DARFIELD SOLAR AND ENERGY STORAGE LIMITED

Darfield Agrivoltaic Solar and Energy Storage

Resource Consent Applications and
Assessment of Environmental Effects

6 September 2024

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Appendix 15 Electric and Magnetic Fields Assessment, EMF Services

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Appendix 17 Pre-application comms with Mahaanui Kurataiao Ltd

Appendix 18 Written Approvals

REPORT INFORMATION

Report Status	Final
Our Reference	MDL002509
Author	Andrew Brown
Review By	Polly Smith
Version Date	6 September 2024

A

PART A

Resource Consent Applications

FORM 9

APPLICATION FOR RESOURCE CONSENT

Section 88, Resource Management Act 1991

To Selwyn District Council
PO Box 90
Rolleston 7643

1. **Darfield Solar and Energy Storage Ltd applies for the following type(s) of resource consent:**

   Land use consent.

2. **The activity to which the application relates (the proposed activity) is as follows:**

   To construct, operate and maintain a solar farm and battery energy storage facility, including construction of new vehicle crossings for site access and construction traffic activity (vehicle movements) exceeding permitted activity standards.

   The Darfield Solar & Energy Storage (DSES) proposal is for a utility scale 117 MW renewable energy project located at 1352 Homebush Road, Darfield, close to the existing dairy processing plant and Kimberly Substation. It consists of 117 MW of solar photovoltaic power generation plus 106 MW / 200-400 MWh of battery energy storage (BESS). It will connect to the National Grid via the Kimberly Substation using underground cabling.

3. **The site at which the proposed activity is to occur is as follows:**

   The site is located at 1352 Homebush Road, approximately 3 km northwest of Darfield, on pastoral land close to the Fonterra Kimberly Factory. It comprises two land parcels with legal descriptions:

   - Lot 1 DP 434071; and
   - Lot 2 DP 60325.

4. **The full name and address of each owner or occupier (other than the applicant) of the site to which the application relates are as follows:**

[redacted]: 1352 Homebush Road, Darfield 7571.

DSES have a lease arrangement for occupation and development of the land.

5. **The other activities that are part of the proposal to which the application relates are as follows:**

Regional activities as follows:

- Discharge of construction phase stormwater to land;
- Discharge of operational phase stormwater land; and
- Earthworks over an aquifer.

6. **The following additional resource consents are needed for the proposal to which this application relates and have applied for:**

Resource consents from Environment Canterbury as follows:

- Discharge Permit for the discharge of construction phase stormwater to land;
- Discharge Permit for the discharge of operational phase stormwater land; and
- Land use permit for earthworks over an aquifer.

7. **I attach an assessment of the proposed activity's effect on the environment that—**

(a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and

(b) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and

(c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

8. **I attach an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.**

9. **I attach an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.**

10. **I attach the following further information required to be included in this application by the district plan, the regional plan, the Resource Management Act 1991, or any regulations made under that Act:**

Assessment of Environmental Effects, including the following Appendices:

Appendix 1	Records of Title
Appendix 2	Land Productivity Assessment, Landvision
Appendix 3	Preliminary Site Investigation, Babbage
Appendix 4	Transportation Assessment, Don McKenzie Consulting Ltd
Appendix 5	Scheme Plans
Appendix 6	POSDP Rules Assessment
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Appendix 9	Glint & Glare Analysis Memorandum, Mansergh Graham Landscape Architects Ltd
Appendix 10	Landscape and Visual Effects Assessment, Mansergh Graham Landscape Architects Ltd
Appendix 11	Ecological Assessment, Ecological Solutions Ltd
Appendix 12	Engineering and Infrastructure Report, CKL
Appendix 13	Stormwater Management Plan, CKL
Appendix 14	Archaeological Assessment, Underground Overground Archaeology Ltd
Appendix 15	Electric and Magnetic Fields Assessment, EMF Services
Appendix 16	Record of SDC Pre-Application Meeting
Appendix 17	Pre-application comms: Mahaanui Kurataiao Ltd
Appendix 18	Written Approvals

Date: 06/09/2024

Signature:

[redacted]

Andrew Brown, Mitchell Daysh Ltd (Person authorised to sign on behalf of applicant)

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PO Box 392
Nelson 7040

Telephone: [redacted]
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Contact person: Andrew Brown

FORM 9

APPLICATION FOR RESOURCE CONSENT

Section 88, Resource Management Act 1991

To Environment Canterbury
PO Box 345
Christchurch 8140

1. **Darfield Solar and Energy Storage Ltd applies for the following type(s) of resource consent:**

   - Discharge Permit for the discharge of construction phase stormwater to land;
   - Discharge Permit for the discharge of operational phase stormwater land; and
   - Land use permit for earthworks over an aquifer.

2. **The activity to which the application relates (the proposed activity) is as follows:**

   To discharge construction and operational phase stormwater and to undertake earthworks over an aquifer as necessary to construct, operate and maintain a solar farm and battery energy storage facility.

   The Darfield Solar & Energy Storage (DSES) proposal is for a utility scale 117 MW renewable energy project located at 1352 Homebush Road, Darfield, close to the existing dairy processing plant and Kimberly Substation. It consists of 117 MW of solar photovoltaic power generation plus 106 MW / 200-400 MWh of battery energy storage (BESS). It will connect to the National Grid via the Kimberly Substation using underground cabling.

3. **The site at which the proposed activity is to occur is as follows:**

   The site is located at 1352 Homebush Road, approximately 3 km northwest of Darfield, on pastoral land close to the Fonterra Kimberly Factory. It comprises two land parcels with legal descriptions:

   - Lot 1 DP 434071; and
   - Lot 2 DP 60325.

4. **The full name and address of each owner or occupier (other than the applicant) of the site to which the application relates are as follows:**

[redacted]: 1352 Homebush Road, Darfield 7571.

DSES have a lease arrangement for occupation and development of the land.

5. **The other activities that are part of the proposal to which the application relates are as follows:**

Territorial land use activities as follows:

- To construct, operate and maintain a solar farm and battery energy storage facility, including connection to the adjacent Orion substation and construction of new vehicle crossings for site access and construction traffic activity (vehicle movements) exceeding permitted activity standards.

6. **The following additional resource consents are needed for the proposal to which this application relates and have applied for:**

Resource consents from Selwyn District Council as follows:

- Land use consent to construct, operate and maintain a solar farm and battery energy storage facility, including construction of new vehicle crossings for site access and construction traffic activity (vehicle movements) exceeding permitted activity standards.

7. **I attach an assessment of the proposed activity's effect on the environment that—**

(a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and

(b) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and

(c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

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Signature:

Andrew Brown, Mitchell Daysh Ltd (Person authorised to sign on behalf of applicant)

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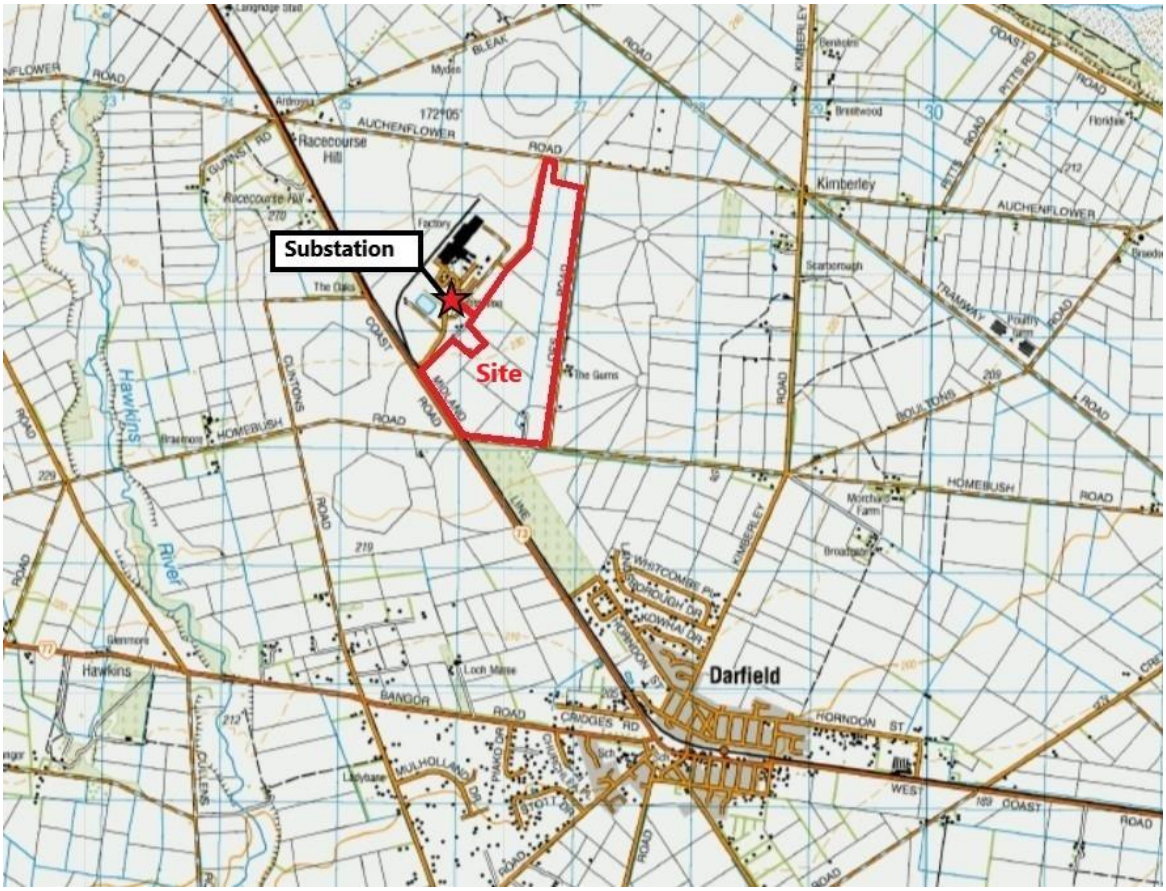
B

PART B

Assessment of Environmental Effects

EXECUTIVE SUMMARY

The Darfield Solar & Energy Storage Project is a utility scale 117 MW renewable energy project located at 1352 Homebush Road, Darfield. It consists of 117 MW of Solar Photovoltaic power generation plus 106 MW / 200-400 MWh of battery energy storage ("**BESS**"). The project is expected to generate enough electricity to supply approximately 29,499 homes per year, saving approximately 15,540 tonnes of CO_2 per annum.



Darfield Site Location

The project will connect to the National Grid via the existing Kimberly Substation – acknowledging that proximity to existing transmission infrastructure with available capacity is a critical factor in locating renewable energy generation facilities of this nature.

The BESS element enables power generated in peak daylight hours to be balanced with times of peak demand – which are generally in the evening and early morning. This is important in optimising the utility of renewable solar energy generation, enabling power to be available when it is needed.

It is proposed that the existing agricultural activity (sheep grazing) continues on site alongside the proposed renewable energy generation activity. This system, known as "agrivoltaics", is a highly

efficient and sustainable use of land, realising simultaneous benefits of primary production and renewable energy generation.

The proposal is made by Darfield Solar and Energy Storage Ltd, a subsidiary of NZ Clean Energy Ltd.

RESOURCE CONSENTS REQUIRED

The proposed development requires resource consents from Selwyn District Council and Canterbury Regional Council (Environment Canterbury).

District Consent Requirements

District consent is required for the renewable energy generation activity. In addition, consents are required for vehicle movements associated with the construction phase of the project due to projected vehicle movements exceeding the permitted activity thresholds for the creation of vehicle crossings (site access) and rural vehicle movements under the Partially Operative Selwyn District Plan ("**POSDP**"), as set out in the table below.

POSDP Rule	Activity	Status
Rule EI-R31 Other Renewable Electricity Generation and Renewable Electricity Generation Activities	The establishment of a new renewable electricity generation activity.	**Discretionary**
Rule TRAN-R4 Vehicle Crossings	Projected vehicle movements in the construction phase exceed the maximum volume of 40vm/d specified for the General Rural Zone in TRAN-R4.1.b	**Restricted Discretionary**
Rule TRAN-R7 Rural Vehicle Movements and Associated Parking	Projected vehicle movements in the construction phase exceed the maximum volume of 60ecm/d specified in TRAN-TABLE1 for an unsealed road.	**Restricted Discretionary**
Rule TRAN-R8 High Trip Generating Activities	Projected vehicle movements in the construction phase exceed the Basic ITA threshold in TRAN-TABLE2.	**Restricted Discretionary**

Where more than one rule applies, and the activity status for each rule is different, then the most restrictive activity status will apply. Therefore, the proposal is a **discretionary activity** under the POSDP.

Regional Consent Requirements

Regional consents are required under the Canterbury Land and Water Regional Plan ("**CLWRP**") for the discharge of stormwater and for earthworks undertaken over an aquifer:

CLWRP Rule	Activity	Status
Rule 5.94B Construction phase stormwater	The discharge of construction phase stormwater from more than two hectares of disturbed land, and from, into or onto contaminated or potentially contaminated land.	**Restricted Discretionary**
Rule 5.97 Operational phase stormwater	The discharge of operational phase stormwater from land other than land used for residential, educational or rural activities, and from, into or onto contaminated or potentially contaminated land.	**Discretionary**
Rule 5.176 Earthworks over aquifers	The use of land to excavate material in excess of 100m^3 over an unconfined or semi-confined aquifer.	**Restricted Discretionary**

Again, the most restrictive activity status applies, and the proposal stands to be considered as a **discretionary activity** under the CLWRP.

In considering a discretionary activity, the consent authorities (district regional) and may take into account a full range of effects (positive as well as adverse) and policy considerations.

SUMMARY ASSESSMENT OF ENVIRONMENTAL EFFECTS

The Darfield Solar & Energy Storage Project will have significant and direct positive effects in providing for the generation of renewable energy, including increasing low emissions energy supply in line with national policy direction. The BESS supports network resilience by providing energy storage capacity to counter the intermittent nature of solar energy generation, and performing a balancing function on grid demands.

A number of technical assessments have been commissioned by Darfield Solar and Energy Storage Ltd in order to provide an understanding of actual and potential adverse effects of the scheme. These effects are summarised in the table below.

Effect	Key Conclusions	Management Measures
Construction Effects	Construction is planned to take place over 12-18 months, and requires consideration of potential effects arising from traffic, earthworks (dust, erosion and sediment control) and noise.	
	• The effects of the anticipated levels of **traffic** on the surrounding road network is well within carrying capacity and unlikely to have a noticeable or measurable effect on the safety or operation of the network. However, right turn movements off SH73 northbound into Homebush Road and across the railway level crossing require mitigation in order to avoid adverse operational and safety effects. This will be managed by a Construction Traffic Management Plan (**"CTMP"**) to limit traffic volumes at the right hand turn. Overall, it is concluded that with appropriate mitigation of construction traffic via a CTMP, any adverse transport effects arising from the proposed development will be **less than minor**.	• Construction Traffic Management Plan (**CTMP**).
	• **Earthworks** of approximately 36,800 m^3 over c. 9.6 Ha will be required to form access tracks, hardstand areas and cable trenching. The site does not present any particular challenges in this regard, and normal dust, erosion and sediment controls will be used, as per the Erosion & Sediment Control Toolbox for Canterbury. Details of these measures, including a 3m offset for all earthworks from the water race, will be specified in an Erosion, Sediment, and Dust Control Plan (**"ESDCP"**). Overall, with earthworks undertaken in accordance with the ESDCP, effects are considered to be **less than minor**.	• Erosion, Sediment, and Dust Control Plan (**ESDCP**).
	• Construction activity will take place between 7:30am and 6:00pm, Monday to Saturday. **Noise and vibration** from construction activities will generally comply with the District Plan noise limits. However, piling activity to install solar	• Construction Noise Management Plan (**CNMP**).

Effect	Key Conclusions	Management Measures
	panel mounting may require mitigation where the activity is taking place within 50m of neighbouring dwellings (of which there are three). Mitigation may be achieved by scheduling, physical mitigation (screening) or use of alternate piling methods in the sensitive areas. These measures will be specified as required in a Construction Noise Management Plan (**"CNMP"**). Overall, with mitigation the proposed development will **avoid** adverse construction vibrations and noise effects in that levels will be within the POSDP limits. • During construction, increased levels of activity will create temporary effects ranging between very low and moderate on **landscape character and visual amenity**. Temporary landscape effects during construction will be generally **no more than minor**, but will locally be **more than minor** in relation to particular dwellings in the immediate vicinity. The temporary localised effects of the proposal on landscape character during the construction period will be mitigated through the staged progression of construction, with the photovoltaic (PV) tables along the perimeter of the site (alongside SH73, Homebush Road, Loes Road and Auchenflower Road) being constructed first. This will ensure that the construction of the remaining PV tables and other components within the interior of the site will be screened / partially screened from view, so that localised effects are reduced to a minor level.	• The staged progression of construction, with the PV tables along the perimeter of the site (alongside SH73, Homebush Road, Loes Road and Auchenflower Road) being constructed first.
Landscape and Visual Amenity Effects (post-construction)	The proposed agrivoltaic development blends elements of agricultural land use with renewable energy infrastructure, creating a hybrid landscape. • In terms of **landscape character**, the proposal will alter the characteristics of the existing site and immediate surroundings at the local level, resulting in a low-moderate (**minor**) adverse effect on landscape character values within the	• Retention of the existing shelter belt planting (within the site) along the western boundary and around the existing dwelling within the site. • Retention of the cluster of eucalyptus trees opposite

Effect	Key Conclusions	Management Measures
	site and a low level (**less than minor**) effect on the wider surrounding landscape. • The visual catchment surrounding the site is constrained by elements in the landscape including buildings, woodlots, shelter belts, curtilage planting, and (to a limited extent) topographic variation. Views of the proposed development will generally be limited to locations immediately adjacent to the site. Adverse effects on local **visual amenity** are generally low - very low (**less than minor**), but may be moderate for localised receptors before mitigation. Mitigation comprises planting to minimise effects so that they are very low to low (**no more than minor**) overall.	68 Loes Road to provide screening. • Screening planting, 2-3m high, along parts of the eastern site boundary, and the southern site boundary, to screen the development from view from adjacent dwellings. and the McHughs Forest Park walkway entrance.
Glint and Glare	Glint and glare may be experienced from some sections of the roads and railway immediately surrounding the site. Mitigation is required to reduce the traffic safety effects of glint and glare on road users along SH73, the Midland Railway line, Homebush Road and Auchenflower Road. With mitigation, effects will be **less than minor.**	• Screening planting along the southwestern, southern and parts of the eastern and northern site boundaries adjacent to SH73, Midland Railway Line, Fonterra Darfield, Homebush Road, Loes Road, and Auchenflower Road.
Ecology - Terrestrial	Vegetation across most of the site is dominated by exotic species such as grasses and herbaceous pasture forage species, conifer and broadleaved shelterbelts. Ecological values are correspondingly low. The proposal entails removal of much of the 'low' ecological value exotic conifer and broadleaved shelterbelts, whilst most of the exotic grassland will be retained. Given the low ecological values, and the ubiquitousness of these features in the rural landscape, the overall level of effect without mitigation (none is proposed) is 'very low'. Habitat within the site is of negligible value for herpetofauna and it is considered unlikely that lizards would be present at the site. No mitigation is proposed or required.	• N/A

Effect	Key Conclusions	Management Measures
	Similarly, it is considered unlikely that bats could be present at the site, therefore the overall level of effect without mitigation (none is proposed) is 'very low' (**less than minor**).	
Ecology - Avifauna	Whilst the ecological value for avifauna is low, the removal of shelterbelt exotic trees has the potential to adversely affect nesting habitat for native bird species if undertaken during the breeding season. Without mitigation this is assessed to be a moderate level of adverse effect. It is therefore proposed to avoid clearance of trees containing nests within key breeding period(s).	• Avoidance of tree felling within key breeding period(s).
	Risk of bird-strike for the solar panel installation is considered to be very low as the habitat on site or in the immediate surroundings is unsuitable for birds of conservation value and the site is not considered to be beneath a significant flyway for water birds. Risk is further reduced by the solar panels being covered in an anti-reflective coating, and the appearance of the development being dissimilar to a large waterbody due to the proposed regular use of access tracks and ample spacing between rows (3.22m). Overall, potential effects on avifauna are considered to be **less than minor**.	• Use of anti-reflective solar panels, access tracks, and panel row spacing.
Ecology - Freshwater	Overall, the ecological value of the water race traversing the site is low. It may, however, provide a migratory pathway for indigenous fish and scored 'moderate' on measures of ecological context.	
	Stream works associated with the construction of culverts has the potential to result in the temporary loss of aquatic habitat and injury / mortality to fish and, if incorrectly installed, prevent fish passage. Mitigation is proposed by way of implementing a Native Freshwater Fish Relocation Plan ("**NFRP**") and designing the culverts to a standard compatible with fish passage.	• Native Fish Relocation Plan (**NFRP**). • Culvert design to facilitate fish passage.

Effect	Key Conclusions	Management Measures
	With mitigation, potential effects on freshwater ecology are considered to be negligible (**less than minor**).	
Productive Land Capacity	The site is classified as LUC3 in the NZ Land Resource Inventory. With the introduction of the agrivoltaic system, the productive capacity of the site will remain largely unchanged. This is because most aspects of the farm system will remain unchanged. The soil will remain, pasture will still be grown, stock will graze, and nutrients will still cycle through the system. Also, the solar energy generation equipment can be completely removed when the project reaches an endpoint. Overall, any adverse effects on productive land capacity are considered to be **less than minor**. The solar installation is not sensitive to the effects of other productive activities in the area – there is no real risk of reverse sensitivity issues arising.	• Ongoing use of the land for agricultural production. • Decommissioning of development at end of operational period for development.
Stormwater (Operational)	The solar panel installation will not materially alter stormwater run-off patterns on the site - whilst the panels themselves are impermeable, they are above ground and the ground below remains vegetated and permeable. The proposal includes impervious ground level surfaces in the form of hardstand areas for the BESS, inverters, transformers and the site office. Run-off from these areas will be managed through either ground soakage, soakage devices, or swales / channels. Flood modelling shows localised shallow flood paths across parts of the site, with the deepest flooding at the existing entrance from Homebush Road, with a depth of 0.3m in a 500 Year ARI flood. The layout and placement of the solar infrastructure means that any effects from flooding on the site and any adverse effects on adjacent / downstream flooding are negligible. Nonetheless, a freeboard of 300mm above the 200 Year ARI floodplain is recommended	• Freeboard of 300mm above the 200 Year ARI flood for site office, substation buildings, and BESS units.

Effect	Key Conclusions	Management Measures
	for the site office, substation buildings, and BESS units. Overall, potential adverse effects from stormwater and flood risk are considered to be **less than minor**.	
Noise (Operational)	Noise modelling indicates that compliance with the permitted noise levels can readily be achieved at all notional boundaries at adjacent sites in the General Rural Zone as well as future notional boundaries that may establish in the Large Lot Residential Zone without the need for mitigation.	• N/A
Cultural Heritage and Archaeology	There are no known sites of archaeological or cultural heritage significance on the site. Nonetheless, in accordance with best practice, earthworks will be undertaken in accordance with an accidental discovery protocol.	• Earthworks to be undertaken in accordance with an accidental discovery protocol.
Potential Land Contamination	As the site has been used for agriculture for an extensive time (at least 69 years) there is potential for land contamination from agrichemical use. The level of risk to human health or the environment is considered to be **no more than minor**, but nonetheless soil testing will be undertaken prior to disturbance of soils.	• Soil testing prior to soil disturbance on site.
Electromagnetic Field (EMF) Effects	The equipment at the proposed development does not emit electromagnetic radiation, but does produce extremely low frequency (ELF) electric and magnetic fields. The strengths of these fields decrease rapidly with increasing distance from the equipment producing them (principally the inverters and transformers). ELF fields at the site boundary will be well below the health-based exposure limits incorporated in the PODP, and in practice will make no discernible difference to existing ELF field levels there.	• N/A

SUMMARY ASSESSMENT OF THE REGULATORY FRAMEWORK

The proposed agrivoltaic facility and BESS are assessed to be in accordance with the relevant statutory framework, in particular:

- The National Policy Statement for Renewable Electricity Generation ("**NPS-REG**");
- The National Policy Statement for Highly Productive Land ("**NPS-HPL**");
- The National Policy Statement for Freshwater Management ("**NPS-FM**");
- The Canterbury Regional Policy Statement ("**CRPS**"); and
- The Partially Operative District Plan ("**POSDP**").

In making a significant contribution to renewable energy generation capacity, the proposal receives strong policy support from the NPS-REG.

The proposal is not considered to be an inappropriate development in terms of the NPS-HPL, and in providing for dual use (renewable energy generation and ongoing agricultural production) minimises any loss of availability and productive capacity of highly productive land.

The proposal, by virtue of its location, avoids any adverse effects on natural inland wetlands or rivers.

The CRPS and POSDP acknowledge and provide for the establishment of renewable energy generation as regionally significant infrastructure, whilst requiring avoidance, remedy or mitigation of actual or potential adverse effects. The proposal is in line with these policy objectives.

THE MAHAANUI IWI MANAGEMENT PLAN

The Mahaanui Iwi Management Plan 2013 is the mana whenua planning document reflecting the collective efforts of six Papatipu Rūnanga that represent the hapū who hold mana whenua rights over lands and waters within the takiwā from the Hurunui River to the Hakatere River and inland to Kā Tiritiri o Te Moana.

It is considered that the proposal is in good alignment with the relevant objectives and policies set out in the Mahaanui Iwi Management Plan, which supports in principle the use of solar energy generation in the region (Policy R3.4). The design of the proposal incorporates design elements and principles reflecting the direction of the Mahaanui Iwi Management Plan relating to cultural values and the management of potential effects.

SUMMARY

Overall, the Darfield site is well suited to accommodate the proposed agrivoltaic development. It is close to existing infrastructure which enables connection to the National Grid, and does not have significant environmental constraints.

The main effects will occur during the 12-18 month construction phase, during which time the development activity will be more apparent in the immediate area. Construction noise, traffic levels and visual amenity will be managed (via conditions of consent) to be within acceptable limits.

Once operational, the proposal will have minimal (less than minor) effects on the environment, and will make a significant contribution to the supply of renewable energy in line with national, regional and local policy.

1. INTRODUCTION

1.1 BACKGROUND TO THE APPLICATION

The Darfield Agrivoltaic Solar & Energy Storage Project is a utility scale 117 MW renewable energy project located at 1352 Homebush Road, Darfield ("**the site**"). It consists of 117 MW of solar generation capacity plus a 106 MW / 200-400 MWh battery energy storage system ("**BESS**").

The site is located adjacent to the Orion Kimberly Substation and associated National Grid transmission lines. From a technical perspective, proximity to a substation and transmission infrastructure with available capacity is key. The cost of constructing a new substation would be unfeasible for projects of the scale being proposed. Power generated also needs to be accommodated in existing transmission infrastructure without the need for major upgrades. The subject site can connect directly to the existing substation and electricity infrastructure of the Kimberly Substation.

The BESS is an essential component in enhancing the utility of solar generation. It enables smoothing of fluctuations in peak supply (generally daytime) and demand (generally evening / early morning). Storage capacity of this nature also performs a supply / demand smoothing function at the National Grid level, which is becoming increasingly important as the proportion of electricity generated nationally from intermittent renewable sources increases.

The project is also designed to maximise land-use efficiency with solar generation sharing space with agricultural activities. The site is currently used for sheep production, and it is proposed to continue this practice, allowing sheep to graze around the solar panels. International studies have shown that dual use agrivoltaics systems of this nature produce viable yields in both renewable energy generation and sheep production systems – indeed, the shade provided by the solar panels can have beneficial effects in providing shelter for the animals (refer to Figure 1).

Figure 1: Solar panels being used by sheep for shade[1]

1.2 DARFIELD SOLAR AND ENERGY STORAGE LTD

The applicant, Darfield Solar and Energy Storage Ltd ("**DSES**"), is a subsidiary company of NZ Clean Energy, which develops, builds, manages and operates utility scale renewable energy projects across New Zealand. NZ Clean Energy has five key objectives:

- Contribute towards a sustainable and secure future for the energy sector to help combat climate change;
- Provide land owners with a financially viable diversification option, benefiting next generation farmers;
- Encourage biodiversity and create new wildlife habitats on sites;
- Bring energy and education benefits to local communities and schools; and
- Create jobs for the local communities during the construction and operational phases of projects.

NZ Clean Energy projects are dedicated to providing a sustainable future for the energy sector by contributing to decarbonisation of the energy sector and providing increased energy security for both the local area and wider network.

[1] Image from: Putting solar panels in grazing fields is good for sheep | New Scientist, 2023.

1.3 RESOURCE CONSENT REQUIREMENTS

The Darfield Agrivoltaic Solar & Energy Storage Project requires the following resource consents:

- Land-use consent from Selwyn District Council for:
  - the establishment of a new renewable electricity generation activity as a **discretionary activity**; and
  - the establishment of vehicle crossings to access the site as a **restricted discretionary activity**; and
- Regional consents from Environment Canterbury for:
  - earthworks over an aquifer as a **restricted discretionary activity;** and
  - the discharge of construction phase stormwater to land as a **restricted discretionary activity;** and
  - the discharge of operational phase stormwater to land as a **discretionary activity.**

These requirements are detailed in Sections 4 and 5 of this AEE.

1.4 REPORT STRUCTURE

All matters required to be addressed in accordance with Schedule 4 of the Resource Management Act 1991 ("**RMA**" or "**the Act**") are contained within this Assessment of Environmental Effects ("**AEE**"), which is set out in ten sections as follows:

Section 1 Is this introduction.

Section 2 Describes the existing environment.

Section 3 Describes the proposal.

Section 4 Sets out the district resource consent requirements.

Section 5 Sets out the regional resource consent requirements.

Section 6 Addresses the actual and potential effects of the proposal on the environment.

Section 7 Describes the consultation undertaken in respect of this resource consent application.

Section 8 Sets out the statutory framework against which the resource consent application has been made and assesses the proposal in relation to the provisions of the relevant statutory planning documents and the RMA.

Section 9 Considers notification requirements under RMA Section 95A - 95E.

Section 10 Is a concluding comment.

Technical assessments have been commissioned by DSES to support this AEE. They are appended to this AEE and are referenced throughout this document as necessary.

2. EXISTING ENVIROMENT

2.1 THE SITE AND ITS ENVIROMENTAL SETTING

The site is located on farmland at 1352 Homebush Road, approximately 3 km northwest of Darfield, Canterbury. It is directly adjacent to the Fonterra Kimberly Factory and the Kimberly Substation (see **Figure 2**). The total site area is 148 ha.

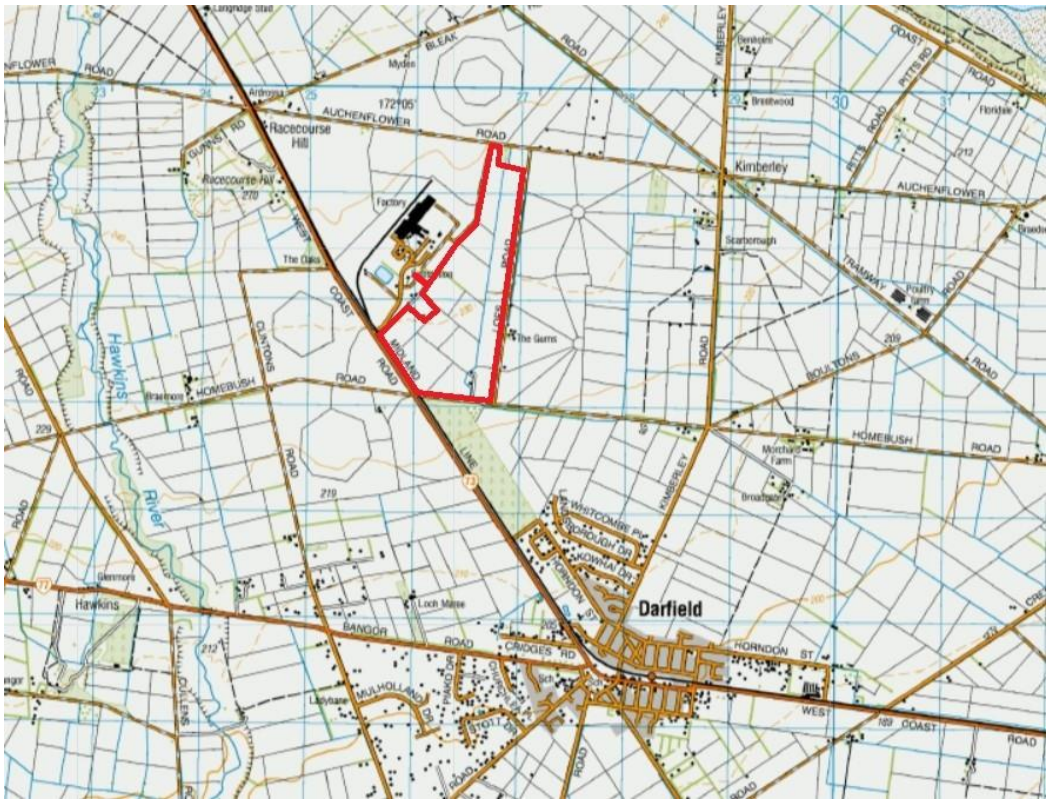


Figure 2: Site location

The surrounding land is rural, typical of the Canterbury Plains, comprising pasture with occasional shelterbelts. The Fonterra plant immediately west of the site is a prominent feature which, together with the Kimberly Substation and associated transmission lines, imparts something of an industrial character to the immediate area.

The site is bounded by the Midland railway line (Rolleston – Greymouth) and SH 73 to the south-west. Homebush Road runs adjacent to southern site boundary, whilst Loes Road runs adjacent to the east, and Auchenflower Road runs adjacent to the north.

There are a limited number of dwellings in the area. The nearest residential properties are 1433 Homebush Road, 32 and 68 Loes Road, and 1/3792 West Coast Road (SH 73). The edge of Darfield township is approximately 1.5km southeast of the site.

The records of title for the site are attached at **Appendix 1**.

2.1.1 Landscape

The site is located within the rural environment on the outskirts of Darfield on the Canterbury Plains between the Waimakariri and Hawkins Rivers. It is backdropped by the Malvern, Front, Puketeraki, Mount Oxford and Mount Thomas Mountain Ranges, and is characterised by its broad and open nature.

Located to the east of the Darfield Dairy Factory, Kimberly electrical substation, SH 73 and the Midland Railway Line, the character of the site is influenced by surrounding pastoral and cropping land use, shelter rows, hedgerows, clusters of specimen trees, woodlots, plantation forests (McHughs Forest Park), pylons, transmission lines, and post-and-wire fencing.

The site is not located in or near any natural character values, Outstanding Natural Landscapes, Visual Amenity Landscapes, Significant Natural Area or Indigenous Biodiversity Management Overlays and does not contain any natural wetlands, lakes or rivers (or their margins), or indigenous planting.

2.1.2 Soils and Productive Land Capability

The site is mapped as entirely class LUC 3 in the New Zealand Land Resource Inventory ("**NZLRI**"), as shown in **Figure 3**. It comprises a single unit of inventory class 3s5 soil. Under the NZLRI, 3s5 is shown as moderately shallow / stoney silt loam textured susceptible to wind erosion.

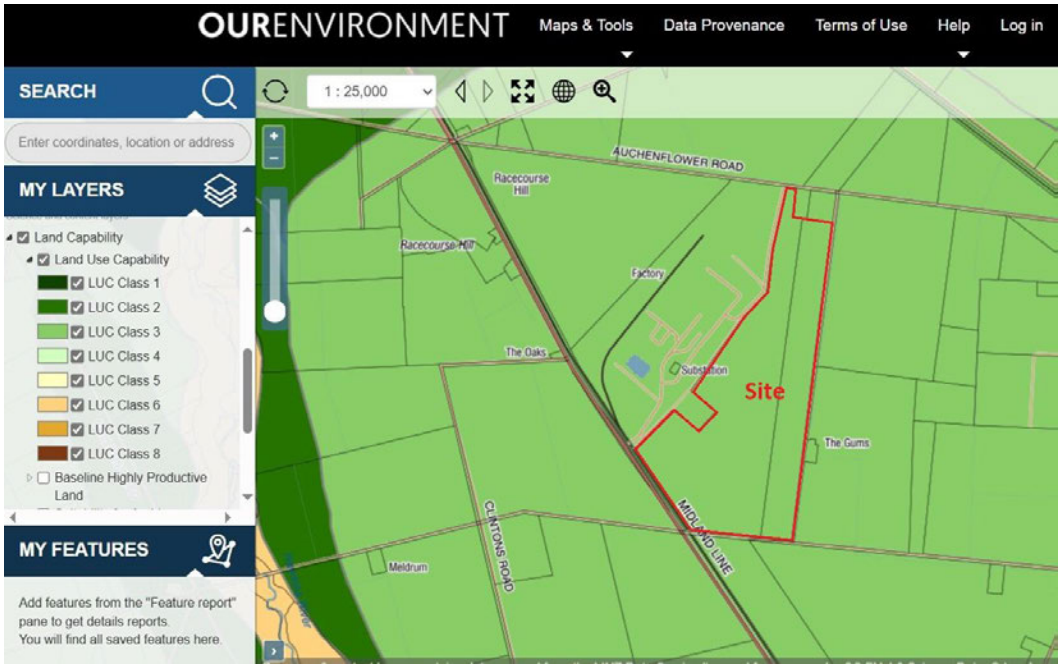


Figure 3: Manaaki Whenua LUC Mapping

Currently, the site is used as part of a lamb finishing operation. This involves approximately 4,000 lambs being bought to site in January and grazed until spring.

Pastures are a mixture of cocksfoot, sub and white clover. Forage crops for lambs are rotated around the site as a form of pasture renewal.

A site survey was undertaken by Landvision Ltd in relation to productive land capability. The focus of this exercise was to collect more detailed information to accurately assess potential effects of the proposed solar farm under the NPS-HPL.

Lamb finishing has been utilised on this site because it is a flexible system that reduces exposure to dry summers. Arable cropping (wheat) has been attempted in the past but not continued as it proved to be ill suited to dry seasons.[2]

Detailed mapping undertaken by Landvision of the soils on site (refer to **Appendix 2**) has revealed that the single HPL unit identified in the regional mapping has significantly variable characteristics, with some parts not having the level of productive capability associated with LUC 3. Notably, across the site there is a recurring pattern of soil depths varying between >20cm and <20cm. Typically, the shallower soils would be mapped as class 4s, were they to be mapped separately.

Landvision found that from observation and physical data collected, the site is suitable for intensive / semi-intensive pastoral agriculture.

Whilst the site is currently mapped as 3s5 within the NZLRI, on-site investigations found shallow and very shallow soils to be present, which would be classified as class 4s within higher resolution mapping. The key limitation for the units(s) on site is a soil limitation. Soil limitation is both permanent and unavoidable. The current use of this land for livestock production effectively manages the soil limitation to maximise production through judicious stock management and timing. Productive activities (such as arable cropping) with more specific requirements and higher net investment are not well suited to this site due to the soil variability and dry summer climate.

2.1.3 Potential Land Contamination

An assessment of the Hazardous Activities and Industries List ("**HAIL**") status of the site (Preliminary Site Investigation) is attached at **Appendix 3**. This concludes that a HAIL activity (A1, Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application) has occurred and will continue to occur on the site. Potential contaminants arising from agricultural activity

[2] Landvision, Highly Productive Land Assessment, 4.2 (refer to Appendix 2).

include organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), and metals.

The conceptual site model indicates that there is a potential source and pathway link to human / ecological receptors, although the actual risk to human health or the environment is considered to be low.

2.1.4 Hydrology

The site is transacted and bounded by a number of artificial watercourses and drains, as shown in **Figure 4**. None of these are classified as natural watercourses.

An artificial watercourse bisects the site, running broadly north to south. This was constructed as part of a 1,700km network of water races used for irrigation and stock water, managed by Selwyn District Council. A second channel runs from the Fonterra site boundary and runs broadly northwest to southeast and connects to the water race via a culvert. This appears to be an intermittent flow drain. Other water races and drains run along site boundaries, although not within the site itself.

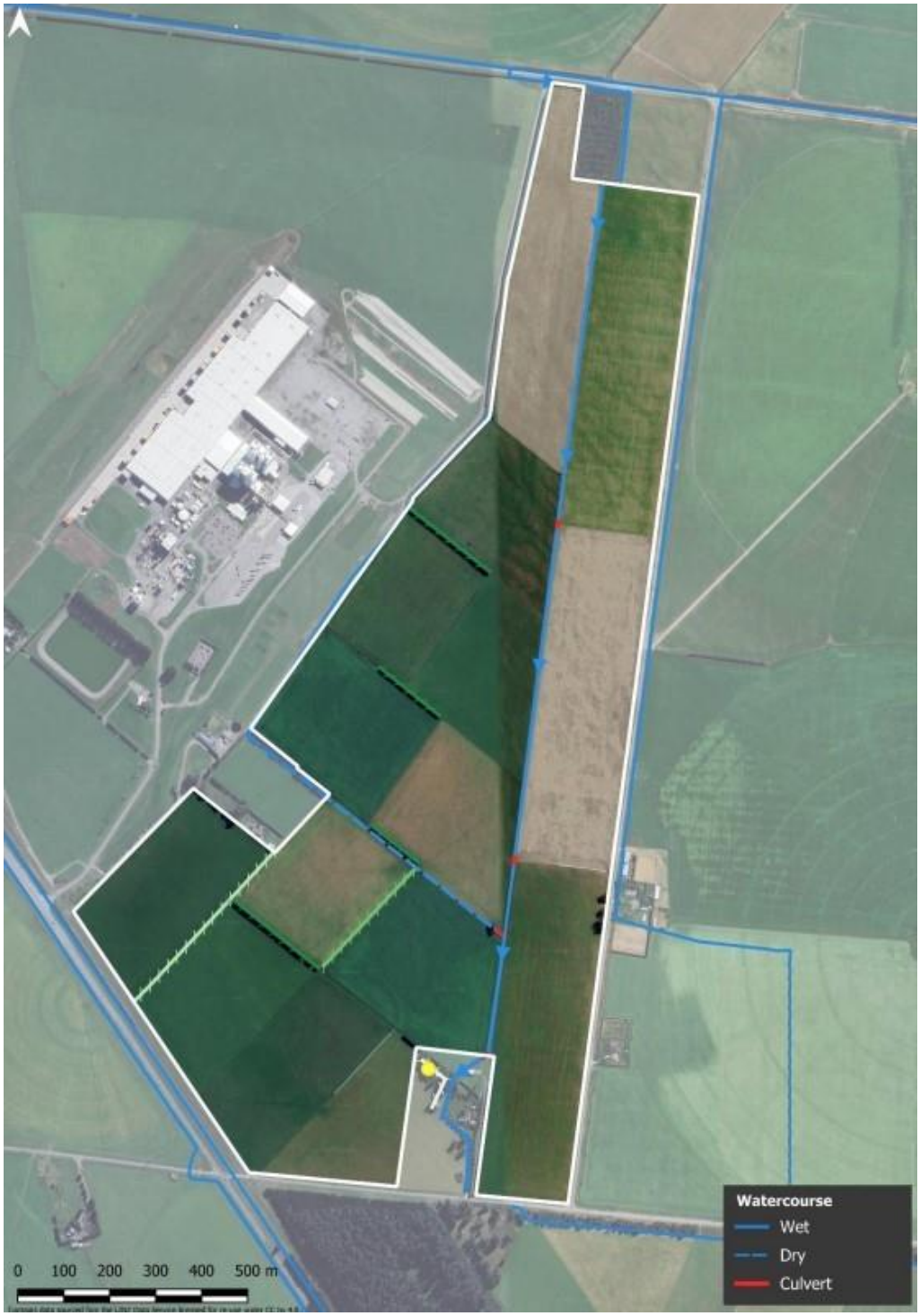


Figure 4: Surface Water Features

Groundwater

The only bore in the vicinity of the site for which data is available is L35/0084, drilled by Fonterra, as shown in **Figure 5**.

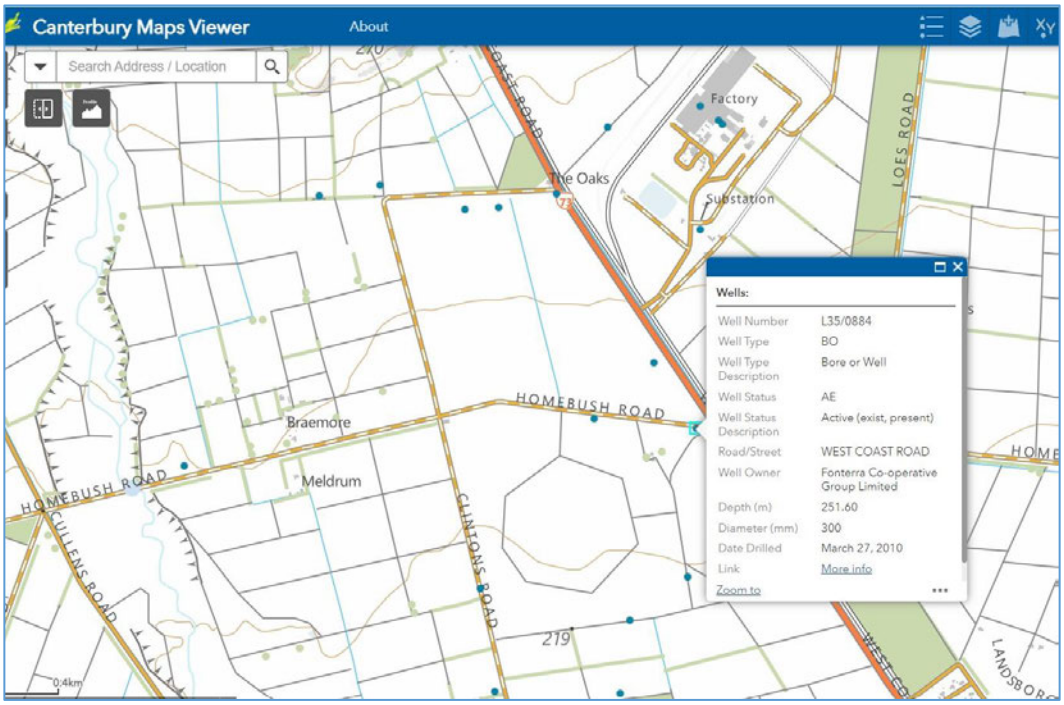


Figure 5: Groundwater monitoring well L35/0884

Records for this bore show the highest groundwater level to be some 140 m below ground level.

2.1.5 Existing Electricity Infrastructure

The site is located adjacent to the Fonterra dairy plant and the associated Kimberly Substation. The substation itself is connected to the National Grid via the Transpower 110kV transmission lines, which run along SH 73 and Homebush Road (refer to **Figure 6**).

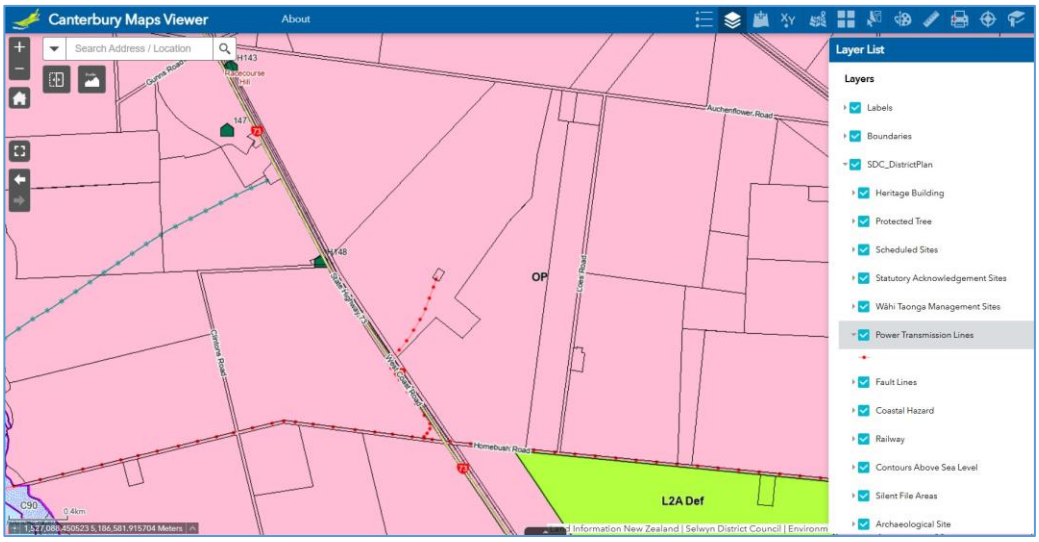


Figure 6: Transmission Lines (OSDP Map)

2.2 CULTURAL CONTEXT

Ngāi Tahu are tangata whenua and hold ancestral and contemporary relationships with the Canterbury region. There are eighteen Papatipu Rūnanga of Ngāi Tahu, and each has their own respective takiwā, where they are kaitiaki and mana whenua. There are six Papatipu Rūnanga in the Canterbury region; these are:

- Ngāi Tūāhuriri Rūnanga;
- Te Hapū o Ngāti Wheke (Rāpaki) Rūnanga;
- Te Rūnanga o Koukourārata;
- Ōnuku Rūnanga;
- Wairewa Rūnanga; and
- Te Taumutu Rūnanga.

The site is within the takiwā of Ngāi Tūāhuriri Rūnanga and Te Taumutu Rūnanga.

Mahaanui Kurataiao is a charitable, resource and environmental management, advisory company established by the six Papatipu Rūnanga of Te Tai o Mahaanui.

Whilst each Papatipu Rūnanga is responsible for protecting the tribal interests in their respective takiwā, Mahaanui Kurataiao facilitates engagement between the Papatipu Rūnanga and the councils, crown and private organisations or individuals regarding

environmental matters. It is mandated to engage in resource and environmental management processes on behalf of the six Papatipu Rūnanga.[3]

The Mahaanui Iwi Management Plan provides a statement of Ngāi Tahu objectives, issues and policies for natural resource and environmental management in the takiwā. A fundamental objective of the plan is to enable external agencies to understand issues of significance to tāngata whenua, and how those issues can be resolved in a manner consistent with cultural values and interests. While the plan is a collective statement of values and policy, it does not replace the need to engage with the appropriate Papatipu Rūnanga [via Mahaanui Kurataiao] for resource management issues in particular takiwā.[4]

2.3 ZONING AND OVERLAYS

There are currently two district plans which apply to the site – the Operative Selwyn District Plan ("**OSDP**") made fully operative on 3 May 2016, and the POSDP. Council released the Appeals Version of the POSDP on 27 November 2023. Most of the rules of the POSDP which are of relevance to this application are now beyond challenge and are treated as operative (pursuant to cl 103 of Schedule 1 and s 86F of the Act). The corresponding provisions in the OSDP are treated as inoperative.[5]

The relevant zoning and overlay provisions of both Plans are set out in Table 1 below.

Table 1 Zoning and overlays attributed to the site in the planning documents

Value	OSDP	POSDP
Zoning	Outer Plains	General Rural Zone
Noise	None identified	Dairy Processing Zone Noise Control Overlay State Highway Noise Control Overlay Railway Network Noise Control Overlay
Ecological Values	None identified	None identified
Landscape Values	None identified	None identified

[3] Mahaanui Iwi Management Plan, Policy K1.7.

[4] *Op. cit.* 1.1 He Kupu Whakataki | Introduction.

[5] The sole exception is *Rule TRAN-REQ7 – Accessway design, formation and use*, which remains under appeal. This is considered in Section 4 of this AEE.

Value	OSDP	POSDP
Hazards and Risks	None identified	Plains Flood Management Overlay

The OSDP zoning and overlay map is shown in **Figure 7** below, and the POSDP zoning and overlay map is shown in **Figure 8**.

The site is located in the Outer Plains Zone under the OSDP. The OSDP attributes no other values to the site.

Under the POSDP, the site is partly covered by the Dairy Processing, State Highway and Railway Network Noise Control Overlays. The site is also within the Plains Flood Management Overlay. The POSDP attributes no other values to the site.

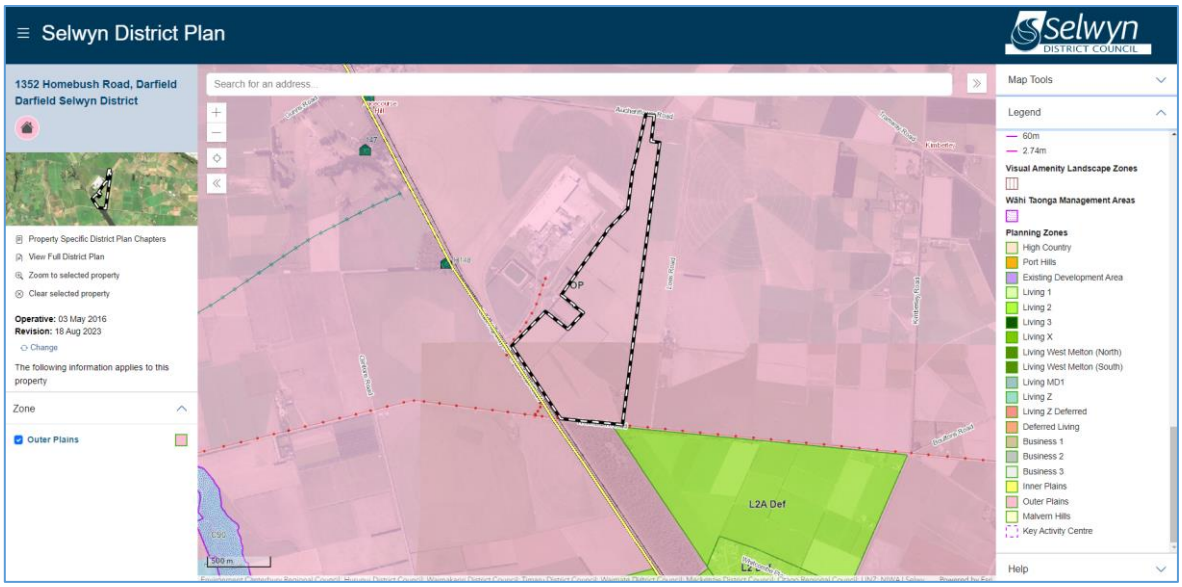


Figure 7: **OSDP Zoning and Overlays**

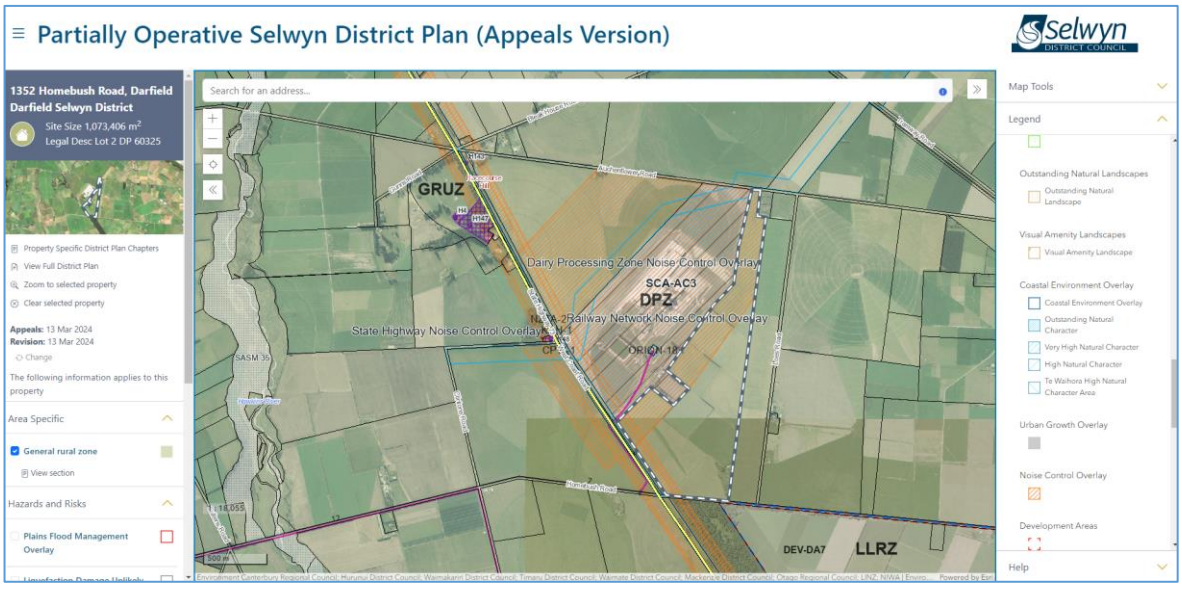


Figure 8: **POSDP Zoning and Overlays**

2.4 SENSITIVE RECEPTORS / NEIGHBOURING DWELLINGS

Sensitive receptors in the area of the proposal include:

- Nearby dwellings, particularly on Homebush Road, Loes Road and Auchenflower Road;
- Nearby workplaces;

- Users of nearby roads, including SH 73;
- Users of the rail line;
- Users of the McHughs Forest Park (entrance); and
- Potential occupiers of the Darfield 7 Development Area.

These receptors are identified in detail in the Landscape and Noise reports included in the appendices.

The Darfield 7 Development Area is one of several sites identified in the POSDP to accommodate future urban growth. It is zoned for Large Lot Residential development. The location of the Darfield 7 Development Area and its spatial relationship to the application site is shown in **Figure 9**.

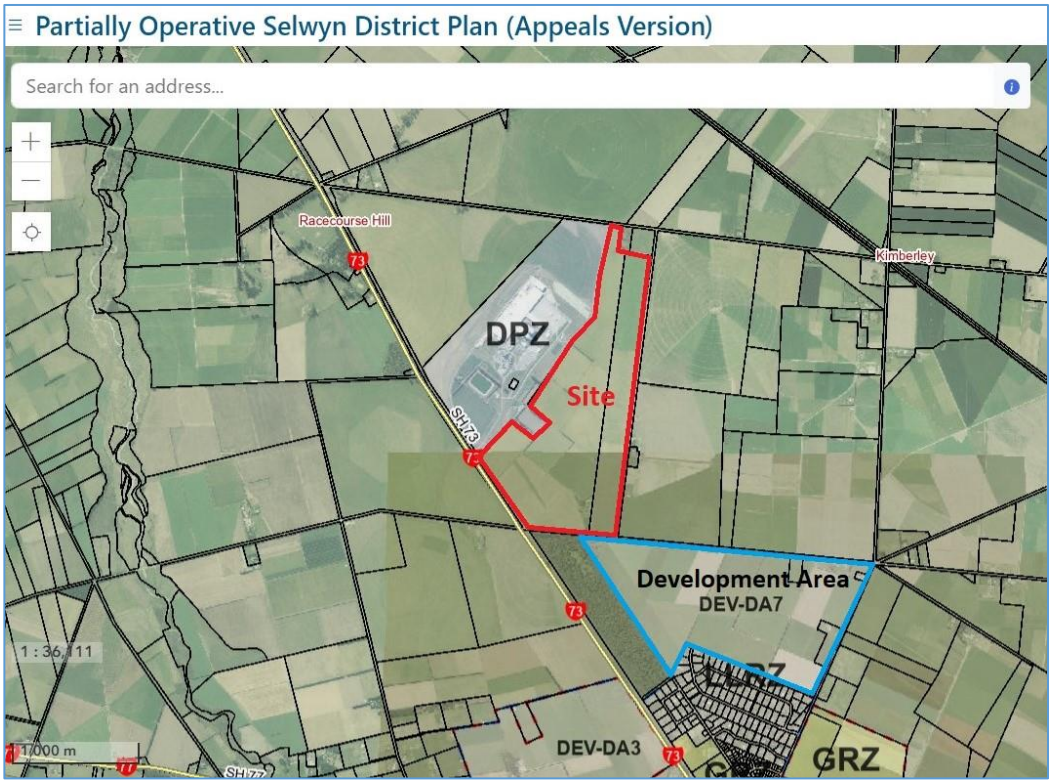


Figure 9: Darfield 7 Development Area (POSDP)

2.5 SITE ACCESS AND TRAFFIC

As described in Section, 3.2, access to the site will be via two points at Homebush Road and Loes Road. Homebush Road is expected to function as the primary access route, with Loes Road as a secondary access also providing for ongoing ease of FENZ access to the northern are of the site

The existing condition of the transport network in relation to the proposed access is as follows:

- Homebush Road is located approximately 3.9km by road from the centre of Darfield, with access directly off State Highway 73. A section of Midland Railway Line runs parallel with the SH 73 route between the site and Darfield;
- Homebush Road is a two-way, two-lane, generally unsealed rural road operating under a posted speed limit of 100km/h. It has a gravel surface of approximately 6.5m in width over the 760m length of the route from SH 73 to (and including) its intersection with Loes Road;
- Towards the western end of the route (prior to the SH 73 intersection), Homebush Road passes over the Midland Railway Line via a level rail crossing. The road surface is sealed across the level crossing and for a length of approximately 50m between the approach to SH 73, and for approximately 10m to the east of the level crossing (towards the Project site). The alignment of the Homebush Road route is generally straight and level between the rail level crossing through to the intersection with Loes Road. There is full and unimpeded visibility;
- Loes Road forms the north-eastern boundary to the site, by way of an unclassified, local access road in terms of the District Plan roading hierarchy. It extends for a length of approximately 2.4km from the tee-intersection with Homebush Road, through to the tee-intersection connection to Auchenflower Road to the north-east of the site; and
- The route provides a single, unsealed carriageway approximately 3.5 - 4m in width within a legal road reserve of approximately 20m, with broad grassed berms provided on each side of the road, facilitating the occasional passing manoeuvre for current farm-based activities.

2.5.1 Connection to SH 73

The intersection of SH 73 with Homebush Road is expected to provide the primary transport network connection.

The SH 73 / Homebush Road intersection provides for all turning movements to and from the Homebush Road (east) approach that will serve the project. The intersection is in the form of a skewed cross-road intersection. There are no turning lanes or marked bays for either left or right turning to / from the SH 73 approaches, reflecting the generally modest volumes of traffic currently turning through the intersection.

The level crossing of the Midland railway line is in the form of a sealed crossing (with the seal extending only for a short distance of approximately one vehicle length to the east of

the crossing). Standard Stop, St Andrew Cross ("Railway Crossing") and "← Look for Trains →" signage are in place on both sides of the crossing.

There is approximately 38m between the Give Way limit line at the approach to the SH 73 intersection and the Stop limit line applying to the level crossing. This distance could accommodate approximately six passenger cars before entering either the State Highway or rail corridors. Due to the proximity and potential for interaction between the SH 73 road intersection and Midland Line level crossing, initial conversations have been held between DSES, New Zealand Transport Agency ("**NZTA**") and KiwiRail personnel. As part of the current application, a Level Crossing Safety Impact Assessment ("**LCSIA**") has been commissioned and will be reported / provided as part of the consent application process once completed and communicated with KiwiRail.

Existing traffic volumes are presented in **Table 2**. The data comes from the latest information available from various publicly available sources including the MobileRoads and One Network Road Classification online traffic databases, and from the NZTA / Waka Kotahi Traffic Monitoring System website for SH 73.

Table 2 Existing traffic Volumes

Route	Daily Traffic Volume (vpd)	Peak Hour[6] (vph)	%HCV	HCV (HCV/day)
SH 73 (north of Darfield)[7]	3,800	360	27[8]	1026
Homebush Road (east of SH 73)	43	5	14[9]	6
Loes Road	16	2	20[10]	5

2.5.2 Road Safety

As part of the transport assessment (see **Appendix 4**), search was made of the Waka Kotahi NZTA's Crash Analysis System along the section of Loes Road, Homebush Road (east) and its intersection with SH 73. The search addressed the full five-year period from 2019 to 2023 (inclusive) plus the partial 2024 records, and revealed one non-injury crash

6 Peak hour volumes are estimated at 15% of daily volume (unless other data is available)

7 One week of traffic data April 11-18, 2024.

8 mobileroad.org.

9 mobileroad.org.

10 mobileroad.org.

associated with a vehicle turning right out of the western approach from Homebush Road at the SH 73 intersection

There were no reported road safety events along either Homebush Road (east) or Loes Road during the search period. There do not appear to be any road safety issues that represent any concern as a result of the proposal, or which would give rise to any alteration to the project and its proposed transport aspects.

3. DESCRIPTION OF THE PROPOSAL

3.1 INTRODUCTION

As noted previously, the proposal is for the construction and operation of a solar and energy storage utility scale 117 MW renewable energy project on an approximately 148 ha site. The site is located adjacent to the eastern side of the Fonterra Kimberley Factory. The solar farm will be connected to the Kimberley Substation, located within the land occupied by the Fonterra plant, via an overhead line or underground cable. The project will utilise existing infrastructure to enable power to be exported to the National Grid.[11] The project will generate enough electricity to supply approximately 29,499 homes per year, saving approximately 15,540 tonnes of CO_2 per annum.[12]

Construction is expected to take between 12-18 months and will generate over 100 jobs during the time of construction, with further employment being generated for the long-term operation and maintenance of the project.

3.2 PROJECT DESIGN

The indicative layout of the proposed installation is shown in **Figure 10**. Key features are outlined below.

3.2.1 The Solar Array

It is proposed that approximately 188,000 solar panels are installed on the site. Each solar panel measures approximately 2.2 m long, 1.3 m wide, and 35 mm thick, with a dark colour. They feature an anti-reflective coating to minimize light reflection, maximizing energy absorption. Solar panels will be mounted on Single Axis Tracking Solar Tables. Around 60 panels will be mounted on each table, which will be around 60 m in length and 2.2 m in width. When parallel to the ground, the panels stand approximately 1.5 m above ground level. At full tilt, they reach a height of around 2.8 m and are positioned about 0.3-0.9 m off the ground. Each row of solar tables will be separated by an approximately 3.22 m gap.

The solar tables are supported by piles driven to the ground. The table structures allow the solar panels to pivot from east to west, tracking the sun's movement across the sky. In the morning, the panels orient eastward, at midday they lie mostly horizontal, and by day's end, they face westward.

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[11] DSES and Fonterra are also discussing the potential for the solar installation to supply power to the Kimberly Dairy Plant.

[12] The emissions reduction figure is based on the assumption that the Darfield solar output replaces the national average NZ electricity generation (which is ~ 85% renewable).

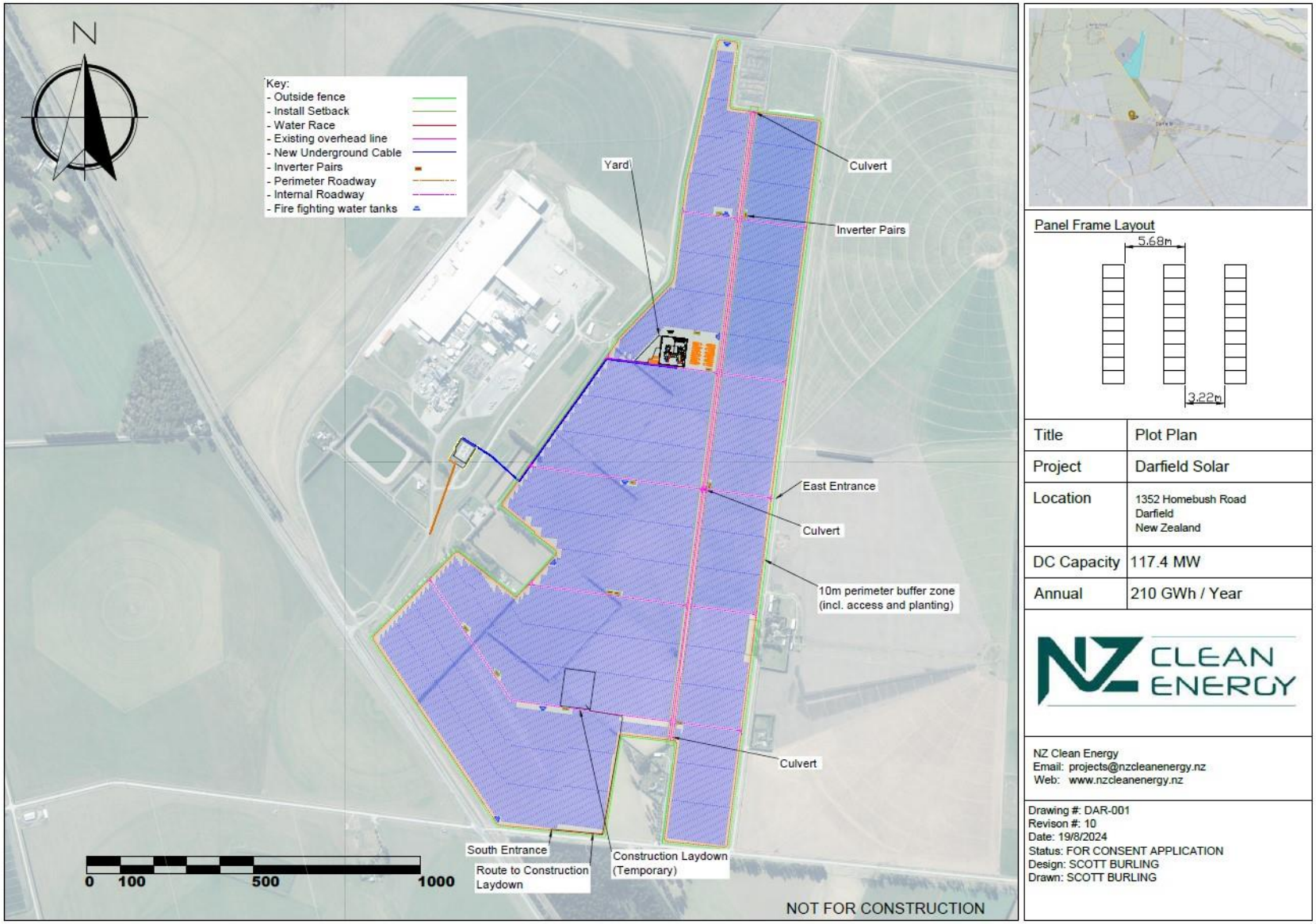

Figure 10: Scheme Plan

3.2.2 Battery Energy Storge System

The BESS is designed to store energy in batteries for later use. These facilities typically consist of numerous battery cells or modules connected together, often housed in containers. An example (from the UK) is illustrated in **Figure 11** (the BESS is located at the bottom of the image).

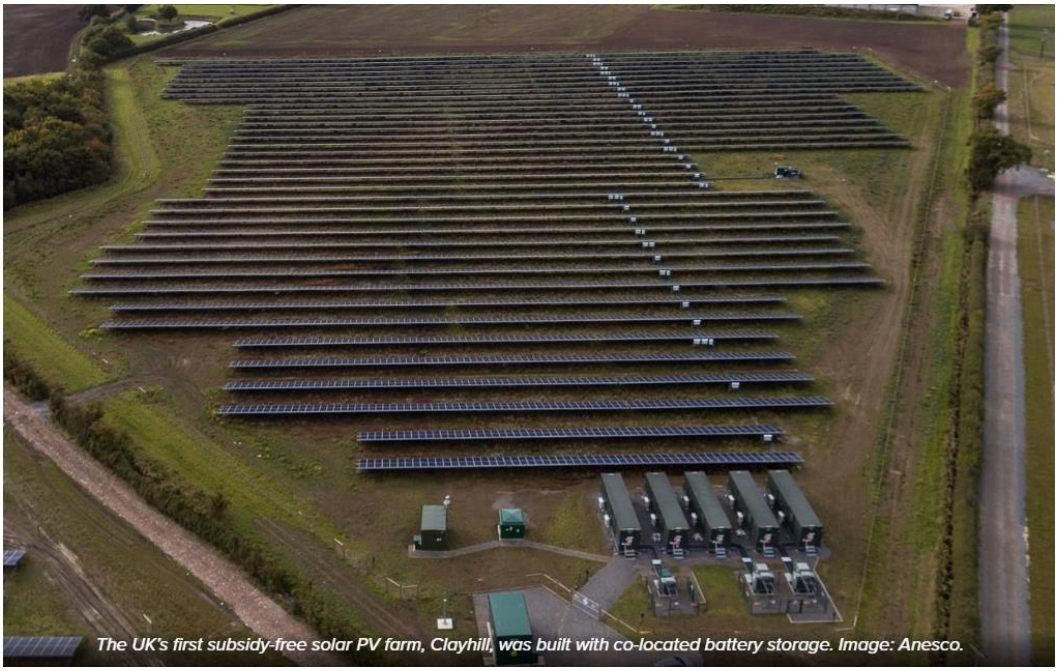

Figure 11: An example solar array and BESS installation

The BESS offers several benefits for solar power generation, enhancing the efficiency, reliability, and overall utility of solar energy. Key benefits include:

- Energy Storage for Later Use:

  Solar power generation occurs during the day. A BESS allows excess energy generated during peak sunlight hours to be stored and used later, such as during the night or on cloudy days;

- Maximizing Solar Output:

  By storing surplus energy, a BESS ensures that none of the solar power goes to waste, maximizing the return on investment in solar panels;

- Grid Stabilization:

  A BESS can help stabilize the electrical grid by providing quick bursts of energy or absorbing excess power, maintaining grid frequency and helping to maintain a stable voltage level; and

- Environmental Benefits:

  The BESS supports the integration of more renewable energy sources into the grid, contributing to a more sustainable energy future. By enabling greater use of renewable energy and reducing reliance on fossil fuel generated supplementary power during peak demand periods, the BESS helps lower greenhouse gas emissions.

Overall, a BESS significantly enhances the value and functionality of solar power systems, making renewable energy more practical and beneficial for both individual users and the wider energy grid.

3.2.3 Agricultural Production

The project is an agrivoltaic system, designed to maximise land-use efficiency with solar generation sharing space with productive agricultural activity. The site is currently used for sheep production, and it is proposed to continue this practice, allowing sheep to graze around the solar panels.

3.2.4 Inverters

The solar panels, which create Direct Current ("**DC**") electricity, will be connected to approximately twenty inverters which convert the power to Alternating Current ("**AC**") electricity. The inverters will be situated throughout the site and connected back to the substation and BESS through a network of underground cables.

The inverters and transformers will be housed either in standard shipping containers, in small buildings, or in an outdoor "skid" type configuration. **Figure 12** illustrates a typical inverter package. The dimensions of each inverter (whether housed in a shipping container, small building or in skid configuration) would be approximately equivalent to a 20-foot HC shipping container. The inverters will be placed on piles or installed on concrete pads (of the same size).

Figure 12: Typical Invertor Installation

Inverters use cooling oils. These will be transported, stored and used in accordance with the requirements of the Hazardous Substances and New Organisms Act 1996 and The Health and Safety at Work Act 2015 ("**HSWA**").

3.2.5 Grid Connection

The solar installation will connect via underground cabling to the existing Kimberly Substation, which is owned and operated by Orion.

Orion have expressed their support for the development, but note that whilst the National Grid transmission lines have capacity to accommodate the project, upgrade work will be required at the substation to establish the connection.

The substation site is designated and these upgrades are outside the scope of this application. DSES will work closely with Orion to address the required upgrades at such time as consent for the solar may be secured (i.e. once the need is established).

The proposal will not require any additional overhead transmission lines.

3.2.6 Fencing

A security fence will be installed around the site perimeter and will be of post and chain mesh construction, similar to a deer fence, with an approximate height of 2.4m.

3.2.7 Building / Utilities

The site will contain an office that will be housed in a small Portacom-type structure, and it is anticipated there will be a small lunchroom within the office. This would have a floor area of approximately 36m^2. The office building will be serviced by a small roof-fed water tank or alternative water supply.

Toilet facilities will comprise portable units for off-site disposal to an appropriate facility.

3.2.8 Landscape Planting and Mitigation

Landscape planting is proposed along sections of the site boundary in order to mitigate localised visual effects (see Section 6.6). This planting will be undertaken using native species to maximise ecological benefits.

3.2.9 Access

The proposed primary access on Homebush Road will be via a vehicle crossing constructed to commercial rural standard in accordance with the relevant District Council standards and positioned approximately 330km from the SH 73 intersection. A secondary vehicle access to the site is proposed via Loes Road at a position approximately 1,100m north of the intersection with Homebush Road. The approximate locations of the accesses are shown in **Figure 13**.

Figure 13: Site access points (approximate)

On-site parking and associated vehicle manoeuvring for approximately 20 construction-related vehicles (car and services trucks) and associated manoeuvring will be provided on-site and accessed via the proposed primary driveway connection to Homebush Road.

3.2.9.1 Construction Phase Activity

The construction for the proposed development is expected to last approximately 12 to 18 months. Construction activities will be largely limited to the preparation of hardstands, tracks and footings, and delivery and construction / installation of prefabricated items such as solar panels, control room, switching station, battery units, and connection components.

Construction activities will generally be undertaken during normal daytime working hours, approximately 6:30am to 7:00pm. Construction work which generates noise (including heavy vehicle movements) will be limited to between 7:30 am and 6:00 pm, Monday to Saturday. There will be no noisy construction works undertaken in the evenings or on Sundays. Noisy construction works include earthworks, trenching, piling, use of generators and air compressors and heavy vehicle movements.

Construction-related vehicle movements will comprise construction workers and deliveries. It is expected that the majority of equipment and plant deliveries will occur via vans, and heavy vehicles (12.5m and 19m trucks).

Heavy vehicle movements during construction will be approximately 60 heavy vehicle movements (inclusive of arrival and departures) across the full extent of the typical working day during the busiest or peak periods of construction within the site (approximately months 8-12). At other non-peak periods there will be less intense activity on-site and a comparably reduced external traffic movement intensity.

Light vehicle traffic relating to the movement of site workers during the construction phase of the project is expected to be generally as shown in **Table 3**, which sets out the anticipated staff travel profile through the course of an 18-month construction phase,[13] noting that precise numbers will not be known until contractors are engaged for the delivery of the site-works and construction of the project.

Table 3 Anticipated construction staff vehicle movements profile

Month	Estimated Staff on-site	Approximate Number of Return Vehicle trips to site per day
1	10	5
2	10	5
3	15	8
4	50	25
5	87	30
6	115	40
7	196	65
8	338	115
9	350	120
10	350	120
11	350	120
12	340	115
13	324	110
14	195	65

[13] Numbers of return vehicle trips have been estimated on the basis that during the early and latter period of construction the average number of construction workers per vehicles would be 2 persons/vehicles, while during the main period of construction with greater numbers of workers based on-site, the average occupancy would be an average of 3 workers/vehicle.

Month	Estimated Staff on-site	Approximate Number of Return Vehicle trips to site per day
15	120	30
16	70	30
17	35	20
18	25	15

3.2.9.2 Operational Phase Activity

Agrivoltaic facilities are usually monitored remotely in real-time and do not require dedicated staff to be based on-site. Staff are however required to access the site from time to time for inspections and maintenance activities. Accordingly, it is anticipated that up to two staff and one technician could potentially be expected to be on-site at any given time.

On this basis, there are expected to be no more than six (generally light utility or equivalent vehicles) (inclusive of inbound and outbound) per day during the operational phase of the project.

3.2.9.3 Emergency Access

Based on Fire and Emergency New Zealand ("**FENZ**") advice received, it is considered that for the purposes of emergency vehicle access, the standard of carriageway along Homebush Road and Loes Road and the proposed access points will be satisfactory to ensure a timely and practical emergency vehicle access if and when required. Internal access tracks will be laid out to accommodate large fire appliances tracking curves and width requirements, plus associated loading requirements for culverts, at detailed design stage.

3.2.10 Water Supply

No public water supply is available. Rainwater tanks will be used to collect roof water to supply the site office for potable and non-potable purposes. Treatment of water will occur through a "packaged treatment system" prior to consumption.

Additional static water tanks will be required around the site for panel cleaning maintenance and firefighting capacity. The proposal is to provide dual 30,000 litre tanks positioned around the site in optimal locations to allow firefighting to reach all areas. The areas for the tanks will be equipped with a hardstand to provide access for a fire appliance to connect to the tanks and be clear of the access track. The tanks will be interconnected with a 100mm pipe along with a FENZ 100mm female suction coupling at the outlet. The tanks will be filled by water tankers brought to site.

The indicative location of the water tanks is shown on the site layout plan (scheme plan) included at **Appendix 5** of this AEE. The final location, number and volumes of these tanks is to be confirmed by FENZ through consultation with their regional fire safety team at the detailed design stage.

3.2.11 Wastewater

The subject site does not have an existing connection to any wastewater network.

Wastewater management requirements for the proposed development will be minimal, and it is proposed to use basic storage and removal systems. Toilet facilities will be provided via a portable toilet that is serviced monthly or as required depending on staff numbers. Alternatively, wastewater will be held in a holding tank and disposed off-site. Should a kitchen be provided, then wastewater will be collected, in much the same options as the toilet facilities via a holding tank for removal.

As noted previously, toilet facilities for the construction phase will be of a portable toilet type.

3.3 CONSTRUCTION

3.3.1 Earthworks

Earthworks comprising approximately 36,800m^3 are required over an area of approximately 9.6 ha for the following activities:

- Stripping of topsoil to form internal tracks (22,600m^3);
- Minimal topsoil disturbance to prepare areas for the site buildings, inverters, and the battery installation (6,200m^3); and
- Trenching of up to 1m depth to lay the cables which connect the frames of solar panels together and to the inverters, and also connect the solar array to the Kimberly Substation (8,000m^3).

The solar tables will be installed using piles directly driven into the ground. This means that excavation is not required.

The internal tracks / accessways will comprise compacted gravel, and given the flat-lying nature of the site, no ground levelling will be required to establish these. The tracks will be 5.0 m in width and will require topsoil stripping to a depth of c.300mm. Stripped topsoil will be spread over a 5m – 10m width adjacent to the track, clear of any structures or water courses, and then grassed. All topsoil stripping and spreading will be at least 3.0m clear of drain edges. Tracks will be formed using metal aggregates imported to site.

Typical track cross-sections are shown in **Figure 14**. The total length of access tracks is approximately 15,100m.

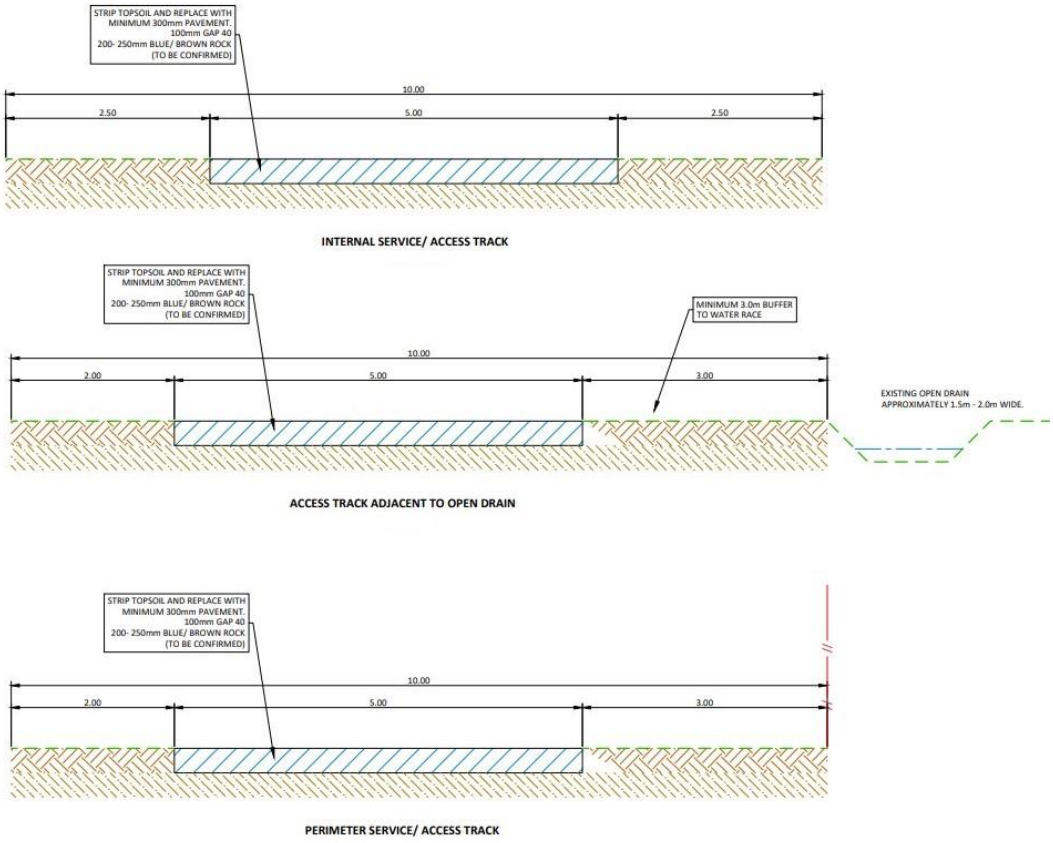

Figure 14: Typical Track Cross-Sections

Hardstand areas are required for the BESS and associated substation, inverter units, site office, parking and a laydown area. Hardstand areas will be formed using the same basic approach as for track formation – i.e. stripping of c.300mm of topsoil and placement of metal (aggregate) fill.

For avoidance of doubt, no permanent stockpiling of topsoil or fill is proposed within the site.

It is expected that the main earthworks / site works operation will be undertaken over approximately 3-4 months, noting that these works will involve both the access tracks and hard stand areas. (*Note: installation of the solar panels will take longer than this and is expected to take place after the establishment of all the internal roading*).

It is considered that sedimentation and dust effects can be readily managed using standard techniques set out in the Erosion & Sediment Control Toolbox for Canterbury[14]

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

(see assessment of effects in Section 6.4.3). The water race will be protected from sedimentation effects with a minimum 3 m buffer in which no earthworks will be undertaken.

Given the potential for agrichemical contamination noted in Section 2.1.2, soil sampling will be undertaken prior to any disturbance of soils and appropriate measures implemented to manage any contaminated material.

3.3.2 Construction Traffic

Construction traffic is described in Section 3.2.9 above.

3.3.3 Operational Period and Decommissioning

The solar farm and BESS installation is intended to be operational for a period no greater than 35 years. At the end of its operational life, all equipment will be removed and the ground reinstated.

4. RESOURCE CONSENT REQUIREMENTS - DISTRICT

As outlined in Section 2.3, there are currently two district plans which apply to the site – the OSDP and the POSDP. The rules of the POSDP relevant to this application are now beyond challenge and are operative / treated as operative (pursuant to cl 103 of Schedule 1 and s 86F of the Act), and the corresponding provisions in the OSDP are treated as inoperative.

Therefore, this application stands to be assessed under the POSDP. The relevant provisions are considered below.

4.1 PARTIALLY OPERATIVE SELWYN DISTRICT PLAN

The rule framework relevant to this proposal is located within the Energy & Infrastructure, and Transportation Chapters. Useful guidance is contained in the 'Note for Plan Users', preceding the rules contained in the Energy & Infrastructure Chapter. Relevant extracts from this guidance explain that:

1. *As required by the National Planning Standards, unless relating specifically to a Special Purpose Zone, the 'Energy, Infrastructure and Transport' heading has been created to be self-contained for all energy, transport and infrastructure works and activities. Under the National Planning Standards it is permitted to have more than one chapter covering these matters under the 'Energy, Infrastructure and Transport' heading. In this Plan, energy and infrastructure matters are contained in a separate chapter to transport matters.*
2. *Regarding energy or important infrastructure activities, while most of the relevant provisions are contained within this chapter, where an activity is located within the Port Zone or the Dairy Processing Zone (both of which are Special Purpose Zones), those chapter provisions must also be considered. Moreover, all activities must be assessed against the Transport chapter. Additionally, the objectives, policies, and methods for managing reverse sensitivity effects relating to noise sensitive activities establishing in proximity to important infrastructure are managed under the Noise Chapter of this Plan. Except where there are direct cross-references, in all other circumstances this chapter sets out all other provisions for energy or infrastructure activities.*
3. *Where a rule or rule requirement from another chapter has been cross-referenced within this chapter, the relevant associated objectives and policies also apply when assessing an application for resource consent.*
4. *Where an activity is within an Overlay, the associated objectives and policies from the relevant chapter for that overlay also apply when assessing an application for resource consent.*

The proposed activity is an "energy" activity and therefore comes under the energy chapter.[15] The plan is clear that other than for consideration of Transport, Special Purpose Zones and Overlays, or where specific cross-references are made, this sets out all other provisions for energy or infrastructure activities. The "General District Wide Matters" Chapters (including earthworks and noise) and corresponding rules therefore do not apply.

The proposal requires resource consent as a **discretionary activity** under EI-R31 for the establishment of a new renewable electricity generation activity. EI-R31 has no applicable rule requirements.

The construction phase of the activity is projected to generate vehicle movements in excess of the TRAN-R4 permitted activity limit for vehicle crossings (which is 40vm/d). The activity therefore defaults to a **restricted discretionary activity** under TRAN-4.2. The activity will meet all other permitted activity standards of Rule TRAN-R4.

When construction traffic is at its busiest period, it will also exceed the permitted activity limit for rural vehicle movements under TRAN-R7, which is specified in TRAN-TABLE 1 as 60 equivalent car movement per day per site on a road formed, unsealed and maintained by SDC (including Homebush Road and Loes Road). The proposal is therefore a **restricted discretionary activity** under TRAN-R7.2.

The construction phase also qualifies as a high trip generating activity under Rule TRAN-R8. It is covered in TRAN-TABLE2 as an "other activity" generating more than 50 vehicles per peak hour, but not more than 120, thus meeting the Basic ITA Development Threshold. The proposal is therefore a **restricted discretionary activity** under TRAN-R8.2.

Applicable rules and consent requirements are summarised in **Table 4**.

Table 4 POSDP rules and consent requirements

Rule	Activity	Status
Rule EI-R31 Other Renewable Electricity Generation and Renewable Electricity Generation Activities	The establishment of a new renewable electricity generation activity.	**Discretionary**
Rule TRAN-R4 Vehicle Crossings	Projected vehicle movements in the construction phase exceed the maximum volume of 40vm/d	**Restricted Discretionary**

[15] For avoidance of doubt, DSES is not an Electricity Operator as defined by the Electricity Act 1992, and consequently, the activity does not meet the definition of "important infrastructure" under the Partially Operative Plan.

	specified in TRAN-R4.1.b.iii.2 for a vehicle crossing in the General Rural Zone.	
Rule TRAN-R7 Rural Vehicle Movements and Associated Parking	Projected vehicle movements in the construction phase exceed the maximum volume of 60ecm/d specified in TRAN-TABLE1 for an unsealed road.	**Restricted Discretionary**
Rule TRAN-R8 High Trip Generating Activities	Projected vehicle movements in the construction phase exceed the Basic ITA threshold in TRAN-TABLE2.	**Restricted Discretionary**

Under HPW8 (applications subject to multiple provisions), if more than one rule applies, and the activity status for each rule is different, then the most restrictive activity status will apply. Therefore, the proposal is a **discretionary activity** under the POSDP.

There are no appeals relating to the relevant rules of the POSDP and they are deemed operative (and any previous rule in the OSDP is deemed inoperative).[16]

A more detailed assessment of the proposal against the applicable POSDP rules is attached as **Appendix 6** to this AEE.

4.2 OPERATIVE SELWYN DISTRICT PLAN

All the rules of the POSDP which are relevant to the proposal are beyond challenge and considered operative (and the corresponding rules of the OSDP inoperative). As such an assessment of the proposed activities against the rules of the OSDP is not required, and has not been provided.

4.3 NATIONAL ENVIRONMENTAL STANDARD FOR ASSESSING AND MANAGING CONTAMINANTS IN SOIL TO PROTECT HUMAN HEALTH ("NES-CS")

The NES-CS manages activities which involve the disturbance of land which may be contaminated. This is determined by whether activities listed in the HAIL have or are likely to have occurred on the site.

An assessment of the HAIL status of the site is attached at **Appendix 3**. This concludes that a HAIL activity (A1, Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application) has occurred and will continue to occur on the site. Clause 5 (8) of the NES-CS sets out the

[16] RMA s.86F.

activities that trigger if the NES-CS regulations apply. Regulated activities include the removal or replacement of fuel storage systems, disturbing soil under or around buildings used for residential purposes, and changing the use of a piece of land in a way that causes the piece of land to stop being production land.

The proposal does not:

- Involve the removal or replacement of a fuel storage system;
- Involve sampling or disturbing soil in or around residential buildings or a farmhouse garden; or
- Subdivide or change the use of the land in a way that causes the land to stop being production land.

On that basis, the proposal does not require resource consent under the NES-CS regulations.

4.4 OVERALL ACTIVITY STATUS

Overall, the proposal stands to be considered as a **discretionary activity** under the POSDP.

5. RESOURCE CONSENT REQUIREMENTS – REGIONAL

The provisions of the Canterbury Land and Water Regional Plan (**CLWRP**) apply to the proposal. Under the CLWRP, the following rules and consent requirements apply.

Earthworks over Aquifers

Rule 5.175 states that

> *The use of land to excavate material is a permitted activity, provided the following conditions are met:*
>
> ...
>
> 2. *Over an unconfined or semi-confined aquifer:*
>
> a. *the volume of material excavated is less than 100m^3; or*
>
> b. *the volume of material excavated is more than 100m^3 and:*
>
> i. *there is more than 1m of undisturbed material between the deepest part of the excavation and the seasonal high water table highest groundwater level; and*
>
> ii. *the excavation does not occur within 50 m of any surface waterbody.*

The site is over an unconfined or semi-confined aquifer, and the volume of material excavated is more than 100m^3. There will be more than 1m undisturbed material between the deepest part of the excavation and the seasonal high water table highest groundwater level.[17] Excavation will, however, occur within 50m of a surface waterbody (being the water race).

The earthworks activity therefore requires resource consent as a **restricted discretionary activity** under Rule 5.176 (the use of land to excavate material that does not comply with one or more of the conditions of Rule 5.175).

Discharge of Construction-phase Stormwater

Under Rule 5.94A, the discharge of construction-phase stormwater, other than into or from a reticulated stormwater system, to a surface waterbody, or onto or into land in circumstances where a contaminant may enter groundwater or surface water, is a permitted activity, provided the following conditions are met:

1. *The area of disturbed land from which the discharge is generated is less than:*

a. *1000m^2 for any construction-phase stormwater generated as a result of work carried out in an area shown as High Soil Erosion Risk on the Planning Maps; or*

[17] Nearby Ecan monitoring bore L35/0884 shows highest water level 142m below measuring point.

b. two hectares in any other location; and

2. The concentration of total suspended solids in the discharge shall not exceed:

a. 50g/m^3 where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake except when the background total suspended solids in the waterbody is greater than 50g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or

b. 100g/m^3 where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the waterbody is greater than 100g/m^3 in which case Schedule 5 visual clarity standards shall apply; and

3. The discharge does not result in an increase in the flow in the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20% (one in five year event); and

4. The discharge is not from, into or onto contaminated or potentially contaminated land; and

5. The discharge does not contain any hazardous substance; and

6. The discharge does not occur within a Community Drinking-water Protection Zone as set out in Schedule 1.

In this instance:

- The area of land that will be disturbed at any given time will be more than 2 hectares;
- Total suspended solids levels will be met;
- There will be no increase in the flow in the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20% (one in five year event;
- The discharge is from potentially contaminated land (but there is no material change from the existing stormwater run-off condition);
- The discharge will not contain any hazardous substance; and
- The discharge does not occur within a Community Drinking-water Protection Zone as set out in Schedule 1.

The discharge of stormwater does not meet 5.94A(1)(b) (are of disturbed land greater than 2 ha) and 5.94A(4) (the discharge is from, into or onto contaminated or potentially contaminated land) and is therefore a **restricted discretionary** activity under Rule 5.94B (the discharge of construction-phase stormwater that does not meet one or more of the conditions of Rule 5.94A).

Discharge of Operational Stormwater

Operational phase stormwater from the proposed tracks, hardstand areas, site office, and the runoff from the solar panels will be discharged to ground.

Under Rule 5.96, the discharge of stormwater, other than into or from a reticulated stormwater system, onto or into land where contaminants may enter groundwater is a permitted activity, provided the following conditions are met:

1. *The discharge is not from, into or onto contaminated or potentially contaminated land; and*

2. *The discharge:*

    a) *does not cause stormwater from up to and including a 24 hour duration 10% Annual Exceedance Probability rainfall event to enter any other property; and*

    b) *does not result in the ponding of stormwater on the ground for more than 48 hours, unless the pond is part of the stormwater treatment system; and*

    c) *is located at least 1 m above the highest groundwater level at the time the discharge system is constructed; and*

    d) *is only from land used for residential, educational, or rural activities; and*

    e) *does not occur where there is an available reticulated stormwater system, except where incidental to a discharge to that system; and*

    f) *is not from a system that collects and discharges stormwater from more than five sites.*

In this instance, the discharge is from, into or onto contaminated or potentially contaminated land, and is not only from land used for residential, educational, or rural activities. It is therefore a **discretionary activity** under Rule 5.97 (the discharge of stormwater that does not meet one or more of the conditions of Rule 5.96).

Dust Generating Activities

Under Rule 7.32 The discharge of dust to air beyond the boundary of the property of origin from the construction of buildings, land development activities, unsealed surfaces or unconsolidated land, is a permitted activity provided the following conditions, where applicable, are met:

1. *The building to be constructed is less than 3 stories in height, or where the building is greater than 3 stories in height, a dust management plan is prepared in accordance with Schedule 2 and implemented by the person responsible for the discharge into air; and*

2. *The area of unsealed surface or unconsolidated land is less than 1000m^2 or where the area of unsealed surface or unconsolidated land is greater than 1000m^2 a dust management plan is prepared in accordance with Schedule 2 and implemented by the person responsible for the discharge into air; and*

3. *The discharge does not cause an offensive or objectionable effect beyond the boundary of the property of origin, when assessed in accordance with Schedule 2.*

A Dust Management Plan will be prepared in accordance with Schedule 2. This will ensure that there will be no offensive or objectionable effect beyond the boundary of the site. Therefore, the proposal is a **permitted activity** under the Canterbury Regional Air Plan.

OVERALL ACTIVITY STATUS

Overall, the proposal stands to be considered as a **discretionary activity** under the CLWRP.

6. ASSESSMENT OF ENVIROMENTAL EFFECTS

6.1 INTRODUCTION

This section addresses the potential effects associated with the construction, operation and maintenance of the Darfield Solar and BESS.

Specialist technical assessments have been prepared to inform this assessment of environmental effects. These technical assessments are referenced, as appropriate, in Sections 6.2 to 6.12 below. In summary, Sections 6.2 to 6.12 address the following matters:

Section 6.2 Positive Effects;

Section 6.3 Cultural Effects

Section 6.4 Construction Effects;

Section 6.5 Glint and Glare Effects;

Section 6.6 Landscape and Visual Effects;

Section 6.7 Effects on Ecology;

Section 6.8 Effects on Productive Land Capacity;

Section 6.9 Stormwater Effects (Operational);

Section 6.10 Noise Effects (Operational);

Section 6.11 Archaeology and Cultural Heritage Effects; and

Section 6.12 Electromagnetic Field ("EMF") Effects.

Within these sections, a number of measures to avoid, remedy or mitigate the potential effects of the Darfield Solar Farm are identified. These measures form the basis of consent conditions proposed by DSES for the Darfield Solar Farm, which are attached as **Appendix 7** to this AEE.

When considering the effects of the Darfield Solar Farm, it is also noted that the receiving environment consists of:

- The existing environment and the associated effects from lawfully established activities;
- The existing environment as modified by any extant resource consents which are likely to be implemented; and

- The environment as likely to be modified by activities permitted by the relevant regulatory plans.

6.2 POSITIVE EFFECTS

The construction and operation of the Darfield Solar Farm will generate a number of positive effects for the local and regional community, and New Zealand. These include:

- The generation of approximately 117 MW renewable energy from installed generation capacity, which Is equivalent of the annual electricity needs of approximately 29,499 households;
- 200-400 MWh of BESS, which enables continuity of power supply between peak generation times (generally around the middle of the day) and peak demand times (typically morning / evening);
- The Darfield Solar Farm will not produce any greenhouse gas emissions in generating electricity;
- The Darfield Solar Farm will make a positive contribution to the Government's goals for increasing the share of renewable generation from its current share of around 80% and its longer term target of achieving zero carbon emissions by 2050;
- The location of the Darfield Solar Farm, near Christchurch, will have a positive effect on the electricity system, as it will be able to despatch electricity to areas of high demand and make the region's electricity demands less reliant on long transmission lines with associated transmission losses;
- The Solar Farm is also immediately adjacent to the Fonterra dairy plant, another high energy user; and
- The solar farm and BESS will assist in the diversity of renewable energy generation, both in terms of generation type but also geographically.

6.3 CULTURAL EFFECTS

As noted in Section 2.2 of this AEE, the application site is within the takiwā of Ngāi Tūāhuriri Rūnanga and Te Taumutu Rūnanga, on whose behalf Mahaanui Kurataiao Ltd act as the first point of contact for RMA matters.

Mahaanui Kurataiao Ltd were consulted in preparation of this application, and expressed a preference to consider the proposal at the time of lodgement, with no requirement for prior engagement. Mahaanui Kurataiao Ltd stated that the Mahaanui Iwi Management Plan should be used as a reference in the first instance for consideration of cultural matters in relation to the proposal.

Accordingly, DSES has undertaken an assessment of the proposal against the Mahaanui Iwi Management Plan, as set out in Section 8 of this AEE. A copy of this application has

also been sent to Mahaanui Kurataiao Ltd in parallel to lodgement with the consent authorities. DSES is happy to support the engagement of Mahaanui Kurataiao Ltd as may be required as the application is considered.

Pending further engagement, and acknowledging that only Ngāi Tūāhuriri Rūnanga and Te Taumutu Rūnanga can speak with authority regarding cultural effects, the DSES interpretation of effects vis a vis the Mahaanui Iwi Management Plan is summarised as follows:

1. The site does not contain any known sites of cultural significance, nor is it subject to any silent files identified in Appendix 6 of the Mahaanui Iwi Management Plan;
2. Site works will be undertaken in accordance with an accidental discovery protocol;
3. The proposal, in providing a significant quantum of solar powered renewable energy, assists with decarbonisation and the reduction of climate change impacts, whilst avoiding potential adverse effects of hydro energy generation;
4. The proposed development does not affect any natural waterbodies;
5. The artificial water race which traverses the site is protected with a 3m setback. DSES is open to discussions regarding appropriate native planting which may be undertaken in this area;
6. Measures have been taken to preserve fish passage in the water race (discussed further in Section 6.7.2 of this AEE);
7. The site has low ecological values, no herpetofauna or bats known to be present. Potential avifauna effects will be managed through timing of (exotic) tree removals to avoid nesting periods;
8. Landscape mitigation planting will be undertaken using native species;
9. Earthworks will be undertaken in accordance with an erosion, sediment and dust control plan; and
10. Any potential contaminated material will be identified and managed appropriately.

Overall, it is considered that the proposal has positive effects when considered against the relevant objectives and policies set out in the Mahaanui Iwi Management Plan. It makes a significant contribution to decarbonisation of energy supply, helping to alleviate climate change, whilst avoiding adverse effects and making improvements to indigenous biodiversity where possible through the use of native planting.

Again, it is emphasised that this is a tentative conclusion based on reading of the Mahaanui Iwi Management Plan, and subject to any specific cultural advice received from Ngāi Tūāhuriri Rūnanga and Te Taumutu Rūnanga or Mahaanui Kurataiao Ltd.

6.4 CONSTRUCTION EFFECTS

Construction is expected to take place over 12-18 months. This requires consideration of potential effects relating to traffic, earthworks (dust, erosion and sediment control), landscape and noise. These are considered further in the following sections.

6.4.1 Transport

As described in Section 3.3.2, the construction phase is expected to generate approximately 60 heavy vehicle movements (inclusive of arrival and departures) and up to 240 light vehicle movements (again, inclusive of arrival and departures) across the full extent of the typical working day during the busiest periods of construction within the site. Most of the light traffic movements (carrying construction staff) would occur at the start and end of each working shift. At the peak of the construction period (between about Month 8 and Month 13) over 100 light vehicle arrival and departure movements could be expected at the start and end of each working shift. Heavy vehicles delivering construction materials and equipment will be more evenly spread through the working day.

With the exception of the right-hand turn from SH 73 to Homebush Road (discussed further below), the transportation assessment undertaken by Don McKenzie Consulting (**Appendix 4**) found that the effects of the anticipated levels of traffic (both heavy and light) on the surrounding road network is low and unlikely to have a noticeable or measurable effect on the safety or operation of the network. The available traffic carrying capacity of the surrounding roads including the proposed access route between the site and SH 73 has entirely sufficient capacity to accommodate these generated traffic volumes. Any effects arising from construction transport for the proposal will be less than minor.

On the basis that the proposed South (Homebush Road) and East (Loes Road) accesses to the site are constructed to the appropriate standards specified in the POSDP[18] (including Section 11.8.3 of the SDC Engineering Code of Practice, and TRAN-Table6A and TRAN-Diagram5 in relation to the design and location of the points), there is no reason to consider that the current Homebush Road and Loes Road carriageways cannot safely and effectively accommodate this level of additional travel demand.

[18] The access design standards set out in TRAN-REQ07 of the POSDP are identified as still being subject appeal. The equivalent rule within the existing ODP is Rural Volume Chapter C4 Roading – Rule 4.5.1 including the Permitted Activities – Vehicle Accessways and Vehicle Crossings. In respect of those matters under appeal within the POSDP, there is compliance in respect of the corresponding ODP rule and standard (refer transport assessment Appendix 4).

Right hand turn from SH 73 to Homebush Road

The transportation assessment found that peak right turn movements off SH 73 northbound into Homebush Road require mitigation in order to avoid adverse operational and safety effects.

The inbound (start of the day) movement involving the right turn towards the site and into Homebush Road eastbound is considered to be the critical movement and timing. The corresponding left turn out of Homebush Road onto SH 73 to the south is not considered to be as critical due to the fact that any queuing or waiting of the turning vehicle is able to wait clear of the SH 73 intersection.

If the anticipated levels of traffic making this right hand turn movement were long term or permanent, an upgrade to the intersection would likely be required (right turning bay). However, the effects of construction traffic are temporary in nature, with a period of around 6 – 8 months during which time the thresholds for consideration of intersection improvements[19] might otherwise be triggered. Based on the analysis presented in the transportation assessment (**Appendix 4**), an hourly turning volume maximum of 80 vehicles per hour (right hand turn from SH 73) is considered appropriate.

To this end, a Construction Traffic Management Plan ("**CTMP**") is proposed to manage the potential effects of the construction phase traffic movements and to ensure the safe and effective on-going operation of the Homebush Road / SH 73 intersection, such that any adverse effects are **less than minor**. Provisions to this effect are included in the proposed conditions of consent set out at **Appendix 7** to this AEE.

Level Crossing (Homebush Road / Midland railway line)

The proposed agrivoltaic facility will involve the generation of additional traffic movements (both staff/contractor and heavy vehicle deliveries) via Homebush Road across a rail level crossing of the Midland Line railway. The increased number of traffic movements over the Homebush Road level crossing generated by the construction and subsequent operation of the agrivoltaic facility triggers a 'change in use' in terms of KiwiRail's consideration of the level crossing, and hence requires a Level Crossing Safety Impact Assessment ("**LCSIA**") to be completed. The LCSIA process followed by Kiwi Rail identifies the potential risks (and change in risk) at level crossing due to changes in operating condition associated with the additional traffic volumes.

There are two criteria applicable to and referenced within the LCSIA process relating to the safety of level crossings, which differ depending on whether the crossing is a new

[19] Austroads Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings Management (see Transportation Assessment Appendix 4).

crossing facility or an upgrade to an existing crossing facility. The two criteria used in the LCSIA process are:

- Criterion 1: requires the Proposed Design and Future Score of a level crossing to achieve a 'Low' or 'Medium-Low' level of risk as determined by the Level Crossing Safety Score ("LCSS").
- Criterion 2: requires the Proposed Design and Future Score of a level crossing to achieve an LCSS number (out of 60) lower than, or equal to, the Updated Existing LCSS number.

Where changes to an existing facility are proposed (as is the case here) the revised crossing must meet Criterion 1. Where the modifications required to meet Criterion 1 are not reasonably practicable, then a documented risk assessment discussion between KiwiRail and the client shall be undertaken to agree on the required crossing treatment. In this case the level of treatment applied must meet or exceed Criterion 2.

DSES has engaged Stantec New Zealand to prepare an LCSIA for the Homebush Road level crossing and has commenced consultation with KiwiRail regarding the LCSS assessment and any mitigation required at the level crossing.

Initial indications are that mitigation will be required in order for the increased traffic during the construction phase to meet Criterion 1. This is likely to include deployment of a Site Traffic Management Supervisor ("**STMS**") and/or Rail Protection Officer ("**RPO**") to effect a manual traffic control and management presence at the level crossing, as well as road seal extensions and remedial (repair) work to address existing deterioration of the level crossing.

Based on discussions to date with KiwiRail, it is considered that appropriate measures to mitigate risk associated with movement across the level crossing can be included in the CTMP. It is therefore proposed that prior engagement with KiwiRail be included as a requirement in the STMP conditions (refer Appendix 7).

Conclusion

Overall, it is concluded that with appropriate mitigation of construction traffic via a CTMP, any adverse transport effects arising from the proposed development will be **less than minor**.

6.4.2 Earthworks

As noted in Section 3.3.1, earthworks of approximately 36, 800m^3 will be required to establish internal access tracks, hardstand areas and cable trenching. Earthworks have the potential to cause adverse effects in dry weather from dust, and from sediment discharge and erosion in storm events.

It is proposed to manage dust and sedimentation effects using standard techniques set out in the Erosion & Sediment Control Toolbox for Canterbury. This will ensure that any effects of the earthworks are appropriately controlled to an acceptable level.

The proposed erosion and sediment control methodology during the works will be confirmed by the Contractor on site prior to commencement of site works. However, the methodology will generally comprise the following:

1. Install the stabilised construction entrance(s) to the site. Install silt fences as necessary on site including around the proposed hard stand areas;
2. Strip topsoil and complete minor earthworks to construct the access tracks;
3. Strip topsoil and complete minor earthworks to construct hard stand areas for site office, laydown area, BESS units and substation;
4. Respread topsoil to completed areas and mulch out; and
5. Once all working areas are sufficiently stabilised, decommission all erosion and sediment control devices and reinstate these areas to complete final works.

To minimise exposed ground, the maximum length of track stripped (at any one time) will be 50m. This will allow the topsoil to be stripped and spread locally whilst pavement metal is imported and placed as 300mm – 500mm compacted layer.

Hardstand areas to be stripped are isolated and could either be stripped all at once or carried out as a cut and cover operation. In either case, a perimeter silt fence is to be installed to contain the area. In practical terms either a silt fence or a temporary topsoil bund would be sufficient to contain the works. A stabilised construction entrance will be installed at hardstand areas to allow entry and provide a raised barrier connecting with the proposed silt fence / earth bund.

Dust management methods will include the watering of haul roads and manoeuvring areas during dry and / or windy periods. Precautions will also include that should weather conditions create a dust nuisance, operations will be suspended until favourable weather conditions return. Once each phase of earthworks is completed, exposed earth will be stabilised with topsoil to ensure clay subgrades are covered in a timely manner to manage the risk of them drying out and creating a dust nuisance.

As is standard practice for operations of this nature, it is proposed to set out detailed measures for the control of construction sediment and dust via an Erosion, Sediment and Dust Control Plan ("**ESDCP**") to be approved prior to commencement of works. Provision for the ESDCP is included in the proposed conditions of consent set out in **Appendix 7** to this AEE.

Given the potential for agrichemical contamination noted in Section 2.1.3, representative samples of soils will be tested for the presence of contaminants prior to commencement of

earthworks in each construction phase. Conditions to this effect are included in **Appendix 7**.

All earthworks have potential to uncover artifacts of cultural or archaeological value. Earthworks will therefore be undertaken with an appropriate accidental discovery protocol ("**ADP**"). Provision for an appropriate ADP[20] is included in the proposed conditions of consent (**Appendix 7**).

Overall, with earthworks subject to prior testing, undertaken in accordance with the ESDCP, and subject to the ADP, effects are considered to be **less than minor**.

6.4.3 Landscape

During construction, increased levels of activity will draw attention to the site preparation and construction works within the site. The temporary effects on landscape character and visual amenity during construction will range between ***very low*** and ***moderate.*** Moderate temporary effects will only occur adjacent to permanent dwellings, for a short duration during construction.

6.4.4 Noise and Vibration (Construction)

An assessment of noise and vibration effects was undertaken by Styles Group, and is attached at **Appendix 8** of this AEE. The findings of this assessment as regards construction noise are summarised as follows.

Vibration generated by construction activities will readily comply with the relevant limits prescribed by the POSDP.

Whilst generally compliant for most of the site, noise generated from the construction phase will need to be managed in some areas to comply with the construction noise limits. Specifically, noise generated from piling works may require mitigation to comply with the permitted construction noise limits in circumstances where a piling rig is used within 50m of any dwelling. These receivers include:

1. 1/3792 West Coast Road (noting that the construction noise limits in Rule NOISE-REQ2 do not apply to dwellings / minor dwellings in the DPZ);
2. 1352 Homebush Road in the GRUZ; and
3. 32 Loes Road in the GRUZ.

[20] As the site is within the takiwā of Ngāi Tūāhuriri Rūnanga and Te Taumutu Rūnanga, who are parties to the Mahaanui Iwi Management Plan, it is considered most appropriate to use the accidental discovery protocol set out in Appendix 3 of that plan.

Conditions of consent are proposed requiring a Construction Noise Management Plan (**CNMP**), which will set out the specific noise mitigation measures required to achieve POSDP noise limit compliance during construction works. These may include (but not be limited to) scheduling, physical mitigation (screening), alternate piling methods.

The proposed conditions are included in **Appendix 7** of this AEE.

Overall, with mitigation the proposed development will **avoid** adverse noise effects in that construction noise will be within the POSDP limits.

6.5 GLINT AND GLARE

DSES commissioned Mansergh Graham Landscape Architects Ltd to evaluate the potential of the proposed agrivoltaic development to cause glint or glare issues for nearby homes, road users, railway, and the adjacent reserve.

Solar glint and glare are caused by bright sunlight reflecting off a surface causing visual discomfort, a brief loss of vision and / or after-imaging.

Glare is continuous bright light reflected off a surface, experienced by stationary or moving observers.

Glint is a brief flash of bright light, typically seen by fast-moving observers (like motorists or boaters) or from moving reflectors (such as solar tracking tables, car windshields, or wind turbine blades).

New Zealand does not have formal guidelines for assessing the effects of glint and glare on the surrounding environment. Consequently, the assessment process has followed the recommendations contained in the New South Wales Large-Scale Solar Energy Guideline and the FAA aviation guidelines (which are not applicable in this situation due to distance from the nearest airstrip). This approach is consistent with industry practice in New Zealand.

The glint and glare analysis has been undertaken for the application site using ForgeSolar GlareGauge analysis software. This identifies potential glare from PV arrays and classifies its ocular impact into three categories based on after-image ocular effects:

- Green: Low potential to cause after-image;
- Yellow: Potential to cause temporary after-image; and
- Red: Potential to cause retinal burn.

The assessment undertaken for the project used a high-resolution digital elevation model (DEM / LiDAR data) to locate the site, outline proposed PV arrays, and specify observer points (“**OP**”s). The potential for glint and glare associated with the proposed development was assessed within a 3 km radius to evaluate the impact on the landscape and visual

amenity as part of the overall landscape and visual assessment. Because the potential for glint and glare only exists in locations with a direct line of sight to the proposed solar farm, the visual catchment identified through GIS viewshed analysis (also known as Zone of Theoretical Visibility or ZTV analysis) was used to identify and select OPs for analysis.

Observer Point and Route Selection

Dwellings within a 3km visual catchment of the application site were identified using aerial photography and selected as OPs for analysis.

Route receptor locations along the sections of road and rail that traverse the visual catchment were identified. Analysis points for each route were identified at regular intervals, with the car driver's eye-level height of 1.1m and a truck driver's eye level height of 2.4m. For the railway line, the engine driver's eye level was set at 3m and 3.5m.

Existing Environmental Screening

The following features were identified as obstructions in the GlareGauge analysis tool:

- Existing earth bunds and hedgerows within the adjacent dairy factory site:
- The dairy factory cool store (adjacent to the railway siding):
- The vegetation and hedgerows that surround existing dwellings adjacent to the site: and
- The McHughs Forest Park.

The glare analysis was run with buildings and bunding in place, but without the vegetative obstruction (as this is most likely to be removed or lost).

The analysis revealed potential for glare at the locations shown in **Figure 15**.

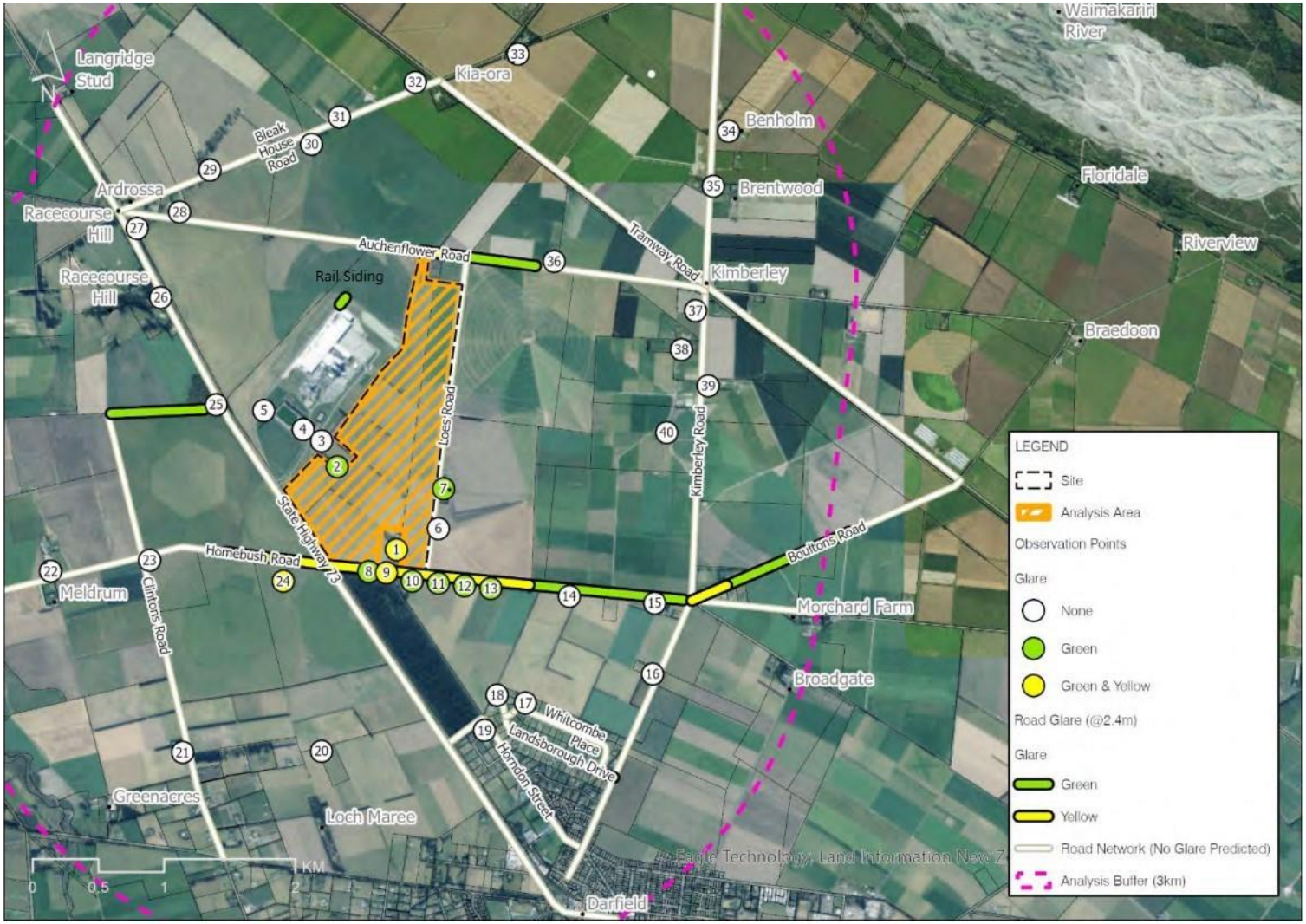

Figure 15: Potential Solar Glare Locations (Observation Points)

The OPs marked green have potential for green glare. Those marked yellow have potential for green and yellow glare.

The full list of observation points is included in the Mansergh Graham Glint & Glare Analysis Memorandum attached as **Appendix 9** to this AEE. In summary for all OPs the maximum predicted exposure to glare is less than 10 minutes per day. Glare durations of less than 10 minutes per day are considered to have a low level of effect under the NSW guidelines, which, as set out in **Table 5**, translates to a **minor or less than minor** level of effect in terms of RMA thresholds.

Table 5 Significance Thresholds for Glint and Glare Effects

Document	Effect Rating						
Te Tangi a te Manu - Aotearoa New Zealand Landscape Assessment Guidelines	VERY LOW	LOW	LOW-MOD	MODERATE	MOD-HIGH	HIGH	VERY HIGH
Table 2: NSW Guidelines	LOW		MODERATE		HIGH		
	< 10 minutes per day < 10 hours per year		< 30 minutes & > 10 minutes per day < 30 hours & > 10 hours per year		> 30 minutes per day > 30 hours per year		
Act/Policy	Threshold						
RMA	Less than Minor		Minor		More than Minor		Significant

Since the glare effects on the surrounding OPs were found to be low, the NSW Guidelines suggest that no mitigation for glare is required for these OPs (dwellings). However, mitigation may be needed for other reasons, such as visual amenity.

The NSW Guidelines do not contain any guidance around the ratings of glare effects on the public road or rail network (drivers / passengers / cyclists / pedestrians). The guidelines do, however, recommend that for road and rail, if glare is geometrically possible then measures should be taken to eliminate the occurrence of glare, or the applicant must demonstrate that glare would not significantly impede the safe operation of vehicles or the interpretation of signals and signage.

In light of this, mitigation is proposed by way of screening planting to eliminate sources of glare for road and rail users. Pending full growth of screening planting, potential glare effects for road and rail users will be avoided by means of monitoring and tracking adjustments for the solar array.

6.6 LANDSCAPE AND VISUAL EFFECTS

The full assessment of landscape and visual effects is attached as **Appendix 10** to this AEE.

In terms of **landscape character**, The introduction of the proposed agrivoltaic development will alter the characteristics of the existing site and immediate surroundings (at the local level), from predominantly rural with industrial and energy generation elements, towards a landscape character with a stronger emphasis on electrical

generation with underlying agricultural production, resulting in a low-moderate adverse effect on existing landscape character values within the site and a low level effect on the wider surrounding landscape. This is equivalent to a no **more than minor** effect overall.

For **visual amenity**, the visual catchment surrounding the site is constrained by elements in the landscape including buildings, woodlots, shelter belts, curtilage planting, and (to a limited extent) topographic variation. The retention of the existing shelter belts will help screen views of the proposed development from the west, south and east. Some screening is afforded by earth bunding in the adjacent Fonterra dairy plant site.

Views of the proposed development will generally be limited to locations immediately adjacent to the site, including along SH73, the railway line, Homebush Road (near the entrances to McHughs Forest Park), Loes Road, and Auchenflower Road. Additionally, views may be possible from the undeveloped part of the Large Lot Residential (LLR) zone, south of Homebush Road.

The development will be difficult to discern from Kimberley Road, Tramway Road, Bleak House Road, Landsborough Drive, Horndon Street and Clintons Road) due to its relatively low profile, distance and existing screening.

The visual absorption capability of the landscape surrounding the site, which is a measure of its ability to absorb a particular type of development without a resultant change in landscape character, ranges from neutral to very good for most surrounding locations due to screening provided by McHughs Forest Park, surrounding rural plantings and other features in the landscape. Poor ratings occur in some locations adjacent to the site, where existing screening is limited.

Effects associated with views into the site will decrease as the mitigation planting establishes until visual impermeability is achieved at 4-6 years. The short-term adverse effects on visual amenity values will range between ***very low*** and (locally) ***moderate***, reducing to a very low to low permanent effect once the mitigation planting has become established.

Overall, with the establishment of the proposed mitigation planting, the adverse effects of the proposed agrivoltaic development on the existing landscape and visual amenity values will be **no more than minor**.

6.7 ECOLOGY

DSES commissioned Ecological Solutions Ltd to assess terrestrial and aquatic values and effects relating to the site and proposed development. The report is attached as **Appendix 11** to this AEE.

The site is currently in agricultural use, and is fairly typical of the Canterbury Plains environment. The surrounding area is almost entirely agricultural, divided up into numerous paddocks and fields, with scattered farmhouses.

6.7.1 Terrestrial Ecology

Vegetation across most of the site is dominated by exotic species such as grasses and herbaceous pasture forage species, conifer and broadleaved shelterbelts. Ecological values are correspondingly low.

The proposal entails removal of much of the 'low' ecological value exotic conifer and broadleaved shelterbelts, whilst most of the exotic grassland will be retained. Given the low ecological values, and the ubiquitousness of these features in the rural landscape, the overall level of effect without mitigation (none is proposed) is 'very low'.

The site contains very little suitable habitat for native birds. Bird species recorded at the site were mostly common native and exotic species. While a number of birds with a conservation status have been recorded within 10 km of the site, these records are predominantly associated with the Waimakariri River and its riparian habitat. The absence of indigenous vegetation at the site further limits potential bird habitat within the site. Risk of bird strike is considered to be low, given the lack of suitable habitat for birds of conservation value and that the site is not beneath a significant flyway for water associate birds. Overall, the site is of 'low' ecological value for avifauna.

Whilst the ecological value for avifauna is low, the removal of shelterbelt exotic trees has the potential to adversely affect nesting habitat for native bird species if undertaken during the breeding season. Without mitigation this is assessed to be a moderate level of adverse effect. It is therefore proposed to avoid clearance of trees containing nests within key breeding period(s). Appropriate controls to this end are included in proposed conditions set out in **Appendix 7** to this AEE.

In relation to lizards, the agricultural use of the site, which involves sheep grazing with seasonal pasture maintenance and rotational cropping creating disturbance makes it unsuitable for herpetofauna. Habitat within the site scores 'very low' for representativeness, diversity and pattern and 'low' for ecological context. It is considered unlikely that lizards could be present at the site. Overall, the site is of 'negligible' habitat value for lizards and no mitigation is proposed or required.

No bats have been detected near the site and no roost or breeding habitat was identified within the site. As a result, the bat habitat values have been assessed as 'negligible'. It is considered unlikely that bats could be present at the site, therefore the overall level of effect without mitigation (none is proposed) is 'very low'.

Overall effects on terrestrial ecology are considered to be **less than minor**.

6.7.2 Freshwater Ecology

The single waterbody on the site is an artificial watercourse that is part of the Selwyn District stock water race network. The 2.3 km reach located within the site scored 'low' on measures of representativeness and diversity / pattern due to its artificial nature, lack of habitat diversity, including structure and composition. The water race may, however, provide a migratory pathway for indigenous fish and scored 'moderate' on measures of ecological context. Overall, the ecological value of the water race on site is assessed as 'low'.

Notwithstanding the low overall aquatic ecology value, stream works associated with the construction of culverts has the potential to result in the temporary loss of aquatic habitat and injury / mortality to fish and, if incorrectly installed, prevent fish passage. Mitigation is proposed by way of implementing a Native Fish Relocation Plan ("**NFRP**") to be approved prior to any stream works and designing the culverts to preserve fish passage (noting that the NES-F regulations are not engaged in this instance).[21] With mitigation to this standard, the overall level of effect is 'very low' (**less than minor**). Conditions to this end are included in **Appendix 7**.

6.8 PRODUCTIVE LAND CAPABILITY

As noted in Section 2.1.2, the site is mapped in the NZLRI as being 100% LUC3 land. It is comprised of a single unit of 3s5 Lismore type soil, being flat to undulating, with slight to moderate wind erosion potential. In practice, the detailed survey undertaken by Landvision demonstrated that the site has soil limitations that limit the range of productive activities which may be undertaken successfully. Accordingly, the site is used for stock grazing (lamb finishing), this being an appropriate and viable productive activity on this land.

Landvision notes that when planning productive activities within a land-based productivity context (i.e. productive land capability), the limitations of various land types are relevant, particularly the ability to overcome known limitations thereby achieving consistent and profitable results. As an example, drainage is typically installed where the dominant limitation is wetness. This is because on sites where drainage can be installed successfully the productive potential and versatility will be improved. Significantly for this assessment, the LUC unit on the subject site has a soil-based limitation. This is considered to be a permanent limitation on productive capability.

The proposal is for an agrivoltaic development – sheep grazing will continue on the site alongside renewable energy generation. The Landvision report considers in some detail the effects of solar panel installations on productive capacity, considering factors such as shading, moisture retention and shelter for animals.

[21] The artificial watercourse is not a "river" under s.2 RMA.

Various studies have shown that the effects of solar panels are not detrimental to primary productivity. While pastures under solar panels produce less dry matter available for grazing, the quality of that dry matter is higher (higher protein content) leading to very similar stock performance for solar and non-solar areas. The shade from the solar arrays is also beneficial for animals. Lambs have been observed to spend time ruminating in shade (refer to **Figure 1**). Rumination is a significant source of body heat and therefore shade has a positive effect on animal performance.

Overall, the net return from a two-year study found that lamb production under solar panels was only 1.6% lower than open pasture. This reduction is more than offset by the benefit of renewable energy production. A similar outcome is anticipated with the proposal.

In summary, with the introduction of the agrivoltaic system, the productive capacity of the site will remain largely unchanged. This is because most aspects of the farm system will remain unchanged. The soil will remain, pasture will still be grown, stock will graze, and nutrients will still cycle through the system. Also, the use of land for solar production will be able to be completely reversed when the project reaches an endpoint. The solar panels can be removed, and the site will continue to grow grass and fatten livestock (its current use). The current productive capacity will remain. Overall effects of the proposal on productive land capability will be **less than minor**.

6.8.1 Reverse Sensitivity

Reverse sensitivity is defined in the POSDP as:

> *"The potential for an approved (whether by consent or designation), lawfully established existing or permitted activity to be compromised, constrained, or curtailed by the more recent establishment, intensification, or alteration of another activity that may be sensitive to the actual, potential or perceived adverse environmental effects generated by the approved, lawfully established existing or permitted activity".*

In this case, the site is located in the General Rural Zone, which is predominantly used for primary production activities, and also includes scattered residential activity. There is very little potential for any of these activities to produce an effect that could be regarded as a nuisance in the context of the proposed agrivoltaic and BESS development. The only plausible causes of potential effects being dust or spray drift from cultivation activities.

Once operational, there will be no permanent staff on site, and the solar array itself will be regularly cleaned as part of normal maintenance (and rainfall in any event is sufficient to keep the panels generally free of dust). During construction, the site office (the only conceivable sensitive receptor) is located well away from the site boundaries. Overall, the risk of reverse sensitivity is considered to be **negligible**.

6.9 STORMWATER (OPERATIONAL)

Operational stormwater is considered in the CKL Engineering and Infrastructure Report and the CKL Stormwater Management Plan attached as **Appendix 12** and **Appendix 13** to this AEE.

The site does not have a stormwater reticulation system other than the existing open drain which flows from north to south. The site is relatively flat, and any stormwater runoff is dispersed overland on existing paddocks soaking to ground, due to the permeable nature of the soil substrata.

The proposed photovoltaic array installation will alter the pattern of rainfall deposition prior to the runoff entering the site's ground surface. However, whilst the panels themselves are considered impermeable, the ground below remains vegetated and permeable. Rainfall (stormwater) will runoff from the panels and fall to the ground, where it will either infiltrate into the soil or runoff as overland flow when the soils infiltration capacity is exceeded, or the soils are saturated. As the photovoltaic array tables will be raised above the ground, with c. 3.2 m separation between the rows, the runoff regime across the surface itself remains the same as the existing scenario. There will be no significant change in impermeable surface cover across the site (at ground level). Therefore, any change in stormwater generation or behaviour due to the solar arrays will be less than minor.

In terms of service / amenity and hardstand areas, the proposal includes the site office, carparks and hardstand areas for inverters, substation and the BESS. Given the limited surface area, and permeable nature of the ground sub-strata, it is considered appropriate to utilise standard soakage structures to manage stormwater from these areas. These may include soakage pits, located under parking areas or in adjacent grass areas or permeable swale / channel systems. Anti-clogging measures such as sediment chambers, catchpits, litter traps or leaf separators will be incorporated in the design of all soakage devices to minimise maintenance requirements and ensure effective long-term operation.

An initial assessment has been conducted to size the soakage devices. The size of the soakage trench / device required per 1,000m^2 of impervious area is shown in **Table 6**.

Table 6 Soakage requirements per 1000m^2 of impervious area

Location	Contributing Catchment	Number of soakage trenches	Trench Base Area (m^2)	Soakage Trench Depth (m^2)	Drainage Metal Void Ratio (%)
Amenity areas (hardstand/roof etc) *	1000 m^2	1	50 m^2	1 m^2	38%

Care needs to be taken regarding the runoff generated from the areas containing structures. The cladding for buildings will be non-contaminant generating material. As a result, this is considered a low contaminant generating activity and as such the standard

collection and cladding choice will provide sufficient treatment mitigation for this site. Electrical installations including the inverters and BESS will be designed in accordance with the requirements of the HSWA, including secondary containment (such as bunding) to manage spill risk.

6.9.1 Flood Risk

A review of the Environment Canterbury Regional Council's Flood modelling, available online, has been undertaken and is shown in **Figure 16**. The flood modelling is for a 500 Year ARI event.

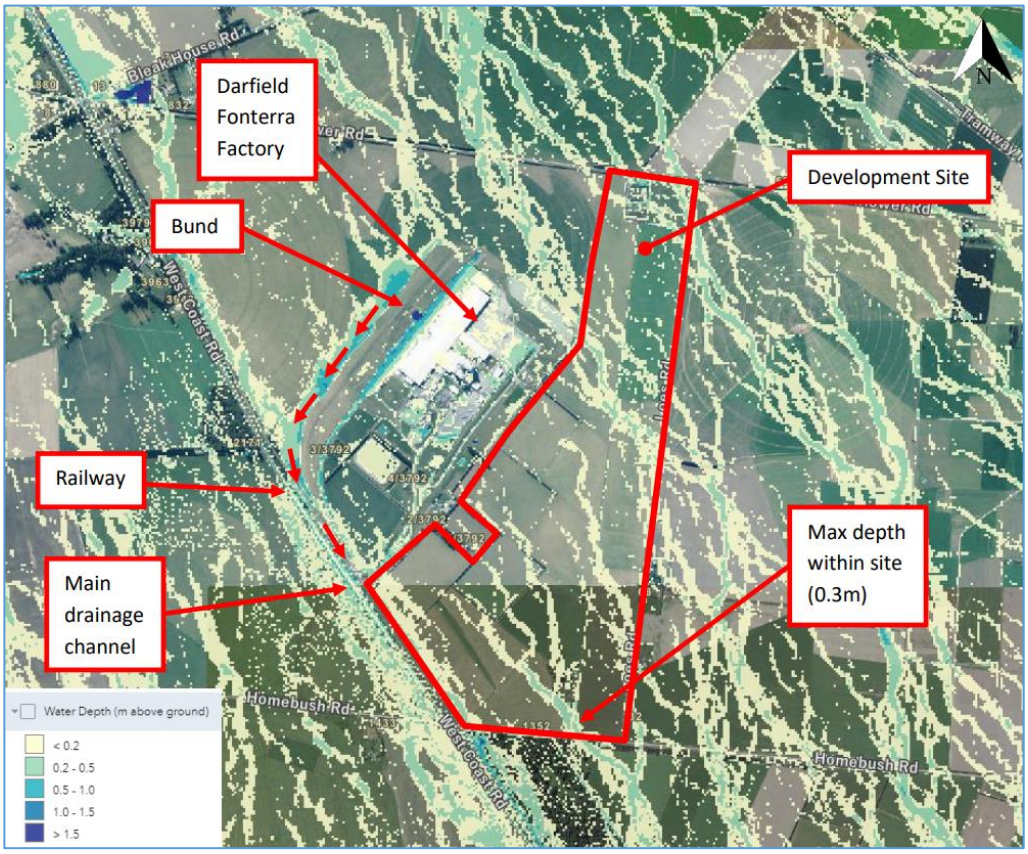

Figure 16: Canterbury Flood Maps, 500 Year ARI

The flood modelling shows relatively scattered flooding across the site, which is expected given the site is flat with only a very slight grade from north west to south east and is located approximately half way between the Waimakariri and Waikirikiri / Selwyn Rivers. There is a large bund in place upstream, to the north west of the Fonterra factory which appears to block some flows and divert them to the main channel adjacent the railway.

The deepest flooding on the site is close to the existing entrance from Homebush Road with a depth of 0.3m. As the entrance is existing and is to remain as is, this is considered acceptable.

The layout and placement of the photovoltaic arrays mean that the flows along the ground in a flooding event will not be diverted or changed from the existing situation. The imperviousness, infiltration, and soil type will not be altered, and therefore the runoff from the site will remain the same.

A freeboard of 300mm above the 200 Year ARI floodplain will be applied to the site office, substation buildings, and BESS units.

Therefore, it is considered the effects from flooding on the site development and any adverse effects on adjacent / downstream flooding are negligible (**less than minor**).

6.10 NOISE (OPERATIONAL)

Styles Group used noise modelling software to predict the cumulative noise emissions from the operation of the solar plant and BESS for assessment against the permitted noise limits prescribed by the POSDP.

Aided by the fact that the BESS and switch station plant have been located to achieve ample separation distances from existing dwellings, the noise modelling indicates that compliance with the permitted noise levels will readily be achieved at all notional boundaries with adjacent sites in the General Rural Zone as well as future notional boundaries that may establish in the Large Lot Residential Zone.

Noise from all other operational noise sources such as ongoing general site operation, maintenance activities (including vehicle movements) will be intermittent and generate only a low level of noise. These noise sources will also readily comply with the POSDP noise standards.

Operation noise effects are therefore considered to be **less than minor**.

6.11 ARCHAEOLOGY AND CULTURAL HERITAGE SITES

DSES commissioned Underground Overground Archaeology Ltd to undertake an archaeological assessment of the site. The report of this assessment is attached as **Appendix 14** to this AEE.

In summary, the results of the archaeological research found that the project area is located at least 1.5 km from any previously recorded archaeological sites. The historical research indicates that the area was part of much larger pastoral stations from the mid-19th century into the 20th century, and has remained primarily pastoral in use to this day. No evidence was found for any form of pre-1900 occupation or use likely to result in archaeological remains, and it is not considered likely that the proposed work will affect an archaeological site.

Whilst the research indicates that the area was used by Māori as part of a broader network of seasonal mahinga kai and kā ara tawhito, no specific information was found suggesting

that the land comprising the current project area was permanently settled upon by Māori or that any archaeological remains of Māori origin would be encountered during the proposed works.

Notwithstanding that there are no known sites of archaeological or cultural heritage significance on the site, earthworks will be undertaken in accordance with an accidental discovery protocol, which is proffered as a condition of consent.

In light of the above, archaeological and cultural heritage effects are considered **less than mino**r.

6.12 ELECTROMAGNETIC FIELD (EMF) EFFECTS

Any wiring, appliances or infrastructure generating or carrying mains electricity will generate extremely low frequency ("**ELF**") electric and magnetic fields.

An assessment of EMF effects with respect to environmental health is attached as **Appendix 15** to this AEE. This assessment concludes that the ELF fields produced around equipment at the proposed development will not extend far from the equipment producing them and would be indiscernible outside the site boundary. High electric fields (but still complying with the POSDP limits) might be found within the substation, and high magnetic fields could be found within a few meters of the inverters and transformers.

The preliminary design shows that the site substation, inverters and transformers are all placed well away from the security fence around the site boundary. This means that the solar farm will have an indiscernible effect on ELF field levels outside the site boundary. In other words, ELF field levels measured outside the boundary will be the same before and after the development is operational.

The assessment demonstrates that there will be **no adverse effects** on the environment or human health arising from EMF emissions from the proposal.

7. CONSULTATION

DSES has undertaken the following consultation prior to lodgement of this application.

7.1 TANGATA WHENUA

An outline of the proposal was sent to Mahaanui Kurataiao and followed up with a telephone call. Mahaanui Kurataiao confirmed that they are the appropriate avenue for consultation, with Ngāi Tūāhuriri Rūnanga and Te Taumutu Rūnanga being the Papatipu Rūnanga for the area including the application site.

Mahaanui Kurataiao advised that they would prefer to consider the application at time of lodgement, at which time they would assess the application against the Mahaanui Iwi Management Plan and take all information to the rūnanga for comment.

7.2 DARFIELD COMMUNITY

A public drop-in session was held at the Darfield Recreation and Community Centre (2 North Terrace) on 11th July. It was advertised in local papers and community social media. The event was lightly attended with approximately 12 visitors. Of these, the majority were interested in and supportive of the solar energy generation concept. Two attendees were local contractors offering services.

One couple were residents who reside close to the proposal site (Loes Road) who wished to discuss effects and possible mitigation. This has been followed up, with DSES providing additional visual simulations and adjusting mitigation proposals in the area (as now incorporated in this AEE).

7.3 SELWYN DISTRICT COUNCIL

A pre-application meeting (online) was held with Richard Bigsby, Planner for SDC, on 15 July 2024. DSES gave an overview of the proposal, together with a summary of the anticipated consent requirements and scope of the assessment of environmental effects.

Mr Bigsby for SDC confirmed the proposed approach and suggested some additions to the scope of the effects assessment.

The SDC record of the meeting is attached as **Appendix 16** to this AEE.

7.4 ENVIRONMENT CANTERBURY

A pre-application meeting (face-to-face) was held with Sinead Hartwell and Edward Ryde of the Environment Canterbury Consents team on 11 July 2024.

Again, DSES gave an overview of the proposal, together with a summary of the anticipated consent requirements and scope of the assessment of environmental effects. The

Environment Canterbury team confirmed the proposed scope and approach to the application, and requested consideration of bird strike risk in the AEE.

7.5 TRANSPORT AGENCIES

DSES has engaged with NZTA and KiwiRail regarding assessment and mitigation of construction traffic effects with regards to their assets (SH 73 intersection and level crossing at Homebush Road). Discussions are ongoing at time of writing to refine the details to be incorporated in the CTMP (refer Section 6 of this AEE).

7.6 ADJACENT LANDOWNERS AND OCCUPIERS

Consultation has commenced with owners and occupiers of the following nearby properties

- Fonterra, Owner of 3792 West Coast Rd, 1433 Homebush Rd, 32 Loes Rd.
- Occupier of 1/3792 West Coast Rd
- Occupier of 2/3792 West Coast Rd
- Occupier of 1433 Homebush Rd
- Occupier of 32 Loes Rd
- Deceased estate managing party for 68 Loes Rd
- Occupier of 68 Loes Rd
- Owner of 526 Auchenflower Rd
- SDC, Owner of McHughes Forest Park and unnamed property on Auchenflower Rd
- Owner of 1352 Homebush Rd

At time of writing no feedback has been received. Any updates will be communicated to Council.

8. STATUTORY ASSESSMENT

8.1 INTRODUCTION

This section of the AEE assesses the proposal against the relevant statutory planning framework. The relevant statutory considerations under the RMA are addressed in the following sections:

Section 8.2 Identifies the information requirements for the resource consent applications in accordance with section 88 of the RMA;

Section 8.3 Addresses the matters the consent authorities must have regard to in accordance with section 104 of the RMA; and

Section 8.4 Addresses Part 2 of the RMA

8.2 INFORMATION REQUIREMENTS

Section 88(2) of the RMA stipulates that a resource consent application must be made in the prescribed form and manner. It must also include an assessment of environmental effects in such detail as corresponds with the scale and significance of the effects that the activity may have in accordance with Schedule 4 of the RMA.

The resource consent applications for the proposal are in the prescribed form as set out in Form 9 of Schedule 1 to the Resource Management (Forms, Fees, and Procedure) Regulations 2003. DSES has also complied with the application forms requirements of the Council.

With respect to the information requirements in Schedule 4 of the RMA, it is noted that Clauses (2), (3), (6) and (7) specify information requirements that are directly relevant to the resource consent applications required for the proposal. These matters have been addressed throughout this AEE and the relevant technical assessments.

8.3 SECTION 104 ASSESSMENT

8.3.1 Introduction

Section 104 of the RMA identifies the matters that a consent authority must have regard to, subject to Part 2 of the Act, when considering an application for resource consent. It states:

(1) When considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to–

(a) any actual and potential effects on the environment of allowing the activity; and

(ab) any measure proposed or agreed to by the applicant for the purpose

of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity; and

(b) any relevant provisions of—

(i) a national environmental standard:

(ii) other regulations:

(iii) a national policy statement:

(iv) a New Zealand coastal policy statement:

(v) a regional policy statement or proposed regional policy statement:

(vi) a plan or proposed plan; and

(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application.

(2) When forming an opinion for the purposes of subsection (1)(a), a consent authority may disregard an adverse effect of the activity on the environment if a national environmental standard or the plan permits an activity with that effect.

(2A) …

Section 104B of the RMA sets out that for discretionary activities:

104B Determination of applications for discretionary or non-complying activities

After considering an application for a resource consent for a discretionary activity or non-complying activity, a consent authority—

(a) may grant or refuse the application; and

(b) if it grants the application, may impose conditions under section 108.

Section 104 of the RMA does not give primacy to any of the matters to which a consent authority is required to have regard. All of the relevant matters are to be given such weight as the consent authority deems appropriate in the circumstances, and all matters listed in section 104(1) are subject to Part 2 of the RMA.

An assessment of the proposal against the relevant matters set out in section 104 of the RMA is provided in the sections below.

8.3.2 Actual and Potential Effects on the Environment

With respect to section 104(1)(a) of the RMA, the actual and potential effects on the environment in respect of the proposal are set out in Section 6 of this AEE.

8.3.3 Relevant Statutory Planning Documents

With respect to section 104(1)(b) of the RMA, the national, regional and district planning documents of relevance to the proposal are:

- National Policy Statement for Renewable Electricity Generation 2011 ("**NPS-REG**").
- National Policy Statement for Highly Productive Land ("**NPS-HPL**").
- The National Policy Statement for Freshwater Management 2020 ("**NPSFM**").
- Canterbury Regional Policy Statement ("**CRPS**").
- The Operative Selwyn District Plan ("**OSDP**").
- The Partially Operative Selwyn District Plan ("**POSDP**").

An assessment of the proposal against the relevant provisions of these statutory planning documents and regulations is provided in the sub-sections below.

8.3.4 National Environmental Standards

The are no National Environmental Standards which are directly relevant to the activities proposed for the project.

For clarity, in terms of the National Environmental Standards for Freshwater 2020, there are no works proposed which affect natural inland wetlands or rivers.

Electricity transmission which may be subject to the National Environmental Standards for Electricity Transmission Activities will use existing transmission infrastructure of the Kimberly Substation.

In terms of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health, as the proposal does not include any of the Clause 5 (8) activities that trigger application of the NES-CS, the regulations do not apply.

8.3.5 National Policy Statement for Renewable Electricity Generation 2011 ("NPS-REG")

The NPS-REG came into effect on 13 May 2011. It seeks to enable the sustainable management of renewable energy generation under the RMA. The sole objective of the NPS-REG seeks to provide for the development and operation of new and existing renewable electricity generation activities, such that the proportion of New Zealand's electricity generated from renewable energy sources increases to levels that meet or exceed the Government's national target for renewable electricity generation. Policies A, B and C1 of the NPS-REG are considered most relevant to the Darfield Solar Farm as they seek to ensure decision makers:

- Recognise the benefits of renewable electricity generation activities;
- Acknowledge the practical implications of achieving an increase in the proportion of electricity generated from renewable sources; and

- Acknowledge the practical constraints associated with the development, operation, maintenance and upgrading of new and existing renewable electricity generation activities.

The Darfield Solar Farm will enable the development of additional renewable electricity generation capacity. It is considered to be consistent with clause (c) of Policy B, which notes that meeting or exceeding the Government's strategic target for the generation of electricity from renewable resources will require the "significant development" of renewable electricity generation activities.

Policy C1 of the NPS-REG recognises the practical implications and locational constraints associated with the development of renewable electricity generation activities. There are a number of factors that influence the identification of a site as being suitable for the development of a solar farm – not least being proximity to a substation and transmission infrastructure with sufficient capacity, open land of suitable contour, and the consistency of the solar resource. As such, it needs to be recognised that potentially suitable sites for Solar Farms in Canterbury are reasonably limited and that infrastructure required to harness the solar resource will generally have some degree of adverse effects. That is, solar farms need to be located where the solar resource and transmission exists and cannot simply be placed in a location where all effects may be avoided.

In light of the assessment above, it is concluded that the construction and operation of the Darfield Solar Farm will be consistent with the stated objective and policy directives of the NPS-REG.

8.3.6 National Policy Statement for Highly Productive Land ("NPS-HPL")

The NPS-HPL came into force on 17 October 2022, with the single overarching objective being to ensure that highly productive land is protected for use in land-based primary production, both now and for future generations.

Highly productive land (HPL) means land that has been mapped in accordance with criteria set out in the NPS. However, until a regional policy statement containing maps of highly productive land in the region is operative, each relevant territorial authority must treat as HPL any land that is:

(i) zoned general rural or rural production; and

(ii) LUC 1, 2, or 3 land (as mapped in the NZLRI);

but is not

(i) identified for future urban development; or

(ii) subject to a Council initiated, or an adopted, notified plan change to rezone it from general rural or rural production to urban or rural lifestyle.

In this case the site is in a General Rural Zone, is mapped as highly productive land LUC 3 and is not identified for future urban development or rezoning. Therefore, the provisions of the NPS-HPL apply to this proposal.

The relevant policies of the NPS-HPL include:

> ***Policy 1:*** *Highly productive land is recognised as a resource with finite characteristics and long-term values for land-based primary production.*
>
> ***Policy 4:*** *The use of highly productive land for land-based primary production is prioritised and supported.*
>
> ***Policy 8:*** *Highly productive land is protected from inappropriate use and development.*
>
> ***Policy 9:*** *Reverse sensitivity effects are managed so as not to constrain land-based primary production activities on highly productive land.*

Land-based primary production is defined in the NPS-HPL as *'production, from agricultural, pastoral, horticultural, or forestry activities, that is reliant on the soil resource of the land'.*

In terms of Policy 1, the proposal has only minimal effects on the characteristics and long-term values of the land for land-based primary production. The proposal will not alter the size and shape of any existing parcels, and there will be no relevant legal constraints imposed. In regard to physical characteristics, the proposal will require earthworks for trenching, piling, and access tracks, but these are minimal in the context of the site and scale proposed. The characteristics of the soils themselves will not change, and the proposal is to continue land-based primary production on the site in the form of sheep grazing. The long-term productive potential of the land is unchanged.

In terms of Policy 4, the proposal will continue to support land-based primary production, with the combination of the new solar farm and continuation of grazing at the site.

In order to consider Policy 8, and uses that are 'inappropriate', it is necessary to consider clause 3.9 of the NPS-HPL, as follows:[22]

> ***3.9 Protecting highly productive land from inappropriate use and development***
>
> *(1) Territorial authorities must avoid the inappropriate use or development of highly productive land that is not land-based primary production.*
>
> *(2) A use or development of highly productive land is inappropriate except where at least one of the following applies to the use or development, and the measures in subclause (3) are applied:*
>
> *[...]*

[22] Cl. 3.9 of the NPS-HPL was amended by the Minister for the Environment on 16 August 2024 as the (National Policy Statement for Highly Productive Land 2022 Amendment No 1). The amendments take effect from 14 September 2024. The text quoted here is the amended version.

(j) it is associated with one of the following, and there is a functional or operational need for the use or development to be on the highly productive land:

(i) (i) the development, operation, or decommissioning of specified infrastructure, including (but not limited to) its construction, maintenance, upgrade, expansion, replacement, or removal:

[...]

(3) Territorial authorities must take measures to ensure that any use or development on highly productive land:

(a) minimises or mitigates any actual loss or potential cumulative loss of the availability and productive capacity of highly productive land in their district; and

(b) avoids if possible, or otherwise mitigates, any actual or potential reverse sensitivity effects on land-based primary production activities from the use or development.

As previously mentioned, since grazing operations will be ongoing at the solar farm, the site will remain in land-based primary production. Consequently, this proposal may not strictly fall under clause 3.9(1) of the NPS-HPL, as it does not exclusively aim to facilitate a use or development that is not land-based primary production.

In the alternative, should it be considered that clause 3.9(1) does apply to the proposal, Clause 3.9(2) outlines that the use of highly productive land is 'inappropriate', except where one of the 'exemptions' is met and the measures in subclause 3 apply. Clause 3.9(2)(j)(i) applies to the proposal to construct a solar array because it qualifies as specified infrastructure and has a functional or operational need to use the subject site.

Specified infrastructure is defined in the NPS-HPL as including infrastructure that is recognised as regionally or nationally significant in a National Policy Statement or regional policy statement.

The need to develop, operate, maintain and upgrade renewable electricity generation activities throughout New Zealand, and the benefits of renewable electricity generation are recognised as matters of national significance in the NPS-REG.

Regionally significant infrastructure is defined in the Canterbury Regional Policy Statement as including *'national, regional and local renewable electricity generation activities of any scale'*.[23]

Therefore, the proposal is for 'specified infrastructure' as defined in the NPS-HPL.

Functional or operational need

[23] Canterbury Regional Policy Statement, Glossary and Definitions, p.243.

Notwithstanding that the installation is specified infrastructure, cl. 3.9 requires demonstration of functional or operational need for it to be located on highly productive land.

The terms 'functional need' and 'operational need' are not defined in the NPS-HPL, but are both defined in the POSDP (pursuant to the National Planning Standards definitions):

> ***Functional need*** *means the need for a proposal or activity to traverse, locate or operate in a particular environment because the activity can only occur in that environment.*
>
> ***Operational need*** *means the need for a proposal or activity to traverse, locate or operate in a particular environment because of technical, logistical or operational characteristics or constraints.*

By their nature, solar farms require large, open sites with low relief and little internal vegetation. Realistically, such sites can only be found in rural areas and given the physical characteristics of suitable site, they are often required on land that is classified as highly productive. Whilst some locations in industrial areas may be suitable from a technical perspective, use of industrial zoned land for a solar farm would be a highly inefficient use of resources, and factors such as availability and price of land would militate against such use.

Other limitations may relate to planning constraints such as significant natural areas, outstanding natural landscapes or features and areas with outstanding natural character. The subject site is free of such constraints.

Proximity to existing transmission infrastructure and a substation, both with available capacity, is a key factor from a technical perspective. The cost of constructing a new substation and / or new transmission lines is infeasible for projects of the scale being proposed. The subject site is able to connect directly to the existing substation and electricity infrastructure, both of which have available capacity to accommodate the anticipated load.

These factors mean that the proposed solar farm therefore has a functional and operational need to locate on the subject site.

Policy 9 and Clause 3.9(3) of the NPS-HPL require that any use or development on highly productive land minimises or mitigates any actual loss or potential cumulative loss of the availability and productive capacity of highly productive land; and avoids if possible, or otherwise mitigates, any actual or potential reverse sensitivity effects on land-based primary production activities from use or development.

In the current instance the land will continue to be available, and used for productive purposes (sheep grazing). Any reduction in productive capacity is minimal, and the long-term potential will remain unchanged.

As set out in Section 6.8.1, there will be little or no potential for the proposed agrivoltaic development to create reverse sensitivity effects on surrounding agricultural production activities.

It is also notable that there will be no reverse sensitivity effects on the productive activity proposed within the site itself – to the contrary, as explained in the technical report (**Appendix 2**), sheep (the intended productive use) have been found to gain benefit from the shading and shelter provided by the solar arrays.

Summary of NPS-HPL assessment

Overall, the proposal sits comfortably with the provisions of the NPS-HPL. The land resource and its long-term values are unaffected (Policy 1). The proposed solar farm development is not "inappropriate" (Policy 8). Primary production is supported and will continue to operate (Policy 4). The risk of reverse sensitivity effects is negligible (Policy 9).

8.3.7 The National Policy Statement for Freshwater Management 2020 ("NPS-FM")

The NPS-FM came into force on 3 August 2020 and has been most recently amended on 7 January 2024. It applies to all freshwater (cl. 1.5).

The objective[24] of the NPSFM is to ensure that natural and physical resources are managed in a way that prioritises:

(a) first, the health and well-being of water bodies and freshwater ecosystems;

(b) second, the health needs of people (such as drinking water); and

(c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

It is based on the fundamental concept of Te Mana o te Wai, which refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment.

There are no natural wetlands on the subject site. The two artificial watercourses do not meet the RMA definition of a "river".[25]

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[24] NPSFM 2.1.

[25] RMA s.2 (Interpretation): **river** means a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).

Notwithstanding their artificial nature, the watercourses and their ecosystem values, together with their functionality will be preserved. This is considered to be in line with the objective of the NPS-FM.

In avoiding effects on natural inland wetlands and rivers, the proposal (by virtue of its location) is in line with Policies 6 and 7 of the NPSFM, which read:

> ***Policy 6:*** *There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.*
>
> ***Policy 7:*** *The loss of river extent and values is avoided to the extent practicable.*

The drain within the site which is part of the water race network has the potential for native fish to utilise it. Therefore, in line with Policy 9 (protection of habitats of indigenous freshwater species), the relevant best practice and standards for managing effects on those native fish have been adopted, and culvert works will be undertaken to preserve fish passage.[26]

Overall, therefore, the proposal is fully compliant with the NPSFM.

8.3.8 Canterbury Regional Policy Statement ("CRPS")

The CRPS provides an overview of the regional resource management issues facing the region. It sets out objectives, policies, and methods to provide ways of navigating these regional issues; with the overall goal to achieve integrated management of natural and physical resources across Canterbury.

The definition of 'regionally significant infrastructure' in the CRPS includes:

> *Regionally significant infrastructure is:*
>
> *...*
>
> *6. National, regional and local renewable electricity generation activities of any scale*

Renewable electricity generation is defined as:

> *The generation of electricity from solar, wind, hydro electricity, geothermal, biomass, tidal, wave, or ocean current energy sources.*

Renewable electricity generation activities are defined as:

> *The construction, operation and maintenance of structures associated with renewable electricity generation. This includes small and community-scale distributed generation activities, the system of electricity conveyance required to convey electricity to the*

[26] Although the NESFM is not engaged, culverts will be designed and installed to a compatible standard.

distribution network and/or the national grid, and electricity storage technologies associated with renewable electricity.

The proposal falls under the definition of renewable electricity generation and therefore falls within the regionally significant infrastructure definition of the CRPS.

Chapter 5 of the CRPS focuses on matters including:

- The strategic integration of land uses and regionally significant infrastructure;
- The recognition of the importance of regionally significant infrastructure to a community's economic wellbeing, social wellbeing, health and safety;
- The need to manage adverse effects; and
- The need to provide for the establishment, retention and enhancement of regionally significant infrastructure.

The proposal is consistent with the relevant objectives and policies of Chapter 5 of the CRPS as follows:

- This application recognises the social and economic well-being benefits of regionally significant infrastructure in the wider region, with the proposal contributing to promoting renewable energy sources across the region and promoting sustainable management in accordance with the RMA;[27]
- The potential adverse effects from the proposal will be avoided, remedied, or mitigated as far as practicable and will not affect any urban areas. Reverse sensitivity effects and conflicts between incompatible activities can be avoided given that the proposal is not sensitive to any adjacent existing and lawfully established activities. The proposal avoids fragmentation of productive land;[28]
- It is (by necessity) located proximate to the existing physical resource of the Kimberly Substation and associated transmission lines, and provides for the development of new renewable energy generation infrastructure, whilst avoiding any adverse effects on significant natural and physical resources and cultural values;[29] and
- It does not foreclose the ability to make appropriate use of the land for primary production, nor result in reverse sensitivity effects that limit or precludes primary production.[30]

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[27] Objective 5.2.2(1).

[28] Policy 5.3.2.

[29] Policy 5.3.9.

[30] Policy 5.3.12.

Chapter 15 of the CRPS focuses on the regions soil resources. Objective 15.2.1 seeks the maintenance of soil quality, whilst Policy 15.3.1 seeks to avoid, remedy or mitigate soil degradation. The proposed activity will not affect soil quality and will maintain primary production in the form of grazing. Overall, the proposal is consistent with these provisions.

Chapter 16 of the CRPS address Energy and seeks to promote a diverse and secure supply of energy. The proposal is consistent with the relevant objectives and policies of Chapter 16 as follows:

- This proposal will contribute to reliable, resilient, and renewable generation and supply of energy for the region, which avoids any adverse effects on significant natural, physical, or cultural values and resources;[31]
- The proposal will provide efficient, reliable, and resilient electricity generation within Canterbury through enabling the development of new electricity generation infrastructure at the site;[32] and
- The proposal has a functional and operational need to utilise associated infrastructure at this location (the Kimberly Substation).[33]

It is considered that proposed solar farm aligns with the CRPS aims to achieve increased renewable electricity generation. It is appropriately located in proximity to existing electricity transmission infrastructure, avoids significant adverse effects and appropriately avoids, remedies or mitigates other adverse effects.

Chapter 17 of the CRPS addresses contaminated land. The establishment of solar energy infrastructure is not considered to be a HAIL activity. The preceding assessment of environmental effects concludes that risk of any effects of potential existing contamination of the soil resource on other environmental receptors is low and will be appropriately mitigated.

Overall, the proposal is considered to be consistent with the CRPS.

8.3.9 Canterbury Land and Water Regional Plan

The CLWRP contains provisions relevant to the consideration of the regional consent applications for earthworks and discharge of stormwater (construction phase and operational phase). The CLWRP operates at two levels:

- The region-wide section, which contains the objectives, policies and rules that apply across the region; and

[31] Objective 16.2.2 and Policy 16.3.3.

[32] Policy 16.3.3.

[33] Policy 16.3.5.

- Sub-region chapters, which apply additional policies and rules specific to given areas. The Selwyn Te Waihora provisions (Subregion 11) apply to this application.

The relevant policies that deal with earthworks and stormwater discharges are summarised and assessed below.

Earthworks over aquifers

Objectives and policies particularly relevant to earthworks, land excavation and deposition of material into land over aquifers are Objective 3.13 and Policy 4.19.

Objective 3.13 is that groundwater resources remain a sustainable source of high quality water which is available for abstraction while supporting base flows or levels in surface water bodies, springs and wetlands and avoiding salt-water.

Policy 4.19 is to ensure that the discharge of contaminants to groundwater from excavation is avoided or minimized by:

- Siting, designing and managing activities to avoid groundwater contamination;
- Managing and monitoring existing or closed landfills and contaminated sites to minimize contamination of groundwater; and
- Ensure sufficient thickness of undisturbed sediment in the confining layer to prevent entry of contaminants into the aquifer.

In this instance, the ground surface is well above the maximum recorded groundwater level in the vicinity (c.140m), and there is negligible prospect of any effect on groundwater.

Stormwater discharge

Objectives and policies particularly relevant to stormwater discharges include Objective 3.13 outlined above, and Policies 4.17, and 4.18.

Policy 4.17 is that stormwater run-off volumes and peak flows are managed so that they do not cause or exacerbate the risk of inundation, erosion or damage to property or infrastructure downstream or risks to human safety.

Policy 4.18 seeks to avoid the loss or discharge of sediment to surface water during earthworks and if this is not achievable, that the best practicable option is used to minimize the release of suspended sediments.

In the current instance, earthworks are relatively small scale, being approximately 6.5% of the total site area. There is no requirement for stockpiling of excavated soils as part of this proposal. The proposed use of the ESDCP, employing sediment control procedures as set out in the Erosion and Sediment Control Toolbox for Canterbury is considered to be the best practicable option.

Operational stormwater that will be discharged to land will be from the solar panels, and to a lesser extent from the site structures including battery storage units, inverters and site office. This will essentially be clean and given the significant depth of undisturbed earth above the groundwater level, will have no material effect on the aquifer.

The volume of stormwater discharged is ultimately the same as existing, and there will be no material increase in risk of erosion, or damage to adjoining property or infrastructure. Similarly, there is also a low risk to human safety.

Overall, the proposal is therefore considered to be consistent with the policy direction of the CLWRP.

8.3.10 Partially Operative Selwyn District Plan ("POSDP")

The POSDP is well advanced in its Schedule 1 development process. Decisions were publicly notified on 19 August 2023, and the "Appeals Version" of the POSDP is now the relevant document.[34] Outstanding appeals affecting policies relevant to the proposal are identified in the following coverage. Except where appeals are noted, the provisions are now beyond challenge.

The relevant objectives and policies under the POSDP are as follows.

8.3.10.1 Strategic Direction

The Strategic Direction provisions support the district identity and seek to provide for the needs of the community whilst protecting environmental values.

Objective SD-DI-O1 is that Selwyn is an attractive and pleasant place to live, work and visit where development:

- Takes into account the existing and anticipated character of individual communities;
- Is well-connected, safe, accessible, and resilient; and
- Enhances environmental, economic, cultural, social and health outcomes for the benefit of the entire District.

Objective SD-DI-O2 is particularly relevant to the application:

- Selwyn Districts economy and community well-being are supported through the efficient use of land, resources and infrastructure, while ensuring existing activities are protected from incompatible activities and reverse sensitivity effects[35].

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[34] This assessment is made with reference to the Proposed Selwyn District Plan Appeals Version, as at 1 July 2024.

[35] Objective SD-DI-O2.

The proposal will be consistent with these objectives as it provides for renewable energy generation infrastructure, whilst minimising adverse effects as outlined in Section 6 above.

Objective SD-MWV-O1 seeks to strengthen the partnership between the Council and Ngāi Tahu by recognising the cultural significance of Selwyn to Ngāi Tahu and Te Taumutu and Ngāi Tūāhuriri Rūnanga by:

- Promoting active and meaningful participation by those who hold mana whenua in the resource management decision-making process;
- Recognising that only those who hold mana whenua can identify their relationship with their culture, traditions, ancestral lands, waterbodies, wāhi tapu and other taonga;
- Enabling the exercise of kaitiakitanga by those who hold mana whenua over Selwyn;
- Providing for the contemporary connections and cultural and spiritual values held by tāngata whenua; and
- Continuing to enable tāngata whenua to protect, develop, and use Māori Land in a way which is consistent with their culture, traditions, and aspirations.

DSES invited Mahaanui Kurataiao Ltd to engage in the development of this proposal, but their stated preference was to consider the resource consent application once submitted.

Considerations regarding the Mahaanui Iwi Management Plan are set out in Section 8.3.12.

8.3.10.2 Energy and Infrastructure

This chapter of the POSDP concerns energy and infrastructure, or more specifically renewable electricity, important infrastructure, and network utilities, and is particularly relevant to this application. It is intended to be self-contained for all energy, transport and infrastructure works and activities. Objectives and policies from other chapters are only directly applicable where they are cross referenced in the Energy, Infrastructure and Transport chapter itself.

The Energy, Infrastructure and Transport chapter has a clear directional focus on increasing renewable electricity generation output for national, regional, and local use while mitigating adverse effects on the environment and sensitive activities (Objective EI-04).

Policy EI-P2 seeks to minimise the adverse effects of renewable electricity generation on the physical and natural environment by a range of means, of which the following are pertinent to this application:

1. *encouraging the co-location of structures and facilities where efficient and practicable.*

2. *locating, designing and operating development while minimising the effects on, the amenity values of the surrounding environment, public access and the health and safety of people.*

3. *limiting the presence and effects of development within Outstanding Natural Landscapes, Visual Amenity Landscapes, natural character areas, areas of significant indigenous vegetation and habitats of indigenous fauna, sites of historic heritage and sites and areas of significance to Māori…*

[…]

The current proposal is in line with these provisions. It is both efficient (and indeed necessary) for the proposed solar array to be established adjacent to the existing substation and transmission infrastructure (which have sufficient capacity to accommodate the development). The location is such that adverse effects on local amenity are minimal and further reduced through mitigation (planting). The site does not affect (and avoids) any of the identified landscape overlays, indigenous biodiversity or heritage values, and is not identified as a site of significance to Māori.

Policy EI-P2 is subject to appeal from both Transpower New Zealand & Christchurch International Airport.[36] The Transpower appeal supports the policy in-part, and seeks that the adverse effects are to be 'managed' instead of 'minimised', and that the policy also applies to effects of 'new and major upgrades to', important infrastructure and renewable electricity generation. The Christchurch International Airport appeal similarly seeks that adverse effects of important infrastructure should be 'managed', rather than 'minimised', and that the policy explicitly acknowledges operational and technical constraints.

There is not considered to be anything in the appeal matters which would materially affect its applicability of EI-P2 to the subject proposal. The policy can therefore be afforded significant weight. For completeness, it is noted that the corresponding provisions of the OSDP provide similar direction (see Section 8.3.11, below).

Policy EI-P4 is to manage the adverse effects from the construction and operation of important infrastructure, and renewable electricity generation, including noise and vibration. Section 6 of this AEE sets out how adverse effects will be managed to be within appropriate levels.

Policy EI-P4 is subject to appeal from Transpower New Zealand Limited.[37] The appeal generally supports the policy, but seeks limited amendments so that it clearly directs compliance with standards and / or regulations that have formal recognition and standing.

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[36] Transpower New Zealand - ENV-2023-CHC-109 & Christchurch International Airport - ENV-2023-CHC-120.

[37] Transpower New Zealand - ENV-2023-CHC-109.

The mitigation proposed in this application is designed to comply with such standards and does not raise prospect of conflict concerning the outcome of the appeal.

There is not considered to be anything in the appeal matters which would materially affect the applicability of the policy in this instance or result in conflict with the proposal. It can therefore be afforded significant weight. For completeness, it is noted that the corresponding provisions of the OSDP provide similar direction (see Section 8.3.11, below).

Policy EI-P5 is to avoid radio, electric, and magnetic fields that do not meet the applicable and recognised standards or guidelines. All standards and guidelines are met in this instance.

Policy EI-P9 specifically provides for renewable electricity generation and renewable electricity generation activities across the district, whilst having regard to:

1. *The potential benefits of the proposed activity, particularly contributions to national energy objectives or renewable electricity generation targets;*
2. *The technical and operational requirements of renewable electricity generation and renewable electricity generation activities;*
3. *The availability of renewable electricity generation sources;*
4. *The location and efficient use of existing electricity generation and distribution infrastructure;*
5. *The potential to provide an affordable, self-sufficient source of electricity to individuals and small communities.*

This proposal will make a significant contribution to renewable electricity generation targets, generating enough electricity to supply approximately 29,499 homes per year. The location enables diversification of the National Grid supply by enabling decentralised generation capacity and reducing demand on long-distance transmission networks. The battery energy storage system provides an important means of balancing the generation of energy with peak demand, which is crucial for maximising the effectiveness of solar generation.

8.3.10.3 **Transport**

The relevant objectives and policies seek to protect land transport corridors and land transport infrastructure from incompatible land use activities, whilst aiming to regulate vehicle access, crossings, and manoeuvring areas to ensure the smooth and secure operation of land transport networks and infrastructure.

Objective Tran-O1 aims to ensure the safety and efficiency of the land transport corridors, networks and systems are well integrated. Policy TRAN-P3 requires Integrated Transport Assessments to assess the effects of high trip generating activities on the surrounding land transport network to:

- Maintain the safety and efficiency of land transport infrastructure by ensuring there is sufficient capacity in land transport corridors; and
- Establish whether the high trip generating activity can be supported by active transport modes, including accessibility to safe and convenient walking and cycling connections and access to public transport and public transport facilities.

The construction phase of the proposal will be a high trip generating activity. A Transport Assessment has been undertaken (see **Appendix 4**). The Transport Assessment demonstrates that the land transport corridors which will service the development have sufficient capacity, subject to control of right-hard turn volumes from SH 73. A CTMP is proposed to manage adverse effects to be within acceptable limits.

The access point and vehicle crossing to the site will be formed to Council's standard for local roads and to enable trucks to access the site.

Active transport modes and mobility parking will be accommodated as required for the construction activity. The proposed CTMP will aim to limit overall vehicle movements, for example by consideration of vehicle-sharing and shuttle services for construction personnel.

The proposal is therefore considered to be consistent with these relevant objectives and policies.

8.3.10.4 Natural Hazards

The application site is located within the Plains Flood Management Overlay ("**PFMO**") in the POSDP. It is not identified as a High Hazard Area.

The Energy and Infrastructure (EI) chapter of the plan is explicit that where an activity is within an overlay, the associated objectives and policies for that overlay apply.

Objective NH-01, supported by Policy NH-P3, requires that new use, and development is undertaken in a manner that ensures that the risks of natural hazards to people, property and infrastructure are appropriately mitigated. NH-O3 seeks that methods to mitigate natural hazards do not create or exacerbate adverse effects on other people, property, infrastructure, or the environment. NH-04 requires that the effects of climate change, and its influence on the frequency and severity of natural hazards, are recognised and provided for. Policy NH-P10 provides for use and development within the PFMO (other than a high hazard area), where buildings have a floor level above the 200 year ARI flood level.

As outlined in Section 6.9, flood risk modelling undertaken for the proposal indicates that flows along the ground in a flooding event will not be diverted or changed from the existing situation, whilst a freeboard of 300mm above the 200 Year ARI floodplain will be

applied to the site office, substation buildings, and BESS units. It has been assumed that the flood mapping in the POSDP has taken into consideration climate change.

The proposal is therefore considered to be consistent with the policy framework of the POSDP as regards flood hazard management.

8.3.10.5 Earthworks

The POSDP aims to control earthwork activities to minimise their negative impact on the nearby environment, including visual disturbances, sedimentation, nuisance effects, erosion, flooding, and silt build-up that could disrupt natural ecological and physical processes. Additionally, the policies aim to ensure that upon completion, earthworks do not cause any visual disruption, privacy loss, dust problems, or shading.

The earthworks will be managed in accordance with the ESDCP and, as outlined in Section 6 above, with less than minor adverse effects on the site.[38] Additionally, the proposed activities will not alter the topography of site and will not have adverse visual effects, loss of privacy, shading or generate dust nuisance.[39] This is consistent with the relevant objectives and policies of the POSDP.

8.3.10.6 Noise

EI-P4 seeks to manage adverse effects from the construction and operation of renewable electricity generation, which include noise and vibration.

Whilst the rules of the noise chapter do not directly apply, they, and the objectives and policies provide a guide for the assessment. These provisions aim to safeguard people against excessive noise levels,[40] whilst ensuring where important infrastructure generates noise, it is protected from reverse sensitivity effects.[41] The provisions seek to do this by setting maximum noise limits to reflect the character and amenity of each zone and limits on the location, frequency, and duration of specific activities that generate noise.[42]

As noted in Section 6, operational noise and vibration will readily comply with the POSDP standards. Construction noise will be managed via a Construction Noise Management Plan to also be generally compliant with the applicable standards. In 3 instances where piling occurs within 50m of adjacent dwellings, further mitigation will be employed as necessary to mitigate effects to acceptable levels.

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38 Objective EW-O1.

39 Policy EW-P4.

40 Objective NOISE-O1

41 Objective NOISE-O2.

42 Policy NOISE-P1.

The proposal is therefore considered to be consistent with the relevant objectives and policies.

8.3.10.7 General Rural Zone

Whilst the rules of the General Rural Zone ("**GRUZ**") do not apply, the objectives and policies provide a guide for assessment. The GRUZ provides for primary production activities and other compatible activities that support, maintain, or enhance the function and form, character, and amenity values of the rural area.[43] Whilst prioritising primary production, the GRUZ allows for economic development of the rural area by enabling a range of activities that:[44]

- Have a direct relationship with, or are dependent on, primary production;
- Have a functional need, or operational need to locate in the rural area;
- Represent an efficient use of natural and physical resources; and
- Maintain or enhance the character and amenity values of the surrounding area.

The agrivoltaic proposal is for combined renewable energy generation and primary production. It has a functional and operation need to locate in the rural area in proximity to the existing substation and transmission infrastructure. In providing for dual land use activities, and in capitalising on existing electricity infrastructure, it represents a highly efficient use of natural and physical resources.

As set out in Section 6 of this AEE, character and amenity values of the surrounding area are maintained, with any adverse effects being no more than minor at a local level, and less than minor once mitigation planting is established.

Overall, it is considered the proposal will be consistent with the objectives and policies of the GRUZ.

It is noted that Objective GRUZ-O1 is subject to appeal (Transpower New Zealand, ENV-2023-CHC-109), but the substance of that appeal (a relatively minor wording change) is not thought to materially affect its applicability in this instance.

8.3.10.8 POSDP summary

Overall the proposal is considered to be in accordance with the applicable provisions of the POSDP.

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[43] Objective GRUZ-O1.

[44] Policy GRUZ-P4.

8.3.11 Operative Selwyn District Plan ("OSDP")

As set out in Section 4 of this AEE, there are no rules in the OSDP that remain operative with which the proposal does not comply.

Most of the objectives and policies of the POSDP are also now beyond challenge. For those appeals on objectives and policies most relevant to the proposal, the appeals express support in-part and the specified relief sought would not conflict with their application to this application. For these reasons, the Partially Operative Plan is considered to carry significantly greater weight.

Nonetheless, the corresponding OSDP policy framework remains pertinent under s.104. Therefore, for completeness, a summary assessment of the proposal under the relevant provisions of the OSDP is presented below.

The OSDP provides an overview of resource management issues for the Selwyn District, and sets out objectives, policies and methods intended to achieve the integrated and sustainable management of the district's resources.

The OSDP contains relevant provisions in the Rural Volume, which address:

- Natural Resources;
- Physical Resources; and
- Health and Safety Values.

These are outlined in turn below.

8.3.11.1 Natural Resources

Part B1 of the OSDP addresses the natural resources of the district, and contains objectives and policies that address soils, vegetation, ecosystems, water and outstanding natural features and landscapes.

The key conclusion in relation to consistency of the proposed solar farm within the relevant objectives and policies of Part B of the OSDP are:

- The proposal will require minimal earthworks at the site and the soils over majority of the site will not be disturbed. Productive agricultural activity (grazing) will continue and there is no long term effect on the productive capacity of the land. Any potential discharge of sediment will be managed according to best practice, and there will be minimal risk of mobilisation of contaminants. Adverse effects on people, activities, ecosystems and land and soil resources are correspondingly minimal and the proposal is therefore not contrary to Objectives B1.1.1, B1.1.2 and B1.1.3 and their associated policies; and

- Objectives and Policies in Section B1.3 aim to protect surface water resources. The proposal is in general alignment with these provisions as there are no significant water values associated with the site, and in any case, the proposal avoids adverse effects on those surface water features (artificial watercourses) that are present. Earthworks will be managed to minimise the risk of mobilisation of sediment and any associated contaminants. Ecological values are unaffected.

8.3.11.2 Physical Resources

Part B2 of the POSDP address the physical resources of the district. It sets out objectives and policies that address the transport network, utilities, community facilities and waste disposal within the district.

The relevant objectives and policies seek:

- An integrated approach to land use and transport planning to ensure the safe and efficient operation of the District's roads, pathways, railway lines and airfields, which is not compromised by adverse effects from activities on surrounding land or by residential growth;[45]
- To ensure that all sites, allotments or properties have legal access to a legal road which is formed to the standard necessary to meet the needs of the activity considering:
    - The number and type of vehicle movements generated by the activity;
    - The road classification and function; and
    - Any pedestrian, cycle, public transport or other access required by the activity.[46]
- To recognise utilities as essential tools for people's economic and social well-being, and to mitigate effects of other activities, on the environment;[47]
- The provision of utilities where any adverse effects on the receiving environment and on people's health, safety and wellbeing is managed having regard to the scale, appearance, location and operational requirements of the facilities;[48] and
- Avoid potential reverse sensitivity effects of activities on the efficient development, use and maintenance of established utilities.[49]

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45 Objective B2.1.1 and Policy B2.1.2.

46 Policy B2.1.4(a).

47 Objective B2.2.1.

48 Objective B2.2.2.

49 Policy B2.2.3.

In terms of transport, the assessment summarised in Section 6 demonstrates that the road network can accommodate the projected traffic generation (notably during construction) without compromising its safe and efficient operation. The site access and vehicle crossings will be formed to a suitable standard, with internal tracks and parking to be implemented during construction to allow for safe and efficient access into the site.

With respect to Objectives B2.2.1 and B2.2.2, the proposal will provide renewable energy generation. The location of the site has been chosen in the rural location to enable efficient connection to the existing substation and transmission infrastructure and to enable dual use for pastoral activities. The assessment of environmental effects set out in Section 6 of this AEE demonstrates that adverse effects are appropriately managed.

Overall, it is considered that the proposal will be consistent with the relevant objectives and policies that deal with the physical resource issues within the district.

8.3.11.3 People's Health, Safety and Values

Part B3 of the OSDP outlines the objectives and policies of people's health, safety and values.

The relevant objectives and policies seek:

- "Reverse sensitivity" effects between activities are avoided;[50] and
- To provide for any activity to locate in a zone provided it has effects which are compatible with the character, quality of the environment and amenity values of that zone.[51]

The proposal is considered to avoid reverse sensitivity effects as outlined in Section 6 of this AEE. Additionally, the proposal will have very localised low-moderate effects on the rural character values and amenities of the site and receiving environment.

8.3.11.4 OSDP Conclusion

The establishment of the solar farm in the manner proposed is considered to be consistent with the provisions of the OSDP.

8.3.12 Other Matters

8.3.12.1 Mahaanui Iwi Management Plan

The Mahaanui Iwi Management Plan 2013 is the mana whenua planning document reflecting the collective efforts of six Papatipu Rūnanga that represent the hapū who hold

[50] Objective B3.4.2.

[51] Policy B3.4.2.

mana whenua rights over lands and waters within the takiwā from the Hurunui River to the Hakatere River and inland to Kā Tiritiri o Te Moana.

The Mahaanui Iwi Management Plan is divided into 6 parts:

- **Part 1** identifies the purpose and structure of the plan, and explains how to use the document;
- **Part 2** identifies the expectations and opportunities associated with implementing the plan;
- **Part 3** introduces plan users to the six Papatipu Rūnanga and includes a description of takiwā boundaries;
- **Part 4** provides an overview of the cultural framework for Ngāi Tahu approaches to resource management, and the legal framework for tangata whenua participation in resource management;
- **Part 5** outlines regional objectives, issues and policies. Part 5 is divided into 8 policy sections (Sections 5.1 to 5.8) addressing Kaitiakitanga, Wai Māori (freshwater) and Ngā Tūtohu Whenua (cultural landscapes), and the domains of Ranginui (sky), Papatūānuku (land), Tāne Mahuta (mahinga kai and biodiversity), Tangaroa (oceans) and Tāwhirimātea (climate change). These policies apply to the whole of the takiwā covered by the Plan except where replaced by a locally specific policy in the catchment sections in Part 6; and
- **Part 6** is divided into 12 catchment or distinctive geographical area sections (Sections 6.1 to 6.12). Policies in these sections sit alongside the regional policies in Part 5, and address issues of local significance in the catchment or geographical area. Part 6.11 of addresses issues of particular significance in the catchment of Te Waihora, which includes Darfield and the subject site.

Mahaanui Iwi Management Plan provisions of particular relevance to this project are addressed below. Matters are considered according to the subject in hand, given that the Mahaanui Iwi Management Plan emphasises that that Parts 5 and 6 should be used together.[52]

References to the Mahaanui Iwi Management Plan in this assessment refer to the online version (https://www.mahaanuikurataiao.co.nz/iwi-management-plan/).

[52] Mahaanui Iwi Management Plan 1.5.

Kaitiakitanga (5.1)

Chapter 5.1 of the Mahaanui Iwi Management Plan notes that kaitiakitanga is fundamental to the relationship between Ngāi Tahu and the environment. It is the intergenerational responsibility and right of tāngata whenua to take care of the environment and resources.

Objective 2 is that Papatipu Rūnanga are able to fulfill their role and responsibility as kaitiaki within management and decision making processes. Policy K2.4 notes that as the tāngata whenua who hold mana whenua, Ngāi Tahu interests in resource management extend beyond stakeholder or community interests.

DSES recognizes the significance of this relationship and accordingly sought early engagement with Papatipu Rūnanga through Mahaanui Kurataiao. Mahaanui Kurataiao stated that was that that there was no need for prior engagement in this instance, and DSES should refer to the Mahaanui Iwi Management Plan in the first instance. Mahaanui Kurataiao indicated that they will review the project at the time of lodgement of the application (see email exchange **Appendix 17**). DSES has assessed the project in light of the Mahaanui Iwi Management Plan and incorporated relevant outcome in the design. This application has also been copied to Mahaanui Kurataiao at time of lodgement. Feedback is pending at time of writing.

Climate Change (Ranginui - 5.2) and Energy (Papatūānuku - 5.4)

Whilst section 5.2 deals primarily with managing the effects of climate change, Policy R3.4 supports the reduction of emissions as a response to climate change.

Ngāi Tahu have an interest in the extraction, generation, distribution and use of energy in the takiwā (Papatūānuku - 5.4). An issue of particular significance is the use of water to generate energy, given the potential for damming, diversion and storage to have effects on indigenous freshwater fauna and the relationship of tāngata whenua to ancestral rivers, together with fundamental questions about competition for water resources and commercial use.

In light of this, Policy P17.5 supports in principle the use of wind and solar energy generation in the region.

The thrust of the Climate Change and Energy policies is to support renewable energy generation whilst emphasising that some development, particularly hydropower, can have adverse cultural consequences which need to be managed (or avoided).

The proposal will generate renewable energy sufficient to provide power for the equivalent of 29,499 homes, saving around 15,540 tonnes of CO_2 per annum.[53] It will do

[53] The emissions reduction figure is based on the assumption that the Darfield solar output replaces the national average NZ electricity generation (which is ~ 85% renewable).

so in a manner than avoids the potential adverse effects discussed in the Mahaanui Iwi Management Plan, and fits well with the above policy directions.

Wai Māori | Water (5.3) and Te Waihora (Sub-Regional Catchment Chapter 6.11)

Water is a significant cultural resource that connects Ngāi Tahu to the landscape and the culture and traditions of the tūpuna. Fundamental to tāngata whenua perspectives on freshwater is that water is a taonga, and water management and land use should reflect this importance. Policy WM1.1 emphasises that Ngāi Tahu, as tāngata whenua, have specific rights and interests in how freshwater resources should be managed and utilised in the takiwā.

Sub-Regional Catchment Chapter 6.11 - Te Waihora deals with the need for effective water catchment management to protect and restore the mauri of Te Waihora. A key objective is that Land and water management in the catchment effectively provides for the Treaty partner status of Ngāi Tahu, and the taonga status of Te Waihora.[54] The cultural health of Te Waihora need to be restored,[55] recognising and providing for the relationship between land use, groundwater, surface water and Te Waihora.[56] Policy TW7.1 requires that the restoration of water quality in lowland streams is addressed as a matter of priority.

The water policies emphasise the need to protect and enhance all waterways, including by means of riparian enhancement.[57] Policy WM12.15 specifies how the appropriate size of buffers or set back areas along waterways should be assessed, based on:

(a) The nature of the adjacent land use and therefore risk to waterway health;

(b) The existing state of cultural health of the waterway; and

(c) The existing pressures on the waterway.

WM6 deals with water quality, noting the existing state of general degradation.[58] Policy WM6.1 recognises that the improvement of water quality in the takiwā is as a matter of regional and immediate importance. Policy WM6.8 opposes the discharge of contaminants to water, and to land where contaminants may enter water. Policy WM6.11 requires consented discharge to land to be subject to appropriate consent conditions to protect ground and surface water.

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[54] 6.11 Objective 1.

[55] Objective 3.

[56] Objective 6.

[57] 5.3 Objective 7 and Policy WM12.2.

[58] Issue WM6.

Of particular relevance to the current proposal, Policy WM14.1 requires that drains are managed as natural waterways and are subject to the same policies, objectives, rules and methods that protect Ngāi Tahu values associated with freshwater. WM14.1(d) requires maintenance of fish passage in waterways.

The solar proposal has been designed to protect surface and ground water. The existing water race is excluded from the development (solar installation) area and protected with minimum 3 m wide buffers, in which DSES is open to discussions regarding appropriate planting. Works to install or upgrade culverts will be undertaken to protect fish passage. Earthworks will be managed in accordance with the Environment Canterbury Erosion and Sediment Control Toolbox. Operational discharges to ground and surface water will be essentially the same as existing.

Appropriate conditions of consent are proposed to secure these safeguards (see **Appendix 7**).

Stormwater and Discharges to land (Papatūānuku – P6, P8)

Section P6 addresses the effects on water quality that may arise from the discharge of stormwater. Policy P6.1 requires a multi-tiered approach to stormwater management, including reducing volume entering system (for example by use of rainwater collection tanks), and reducing contaminant loading, and using environmental infrastructure such as swales, retention basins, and constructed wetlands, using appropriate native plant species to absorb and filter water.

Policy P6.2 opposes the use of existing waterways and drains for the treatment and discharge of stormwater. Policy P8.1 requires that discharges to land are appropriate to the soil type and slope, and the assimilative capacity of the land to avoid over-saturation and therefore the contamination of soil. Discharges should be accompanied by regular testing and monitoring.

The solar proposal sits well with these provisions. As described in Section 6 of the AEE, the behaviours of stormwater after development of the solar farm will be largely unchanged, soaking to ground around the solar array. Stormwater from the limited hardstand areas will be directed to ground discharge using soakage devices. Building materials such as roofing and cladding will be specified to avoid risk of release of contaminants. The solar panels themselves are sealed and present no risk of contaminant release.

Earthworks (Papatūānuku – P11; Ngā Tūtohu Whenua - CL.3.8)

Policy P11.1 requires assessment of proposals for earthworks with particular regard to:

(a) Potential effects on wāhi tapu and wāhi taonga, known and unknown;

(b) Potential effects on waterways, wetlands and waipuna;

(c) Potential effects on indigenous biodiversity;

(d) Potential effects on natural landforms and features, including ridge lines;

(e) Proposed erosion and sediment control measures; and

(f) Rehabilitation and remediation plans following earthworks.

This is supported by a series of subject-specific policies including:

- **P11.6** To avoid damage or modification to wāhi tapu or other sites of significance as opposed to remedy or mitigate;
- **P11.7** To require that indigenous vegetation that is removed or damaged as a result of earthworks activity is replaced;
- **P11.8** To require the planting of indigenous vegetation as an appropriate mitigation measure for adverse impacts that may be associated earthworks activity;
- **P11.9** To require stringent and enforceable controls on land use and earthworks activities as part of the resource consent process, to protect waterways and waterbodies from sedimentation, including but not limited to:
  - (a) The use of buffer zones;
  - (b) Minimising the extent of land cleared and left bare at any given time; and
  - (c) Capture of run-off, and sediment control.

The solar proposal meets these requirements in that:

- There are no known wāhi tapu or other sites of significance associated with the site;
- There is no removal of indigenous vegetation proposed;
- Earthworks will take place progressively to minimise the amount of ground exposed at any one time;[59]
- Earthworks will be undertaken with appropriate sediment controls (as per the Erosion and Sediment Control Toolbox); and
- The water race is excluded from the solar development area and are protected by buffer zones.

[59] As noted in Section 6, earthworks are primarily associated with the establishment of access tracks, and will be limited to 50m exposure at any time.

Earthworks have potential to disturb artifacts or sites of cultural significance. This is addressed in the Mahaanui Iwi Management Plan under section 5.8, Ngā Tūtohu Whenua Cultural Landscapes.

The site contains no known sites of cultural significance, nor is it subject to any silent files identified in Appendix 6 of the Mahaanui Iwi Management Plan. In light of this, and pending receipt of any further information from Mahaanui Kurataiao in relation to this application, the site is tentatively considered to fall under Policy CL.3.8(a) of the Mahaanui Iwi Management Plan as a low risk site.

Policy CL.3.8(a) requires application of an accidental discovery protocol.

As provision for an accidental discovery protocol is included in the proposal (see proposed conditions, **Appendix 7**), and there is no other apparent engagement of the Ngā Tūtohu Whenua provisions of the Mahaanui Iwi Management Plan, the proposal is considered to be consistent with the Plan in this regard.

Tāne Mahuta | Biodiversity (5.5)

Ngāi Tahu has a particular interest in indigenous biodiversity, both for its inherent value on the landscape and the ecosystem services it provides, and with regard to mahinga kai. Indigenous flora and fauna has sustained tāngata whenua for hundreds of years, providing food, fibre, building materials, fuel, medicine and other necessities. The relationship between tāngata whenua and indigenous biodiversity has evolved over centuries of close interaction and is an important part of Ngāi Tahu culture and identity.

The issue of main relevance for the proposal is TM1(h) - infrastructure barriers to fish passage. The proposal includes the installation of 3 culverts[60] in order to establish access tracks across a central water race. As the ecological assessment indicated that native fish species may use the water race in transit, works to install or upgrade culverts will be undertaken to preserve fish passage.

Policy TM2.8 relates to integrating indigenous biodiversity into the landscape, including:

(a) Indigenous species in shelter belts on farms;

(b) Use of indigenous plantings as buffers around activities such as silage pits, effluent ponds, oxidation ponds, and industrial sites;

(c) Use of indigenous species as street trees in residential developments, and in parks and reserves and other open space; and

(d) Establishment of planted indigenous riparian margins along waterways.

[60] 3 culverts are identified in the plans at this time. It is possible that this number may change (although not significantly) at the detailed design stage.

The proposal includes use of indigenous planting in the perimeter landscape screening, thus realising ecological and cultural benefits alongside landscape effect mitigation.

There are no other biodiversity implications of the proposal (no herpetofauna or bats have been identified on site, and avifauna effects will be managed through timing of works on (exotic) tree removals to avoid nesting periods). The proposal is considered to be in accordance with the Tāne Mahuta policies of the Mahaanui Iwi Management Plan.

Summary

Overall, it is considered that the proposal is in good alignment with the relevant objectives and policies set out in the Mahaanui Iwi Management Plan. The Mahaanui Iwi Management Plan supports in principle the use of solar energy generation in the region (Policy R3.4), and the design of the proposal incorporates design elements and principles reflecting the direction of the Mahaanui Iwi Management Plan relating to cultural values and the management of potential effects:

- By virtue of its location, the site avoids known sites of significance for Ngāi Tahu;
- Earthworks will be managed according to the guidelines of the Ecan *Erosion and Sediment Control Toolbox* for Canterbury to avoid adverse effects of sediment discharge. The accidental discovery protocol set out in Appendix 3 of the Mahaanui Iwi Management Plan will be followed (subject to agreement of Mahaanui Kurataiao);
- The water race is excluded from the development footprint and is protected by appropriate buffers. Culverts will be engineered to facilitate fish passage;
- The site currently has low biodiversity value, and thus avoids adverse effects on indigenous biodiversity. Landscape planting on the site will utilise indigenous species in order to enhance biodiversity values.
- The limited discharge of stormwater from hardstand areas will be managed via soakage devices – there will be no material change to the existing drainage patterns on site.

Whilst DSES has endeavoured to follow the guidance of the Mahaanui Iwi Management Plan in preparing the solar proposal, it is acknowledged that there may be gaps in the assessment, and further discussion with Mahaanui Kurataiao on receipt of this application is welcomed.

8.3.12.2 Government Policy Direction for Renewable Energy Generation

The information presented in this section summarises key Government energy and climate change related initiatives and reforms. It is noted that, with the relatively newly elected coalition Government, it is likely that some of these initiatives will be amended.

Nevertheless, this information provides a broad picture of the general direction of travel with respect to New Zealand's likely energy future.

The NZ Government declared a climate emergency in December 2020, noting that climate change is one of the greatest challenges of our time, and committing to taking urgent action on greenhouse gas mitigation and climate change adaptation, including transitioning to a low-carbon economy.

Subsequent plans and strategies that provide direction on how this is to be achieved include Aotearoa New Zealand's First Emissions Reduction Plan (2022) and The New Zealand Infrastructure Strategy 2022-2052.

These documents provide high level statements of Government policy, which are relevant matters for consideration under s.104(1)(c), and are considered below.

It is noted that on 26 August 2024, the Government announced its intention to progress a series of reforms to make it easier and cheaper to consent, build and maintain renewable electricity generation as well as electricity distribution and transmission,[61] indicating its ongoing commitment to electrifying New Zealand's economy as a *"key part of the Government's plan to grow our economy and reduce emissions to achieve Net Zero 2050*".

New Zealand's Emissions Reduction Plan

New Zealand's Emissions Reduction Plan (**"ERP"**) notes the urgency of transitioning to net-zero emissions and sets out strategies, policies and actions for achieving this. In doing so, it outlines how New Zealand intends to play its part in global efforts to limit warming to 1.5˚C above pre-industrial levels.

Relevant actions set out in the ERP include:

- Increasing uptake electric vehicles (EVs) and expanding EV-charging infrastructure;
- Beginning the process of decarbonising heavy transport and freight;
- Supporting businesses to improve energy efficiency and move away from fossil fuels to low-emissions alternatives; and
- Ensuring the electricity system is ready to meet future needs and reducing barriers to developing and efficiently using electricity infrastructure.

A discussion document in preparation for the Second Emission Reduction Plan was published by the coalition Government in July 2024. This signals ongoing commitment to achieving the transition to a lower emissions economy under the "Electrify NZ" policy,

[61] "Electrify NZ" press release: Next steps on Electrifying New Zealand | Beehive.govt.nz

which aims to double renewable energy by 2050 and enable investment by removing barriers.[62]

The solar and BESS proposal fits squarely with this direction in providing required renewable energy generation, with minimal environmental effects, and with the added benefit of security of supply provided by the battery storge capacity.

New Zealand Infrastructure Strategy

The New Zealand Infrastructure Strategy notes that "we need to grow our clean electricity generation significantly over the next 30 years."[63]

With population growth and the need to decarbonise the transport and process heat sectors through electrification, it is estimated that 70 per cent more renewable generation capacity will be needed by 2050, and most of this additional capacity will come from new solar and wind generation.[64]

Again, the solar and BESS proposal is directly in line with these aims.

8.3.13 Conclusion on Statutory Considerations

Overall, it is considered that the proposal aligns well with the policy directions and statutory framework at national, regional and local levels. It provides for needed renewable energy generation, whilst avoiding significant adverse environmental effects and appropriately mitigating other effects.

The proposal aligns with the objectives and policies outlined in the RPS and Regional and District Plans. Whilst the proposal involves using highly productive land for infrastructure, it will also maintain productive land uses with primary (agricultural) production ongoing in conjunction with renewable energy generation.

8.4 PART 2 OF THE RMA

In R J Davidson the Court of Appeal determined that:

a) RMA decision makers should usually consider Part 2 when making decisions on resource consents (that is, the implication of the words "subject to Part 2" in section 104, RMA); and

b) However, where the relevant plan provisions have clearly given effect to Part 2, there may be no need to do so as it "would not add anything to the evaluative exercise". It

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62 Ministry for the Environment. 2024. New Zealand's second emissions reduction plan (2026–30): Discussion document, p.53.

63 New Zealand Infrastructure Commission (2022). Rautaki Hanganga o Aotearoa 2022 - 2052 New Zealand Infrastructure Strategy, 6.1.3 "Strategic Direction".

64 Ibid. p.55.

would be inconsistent with the scheme of the RMA to override those plan provisions through recourse to Part 2. In other words, "genuine consideration and application of relevant plan considerations may leave little room for Part 2 to influence the outcome".

The CRPS, CLWRP and POSDP are the mechanisms by which Part 2 is given effect to at the local level. It is considered that all these documents were competently prepared through an independent hearing and decision-making process in a manner that appropriately reflects the provisions of ss 5-8 of the Act. Accordingly, no further assessment against Part 2 is considered necessary.

9. NOTIFICATION ASSESSMENT

The following sub-sections provide an assessment against the relevant sections and steps in the RMA for determining whether to publicly or limited notify a resource consent application.

9.1 SECTION 95A PUBLIC NOTIFICATION

Whether the resource consent application should be publicly notified has been assessed as follows, in accordance with Section 95A of the RMA:

Step 1 – Mandatory public notification

- The applicant does not request public notification of the application (as per section 95A(3)(a) of the RMA); and
- The application does not include an application for the exchange of recreation reserve land under the Reserves Act 1997 (section 95A(3)(c) of the RMA).

Step 2 – Public notification precluded

- None of the relevant rules in the POSDP preclude public notification of the resource consent application (as per section 95A(5)(a) of the RMA).

Step 3 – Public notification required in certain circumstances:

- There are no relevant rules in the POSDP or Freshwater NES that require public notification (as per section 95A(8(a) of the RMA); and
- For the reasons set out in Section 6 of this AEE, it is not considered that the proposal will have adverse effects on the wider environment that are more than minor in accordance with Sections 95A(8)(b) and 95D of the RMA.

Step 4 – Public notification in special circumstances

- There are no special circumstances in relation to the resource consent application.

- In considering whether special circumstances apply to warrant notification of an application, it is noted that special circumstances:
    - Are unusual or exceptional but may be less than extraordinary or unique; and
    - Unlikely to be justified where there is no evidence of adverse effects likely to arise from an activity.

The resource consents required for the Darfield Solar and BESS proposal are not unusual or exceptional for the following reasons:

- As already noted in this AEE, DSES is seeking resource consents for the construction, operation and maintenance of a solar farm at the site in a rural location where such activity is explicitly anticipated in the POSDP;
- The project is in line with the expectation of the POSDP in terms of the avoidance, remedy or mitigation of adverse environmental effects – it largely screened from public view and with the exception of the visual impacts on adjacent landholdings will have less than minor effects;
- The project is not considered to be controversial or of significant public interest; and
- The application and its supporting material have been prepared by a set of qualified professionals, so it is very unlikely that notification would elicit any additional, relevant information.

In light of the above, it is considered that public notification of the resource consent application is not required under Section 95A of the RMA.

9.2 SECTION 95B LIMITED NOTIFICATION

Section 95B(1) of the RMA requires a consent authority to determine whether to give limited notification of a resource consent application if an application is not publicly notified under section 95A of the Act. This has been considered according to section 95B of the RMA as follows:

Step 1 – Certain affected groups and affected persons must be notified:

- Limited notification is not required under Step 1 as the resource consent application does not affect customary rights groups, customary marine title groups or a statutory acknowledgement (as per sections 95B(2) and (3) of the RMA).

Step 2 – If not required by Step 1, limited notification precluded in certain circumstances:

- The resource consent application is not subject to a rule or national environmental standard that precludes limited notification (as per section 95B(6)(a) of the RMA); and

- Limited notification is also not precluded as the resource consent application is not a controlled activity (as per section 95B(6)(b) of the RMA).

Step 3 – If not precluded by Step 2, certain other affected persons must be notified:

- The proposal is not a boundary activity (as per section 95B(7) of the RMA); and
- No other special circumstances have been identified in relation to the resource consent application that warrant notification of the application to any other persons not already determined to be eligible for limited notification (as per section 95E(10) of the RMA).

The resource consent application therefore falls into the 'any other activity' category (s. 95B(8) and the effects on any persons are to be assessed in accordance with section 95E of the RMA to determine if limited notification is required.

9.3 SECTION 95E OF THE RESOURCE MANAGEMENT ACT 1991

According to section 95E of the RMA, a person is deemed to be an affected person if the adverse effects of any activity on the person are minor or more than minor (but not less than minor). In forming an opinion on the potential effects of an activity on a person, a consent authority is also entitled to disregard any adverse effect that is permitted by the POSDP.

Furthermore, and in accordance with section 95E(3)(a) of the RMA, a person is not an affected person in relation to a resource consent application for an activity if the person has given, and not withdrawn, approval for the proposed activity before the consent authority has decided whether there are any affected persons.

Based on the effects identified in the technical assessments, potentially affected parties are listed in **Table 7,** below. No other persons are considered to be adversely affected to a minor or more than minor extent by the resource consent applications. (For avoidance of doubt, the owners of 1352 Homebush Road are also owners of the proposal site.)

Table 7 Affected Parties Assessment

Party	Reason	Written approval received	Limited Notification Required
Owners / occupiers 1/3792 West Coast Road	Visual amenity: Minor or more than minor adverse effects (temporary during construction)	No	Yes
Owners / occupiers 1352 Homebush Road	Visual amenity:	Yes	No

Party	Reason	Written approval received	Limited Notification Required
	Minor or more than minor adverse effects (temporary during construction)		
Owners / occupiers 1433 Homebush Road	Visual amenity: Minor adverse effects (temporary during construction)	No	Yes
Owners / occupiers 32 Loes Road	Visual amenity: Minor or more than minor adverse effects (temporary during construction and before mitigation planting is established)	No	Yes
Owners / occupiers 68 Loes Road	Visual amenity: Minor or more than minor adverse effects (temporary during construction and before mitigation planting is established)	No	Yes

10. CONCLUDING COMMENT

The agrivoltaic solar energy and BESS proposal, located at 1352 Homebush Road, Darfield, consists of 117 MW of Solar Photovoltaic power generation plus 106 MW / 200-400 MWh of BESS. The project is to feed into the National Grid and is expected to generate enough electricity to supply approximately 29,499 homes per year, saving approximately 15,540 tonnes of CO_2 per annum. It is in line with policy direction at national, regional and local levels to secure significantly increased levels of renewable electricity generation and transition to a low carbon economy.

The proposal manages environmental effects in line with the relevant RMA policy statements and plans. It avoids areas of significant natural or cultural value, and has no more than minor environmental effects overall. Agricultural production is maintained in parallel to renewable energy generation, whilst the project capitalises on existing electricity transmission infrastructure. It represents a highly efficient use of resources.

As set out in this assessment, and the appended technical reports, there is no reason why the necessary regional and district resource consents should not be granted.