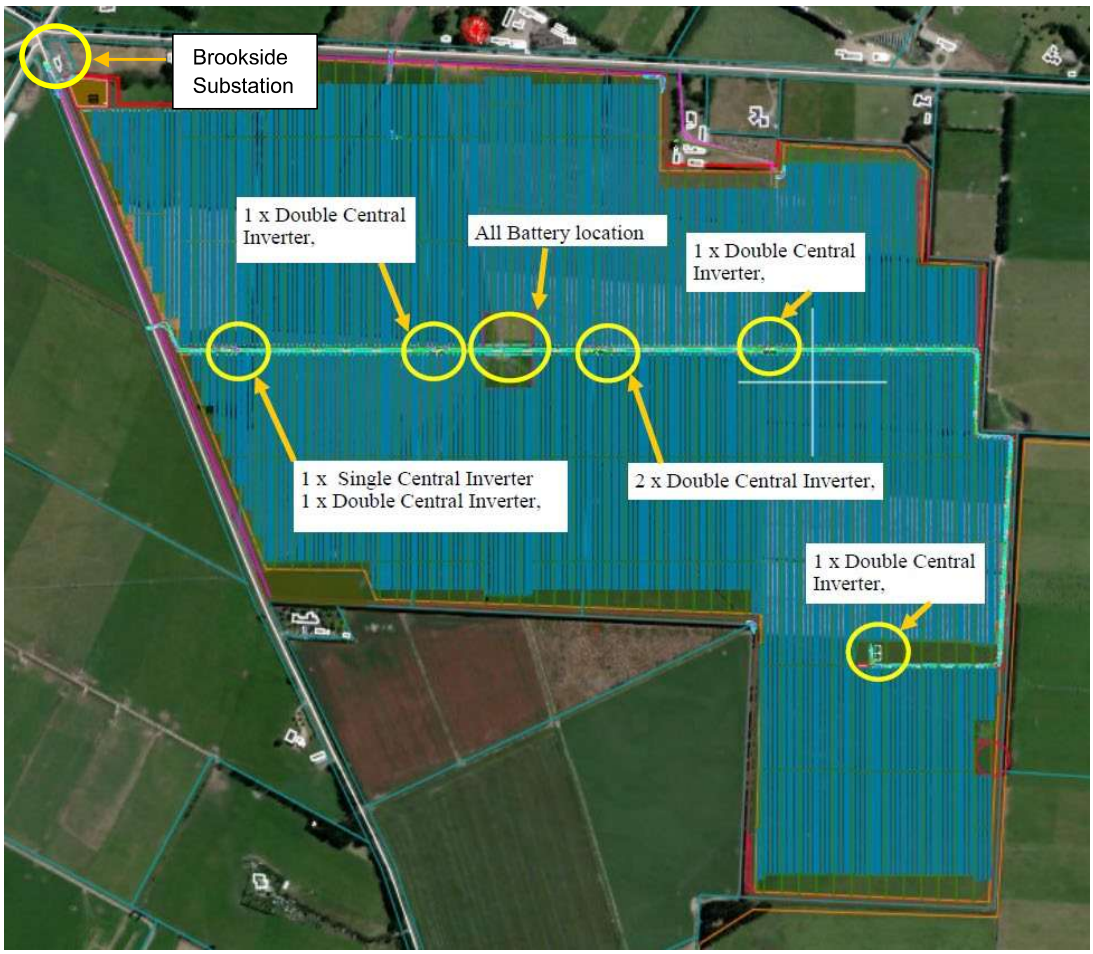

***Image 2**: Indicative proposed solar farm layout, KeaX.*

The solar array will consist of a single axis tracking system and move with the sun throughout the day. There will be approximately 140,000 modules in total. The panels will be approximately 1.30m wide and approximately 2.38m long. When flat/horizontal (in stow position) they will be 1.80m above the ground extending to 500mm above the ground and no more than 3.0m above the ground (during maximum tilt).

They will be on piles that are driven into the ground approximately 1.8m deep and the piles are approximately 6.5m apart. It is proposed that the rows will be approximately 4.0m apart (when the panels are flat). Refer to **Image 3** below. The reflectivity value of the panels will be below 4%.

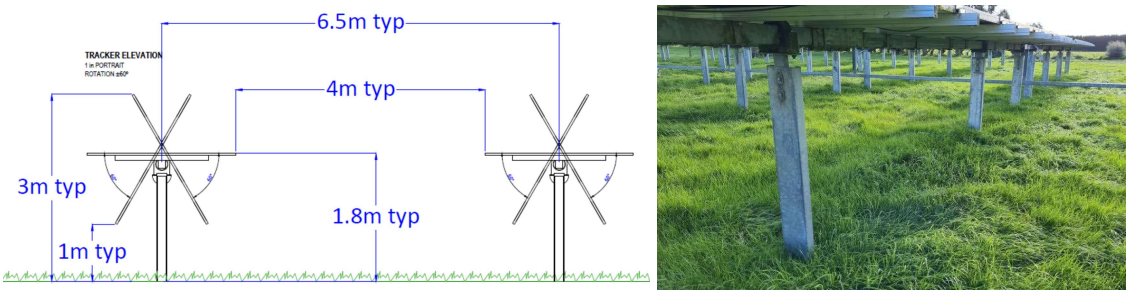

Image 3: *Example of a generic single axis tracking system (diagram and photo), KeaX.*

It is proposed that sheep will graze underneath the panels to maintain the grassy land cover. The solar panels will be setback at least 40m from the shared boundary with 324 Branch Drain Road and approximately 20m from remainder of the southern boundary. This will enable a new shelterbelt to be established and allow for maintenance access on either way. Refer to **Image 2** above.

The Site will be accessed from an existing accessway from Branch Drain Road, approximately halfway between the northwest corner of the Site (near the substation) and 324 Branch Drain Road, the southwest corner of the Site. The vehicle crossing will be upgraded prior to commencing construction on the Site.

As illustrated in **Image 2** above, KeaX proposes to construct several buildings across the Site. The number and nature of permanent buildings proposed to be located on the Site is as follows:

- (1) Single Skid Inverter – 10.2m long, 2.1m wide, and 2.25m high, covering an area of approximately 21.42m².
- (6) Twin Skid Inverter – 9.2m long, 5.4m wide, and 2.35m high, covering an area of approximately 25m².
- Site office will be 12m in length and 4.198m in width, covering an area of approximately 50.4m².
- Storage buildings for retaining equipment and materials on site: Comprised of four 40ft shipping containers approximately 59.4m² each (12.19m long, 2.44m wide, and 2.59m high).
- One future battery site, situated in the middle of the Site will be 14 x 40ft containers.

During construction it is expected there will be a series of Site preparation works, earthworks, and installation of solar panels within the Site. These are outlined below.

Site preparation works: To prepare the Site for the installation of the panels, all existing internal fencing and structures such as irrigators will be removed, as well as shelter belt plantings that are internal to the Site. Trees that will be removed will be utilised for firewood by the landowners. All existing road boundary plantings and shelterbelts will remain on Site.

It is proposed to retain some of the water infrastructure, including existing water tanks, to provide water for livestock grazing on the Site, and reduced irrigation.

The Wāhi Taonga Management Site – C59 within the Site will be fenced off, with a 50m buffer surrounding the area as part of the site preparation works.

Earthworks: KeaX will complete the piling required to install each module/panel, with a piling machine, to avoid excavation. Trenches will also be dug to install the inverter cables in order to

connect to the Orion network (via the Brookside Substation at the north-western corner of the Site).

Security Fencing: Fencing is proposed to be erected along the road boundaries for security. The fencing will be a chain link fence with barbed wire on top. The fencing will have a maximum height of 2.65m, and the fence posts will not exceed 3m in height. The fencing will be located behind the existing and proposed planting. Refer to **Image 4** below. The security gates will be the same height as the fence: 2.65m.

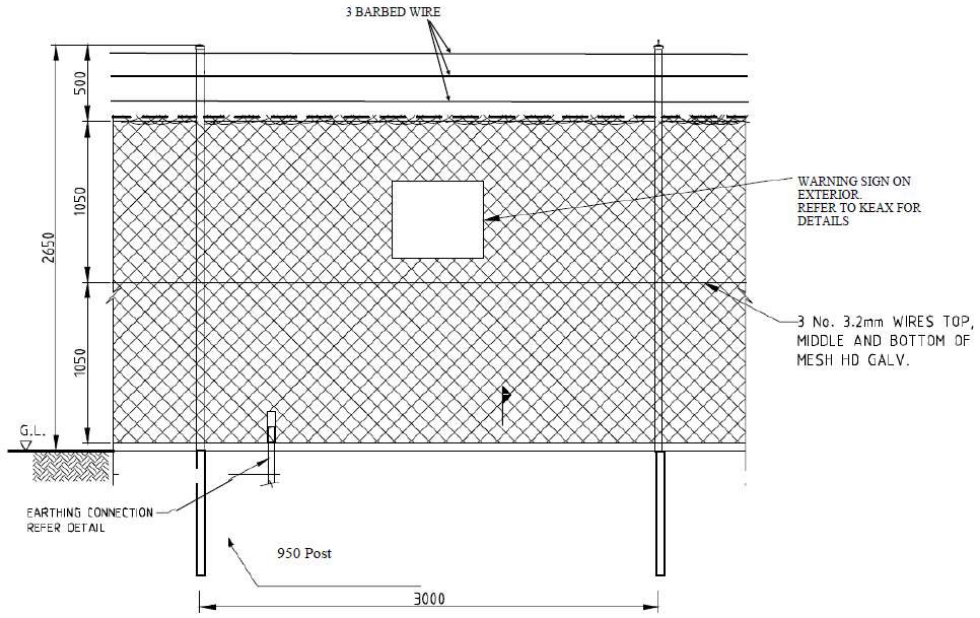

***Image 4**: Typical fence detail of the proposed security fence to surround the Site, KeaX.*

Existing Site boundary planting: There is a range of existing native and exotic vegetation that borders the Site boundaries, most of which is over 2m in height. Refer to **Image 5** below for an example of an existing shelterbelt located at the south-western corner of the Site (shared boundary with 324 Branch Drain Road). The existing native vegetation and exotic shelterbelts along the Site boundaries will be retained as illustrated in **Figure 3** in the Graphic Supplement.

***Image 5**: Example of an existing shelterbelt along the shared boundary with 324 Branch Drain Road.*

Proposed Site boundary planting: Where there are gaps in the existing vegetation along the Site boundary, fast growing, evergreen exotic shelterbelt plant species at 2m in height will be planted. Where additional vegetation is required to supplement existing vegetation, a smaller grade of plant will be implemented (PB3 size). Refer to **Figures 3 – 5 and 19** in the Graphic Supplement for further details. All existing and proposed planting that has been relied on for mitigation purposes is within the Site boundary and will be retained/maintained by KeaX for the life of the solar farm to a height of 3.5m.

3.1 Visual Simulations

Two visual simulations illustrating the proposal have been prepared to provide a greater understanding of its extent of visibility from the nearby road network. The visual simulations have been prepared in accordance with the NZILA Best Practice Guideline for Visual Simulations[2]. The simulations illustrate the proposal once it has been constructed (with 2m high, staggered, double rows of exotic shelterbelt species in between the 'gaps' in existing vegetation) and five years after the planting has been implemented (plants shown at 3.5m after 5 years). Refer to **Figure 3 and 19**.

The visual simulations have relied on the following assumptions:

- The solar panels will be tracking which means their orientation will change throughout the day to follow the sun. The visual simulations illustrate the solar panel modules at a 60-degree tilt reaching a height of approximately 3m above ground level at their highest point. This depicts a worst-case scenario (at a point in time) where the solar panels would be at their maximum height for the morning/afternoon sun.
- The chain link fence is approximately 2.6m in height.
- The 3m wide mitigation planting includes fast growing, evergreen shelterbelts species at approximately 2m high[3] (planted prior to construction) and after 5 years of being in the ground (maintained to a height of 3.5m). The respective plant growth rates have been sourced from the Southern Woods website[4].

It should be noted that any form of visualisation does not depict "real-life views". Rather they are a tool which illustrates a view of a proposed activity from a viewpoint as depicted – not as it would appear in reality with the human eye. Therefore, visual simulations are not solely relied on to determine the nature and level of visual effects but rather to assist in the assessment of visual effects. This is explained further in the simulation methodology – refer to **Appendix 3** Graphic Supplement, **Figure 21** Visual Simulation Methodology.

4.0 Existing Environment

4.1 Broader Landscape Context

The Site is located within the Low Altitude Plains Landscape Character Area as identified in the Selwyn District Landscape Study[5]. The Low Altitude Plains are contained by two large, braided rivers, the Waimakariri River to the north and Rakaia to the south. The broader landscape is characterised by open and expansive plains which have been highly modified to accommodate large scale agricultural farming and small rural towns. The broader landscape surrounding the Site is within a river floodplain relating to the Waikirikiri/Selwyn River and its tributaries. The

[2] https://nzila.co.nz/media/uploads/2017_01/vissim_bpg102_lowfinal.pdf
[3] 2m high plants will be implemented where there is no vegetation or gaps along the Site boundary, where there is existing vegetation that needs to be supplemented, a smaller grade (PB3) of plants will be implemented.
[4] https://www.southernwoods.co.nz/
[5] Selwyn District Landscape Study, prepared by BML, dated 2018.

nearby Selwyn and Irwell Rivers flow into Te Waihora/Lake Ellesmere, approximately 11kms south-east of the Site.

In the wider landscape, agricultural patterns of shelterbelts, fenced paddocks and pivot irrigators create a distinctive patchwork pattern on the land. There is a distinct lack of native vegetation present on the plains as much of the vegetation has been cleared, cultivated and converted into dairy farms within the last decade.

There is a clear land use pattern apparent throughout the Low Altitude Plains which is predominantly intensive agriculture. Dairy farming is the dominant agricultural use in the southern parts of the Selwyn rural landscape, with sheep and beef farming and areas of cropping/arable farming common as well. The majority of land south of the Selwyn River has been converted into irrigated dairy farming and has a 'spacious' appearance by views gained across the flat plains. Single storey dwellings are scattered across the landscape and near the small rural township of Leeston.

The Brookside Substation is located directly north-west of the Site on the corner of Buckleys and Branch Drain Roads. At this road intersection, there are numerous overhead powerlines apparent that all feed into the substation and continue off in different directions across the Canterbury Plains. In addition to this, solar panels are already part of the existing environment as illustrated below in **Image 6**.

***Image 6**: Example of existing solar panels located north of the Site on Buckleys Road.*

The broader landscape context surrounding the Site shares a similar character to the wider Low Altitude Plains which consists of a rural landscape that is relatively flat with little topographical relief and established shelter belts that delineate agricultural land uses. There is also energy infrastructure in place and apparent in the immediate landscape surrounding the Site.

4.2 The Site

The Site is located at 150 Buckleys Road, Brookside, and is approximately 111ha in area, comprising four parcels of land. The small rural town of Leeston is located approximately 5.5kms south of the Site and Dunsandel (situated on State Highway 1) is approximately 8kms northwest. The Site is bound to the north by Brookside Substation, Buckleys Road, small rural farms and lifestyle blocks screened by shelterbelts and agricultural paddocks. The eastern Site boundary borders a dairy farm, and the southern Site boundary borders a dairy farm,

agricultural paddocks and a residential dwelling. The western Site boundary borders Branch Drain Road. Refer to **Figure 2** in the Graphic Supplement.

The Site is largely flat in nature and situated between 30 and 40 meters above sea level (masl). The land cover of the Site includes mostly grassed paddocks framed by established shelter belts and native plantings along Buckleys/Branch Drain Roads. The paddocks are delineated by shelter belts, mature trees and post and wire fencing.

The Site is currently used as a dairy farm and features pivot irrigators, shelter belts, cows and overhead powerlines. Neighbouring the Site are several residential properties on lifestyle or farm blocks. Many of these properties have ancillary structures associated with the main dwelling and are surrounded by large shelter belts or other intervening vegetation. The Site has two main access points, Buckleys Road to the north and Branch Drain Road to the east.

Overall, the Site is located adjacent to the Brookside Substation within a highly modified, flat rural landscape currently used for dairy farming and is predominately screened by existing shelterbelts.

4.3 Landscape Values

The Site is located within a highly modified rural landscape and is characterised by several forms of linearity including shelterbelts and paddocks. The Site is not located in an Outstanding Natural Landscape (ONL) or in a Visual Amenity Landscape (VAL) in either the District or Regional Plans. However, the Site does possess a distinctive rural character and as such the rural amenity values that relate to the Site are outlined below:

- Areas of open, green pasture which are separated into paddocks by linear shelterbelts and mature trees that criss-cross the landscape.
- There is a general lack of structures and buildings, aside from the pivot irrigators and power lines.

The Site has identified mana whenua values relating to a Wāhi Taonga overlay (C59 – consisting of ovens/middens). Engagement with Mahaanui Kurataiao Ltd has taken place by BML to better understand the location, extent and character of the C59 Wāhi Taonga Site. Following this engagement, a 50m buffer zone surrounding the area has been agreed upon and will be implemented.

4.4 Visual Catchment

To determine the visual catchment and viewing audience of the proposed solar farm, a study of aerial photography including land use, landform and vegetation patterns was undertaken in addition to visiting the Site and surrounding local area. Below is a description of the visual catchment and representative public viewpoint locations contained within the **Graphic Supplement (Appendix 3)**.

Private properties which could be affected have been visually surveyed from nearby publicly accessible locations where possible, with further reference to aerial imagery to understand the nature of these potential viewing audiences.

Due to the flat topography of this landscape, the visual catchment of the Site is limited to the immediate surrounding area. The viewing audience includes private properties neighbouring the

Site boundary and road users of Buckleys, Hanmer, Caldwells, Grahams, Branch Drain and Smythes Roads. Overall, the Site has limited visibility in the broader landscape, due in part to the flat nature of Site and intervening vegetation.

Public viewing audiences consist of:

- Road users of Buckleys Road, Caldwells Road, Hanmer Road, Grahams Road, Branch Drain Road and Smythes Road.

Private viewing audiences consist of:

- Nearby dwellings located on Buckleys Road, Caldwells Road, Grahams Road, Branch Drain Road, Smythes Road and Irwell Rakaia Road. Refer to **Section 6.2** for the Visual Effects assessment and **Appendix 2** for a detailed visibility analysis.

A range of viewpoints representing the key public viewing audiences have been selected and are outlined below. The location of the following Viewpoints is illustrated in **Figure 2**.

Viewpoints 1 – 3 are located on Buckleys Road, north of the Site, looking in a southerly direction towards the Site. These views illustrate the varying visibility of the Site due to the presence (or not) of existing vegetation in place, along the length of Buckleys Road.

Viewpoints 4 – 6 are located on Caldwells Road, east of the Site, looking in a westerly direction towards the Site. From here, the Site is located approximately 685m – 970m to the west of Caldwells Road with only a small portion of the Site visible as illustrated by the red lines.

Viewpoint 7 is located on Grahams Road, approximately 960m south of the Site, looking in a northerly direction towards the Site. From here, the Site would likely be indiscernible due to intervening vegetation.

Viewpoints 8 – 14 are located along the length of Branch Drain Road, west of the Site, looking in an easterly direction towards or across the Site. Where the Site borders Branch Drain Road, views into the Site are more readily available (in between gaps in the existing vegetation) than from further away.

Viewpoint 15 is located on Smythes Road, approximately 360m west of the Site, looking in an easterly direction towards the Site. From there, partial views of the Site may be available in between the gaps in existing vegetation however the existing planting along the western Site boundary filters the view into the Site.

Refer to **Section 6.2** for the Visual Effects assessment and **Appendix 2** for a detailed visibility analysis.

5.0 Statutory Provisions

The following is a review of the statutory provisions relevant to the assessment. The purpose of such a review is to help frame the landscape assessment rather than to undertake a

comprehensive appraisal of the provisions or a planning assessment of the proposal against the provisions. There are a number of planning provisions that are relevant to this proposal, and these are discussed below.

5.1 Resource Management Act (RMA)

The RMA provisions relevant to landscape and visual effects addressed in this report are in respect of:

- Section 7(c) – the maintenance and enhancement of amenity values.
- Section 7(f) – the maintenance and enhancement of the quality of the environment.

5.2 Canterbury Regional Policy Statement (CRPS)

The key objectives, and policies in the Canterbury Regional Policy Statement that relate to the proposal include the following:

12.2.2 Identification and management of other landscapes

The identification and management of other important landscapes that are not outstanding natural landscapes. Other important landscapes (relevant to the Site) may include amenity and cultural heritage (Wāhi Taonga Site C59).

Policy 13.3.3 Historic cultural and historic heritage landscapes

Significant historic cultural and historic heritage landscapes are to be protected from inappropriate subdivision, use and development.

5.3 Selwyn Operative District Plan (OPD)

Under the Operative District Plan, the Site is zoned Outer Plains and includes Wāhi Taonga Site C59 relating to Ovens/Middens. The proposal is defined as a 'utility' in the ODP and has been assessed as a Discretionary activity.

5.4 Selwyn Proposed District Plan (PDP)

Under the PDP, the Site is zoned General Rural Zone and has been assessed as a Discretionary activity. The key objectives and policies in the PDP that relate to the proposal include the following:

GRUZ-O1 Subdivision, use, and development in rural areas that:

1. supports, maintains, or enhances the function and form, character, and amenity value of rural areas;
2. prioritises primary production, over other activities to recognise its importance to the economy and wellbeing of the district;
3. allows primary production to operate without being compromised by reverse sensitivity; and
4. retains a contrast in character to urban areas.

GRUZ-P1 Maintain or enhance rural character and amenity values of rural areas by:

1. retaining a low overall building density, and predominance of vegetation cover;
2. enabling primary production while managing adverse effects of intensive primary production, and mineral extractive industries;
3. managing the density and location of residential development; and
4. retaining a clear delineation and contrast between the district's rural areas and urban areas, including Christchurch City.

6.0 Assessment of Effects

A landscape effect is a consequence of changes in a landscape's physical attributes on that landscape's values. Change is not an effect: landscapes change constantly. It is the implications of change on landscape values that are relevant. While an effect arises from changes to physical attributes, the consequences on landscape values relate to all of a landscape's physical, associative, and perceptual dimensions. Landscape effects can be adverse, neutral, and positive.

Effects are considered against the existing and potential landscape values, and the outcomes sought in the statutory provisions. Such provisions often anticipate change and achieve certain landscape values. Whether effects on landscape values are appropriate will therefore depend both on the nature and magnitude of the effect on the existing landscape values and what the provisions anticipate.

The landscape and visual effects have been determined using a seven-point scale ranging from very low to very high as set out in **Appendix 1** of the assessment methodology.

Particular effects considered relate to the following:

- Landscape Effects: Physical Effects
- Landscape Effects: Rural Character Effects and
- Visual effects from public and private locations.

The principal elements of the proposal that will give rise to landscape effects are:

- A change from an open, rural landscape to one containing energy infrastructure and solar arrays.

6.1 Landscape Effects

6.1.1 Physical Landscape Effects

The assessment of physical effects considers the nature and significance of modifications to the landform of the Site and existing vegetation.

The flat topography across the Site will remain unchanged as no large bulk earthworks will be required as part of the proposal. There will be minor disturbance to the soil associated with the construction of the solar panels, inverters, cable trenching and security fencing around the Site. The foundations to support the solar panel frames will be pile driven into the ground to minimise the overall earthworks required on Site.

Existing Site boundary vegetation will be retained, however all existing trees and shelterbelts within the wider Site will be removed to make way for the solar farm. Internal vegetation (shelterbelts) will be removed prior to construction. However, the Site will remain grassed and be utilised for grazing by sheep. The proposed mitigation planting will be implemented along the full extent of the Site boundary where there is no existing boundary planting or where it needs to be increased. The fast-growing, evergreen exotic shelterbelt species chosen will be hardy to the Site conditions, giving the proposed planting the best opportunity to thrive and achieve meaningful visual screening. Planting will assist with reducing the visibility of the solar farm structures when viewed from the immediate and wider context.

The removal of all internal Site vegetation that relates to the Site's character will have a **low (adverse)** effect on the physical nature of the Site. As the mitigation planting establishes along the Site boundaries, the removal of the internal vegetation will be indiscernible.

6.1.2 Rural Character Effects

Landscape character is derived from the distinct and recognisable pattern of elements that occur consistently in a particular landscape. It reflects particular combinations of geology, landform, soils, vegetation, land use and features of human settlement. It creates the unique sense of place defining different areas of the landscape.

The proposed solar farm will introduce delineating structures into the rural landscape which currently displays an open character that is somewhat interrupted by the verticality of the surrounding shelterbelts. The Sites' open, rural character will be infilled will solar panel modules between shelter belts that border the Site's boundary. The Site will transition from a rural dairy farm to a landscape containing energy infrastructure. The expanse of open space will be reduced to areas between solar panels. Grazing animals, such as sheep, will continue to manage the pasture underneath the panels and frames. The presence of grazing animals maintains a sense of the rural character of the Site.

The ODP provisions in the Rural Zone provide for horticultural infrastructure such as hot houses with dirt floors that can reach heights of 12m in addition to plantation forestry. These land uses are anticipated outcomes and form part of the mosaic found in the rural environment.

The proposed solar panels will have a low profile in the context of the flat topography (being up to 3m in height) and the surrounding vegetation when compared to hot houses (up to 12m in height) or forestry. Due to this, the solar farm is not expected to be a prominent feature in the landscape when viewed from beyond the immediate context of the Site. Any anticipated effects on the landscape character would be very localised.

The 3m wide landscape buffer planting proposed (along Site boundaries that do not have planting) will assist in integrating the proposal into the landscape, softening the infrastructure and providing a vegetative backdrop. Refer to **Figure 3** in the Graphic Supplement. The proposed landscape buffer will provide screening from the neighbouring private properties and public roads while visually containing the proposal within the Site.

Based on the above, a (very localised) **low-moderate (adverse)** effect is anticipated on the rural character values and amenity of the Site. This relates to the removal of internal vegetation,

the introduction of solar panel structures and associated infrastructure. However, as the proposed mitigation planting grows and establishes along the Site boundary, the solar farm will be visually contained within the Site. Beyond the Site, the adverse effects on the landscape are expected to reduce over time to **low (adverse).**

6.2 Visual Effects

Visual amenity effects are influenced by a number of factors including the nature of the proposal, the landscape absorption capability and the character of the Site and the surrounding area. Visual amenity effects are also dependent on the distance between the viewer and the proposal, the complexity of the intervening landscape and the nature of the view.

Due to the flat topography of this landscape, the visual catchment of the Site is limited to the immediate surrounding area. The viewing audience includes private properties neighbouring the Site boundary and road users of Buckleys, Hanmer, Caldwells, Grahams, Branch Drain and Smythes Roads. Refer to the **Viewpoints 1-15** and **Figure 2** in the Graphic Supplement.

6.2.1 Visual Effects from public locations

From the surrounding roads that border the Site, (Buckleys and Branch Drain Roads), the views vary from open to no view of the Site due to gaps in existing vegetation or established, mature shelterbelts along the Site's boundaries. The surrounding road corridors provide transient views for road users.

6.2.1.1 Buckleys Road

***Image 7**: View from Buckleys Road, looking in a southerly direction across the Site.*

The Site borders Buckleys Road for approximately 610m along its northern boundary. As illustrated in **Image 7** above and **Viewpoint 1/Visual Simulation 1**, road users have intermittent, open views of the Site for a combined total of 100m due to gaps in the existing vegetation along Buckleys Road. For the remaining length of the road, there are glimpsed to no

views of the Site due to established plantings that line the remainder of the northern Site boundary.

The solar panels will be setback approximately 25m near the north-east boundary with Buckleys Road and to 55m from the north-west boundary with Buckleys Road. Prior to the construction of the solar farm, 2m tall fast growing exotic evergreen shelter belt plant specimens will be planted in the 'gaps' between existing vegetation. This will initially filter views of the proposal until the proposed exotic planting fills out the gaps and provides full screening of the Site. In the short term, glimpses of solar panels will be apparent in the gaps. However due to the tracking solar system, the overall height of the panels will vary throughout the day as the panels rotate with the sun. The panels will appear the most visible during the morning and afternoon sun when the panels are at their maximum tilt (no more than 3m above ground level).

The visual effects along the 610m length of Buckleys Road that borders the Site vary depending on the extent of existing vegetation in place. Based on the above, a **low-moderate (adverse)** visual effect is anticipated along the short, open stretches where filtered views of the proposal will be apparent through newly established 2m high mitigation planting. As the mitigation planting grows to a height of approximately 3m – 3.5m tall and fills out the gaps in existing vegetation, the visual effects will reduce to **very low (adverse)**. Where existing vegetation exists along the remaining lengths of Buckleys Road, a **very low (adverse)** visual effect is anticipated on the users of the road as the proposal will be visually contained within the Site boundary.

6.2.1.2 Branch Drain Road

***Image 8**: View from Branch Drain Road, west of the Site, looking in a north-easterly direction toward the Site.*

The Site borders Branch Drain Road for approximately 840m along its western boundary. For the majority of this length there is existing vegetation in place that provides screening of the Site. However, as illustrated in **Image 8** above, there are gaps in the existing vegetation, similar to Buckleys Road. The intermittent gaps in between the existing vegetation allow open views into the Site for a combined length of approximately 160m. The existing vegetation consists predominately of pittosporum plant varieties that range from 1.5m to over 3m in height.

The solar panels will be setback at least 20m from the Branch Drain Road frontage and due to the tracking solar system proposed, the height of the panels will vary throughout the day. The panels will reach their maximum height of 3m during the morning and afternoon sun. For the

remainder of the day, they will be less than 3m in height, approximately 1.8m in height when they are horizontal.

A 3m wide mitigation planting strip will be setback 10m from the road frontage and consist of two staggered rows of 2m tall fast growing exotic evergreen shelter belt plant species. The mitigation planting will be implemented prior to the construction of the solar farm to initially filter views of the proposal until the proposed exotic planting fills out the gaps and provides full screening of the Site. In the short term, glimpses of solar panels will be apparent in the gaps. As described previously, the height of the panels will vary throughout the day as they rotate with the sun. The panels will appear the most visible during the morning and afternoon sun when the panels are at their maximum tilt (no more than 3m above ground level).

The south-western extent of the proposal which is setback approximately 695m from Branch Drain Road is predominately screened by intervening vegetation that exists on the road frontage. For a short 390m span, glimpses of the proposal will be available as illustrated in **Viewpoints 8-9**. However, given the long-distance viewing location and dark backdrop of a distant shelterbelt, the tracking solar panels will likely appear as a dark structure that fades into the background. Along this stretch of the western Site boundary, the gaps in the existing shelterbelts will be filled in with 2m tall fast-growing exotic evergreen shelter belt plant species, similar to the other Site boundaries.

The visual effects will vary along the 840m length of Branch Drain Road that borders the Site due to the existing vegetation in place. Based on the above, a **low-moderate (adverse)** visual effect is anticipated along the short, open stretches where filtered views of the proposal will be apparent through newly established 2m high mitigation planting. As the mitigation planting grows to a height of approximately 3m – 3.5m tall and fills out the gaps in existing vegetation, the visual effects will reduce to **very low (adverse)**. Where existing vegetation exists along the remaining length of Branch Drain Road and where the proposal is setback approximately 695m, a **very low (adverse)** visual effect is anticipated on the users of the road as the proposal will predominately be visually contained within the Site boundary.

6.2.1.3 Grahams Road

Image 9: *View from Grahams Road, south of the Site, looking in a northerly direction (the Site is screened by intervening vegetation).*

Views of the Site from Grahams Road are curtailed by intervening vegetation as illustrated above in **Image 9** and **Viewpoint 7**. The Site is setback approximately 950m (at its closest point) from Grahams Road and is predominately screened by an established shelterbelt in the foreground. However, there are gaps beneath the trees that allow glimpsed views into the Site.

An approximate 325m length of the southern Site boundary does not currently have any form of screening in place. However, this gap in the existing vegetation will be filled with two staggered rows of 2m tall fast growing evergreen exotic shelterbelt plant species. The proposed mitigation planting will initially filter views of the proposal prior to the planting filling out the 3m wide mitigation planting strip and reaching a height of at least 3m – 3.5m. However due to the long-distance viewing location, intervening vegetation, tracking solar system and 2m tall plants implemented prior to the construction of the solar farm, the visual effects are considered to be **low (adverse)**. As the planting establishes and grows to fill out the gap and reaches a height of 3m – 3.5m, the visual effects will reduce to **very low (adverse).**

6.2.1.4 Hanmer/Caldwells Road

***Image 10**: View from Caldwells Road, east of the Site, looking in a westerly direction towards the Site in the distance.*

The Site is partially visible from Caldwells Road in between a gap in the intervening vegetation and existing shelterbelt along the eastern Site boundary as illustrated above in **Image 10** and in **Viewpoints 4 - 6.**

The proposal is located approximately 700m from Caldwells Road and is predominately screened by existing vegetation in place. The 200m gap in the existing vegetation along the eastern Site boundary will be filled with two rows of 2m tall fast growing evergreen exotic shelterbelt plant species that will be staggered. However, where the Wahi Taonga 50m buffer overlaps the Site boundary, an approximate 60m long gap in the vegetation will remain boundary. The proposed mitigation planting will initially filter views of the proposal prior to the planting filling out the 3m wide mitigation planting strip and reaching a height of at least 3m. From this viewing distance, the panels are likely to appear dark in colour and blend into the distant dark colour of the shelterbelts which will form the backdrop when viewed from Caldwells Road.

Due to the long-distance viewing location, tracking solar system and 2m tall plants implemented prior to the construction of the solar farm, the visual effects are considered to be **low (adverse)**.

As the planting establishes and grows to fill out the gap and reaches a height of 3m – 3.5m, the visual effects will reduce to **very low (adverse).**

6.2.1.5 Smythes Road

***Image 11**: View from Smythes Road, west of the Site, looking in an easterly direction towards the Site.*

The Site is approximately 360m east of Smythes Road and as illustrated in **Image 11** above and **Viewpoint 15**, only glimpses of the Site would be apparent. From there, the removal of the mature trees within the Site would be noticeable, however the lower growing vegetation along Branch Drain Road would remain in the short term (until the proposed mitigation planting within the Site reaches a height of 3m – 3.5m). Due to the viewing distance and transient nature of the viewing audience, the proposal is likely to fade into the darker backdrop of distant shelterbelts and be relatively discrete within the landscape. As previously described, the height of the solar panels will change throughout the day and only they will reach their maximum tilt height of 3m to capture the morning/afternoon sun. Based on this a **low (adverse)** effect is anticipated prior to the proposed mitigation planting establishing and visually containing the proposal within the Site. Once the proposed mitigation planting fills out the gaps and reaches a height of 3m – 3.5m, the visual effects will reduce to **very low (adverse).**

6.2.2 Visual Effects from private locations

A desktop assessment of the visual effects of the proposal from a number of houses that abut or are within close proximity (within 1.2kms) to the Site was undertaken using aerial imagery and photos taken during the Site visit. Each of the dwellings is numbered on **Figure 2** in the Graphic Supplement. Individual dwellings were not visited as part of the Site visit. This assessment is tabulated in **Appendix 2**: **Table 1.**

This assessment assigned a level of effect[6], based on the following: visibility and proximity to the Site (in particular to the nearest solar panel); and the nature of the view, including any existing or proposed vegetation that might provide full or partial screening of views.

[6] Based on a seven-point scale: Very Low (VL); Low (L) Low-Moderate (LM); Moderate (M); Moderate-High (MH); High (H); Very High (VH).

The level of effect has been assessed with mitigation planting starting at 2m high (prior to construction) and 5 years following the mitigation planting being implemented along the Site boundary (reaching a height of 3m – 3.5m). Refer to **Figure 3** in the Graphic Supplement for the Landscape Mitigation Plan.

In summary, the majority of the private dwellings near the Site are surrounded by established trees, plantings or shelterbelts which predominately screen views of the Site. In addition to the intervening vegetation that is located on private properties, the Site is mostly lined in established shelterbelts resulting in very limited visibility from outside of the Site boundaries. Where there are gaps in the existing vegetation, fast growing exotic evergreen shelterbelt species will be implemented to establish fast growth and visually contain the proposal within the Site. Initially the 'gap filling' of mitigation planting will filter views. During this time, the solar panels will likely be partially visible (in the gaps) and appear dark in colour. As the solar panels are tracking, their height and visibility will vary over the course of the day as they move with the sun. The solar panels will be at their maximum height during the morning and afternoon hours to capture the sunlight. Their dark appearance will likely blend into a backdrop of exotic shelterbelt species that line the Site when viewed from a distance. As the proposed mitigation planting establishes, the solar panels will be visually contained within the Site. Based on the above, the visual effects from private locations range from **neutral to low (adverse)** with 2m high mitigation planting which will reduce to **neutral – very low (adverse)** as the mitigation planting provides full screening of the proposal.

6.2.3 Glint and Glare Effects

Boffa Miskell has prepared a Glint and Glare analysis for the Site to provide a greater understanding of the potential for glint and glare at the Site. This analysis has been carried out using Forge Solar software and has provided an analysis of potential glare for point locations at each individual dwelling and for points every 100m along nearby roads, as identified in **Figure 18**. Forge Solar analysis is carried out on a 'bare ground' scenario which does not include the presence of any intervening shelterbelts, or any buildings within or outside the Site, which will be a further mitigating factor in the presence of any actual glare. The methodology for carrying out the Glint and Glare analysis has been provided as **Appendix 4**.

6.2.3.1 Potential Glare from Roads

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. 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 origin 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 origination of the solar reflection and road type are considered. 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.

The Glare analysis found that glare was present in only one location aligned with a road – at the junction of Caldwells and Hanmer Roads. As the alignment of these roads also aligns with a

gap in the proposed screening to accommodate the identified Wahi Taonga site, it is recommended panels in this section of the solar farm incorporate no backtracking (where panels backtrack and the beginning and end of the day to avoid the effects of shading), to avoid the potential for glare at this location. All other locations of potential glare will be screened by the proposed shelterbelt planting around the Site.

The full glint and glare analysis of the road corridors is outlined below. For the purposes of the assessment, roads were analysed in the following sections:

- Branch Drain Road (from the intersection with Buckleys Road to the north and Grahams Rd to the south)
- Brookside and Irwell Road (from the intersection with Boundary Creek Rd to the north, to Stephens Rd in the east)
- Buckleys Road (entire length)
- Caldwells Road (including Hanmer Rd, from Brookside and Irwell Rd north, to junction of Caldwells and Harman Rd south)
- Dunsandel and BrooksideRoad (750m from the junction with Buckley's Rd)
- Grahams Road (entire length)
- Hanmer Road (between Caldwells Rd and Stephens Rd)
- Irwell Rakaia Road (750m from the junction with Buckley's Rd)
- Smythes Road (750m from the junction with Buckley's Rd)
- Stewarts Road (750m from the junction with Buckley's Rd)

The findings of the road analysis are outlined in **Table 1** below:

Table 1: Glint and Glare Analysis of nearby Roads
*Refer to **Figure 18** in the Graphic Supplement*

Road Name	Analysis results	Recommendations
Branch Drain Road	Modelling identifies no glare geometrically possible	No further mitigation required.
Brookside and Irwell Road	Modelling identifies a small stretch of the road has the potential for glare approaching the bend in the road, as illustrated on **Figure 18**. Glare has the potential to occur between the months of Feb-May and August to November, between the hours of 5-8pm. Duration of the glare period during these times is predicted at less than 10 minutes per day.	Potential glare available in the direction of travel towards the site would be screened by proposed planting along eastern site boundary.
Buckleys Road	Modelling identifies a small stretch of the road potential for glare as illustrated on **Figure 18**. Glare has the potential to occur between the months of October to April between the hours of 5-6am in the morning and 5-8pm in the evening. Duration of the glare period during these times is predicted at less than 5 minutes per day.	Potential Glare in the location of VPs 1 & 2 would be oblique to the direction of travel along the road corridor. Mitigation is not required, however, proposed planting along the site boundary would screen any potential glare from view.
Caldwells Road	Modelling identifies a small stretch of the road has the potential for glare approaching the bend in the road, as illustrated on **Figure 18**. Glare has the potential to occur between the months of	Potential glare identified at the junction of Caldwells and Hanmer Road in the location of VP6 would be mostly screened by proposed

	April to September, between the hours of 4-6pm. Duration of the glare period during these times is predicted at 10 minutes per day or less.	planting along eastern site boundary For the area where a gap in planting is proposed around the Wahi Taonga site, it is proposed to have no panel backtracking in this location, to avoid the effects of glare in alignment with the road corridor.
Dunsandel and BrooksideRoad	Modelling identifies no glare geometrically possible	No further mitigation required.
Grahams Road	Modelling identifies no glare geometrically possible	No further mitigation required.
Hanmer Road	Modelling identifies that a small stretch of the road has the potential for glare as illustrated on **Figure 18**. Glare has the potential to occur between the months of April to October between the hours of 4-6pm. Duration of the glare period during these times is predicted at 10 minutes per day or less.	Potential glare identified at the junction of Caldwells and Hanmer Road in the location of VP6 would be mostly screened by proposed planting along eastern site boundary. For the area where a gap in planting is proposed around the Wahi Taonga site, it is proposed to have no panel backtracking in this location, to avoid the effects of glare in alignment with the road corridor.
Irwell Rakaia Road	Modelling identifies no glare geometrically possible	No further mitigation required.
Smythes Road	Modelling identifies low potential for glare from a limited location only.	No further mitigation required.
Stewarts Road	Modelling identifies no glare geometrically possible	No further mitigation required.

6.2.3.2 Potential Glare towards Dwellings

A full description of the findings of the Forge Solar analysis on nearby dwellings is provided in **Appendix 2**. In summary, the Forge Solar analysis was carried out on a 'bare earth' scenario to analyse to the potential for glare for each of the identified 29 locations. The analysis found that for 17 of the locations, no glare was geometrically possible.

Potential for glare (yellow points on **Figure 18**) was identified for six dwellings, IDs 3, 4 and 5, (located to the north of the Site) and 12, 13 and 14 (located to the east). Dwelling ID3 is an involved landowner. Potential glare is of a low duration (less than 10 minutes per day and 3.3 hours across the year), and effects are of a low level, therefore no further mitigation is required. Effects for dwellings at ID 4 and 5 are also low, and in both cases, these dwellings are already surrounded by vegetation which obscures their view towards the Site. For dwellings at ID 12, 13 and 14, effects are also low (less than ten minutes duration per day, and less than 10 hours per year), and in any case, these dwellings have their views towards the Site screened by existing vegetation. For a further three dwellings (ID 11, 17 and 21) low potential for glare was identified which does not require further mitigation.

6.2.4 Summary of Visual Effects

In summary the visual effects will range from **low to low-moderate (adverse**) from public viewing locations and **neutral to low (adverse)** for private viewing locations following construction of the solar farm. As the mitigation planting establishes within the 'gap' areas and grows to form a dense impermeable screen, the visual effects will reduce to **very low (adverse)** from all public viewing locations and **very low (adverse)** to **neutral** from all private viewing locations.

6.3 Response to Statutory Provisions

As identified in the relevant statutory provisions, the policies and objectives seek to maintain and enhance rural character and amenity values in rural areas.

The permitted baseline for the Site provides for plantation forestry and hot houses which are anticipated activities under the ODP/PDP. A small forestry block was previously located directly south (198 Branch Drain Road) of the Site but has now been felled. While it is recognised that the Site is identified as highly productive land, land uses other than dairy farming are anticipated outcomes in the rural environment. As of right, hot houses are permitted to heights of 12m whereas the proposed solar arrays with only reach a maximum height of no more than 3m (for a limited time throughout the day). The proposal will be less than a quarter of the permitted height baseline to accommodate hot houses in the rural environment. Refer to **Image 12** below.

***Image 12**: Example of structures permitted under the Rural Zone that can reach heights of approximately 12m, photo located on Waterholes Road in Selwyn District.*

The Site will transition from a rural dairy farm to a landscape containing renewable energy infrastructure. The large expanse of open space will be reduced to areas between solar panels. Grazing animals, such as sheep, will continue to manage the pasture underneath the panels and frames. The presence of grazing animals and/or high value crops (such as blueberries), maintains a sense of the rural character of the Site.

When considering the proposal against the permitted baseline provided for in the statutory provisions, the rural character of the Site will be maintained. The proposed mitigation planting will be in character with vegetation patterns found in the local landscape and provide a consistent linear, planting approach along all Site boundaries.

7.0 Recommendations

1. **Mitigation Planting**: prior to the construction of the solar farm, the proposed mitigation planting shall be implemented along the full length of Site boundary as illustrated on **Figures 3 - 5**.
    a. Where there are gaps in the existing vegetation, 2m high double staggered rows of fast growing, evergreen shelterbelt plant species shall be implemented. Where existing vegetation is in place, but supplementary screening is required, PB3 size fast growing, evergreen shelterbelt plant species shall be implemented.
    b. Planting shall be implemented prior to the construction of the solar farm and be maintained for the life of the solar farm. Plant species shall consist of fast growing, evergreen exotic shelterbelt species (*Cupressus x ovensii*, Oven's Cypress or a similar plant species with a very rapid growth rate).
2. **Landscape Management Plan (LMP):** A LMP shall be prepared by a suitably qualified registered Landscape Architect that consists of the following:
    a. **Planting**:
        i. Where there are gaps in the existing vegetation, 2m high double staggered rows of fast growing, evergreen shelterbelt plant species shall be implemented. Where existing vegetation is in place, but supplementary screening is required, PB3 size fast growing, evergreen shelterbelt plant species shall be implemented.
        ii. Plant species shall consist of fast growing, evergreen exotic shelterbelt species (*Cupressus x ovensii*, Oven's Cypress or a similar plant species with a very rapid growth rate).
        iii. Planting shall consist of fast growing, evergreen shelterbelt plant species and be maintained to a height of at least 3.5m for the life of the solar farm. If at any time, a gap in the mitigation planting becomes apparent, additional fast-growing, evergreen shelterbelt plant species (non-invasive) and suitable to Site conditions shall be implemented.
        iv. Details for the management of the mitigation planting for the life of the solar farm shall be included.
    b. **Irrigation**: shall be implemented along the full length of the Site boundary, where mitigation planting is required.
    a. **Plant replacement**: All dead or diseased plants shall be replaced within the next growing season or as soon as practically possible.

3. **Fencing**: All fencing shall be located internally within the Site and be screened by the proposed mitigation planting. Closed board fencing shall be prohibited along the Site boundaries. Where there are entries into the Site from Branch Drain Road, a semi-solid gate may be required to provide screening of the solar panels.
4. **Decommissioning and Site Rehabilitation:** when the solar farm has reached its end-of-life cycle and a change in land use is sought, the agricultural land shall be returned to its previous state, leaving the land in a condition that is safe and suitable for subsequent land use. Ensuring that the components and infrastructure are disposed of in a way that maximises reuse and recycling. For any parts that cannot be reused or recycled, ensure that they are disposed of in an environmentally responsible way in accordance with industry best practices.

8.0 Conclusion

KeaX proposes to construct a 111ha solar farm on the Site. The Site is located directly south of an existing Orion substation that will facilitate connections into the local lines network. The overall capacity of the solar farm will be able to generate energy for approximately 11,200 homes in Canterbury annually, equating to 100GWh on completion.

The Site is located at 150 Buckleys Road, Brookside and is largely flat in nature and situated between 30 and 40 meters above sea level (masl). The land cover of the Site includes mostly grassed paddocks framed by established shelter belts and native plantings along Buckleys/Branch Drain Roads. The Site is currently used as a dairy farm and features pivot irrigators, shelter belts, cows and overhead powerlines. Overall, the Site is a highly modified, flat rural landscape currently used for dairy farming and is predominately screened by existing shelterbelts.

Due to the flat topography of this landscape, the visual catchment of the Site is limited to the immediate surrounding area. The viewing audience includes private properties neighbouring the Site boundary and road users of Buckleys, Hanmer, Caldwells, Grahams, Branch Drain and Smythes Roads.

The flat topography across the Site will remain unchanged as no large bulk earthworks will be required as part of the proposal. Existing Site boundary vegetation will be retained, however all existing trees and shelterbelts within the wider Site will be removed to make way for the solar farm. The removal of all internal Site vegetation that relates to the Site's character will have a **low (adverse)** effect on the physical nature of the Site. As the mitigation planting establishes along the Site boundaries, the removal of the internal vegetation will be indiscernible.

The proposed solar farm will introduce delineating structures into the rural landscape which currently displays an open character that is interrupted by linear shelterbelts and mature trees. The Site will transition from a rural dairy farm to a landscape containing energy infrastructure. The expanse of open space will be reduced to areas between solar panels. Grazing animals, such as sheep, will continue to manage the pasture underneath the panels and frames maintaining a sense of the rural character of the Site.

The proposed solar panels will have a low profile in the context of the flat topography and the surrounding vegetation. Due to this, the solar farm is not expected to be a prominent feature in the landscape when viewed from beyond the immediate context of the Site.

The 3m wide landscape buffer planting proposed (along Site boundaries that do not have planting) will assist in integrating the proposal into the landscape, softening the infrastructure and providing a vegetative backdrop. Based on the above, a (very localised) **low-moderate (adverse)** effect is anticipated on the rural character values and amenity of the Site. This relates to the removal of internal vegetation, the introduction of solar panel structures and associated infrastructure. However, as the proposed mitigation planting grows and establishes along the Site boundary, the solar farm will be visually contained within the Site. Beyond the Site, the adverse effects on the landscape are expected to reduce over time to **low (adverse).**

Glint and Glare analysis carried out identified no potential glare issues for nearby dwellings. Where potential glare was identified, this is of a low duration and dwellings are already surrounded by existing vegetation which screens potential views form these locations towards the site.

In summary the visual effects will range from **low to low-moderate (adverse**) from public viewing locations and **neutral to low (adverse)** for private viewing locations following the construction of the solar farm. As the mitigation planting establishes within the 'gap' areas and grows to form a dense impermeable screen, the visual effects will reduce to **very low (adverse)** from all public viewing locations and **very low (adverse)** to **neutral** from all private viewing locations.

Appendix 1: Landscape Effects Assessment Method

22 June 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. 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.

The Significance of Effects

Decision makers assessing resource consent applications must evaluate if the effect on individuals or the environment is less than minor[7] or if an adverse effect on the environment is no more than minor[8]. 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[9] (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[10].

[7] RMA, Section 95E

[8] RMA, Section 95E

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

[10] 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: Visibility Analysis

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
1	187 Buckleys Road		-	-	N/A – Land owner	Modelling identifies no glare geometrically possible.
2	150 Buckleys Road		-	-	N/A – Land owner	Modelling identifies low potential for glare of a low duration (less than 10 min per day, totalling 1.6 hours per year). Effects are therefore considered to be low, no further mitigation is required.
3	115 Buckleys Road		-	-	N/A – Land owner	Modelling identifies potential for glare of a low duration (less than 10 minutes per day, 3.3 hours per year). Effects are therefore considered to be low, no further mitigation is required.

[11] Measured from the edge of the dwelling to the closest solar panel.
[12] Nature of View: Open, Partial, Glimpse, No View
[13] Proportion of Development Visible: Most, Partial, Small Amount, None
[14] Based on a seven-point scale: Very Low (VL); Low (L); Low-Moderate (LM); Moderate (M); Moderate-High (MH); High (H); Very High (VH).
[15] Nature of Effect: Adverse, Neutral, Beneficial

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
4	105 Buckleys Road	110m No view None	Neutral	Neutral	The single storey dwelling is surrounded by established shelterbelts which fully screen the proposal from view.	The dwelling is surrounded by shelterbelts which screen the property from view. Modelling identifies potential for glare but of a low duration (less than 10 minutes per day, 0.4 hours per year), with low potential for glare also identified beneath this threshold. Effects are therefore considered to be low, no further mitigation is required.
5	79 Buckleys Road	140m No view None	Neutral	Neutral	The single storey dwelling is surrounded by established trees and shelterbelts which fully screen the proposal from view.	The dwelling is surrounded by shelterbelts which screen the property from view. Modelling identifies potential for glare but of a low duration (less than 5 minutes per day, 0.4 hours per year), with low potential for glare also identified beneath this threshold. Effects are therefore considered to be low, no further mitigation is required.
6	80 / 56 Buckleys Road	290m No view None	Neutral	Neutral	The single storey dwelling associated with this property is surrounded by established plantings and shelterbelts which fully screen the proposal from view.	The dwelling is surrounded by established planting which screens the property from view. Modelling identifies low potential for glare that is also short in duration (1.7hr per year). Effects are therefore considered to be low, no further mitigation is required.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
7	23 Buckleys Road	512m No view None	Neutral	Neutral	The single storey dwelling on this property fronts Buckleys Road and is surrounded by established shelterbelts which fully screen the Site. The wider property borders the northern/eastern Site boundary which is lined in mature shelterbelts. The established shelterbelts provide full screening of the Site and will be retained.	Modelling identifies no glare geometrically possible.
7a	883 Caldwells Road	No dwelling No view None	Neutral	Neutral	There is no dwelling on this property, and it has the same landowner as 23 Buckleys Road. Established shelterbelts along the Site boundary provide full screening of the Site.	No dwelling on this property
8	932 Hanmer Road	876m No view None	Neutral	Neutral	The single storey dwelling associated with this property is surrounded by established plantings and shelterbelts which fully screen the proposal from view.	Modelling identifies no glare geometrically possible.
9	381 Brookside and Irwell Road	1km No view None	Neutral	Neutral	The single storey dwelling associated with this property is surrounded by established plantings and shelterbelts which fully screen the proposal from view.	Modelling identifies no glare geometrically possible.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
10	375 Brookside and Irwell Road	1.1km No view None	Neutral	Neutral	The dwelling associated with this property fronts Brookside and Irwell Road, whereas the wider property extends to Caldwells Road. However due to established vegetation between the dwelling and the Site, the proposal will be fully screened from view.	Modelling identifies no glare geometrically possible.
11	365 Brookside and Irwell Road	1.2km No view None	Neutral	Neutral	The dwelling associated with this property fronts Brookside and Irwell Road, whereas the wider property extends to Caldwells Road. However due to established vegetation between the dwelling and the Site, the proposal will be fully screened from view.	There is established vegetation between the dwelling and the site which screens the property from view. Modelling identifies low potential for glare that is also short in duration (0.6hr per year). Effects are therefore considered to be low, no further mitigation is required.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
12	870 Hanmer Road	915m No view None	Neutral	Neutral	The dwelling associated with this property is set amongst established trees and vegetation which provide full screening of western views towards the Site. The wider property south of the Site may have partial views of the proposal, however, given the viewing distance the solar panels will likely appear as a dark structure and blend into the dark shelterbelt backdrop. Proposed mitigation planting will also filter views initially, until full screening is achieved.	This dwelling has no view of the proposed development. Modelling identifies potential for glare that is also of a low duration (less than 10 minutes per day, 2.5 hrs per year). Effects are therefore considered to be low, no further mitigation is required.
13	851 Caldwells Road	612m No view from dwelling None from the dwelling, partial from the wider property	Very Low (adverse)	Very Low (adverse)	The dwelling on this property is surrounded by mature shelterbelts that screen western views towards the Site. Established shelterbelts along a majority of the Site's eastern boundary provides further screening of the Site from this dwelling. The wider property may have partial views of the Site until the proposed mitigation provides full screening of the proposal, however only a very small portion of the solar arrays may be apparent in the south-eastern corner of the Site due to the gap in vegetation near the Wahi Taonga Site.	No view is identified from the dwelling, with partial views from the wider property. Modelling identifies potential for glare that is also of a low duration (less than 10 minutes per day, 3.1 hrs per year). Effects are therefore considered to be low, no further mitigation is required.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
14	821 Caldwells Road (2 land parcels)	325m No view from the dwelling	-	-	Written approval provided.	Written approval provided.
15	180 Grahams Road	840m Glimpse to no view from the dwelling Small amount from the wider property	Very Low (adverse)	Neutral	The two-storey house associated with the wider property would only have views towards the Site from the second level as the dwelling is surrounded by mature shelterbelts. There are also established shelterbelts that intervene in the view from the second level, resulting in a very small portion of the Site being visible. The wider property borders the south-western extent of the Site which is mostly lined in established shelterbelts. There are a few gaps in the existing vegetation which will be filled with the proposed mitigation planting. It is proposed that 2m high plants will be implemented initially to filter views of the proposal. Over time, the proposal will be visually contained within the Site as the proposed mitigation continues to grow.	Modelling identifies no glare geometrically possible.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
15a	198 Branch Drain Road	No dwelling Partial view Small Amount	Very Low (adverse)	Neutral	There is no dwelling on this property, and it borders the southwestern extent of the Site which is mostly lined in established shelterbelts. There are a few gaps in the existing vegetation which will be filled with the proposed mitigation planting. It is proposed that 2m high plants will be implemented initially to filter views of the proposal. Over time, the proposal will be visually contained within the Site as the proposed mitigation continues to grow.	No dwelling on this property
16	191 Branch Drain Road	907m No view None	Neutral	Neutral	The single storey dwelling associated with this property has intervening vegetation (in addition to a long-distance view) in the view that provides full screening of the Site from this location.	Modelling identifies no glare geometrically possible.
17	229 Branch Drain Road	743m No view None	Neutral	Neutral	The single storey dwelling associated with this property has intervening vegetation in the view that provides full screening of the Site from this location.	No view is identified from the dwelling, due to surrounding screening. Modelling identifies only low potential for glare, of a short duration (0.9 hours per year). No further mitigation is required.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
18	233 Branch Drain Road (Lot 1 DP 446980)	700m No view None	Neutral	Neutral	The single storey dwelling associated with this property is surrounded by mature shelterbelts and has intervening vegetation in the view that provides full screening of the Site from this location.	Modelling identifies no glare geometrically possible.
19	265 Branch Drain Road	535m No view None	Neutral	Neutral	The single storey dwelling associated with this property has intervening vegetation in the view (in addition to existing shelterbelts along the Site's south-western extent) that provides full screening of the Site from this location.	Modelling identifies no glare geometrically possible.
20	277 Branch Drain Road	700m No view None	Neutral	Neutral	The two-storey dwelling on this property is surrounded by established vegetation and shelterbelts (in addition to existing shelterbelts along the Site's south-western extent) which screen views of the Site.	Modelling identifies no glare geometrically possible.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
21	313 Branch Drain Road	274m Glimpses to no view Small amount	Very Low (adverse)	Neutral	The single storey dwelling associated with the wider property may have glimpses of the proposal to the north during winter (as some of the intervening vegetation is deciduous). However, once the proposed mitigation planting establishes, the proposal will be visually contained within the Site. The wider property that borders Branch Drain Road may have partial views of the proposal prior to the mitigation planting achieving full screening.	This dwelling obtains only a glimpsed view of the proposed development during the winter months. Mitigation proposed will screen views form this dwelling. Modelling identifies only low potential for glare, of a short duration (less than 5 minutes per day, 1.5 hours per year). No further mitigation is required.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
22	324 Branch Drain Road	80m to the north and 660m to the east Partial to no view Small amount to the east	Very Low (adverse)	Neutral	The single-storey dwelling associated with this property is predominately surrounded by established vegetation. An existing shelterbelt north of the dwelling provides full screening of the Site. To the east, a gap in the existing shelterbelt provides partial views of the proposal in the distance (660m). The solar panels will likely appear as a dark structure in the distance and blend into the dark green shelterbelt backdrop. However proposed mitigation planting will be implemented in the gaps of the shelterbelt (to the east) which will filter views of the solar panels. Over time, the proposed mitigation planting will visually contain the proposal within the Site.	Modelling identifies no glare geometrically possible.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
23	121 Irwell Rakaia Road	1.2kms Glimpses to no view Small amount	Very Low (adverse)	Neutral	The two-storey dwelling associated with this dwelling would likely have glimpses of the proposal between the gaps of the existing vegetation along the western Site boundary on Branch Drain Road. However, given the long-distance viewing location and proposed 2m high mitigation planting, the solar panels (if visible initially) will appear dark in colour and views will be filtered by the proposed exotic shelterbelt. Over time, the proposed shelterbelt planting will visually contain the proposal within the Site.	Modelling identifies no glare geometrically possible.
24	29 Irwell Rakaia Road	370m No view None	Neutral	Neutral	An established shelterbelt along Smythes Road intervenes in the view from this property, providing full screening of the Site.	Modelling identifies no glare geometrically possible.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
25	43 Dunsandal and Brookside Road	457m No view None	Neutral	Neutral	The single storey dwelling located on this property is surrounded by established vegetation that fully screens views towards the Site. The wider property (dairy farm) may have glimpses of the proposal to the east prior to the mitigation planting achieving full screening. However, once the proposed mitigation planting establishes, the proposal will be visually contained within the Site.	Modelling identifies no glare geometrically possible.
26	15 Stewarts Road	340m No view None	Neutral	Neutral	Established shelterbelts and vegetation along Stewarts Road intervenes in the view from this property, providing full screening of the Site.	Modelling identifies no glare geometrically possible.
27	10 Stewarts Road	207m No view None	Neutral	Neutral	Established shelterbelts and vegetation along Buckleys Road intervenes in the view from this property, providing full screening of the Site.	Modelling identifies no glare geometrically possible.
28	414 Branch Drain Road	-	-	-	Brookside Substation	Modelling identifies no glare geometrically possible.

Table 1: Visual Effects from Private Locations *Refer to **Figure 2** in the Graphic Supplement for the Dwelling IDs.*						
ID	**Address/ Viewing Audience**	**Distance[11], Nature of View[12], and Portion of Development Visible[13]**	**Visual Effect[14] and Nature of Effect[15]**		**Description of Potential Visual Effects** **Note: private dwellings were not visited, however assumptions of potential visibility have been made from private locations based on the Site visit and current aerial imagery.*	**Description of potential Glare effects** *(Refer to **Figure 18** and **Appendix 4** for the Methodology)*
			2m high mitigation planting	**After 5yrs with mitigation planting**		
29	Lot 1 DP 77659 & Lot 2 DP 77659	No dwelling Partial to no view Small amount	Neutral	Neutral	There are no dwellings on these parcels of land. They are used for agricultural purposes. The western extent of Lot 2 may have partial views of the proposal, however, given the viewing distance and intervening low growing vegetation, the solar panels will likely appear as dark structures and blend into the dark shelterbelt backdrop. Proposed mitigation planting will also filter views initially, until full screening is achieved.	No dwelling on this property