Brinkworth Solar Farm Pty Ltd (sponsored by the Department for Energy and Mining)
Brinkworth Solar Farm Project

Koolunga Road, Brinkworth
Development Application 24016679

CONTENTS:

OVERVIEW

DEVELOPMENT NO.	24016679
APPLICANT	Brinkworth Solar Farm Pty Ltd Sponsored by the Department for Energy and Mining
CONSENT SOUGHT	Development Approval
ADDRESS	▪ LOT 256W POWER STATION RD BRINKWORTH ▪ 873 KOOLUNGA RD KOOLUNGA ▪ 653 KOOLUNGA RD BRINKWORTH ▪ LOT 102 LAKE VIEW RD BRINKWORTH
NATURE OF DEVELOPMENT	Brinkworth Solar Farm Project comprising: 209MW solar farm, associated infrastructure and ancillary works (temporary and permanent), and connection to the national electricity grid through the Brinkworth Substation.
ZONING INFORMATION	**Zone:** ▪ Rural **Overlays**: ▪ Dwelling Excision ▪ Hazards (Bushfire - General) ▪ Hazards (Flooding - Evidence Required) ▪ Limited Land Division ▪ Native Vegetation ▪ Water Resources **Local Variations (TNV):** ▪ Minimum Site Area (100 ha)
LODGEMENT DATE	28 June 2024
RELEVANT AUTHORITY	Minister for Planning
PLANNING AND DESIGN CODE	P&D Code Version 2024. 11 - 20/06/2024
CATEGORY OF DEVLEOPMENT	Crown Development – section 131 (State Agency sponsored development)
APPEAL RIGHTS	Nil
NOTIFICATION	Public notification required – Eight representations with three to be heard.
REFERRALS STATUTORY	Port Pirie Regional Council Wakefield Regional Council Native Vegetation Council
DELEGATION	SCAP (as the delegate of the SPC) to provide advice to the Minister for Planning pursuant to Section 131 (17) of the *Planning, Development and Infrastructure Act 2016*.
REPORT AUTHOR	Lee Webb, Project Lead

EXECUTIVE SUMMARY

The Brinkworth Solar Farm Project involves the construction of solar photovoltaic arrays mounted on single axis tracking racks with a combined maximum capacity of 209MW, associated infrastructure and ancillary works (both temporary and permanent). The solar farm would be connected to the national electricity grid via the Brinkworth Substation, which is located next to the site. The project also includes a 300MW storage capacity battery (with a 4-hour storage duration up to 1200MWh) that will be constructed as 'exempt development' pursuant to Schedule 13 of the *Planning, Development and Infrastructure Act 2016* (PDI Act).

The application has been sponsored by the Department for Energy and Mining as 'essential infrastructure' pursuant to Section 131 of the PDI Act. Brinkworth Solar Farm Pty Ltd (a member of the

Akaysha Energy Pty Ltd Group) is the applicant / developer and MasterPlan is the lead consultant for the project (with assistance from Wind Prospect).

The subject land comprises four (4) parcels and is within the suburb of Brinkworth, Wakefield Regional Council. It should be noted that part of the northern land parcel (CT 5864/896) is within the Port Pirie Regional Council but the project footprint does not extend into this area.

The development cost of the project exceeds $10 million (i.e. $420M) and was therefore publicly notified for four (4) weeks between 7 August 2024 and 4 September 2024. Eight (8) submissions were received, all in opposition of the proposal, with three (3) respondents electing to be heard. The applicant has prepared a response to the respondents' concerns.

The Rural Zone of the Planning and Design Code supports the South Australian economy through a range of primary production, forestry and renewable energy activities. The zone envisages renewable energy facilities where they minimise significant fragmentation and displacement of existing primary production. The construction of a solar facility in proximity to the existing state-wide electricity transmission network is consistent with the intent of the zone.

Environmental and social impacts during construction and operation can be appropriately managed through a suite of management plans including a Construction Environmental Management Plan and Traffic Management Plan.

The proposed development is considered to be in accordance with key policies of the Rural Zone; relevant Hazard overlays and Native Vegetation Overlay; and General Development policies relating to land use, siting, design, interface matters, transport and vegetation clearance.

It has been assessed that the proposal is not seriously at variance with the relevant provisions of the Planning and Design Code and warrants the granting of Development Approval, subject to the assignment of relevant conditions to manage external impacts during construction and operation.

ASSESSMENT REPORT

1. BACKGROUND

1.1 Strategic Context

South Australia is already a leader in renewable energy and the South Australian Government continues to prioritise and accelerate investment and policy reform in decarbonised economic development.
The *Climate Change and Greenhouse Emissions Reduction Act 2007* sets targets for greenhouse gas emission reduction and renewable electricity. The Act is currently being reviewed, to reflect the SA Government's commitment to achieve at least 50% net emissions reduction on 2005 levels by 2030, net zero greenhouse gas emissions by 2050 and 100% net renewable electricity generation by 2027.
The Australian Energy Market Operator (AEMO) Integrated System Plan sets out a plan for a transformation of the National Electricity Market, from fossil fuels to firmed renewables while supplying affordable and reliable electricity. The addition of 209MW of solar energy will make a significant contribution to the renewable energy targets for the Mid North Renewable Energy Zone. Through grid strengthening services being offered by the planned battery (not subject of this application), the project will help to address the most pressing needs of the grid.

1.2 Process

The solar farm and battery project was sponsored for the purposes of 'essential infrastructure' by the Department for Energy and Mining (DEM) on 7 September 2023. An application was lodged with the State Planning Commission (SPC) on 28 June 2024.

As required by regulation 107 of the *Planning, Development and Infrastructure (General) Regulations 2017*, the application was accompanied by a certificate from the Office of the Technical Regulator (OTR) supporting the proposed generator on the basis that the project includes a 300MW battery.

In October 2023, DEM invited Akaysha Energy to provide an Expressions of Interest (EOI) for the battery component to be considered as an exempt form of development. The EOI application was subsequently supported by the DEM Chief Executive on 12 February 2024, endorsing the battery (BESS) component as 'essential infrastructure' under the PDI Act, and the subject land was formally defined (via the Government Gazette) as being exempt of planning approvals to host the battery.

The solar farm application has been assessed in accordance with the provisions of Section 131 of the *Planning, Development and Infrastructure Act 2016*, including mandatory referrals and public notification.

If a development authorisation is granted for the solar farm, the approval will address the requirements that need to be met by the applicant for the final design and construction phases of the development. The operational and decommissioning phases of the facility would be managed under the regulatory regime of the *Hydrogen and Renewable Energy Act 2023* administered by the Department for Energy and Mining, in accordance with the transitional provisions of the Act and regulations.

2. DETAILED DESCRIPTION OF THE PROPOSAL

2.1 Proposal

As illustrated in **Figures 1 - 5**, the proposed development is for the construction of a utility-scale solar farm and associated infrastructure, comprising the following:

- Solar photovoltaic (PV) arrays, with modules (panels) mounted on single axis tracking racks installed in parallel rows.
  - Modules to be aligned on the tracking system in a north/south row and rotate in position from east to west in order to track the position of the sun over the course of the day.
  - Racks spaced approximately 6.5m apart.
  - Solar panels approximately 2.28m long by 1.13m wide, with an estimated 367,360 panels to be used.
  - The maximum height of the panels to the higher edge from ground level at the maximum tilt angle is expected to be 4.5m, with the leading (lower) edge of each PV module up to 1.2m from the ground (when in a horizontal position) and no less than 0.3m (maximum tilt).
- Ancillary electrical equipment, including:
  - Power conversion units (inverter stations) to convert energy from Direct Current (DC) to Alternating Current (AC). Step-up transformers are housed within the inverter containers.
  - Underground cables, connecting groups of solar panels to inverter stations.
  - Underground cables connecting each inverter station to the on-site switching yard and electrical substation.
- Substation for the step-up of electricity voltage to connect the solar farm to the Brinkworth Substation. The substation would include a 275/33 kV transformer, earthing/auxiliary transformers, outdoor switchgear, control room and switch room, and cable termination structures. The connection could be un underground or overhead cable.
- Ancillary infrastructure (permanent) including:
  - Operations and Maintenance compound, including a control room, site office, amenities, maintenance building, other ancillary buildings, car parking for employees and contractors, laydown / compound area and internal access roads.
  - Vehicular access points / gates from the road network, with the primary access gates located on Power Station Road, and internal access roads (up to 6m wide).
  - Perimeter fencing - indicative height 2.93m black chain wire mesh.
  - CCTV and low-level security lighting.

  - Connection to mains water and electricity supply (if required); provision of on-site sewage treatment system or installation of holding tanks.
- Ancillary infrastructure (temporary) including:
  - Vehicular access points, access roads and car parking areas.
  - Workshops, outbuildings, site office and amenities.
  - Laydown, waste storage and refuelling areas.
  - Clean-down facilities.
  - Fencing.
- Bulk earthworks (excavation or filling), drainage works and stormwater management systems.
- Proposed setback (i.e. from solar farm structures) - minimum 30m from the development site boundary.

2.2 Amended Plans

The layout design was revised after consideration of visual impact concerns raised by nearby representors, especially a neighbouring resident who owns a property adjoining the south-eastern boundary of the site. Solar arrays in the south-eastern corner of the site have been relocated to the site of the battery facility to increase the setbacks from solar arrays and the residence. This resulted in a redesign of the battery facility and substation. In addition, a vegetated strip would be established south-west of the residence to screen views of the arrays. Landscaped screening would also be established along the western and south-western boundaries, which would screen the security fencing and arrays. **Figure 1** shows the amended design and **Figure 2** shows the original design.

It is noted that adjustments to the project design are expected, subject to the outcomes of ongoing design and engineering, stakeholder engagement and technical studies.

The applicant is seeking two (2) years to substantially commence construction (bulk onsite earthworks) and four (4) years to complete construction.

The project would directly employ up to 225 full time equivalent jobs at the height of the construction phase. An estimated additional peak of 391 FTE roles is anticipated to be indirectly generated by the project during construction. Across the civil, construction and commissioning phase, a peak of 80 staff are anticipated to be on site at any one time. Personnel would travel to the site by private vehicles and potential minibus services, generating up to 80 vehicle arrivals/departures associated with the site in the peak hour. The applicant is exploring accommodation solutions for the construction workforce in consultation with the local and neighbouring councils and every effort would be made to hire staff locally.

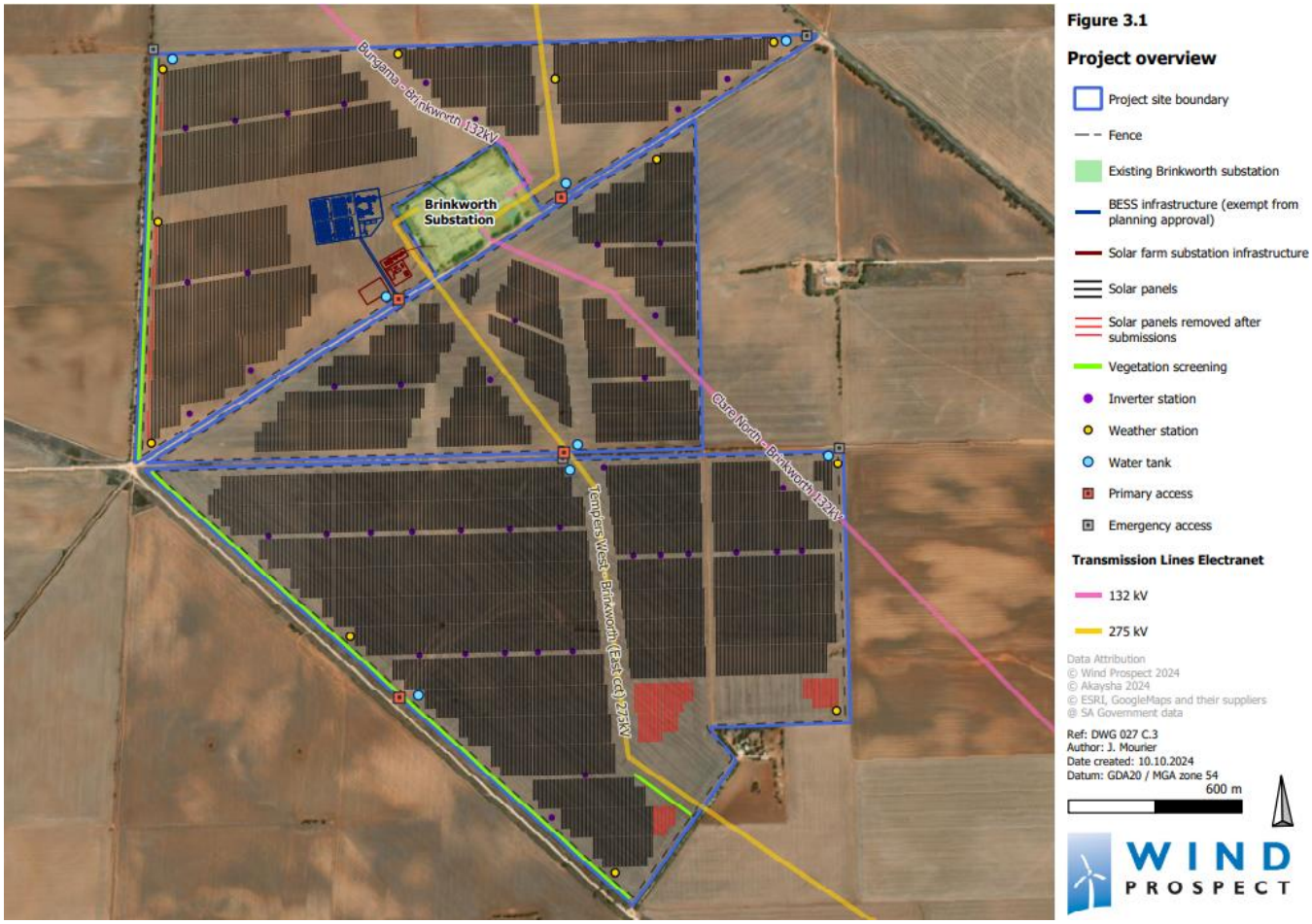


Figure 1: Amended Site Layout (as provided in the applicants Response to Represenations)

Figure 2: Original Site Layout (as provided in the development application)

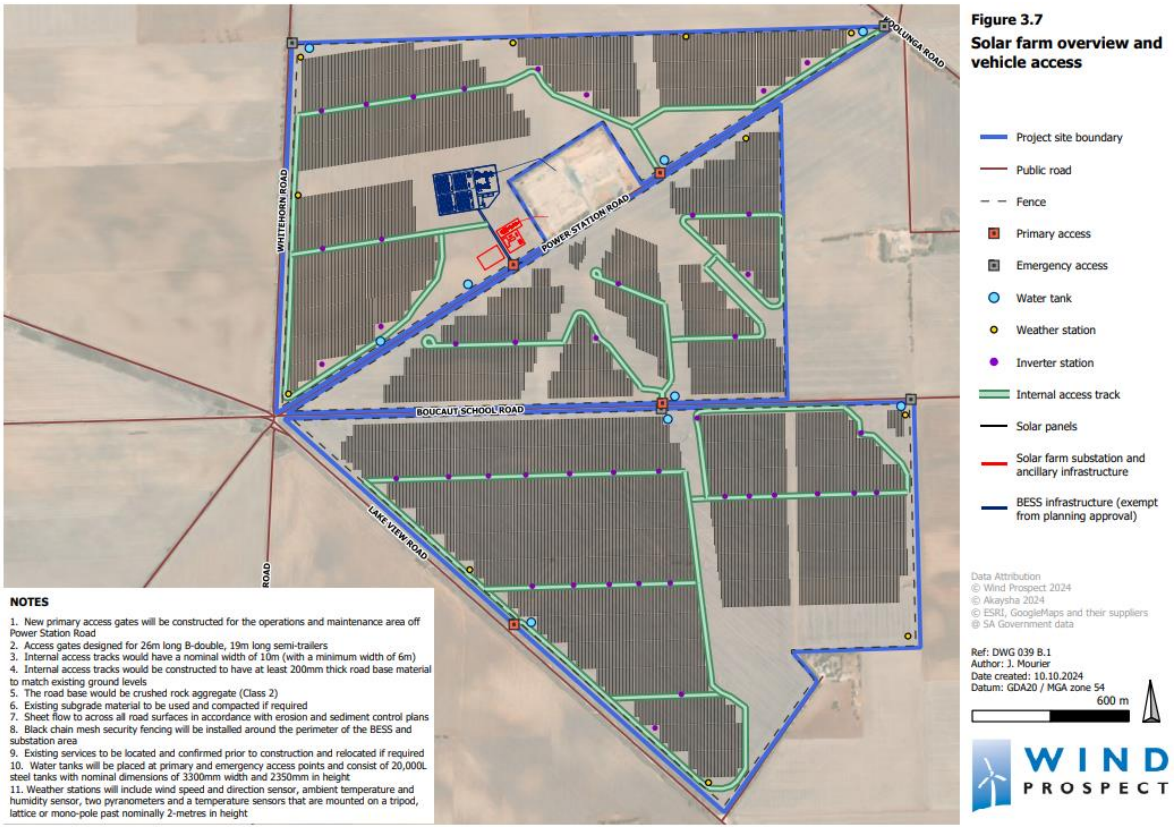


Figure 3: Amended Site Layout showing access arrangements

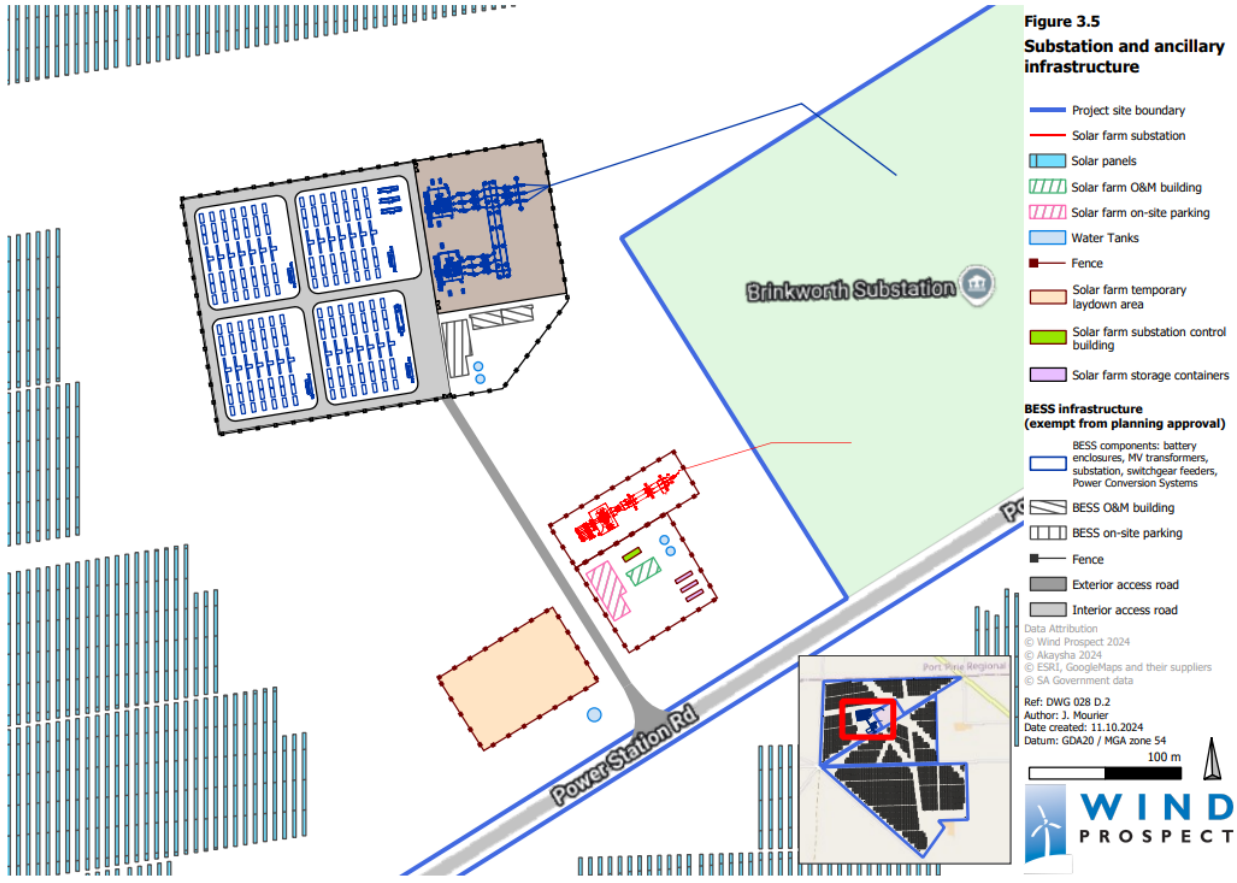


Figure 4: Amended Layout of Battery facility and Substation

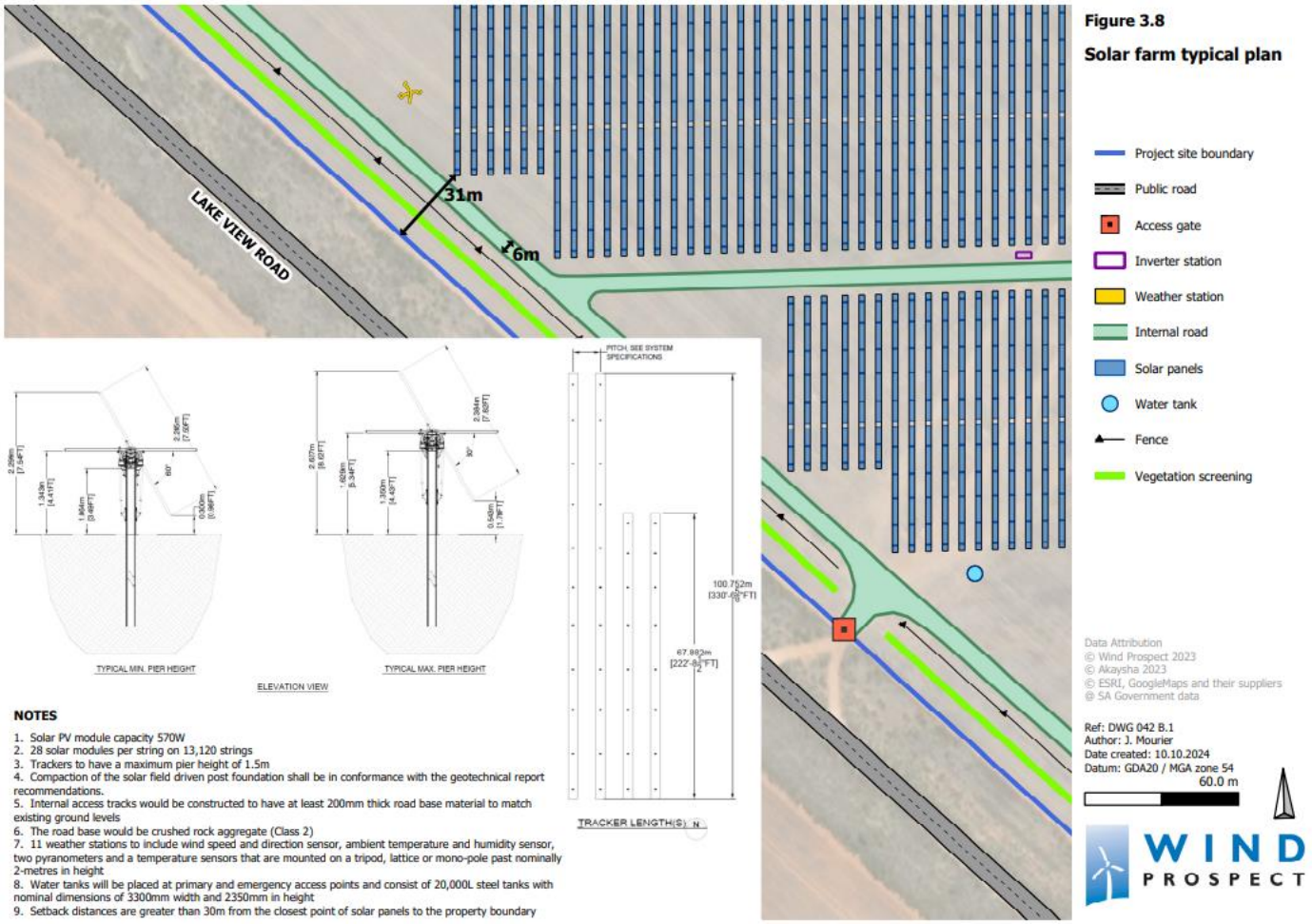


Figure 5:Typical plan showing setbacks and details

3. SITE AND LOCALITY

Location Reference	Plan Parcel	Title	Council
LOT 256W POWER STATION RD BRINKWORTH	H230400 SE256W	CT 5559/453	Wakefield Regional Council
873 KOOLUNGA RD KOOLUNGA	F199935 A873	CT 5864/896	Wakefield Regional Council
653 KOOLUNGA RD BRINKWORTH	H230400 SE653	CT 5588/666	Wakefield Regional Council
LOT 102 LAKE VIEW RD BRINKWORTH	D27337 A102	CT 6169/612	Wakefield Regional Council

The subject site is located approximately 7 km north of the town of Brinkworth, 4 km southeast of Koolunga, and 145 km north of Adelaide (refer to **Figure 6**). The site includes four (4) land parcels and covers approximately 474ha of freehold land (refer to **Figure 7**).

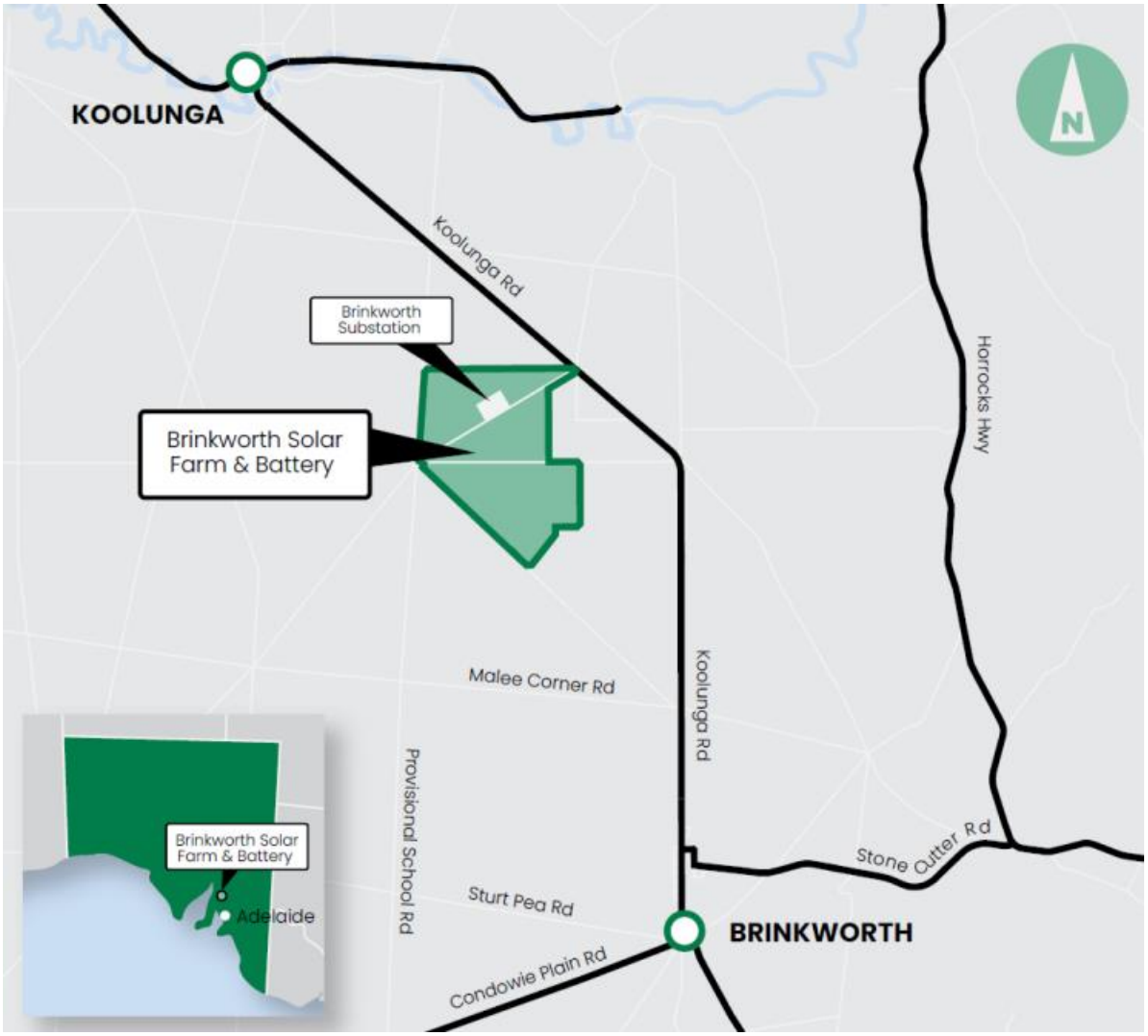


Figure 6: Location map

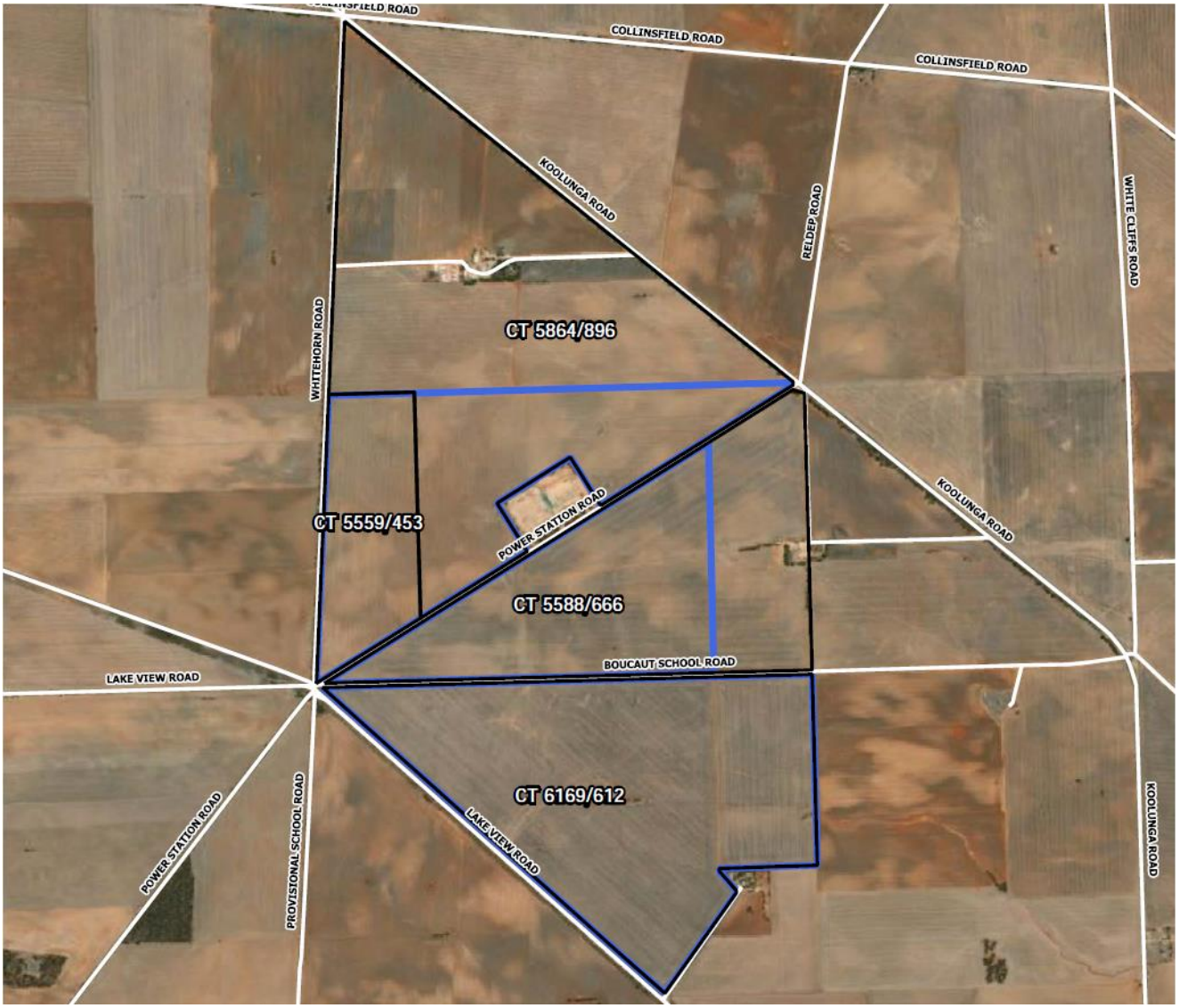


Figure 7: Subject site land parcels

3.1 Site Description

The subject site is predominantly flat, with no recorded watercourses, and has been historically cleared and used for agriculture (cropping and grazing). **Figures 8** and **9** shows typical vistas of the site. The land surrounds the existing Brinkworth Substation enabling a direct connection to the existing National Electricity Grid. The main access to the site is via the sealed arterial Koolunga Road and the unsealed Power Station Road. All other local roads are unsealed, some with sparse roadside vegetation. A number of transmission line easements traverse the site for an ElectraNet 275 kV transmission line and 132 kV transmission line to connect to the Brinkworth Substation.

The nearest non-host sensitive receiver (i.e. dwelling) is located on the south-western boundary of the site, with the next closest sensitive receivers located approximately 560m from the southern boundary and 1.9km and 2km from the western boundary. There are 30 dwellings within 5km of the site (refer to **Figure 10**).

Figure 8: View of the subject site from the corner of Koolunga Road and Power Station Road

Figure 9: View of the Brinkworth Substation (with the Snowtown Wind Farm in the background)

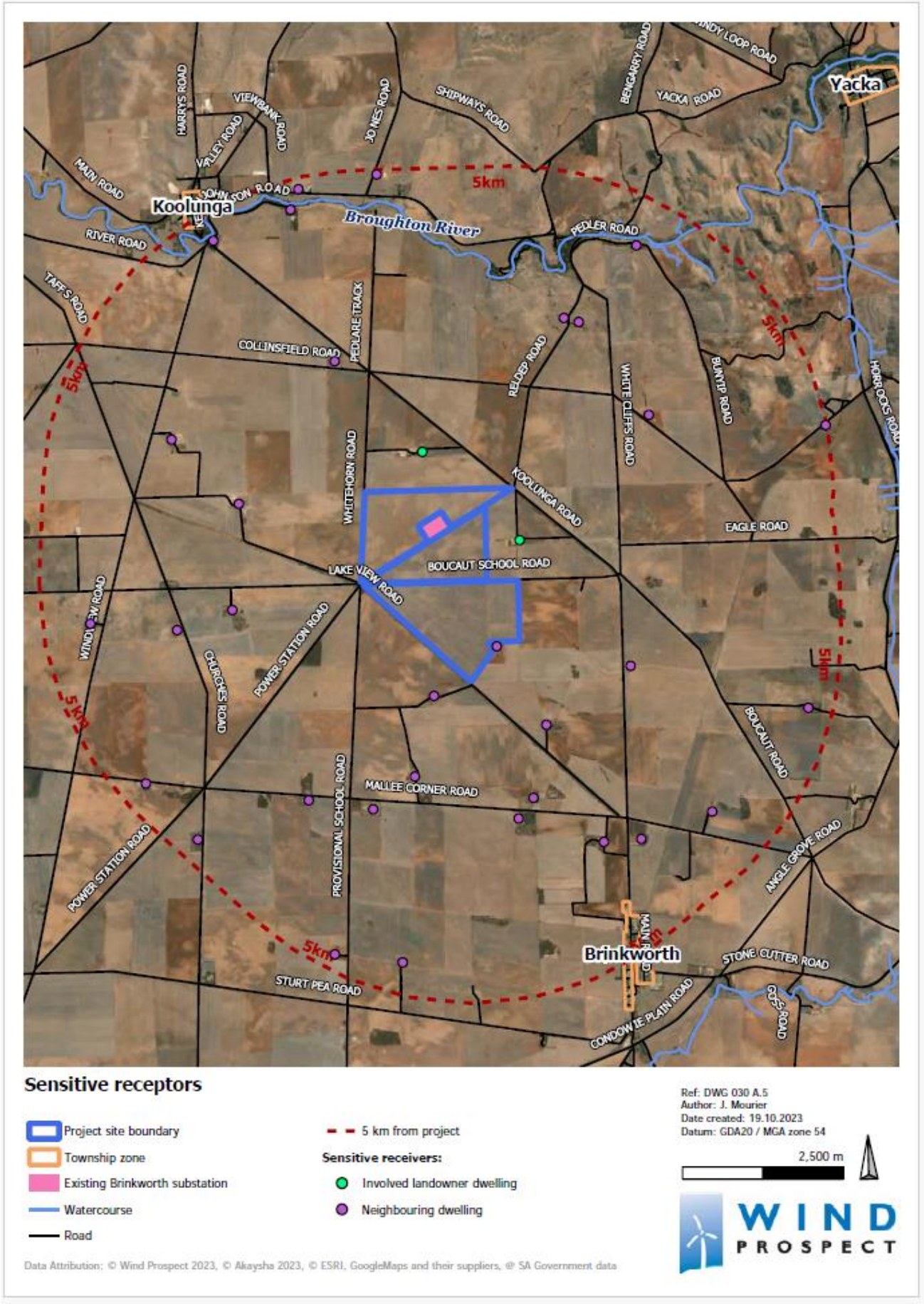


Figure 10: Location of sensitive receivers within 5km of the site

3.2 Locality

The subject site is within the Wakefield Regional Council area in the Mid North Region of South Australia. The main industry of employment in the region is agriculture, primarily cereal crops, as well as sheep grazing. The region provides a significant energy resource (wind and solar) with numerous wind farms in operation, primarily between Snowtown and Redhill to the east. The locality is predominantly cleared for agricultural purposes, with native vegetation mainly located along property boundaries and roadsides. A low density of dwellings and structures are located throughout farm holdings.

4. CATEGORY OF DEVELOPMENT

PER ELEMENT:

Essential Infrastructure - Performance Assessed – Crown

OVERALL APPLICATION CATEGORY:

Crown Development

REASON:

Pursuant to section 131 of the Act, Crown sponsorship by the Department for Energy and Mining (sponsorship letter provided at **Attachment 1A**).

5. DECLARATIONS

Regulated / Significant tree impacts:	YES ☐ NO ☐ N/A ☒	Outside of regulated / significant tree overlay.
Easements or Encumbrances:	YES ☒ NO ☐ N/A ☐	Several transmission line easements cross the site.
State or local heritage:	YES ☐ NO ☐ N/A ☒	NA.
Electricity Declaration Form:	YES ☒ NO ☐ N/A ☐	Certificate from Office of the Technical Regulator provided on lodgment.
Native Vegetation Declaration Form:	YES ☐ NO ☒ N/A ☐	Level 3 clearance category. Application lodged with Native Vegetation Council.

6. STATUTORY REFERRAL BODY COMMENTS

6.1 Wakefield Regional Council

The application was referred to the Council for comment in accordance with Regulation 107(4) of the *Planning, Development and Infrastructure (General) Regulations 2017* (the Regulations).

A copy of the referral response is contained in **Attachment 3A**.

Council supports the application subject to the following advisory note being applied:

- Details of the road construction and re-sheeting of Power Station Road and details of the source of the incoming road base used to construct the proposed internal road network, to be provided to Council prior to commencement of construction

6.2 Port Pirie Regional Council

The application was referred to the Council for comment in accordance with Regulation 107(4) of the *Planning, Development and Infrastructure (General) Regulations 2017* (the Regulations).
Council did not respond.

It is noted that only a small part of the northern land parcel (CT 5864/896) is within the Port Pirie Regional Council but the project footprint does not extend into this area

6.3 Native Vegetation Council (NVC)

This application was referred to NVC in accordance with s.131(10) of the Act and r.107(5) and Schedule 9 Clause 3 Part A(11) of the PDI (General) Regulations.

The NVC advised that:

- The native vegetation impacts relating the proposed development are assessed as a level 2 risk in the data report provided. In context the clearance is relatively minor and appears to be unavoidable to provide access to the site.
- The proponent lodged an application directly to the Native Vegetation Council on 31/5/24. The application is yet to be processed.

A copy of the referral response is contained in **Attachment 3B**

7. PUBLIC NOTIFICATION

7.1 Reason

Pursuant to s.131(13) of the Act, a Crown development application where the total construction cost exceeds $10 million must undertake public notification. The development cost is $420 million.

The application was notified for 20 business days between 24 July 2024 and 21 August 2024 with a public advertisement in the *Adelaide Advertiser* and *Plains Producer*, and physical signs erected on the subject land along all road frontages. The applicant provided photographic evidence of placement of the signs of the land at the commencement of the public notification period.

Application details were displayed on PlanSA's online planning portal.

7.2 Representations and Applicant Response

Eight (8) representations were submitted during the public notification period, comprising six (6) from surrounding landowners and one (1) from an interstate resident. One representation did not provide a surname, address or phone number.

1. Steve Welke - opposed to the development and wishes to be heard.
2. Tamara Welke - opposed to the development.
3. Sharon Welke - opposed to the development.
4. Damian Welke - opposed to the development.
5. Andrew Whitehorn - opposed to the development and wants to be heard.
6. Fred Whitehorn - opposed to the development.
7. Lynette LaBlack (Lake Albert, NSW): opposed to the development, wishes to be heard.
8. Ali [no surname provided] - opposed to the development.

The applicant has identified that the four submissions by the Welke family members all relate to the property at 1461 Lake View Road, Brinkworth (Allotment 101, CT 6169/611) and a non-associated dwelling immediately adjacent to the south-east boundary of the site. The property of Andrew Whitehorn at 1694 Churches Road, Brinkworth is to the west of the site and Whitehorn Road (approximately 1.90km from the site boundary). Representations 7 (Lynette LeBlack) and 8 (Ali) express concerns regarding the general application of renewable energy and government policy, being opposed to renewable projects, and do not appear to be directly related to an interest in the subject land/development.

A copy of the representations and applicant's response is provided in **Attachment 4A** and **Attachment 4B**. The applicant identified a number of similar concerns raised in the representations and provided the following responses:

1. Alternate siting/location

Several representations indicated that the proposed development should be located on an alternate site, including suggestions of land to the north which was not currently cropped. Whilst it is acknowledged that there would be several alternate locations for a solar farm development, there are strong locational advantages in developing the solar farm in proximity to the Brinkworth substation.

2. Loss of primary production land

It is understood that the suggestion of alternate locations is partly a result of concerns regarding the loss of productive agricultural land. The proposed development utilises approximately 474 hectares of land. Whilst the development would preclude this land from being utilised for primary production purposes, it is appropriately sited adjacent to the existing Brinkworth substation to efficiently generate and store electricity in a manner consistent with the Desired Outcome of the Rural Zone. Within the locality of the subject land, there are no other developed and operational renewable energy facilities. Establishment of a solar farm would not add to a cumulative displacement of primary production land. Utilisation of agricultural land for renewable energy facilities may result in loss of primary production, but this should be balanced against the economic and strategic benefits of renewable energy projects.

3. Heat island impact

Several representations expressed concern that the proposed solar farm would result in alterations to local climatic conditions, particularly an increase in temperature on the site and adjacent boundaries. This impact is often referred to as the "heat island effect". The applicant cited the 2018 assessment of the Greater Shepparton Solar Energy Facility application by the Victorian Planning Panel that, based on expert evidence, found that there would be no temperature increase beyond 30m of a solar array. The findings informed the current setback policies for renewable energy facilities in the Planning and Design Code.

4. Visual impact/amenity

Whilst the establishment of a solar farm in a rural environment will result in some visual change, the visual assessment of the project predicted it to have an inconsequential to very low overall impact. The development has been designed to accord with the policies of the Rural Zone and General Development Policies - Infrastructure and Renewable Energy Facilities of the Planning and Design Code, to minimise the visual impacts in accordance with the following policies:

- Setback a minimum of 30 metres from the boundary of adjoining land.
- Setback approximately 5.0 kilometres from the Township Zones of Brinkworth and Koolunga, which is in excess of the guiding 2.0 kilometres.
- Is not within 2.0 kilometres of any rural living, settlement or neighbourhood zones.
- Is not within 500 metres of any conservation area.

The applicant has amended the plans to further increase the setbacks and additional landscape screening to further mitigate the visual impact of the development to the nearest sensitive receivers. In particular, the relocation of some of the solar arrays in the south-eastern corner of the site results in the following in relation to the Welke property (as shown in Figure 11):

- A setback of 375metres to the nearest solar arrays (from the dwelling) to the south west, an increase of 55 metres.
- Removal of the nearest bank of solar arrays to the west, providing a setback in excess of 400 metres (from the dwelling) to the nearest solar arrays to the west, which is a substantial increase from the 245 metres originally proposed.
- Retention of a setback of 250 metres from the dwelling and 170 metres from the northern boundary to the nearest solar arrays to the north.
- Removal of the nearest bank of solar arrays to the north east. The setback is now 370 metres to the north east corner of northern bank of solar arrays.
- Incorporation of a vegetated screen adjacent to the solar arrays to the south west between the Welke dwelling and the arrays (parallel to the existing 275kV overhead electricity line).

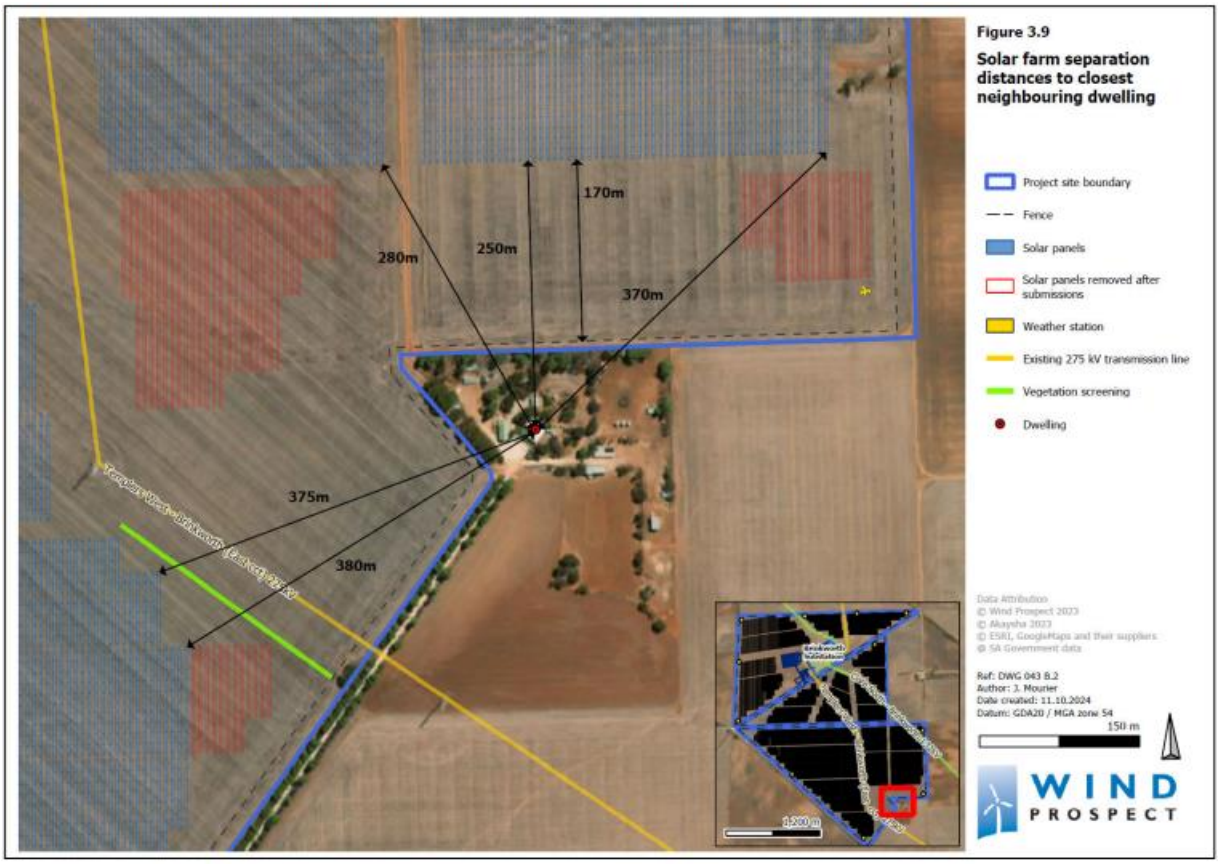


Figure 11: Solar arrays (in red) relocated to increase setback from residence

5. Industrial land use

The proposed development has been described in some representations as an "industrial" development. The question has been raised on other renewable energy projects in South Australia, specifically in relation to wind farm development and the Environment, Resources and Development Court has found that a wind farm is not an industrial activity. The definition of industry in the Planning and Design Code specifically excludes generation of electricity using a renewable energy source. Whilst some representors may perceive a solar farm to be akin to an industrial activity, it is not an "industry" in terms of land use definition.

6. Impacts of construction including traffic

One adjoining land owner expressed concern that the development would have an adverse impact on local roads during the construction period and post commissioning. The detailed Traffic Impact

Assessment (TIA) included in the application estimated that vehicular movements during peak construction periods will be in the order of 400 vehicles per day. This would not result in any detrimental impacts to the safety, function or condition of the surrounding road network where unsealed roads can carry up to 500 vehicles per day. The applicant anticipates that a Traffic Management Plan would be required if a development authorisation was granted. The Traffic Management Plan would be prepared in consultation with the Council and Commissioner of Highways and address matters such as finalisation of route to/from the site, a risk assessment for involved roads, identification of upgrades required to roads and a management schedule for the construction stage of the development to minimise impact on road users

7. Decommissioning and disposal of materials

We understand that solar panels are primarily made of glass, aluminium, copper and other common materials. Solar projects use steel racks to position panels, electric cabling and a small number of inverters to deliver power to the grid. All of this equipment is safe and contains the same materials found in household appliances. At the end of the life of the project, materials would be removed and recycled. The applicant anticipates that a Draft and Final Decommissioning and Rehabilitation Plan(s) would be required if a development authorisation was granted.

[Note: If a development authorisation is granted for the construction of the solar farm, the operational and decommissioning phases of the facility would be managed under the regulatory regime of the *Hydrogen and Renewable Energy Act 2023* administered by the Department for Energy and Mining].

8. Lack of environmental assessment

The applicant states there have been a range of environmental assessments undertaken to inform the proposed development. During the processing of the application, there have been no requests to provide additional information by the planning authority or any referral agency. It is therefore considered that the application is appropriately informed in terms of technical assessments, including those considered necessary for assessment of the development by the planning authority.

9. Lack of consultation

The applicant states that Akaysha Energy (i.e. through Wind Prospect) has actively sought input from a wide range of stakeholders including landowners, neighbours, Wakefield Regional Council, State and Federal Government agencies, Traditional Owner groups, and other interested parties in preparing the development application. Stakeholders were engaged through various communication methods, such as project newsletters sent to the entire district post code (in April and September 2023 and in April 2024), drop-in information sessions (May and October 2023 and August 2024), a project website, in-person meetings, phone calls, and email correspondence, as well as maintaining a stakeholder engagement database.

10. Property devaluation

Concerns were expressed in the submissions by the Welke family that the proposed development would have a negative impact on the value of their property. Impacts of development on property values is frequently raised in relation to renewable energy developments. We note that it is a well-established planning principle that depreciation of land values as a result of a proposed development is not a relevant planning consideration.

11. Government policy applying to renewable energy facilities

Several comments included in some of the representations related to issues of Government policy relating to renewable energy, climate change and the energy market. The applicant considers these to be wider policy matters that are outside of the scope of the consideration of the development application.

8. POLICY OVERVIEW

8.1 Mid North Regional Plan (2011)

The subject site is within the Yorke Peninsula and Mid North regional planning area. As required by s64(1) of the PDI Act, the State Planning Commission has initiated the process to prepare a new regional plan.

The current policy framework relevant for the subject site is the Mid North Regional Plan (2011). The plan encourages the development of alternative and innovative energy generation in appropriate locations, to build the regional economy and increase resilience to the impacts of climate change. At the time the plan was prepared, the first wind farms were being built in the region at Snowtown and Hallet.

Specific policies relating to renewable energy development are:

- 4: Provide for the development of alternative and innovative energy generation (for example, wind, solar, marine, biomass and geothermal technologies) and water supply facilities, as well as guidance on environmental assessment requirements.
- 5.7: Identify land suitable to accommodate renewable energy development, such as wind farms.
- 6.12: Support the development of wind farms in appropriate locations, including the collocation of wind farms and existing agricultural land.

In terms of land biodiversity, the plan seeks the retention and management of native vegetation on private land, to reverse the negative effects of grazing and other human activities.

8.2 State Planning Policies (SPP)

State Planning Policies relevant to the assessment of the application are:

SPP 4 *Biodiversity* seeks to maintain and enhance South Australia's biodiversity and life supporting functions.

- Policy 4.5 where impacts to biodiversity cannot be avoided, these impacts should be minimised and where possible, offset.

SPP 5 *Climate Change* provides for development that is climate ready so that our economy, communities and environment will be resilient to climate change impacts.

- Policy 5.6 Facilitate green technologies and industries that reduce reliance on carbon-based energy supplies and directly or indirectly reduce our greenhouse gas emissions.

SPP 8 *Primary Industry* seeks a diverse and dynamic primary industry sector making the best use of natural and human assets.

- Policy 8.4 Equitably manage the interface between primary production and other land use types, especially at the edge of urban areas.

SPP 9 *Employment Lands* seeks the provision of a sufficient supply of land for employment uses to support job growth and the economic prosperity.

- Policy 9.1 supports the expansion and clustering of key economic growth area, including defence. Policy 9.6 seeks for employment lands to be located in strategic locations that improve economic productivity, connect to efficient supply chains, and provide transport access and connectivity.

SPP 10 *Mineral and Energy Resources* seeks to protect key resources that contribute to our state's economy and provide valued employment opportunities.

- 10.2 Plan for and encourage the development of energy resources, energy resources operations and associated infrastructure to ensure their ongoing safe and efficient operation.
- 10.3 Identify and maintain key infrastructure that supports mineral and energy resource activities and supply chains, including strategic transport corridors and pipelines used for energy transportation.
- identifed10.5 Promote decision making that maximises the long term benefits of different land uses to the economy, communities and the environment.

SPP 11: *Strategic Transport Infrastructure* seeks to integrate land use policies with existing and future transport infrastructure, services and functions to preserve and enhance safe, efficient and reliable connectivity for people and business.

- Policy 11.4 Minimise negative transport-related impacts on communities and the environment.

SPP 12: *Energy* supports the ongoing provision of sustainable, reliable and affordable energy options that meet the needs of the community, business and industry

- **12.1 Development of energy assets and infrastructure (including ancillary facilities) where the impact on surrounding land uses, regional communities and the natural and built environment can be minimised.**
- **12.2 Facilitate renewable sources of energy supply, such as solar and wind, at the local level.**
- **12.6 Facilitate energy technologies that support a stable energy market and continued energy supply and do not adversely affect the amenity of regional communities.**

8.3 Zoning

The subject site is located within the Rural Zone of the Planning and Design Code (the Code) at the time of start of assessment being version 2024. 11 (20/06/2024). Relevant Code policies are contained in Appendix 1A and 1B and are summarised below.

The subject is located within the Rural Zone, which supports the economic prosperity of the state through primary industries, value-adding industries, and the generation of energy from renewable sources. A renewable energy facility is specifically envisaged in the zone. Renewable energy facilities (and ancillary development) should be sited to minimise significant fragmentation or displacement of existing primary production.

8.4 Overlays

The following Overlays and local variations apply to the subject site:

Overlays:

- Dwelling Excision [not relevant to this assessment]
- Hazards (Bushfire - General)
- Hazards (Flooding - Evidence Required)
- Limited Land Division [not relevant to this assessment]
- Native Vegetation
- Water Resources

Local Variation (TNV):

- Minimum Site Area (Minimum site area is 100 ha) [not relevant to this assessment]

8.4.1 Hazards (Bushfire – General) Overlay

Development should be sited and designed to mitigate the threat and impact of bushfires on life and property. Access for emergency services should be provided to aid the protection of lives and assets.

8.4.2 Hazards (Flooding – Evidence Required) Overlay

Development should adopt a precautionary approach to mitigate potential impacts on people, property, infrastructure and the environment from potential flood risk through the appropriate siting and design of development.

8.4.3 Native Vegetation Overlay

Areas of native vegetation are protected, retained and restored in order to sustain biodiversity, threatened species and vegetation communities, fauna habitat, ecosystem services, carbon storage and amenity values

8.4.4 Water Resources Overlay

Protection of the quality of surface waters considering adverse water quality impacts associated with projected reductions in rainfall and warmer air temperatures as a result of climate change.

8.5 General Development Policies

The following General Development Policies (GDPs) are particularly relevant for this development.

8.5.1 Infrastructure and Renewable Energy Facilities

These policies aim to ensure the development of infrastructure networks and renewable energy facilities in a manner that minimise hazards, and minimises environmental, cultural, visual and amenity impacts (DO1), including by:

- Siting of renewable energy facilities as close as possible to existing transmission infrastructure to minimise impacts associated with new / extended transmission infrastructure (PO7.1)
- Siting of development to minimise visual /amenity impact using various techniques including adequate separation from conservation areas and sensitive receivers; use of natural landscape features; clustering of non-residential structures; and incorporation of landscaping / vegetation buffers where appropriate (PO2.1, 2.2, 9.3, 9.4).
- Facilities should be sited on areas already cleared of native vegetation, or where there is minimal disturbance to biodiversity (PO5.1). Areas of high environmental, cultural and scenic value should be avoided (PO9.1).
- Location of design of facilities to minimise hazards associated with bushfire, air transport, and public safety (PO4.1, 4.2, 4.3, 9.4).
- Disturbed surfaces should be reinstated and revegetated following construction (PO2.3).
- Temporary construction activities should be sired and operated to minimise environmental impact, including waste management (PO13.1, 13.2).

8.5.2 Interface between Land Uses

Development should be located and designed to mitigate adverse effects on or from neighbouring and proximate land uses (DO1), including by:

- Development adjacent sensitive receivers should be designed to minimise adverse impacts (PO1.2)
- Ensuring external lighting is positioned and designed to not cause unreasonable light spill impact on adjacent sensitive receivers (or lawfully approved sensitive receivers) (PO6.1).
- Development is designed using materials and finishes that minimise solar glare (PO7.1).

8.5.3 Transport, Access and Parking

Development should support a safe, sustainable, efficient, convenient, accessible and connected transport system (DO1) by:

- Ensuring integrated with the existing transport system and designed to minimise its potential impact on the functional performance of the transport system (PO1.1).
- Sightlines at intersections, pedestrian and cycle crossings are maintained or enhanced to ensure safety for all road users and pedestrians (PO2.1).
- Ensuring access points are designed to accommodate the projected type and volume of traffic generated by the development or land use (PO3.3) and minimise impacts on neighbouring properties (PO3.4).

8.5.4 Design

These policies aim to ensure development is contextual, durable, inclusive and sustainable by:

- Incorporating landscaping and tree planting to minimise heat effects, maximise shade and shelter, maximise stormwater infiltration and enhance amenity and biodiversity (PO3.1)
- Using locally indigenous species best suited to the climate conditions in soft landscaping and tree planting and avoids pest plant and weed species (PO3.2)
- Siting development to maintain natural hydrological systems (PO5.1).

9. PLANNING ASSESSMENT

In accordance with the Crown assessment pathway, the application has been assessed against the relevant provisions of the Code, which are contained in Appendix 1, and other planning instruments where relevant.

9.1 Land Use

The proposed development is for a 'renewable energy facility', which is defined in the Code as:

> *Means land and/or water used to generate electricity from a renewable source such as wind, solar, tidal, hydropower, biomass and/or geothermal. This use may also include:*
> 1. *any associated facility for the storage and/or transmission of the generated electricity;*
> 2. *any building or structure used in connection with the generation of electricity.*

The development site is within the Rural Zone, which anticipates a range of primary production activities and the generation of energy from renewable sources (DO1). A renewable energy facility is specifically envisaged in the zone (PO1.1), where they can take advantage of natural energy sources.

The Zone seeks to protect and maintain the productive value of rural land (PO1.1), with renewable energy facilities and ancillary development sited to minimise significant fragmentation or displacement of existing primary production (PO9.1).

The proposed development is located on private landholdings, with a history of agricultural production (cropping and grazing). The change of land use from primary production to renewable energy facility is not considered a 'significant' displacement of the existing land use, given the site is of moderate size (474ha) compared to other solar farms and strategically located next to an existing substation and transmission line network. There are no other solar farms in the locality, so there would be no cumulative fragmentation of existing primary production land.

With the development of the project the cropped land will shift from agricultural land to being used for renewable energy generation. Despite the reduction in cropping, the project offers a guaranteed rental income to landowners, ensuring a stable and diversified source of income during periods of drought and ongoing climate variability. There are examples of solar farms co-existing with forms of primary production under controlled conditions. For example, the operational Tailem Bend Solar Farm is currently being used for sheep grazing by the landowner. The benefits can be mutual, with the sheep reducing fuel loads around the panels (reducing the need for slashing etc), whilst the panels offer shade and protection to livestock.

During the construction phase, a wide range of on-site and off-site activities will generate jobs, such as structural concrete foundations, earthworks, roads, fencing, landscaping, vehicle, and equipment hire, trade services, security, office cleaning, waste disposal, building maintenance, foundation laying, electrical transformer installation, crane works, cabling, temporary site facilities (power, water, telecommunications), and transportation of components and workers. In addition to these construction-related jobs, various local and regional professional services may be involved, including civil engineering, mechanical engineering, environmental engineering, specialist consultants, employment agencies, electrical engineering, and legal and financial services.

Throughout the construction phase, the development would provide 225 FTE jobs over a 26-week period. Local employment opportunities include jobs in civil works, construction, and commissioning , in addition to the associated infrastructure and grid connection. There would also be a multiplier effect on job creation, indirectly supporting a significant number of additional jobs through existing supply chains and consumption impacts. During the twenty-year operational phase, the project would provide ongoing support for 10 FTE jobs at the local level, including civil maintenance, electricians, land management and security.

Following project decommissioning, there is scope for the infrastructure to be removed and the land returned to its existing land use.

9.2 Design and Appearance

The built form elements of the project are typical of a utility scale solar farm / renewable energy facility. Example images of a solar and ancillary infrastructure are provided in **Figure 12**.

The solar modules will be arranged in a lineal pattern with consistent spacing, height and physical form. The control room, switchroom, and workshop buildings will be clustered together, and are expected to be constructed with colorbond cladding or similar. Switch rooms are typically elevated above ground level to accommodate electrical connections. The onsite substation / switchyard will comprise electrical componentry, likely to be the tallest elements of the project, and would be fenced for safety and security purposes.

Figure 12a: Example solar modules (Tailem Bend Solar, Vena Energy)

Figure 12b: Example inverter

Figure 12c: Example switchroom

Figure 12d: Example control room

Figure 12e: Example substation

Figure 12e: Example operations compound

Renewable energy facilities are envisaged in the mid north region of South Australian and are part of the desired character for the Rural Zone.

The Rural Zone and the GDPs for Infrastructure and Renewable Energy Facilities provide guidance around site selection and project design, to minimise visual impacts on the landscape and sensitive receivers.

9.3 Visual Impact

The Code seeks to reduce impacts on natural and rural vistas, scenic routes and public routes, and from townships (PO10.1 – Rural Zone; PO2.1 – Infrastructure & Renewable Infrastructure Facilities). The site is not within an area of high cultural or scenic value, nor is it visible from any key scenic or tourist routes.

The project is generally consistent with the relevant policies by being in a sparsely populated, rural area with few nearby sensitive receivers, and a generous distance from the nearest townships of Koolunga and Brinkworth.

The subject site is located next to existing transmission infrastructure (i.e. the Brinkworth Substations) in accordance with PO 7.1 (Infrastructure & Renewable Infrastructure Facilities) to minimise the visual impact of extending overhead transmission lines. Thus, there is no need for a new overhead transmission line connection.

The subject site is relatively flat land, and the development is not on a ridgeline. Substantial cut and fill is therefore not required.

The indicative project layout complies with the minimum setback requirements for solar power facilities provided in the Infrastructure and Renewable Energy Facilities GDPs (PO9.3):

	Code requirement	**Project proposal**	**Compliant**
Setback from adjoining land boundary	30m	30m	Yes
Setback from conservation areas	500m	N/A	N/A
Setback from township, rural settlements, rural neighborhood and rural living zones	2km	7km to Brinkworth and 4km to Koolunga	Yes

The application included a Landscape Character and Visual Impact Assessment, prepared using industry standard guidelines, using aerial photography to establish a Zone of Theoretical Visual Influence (ZTVI). Key findings of the assessment are:

- Visibility shadow enveloping 60% of the ZTVI, with several dwellings within the ZTVI not expected to be adversely impacted by the project.
- The project will not be visible from the nearest township of Brinkworth or Koolunga.
- The visual impacts on identified sensitive receptors will be negligible to moderate.
- The location of the project, comprising of solar PV panels and supporting infrastructure to existing substation infrastructure are considered complementary infrastructure.
- Avoidance of clearance of existing vegetation during construction, and opportunities for screening with native vegetation and matte non-reflective finishes on the constructed infrastructure will further lessen the impacts of the project.

In response to concerns raised by two nearby residents, the applicant has revised the layout of the solar farm to increase the setback distances to the closest residence (and a vegetated strip to screen views from the residence) and a landscaped screen along the western and south-eastern boundaries of the site to minimise the visual impact.

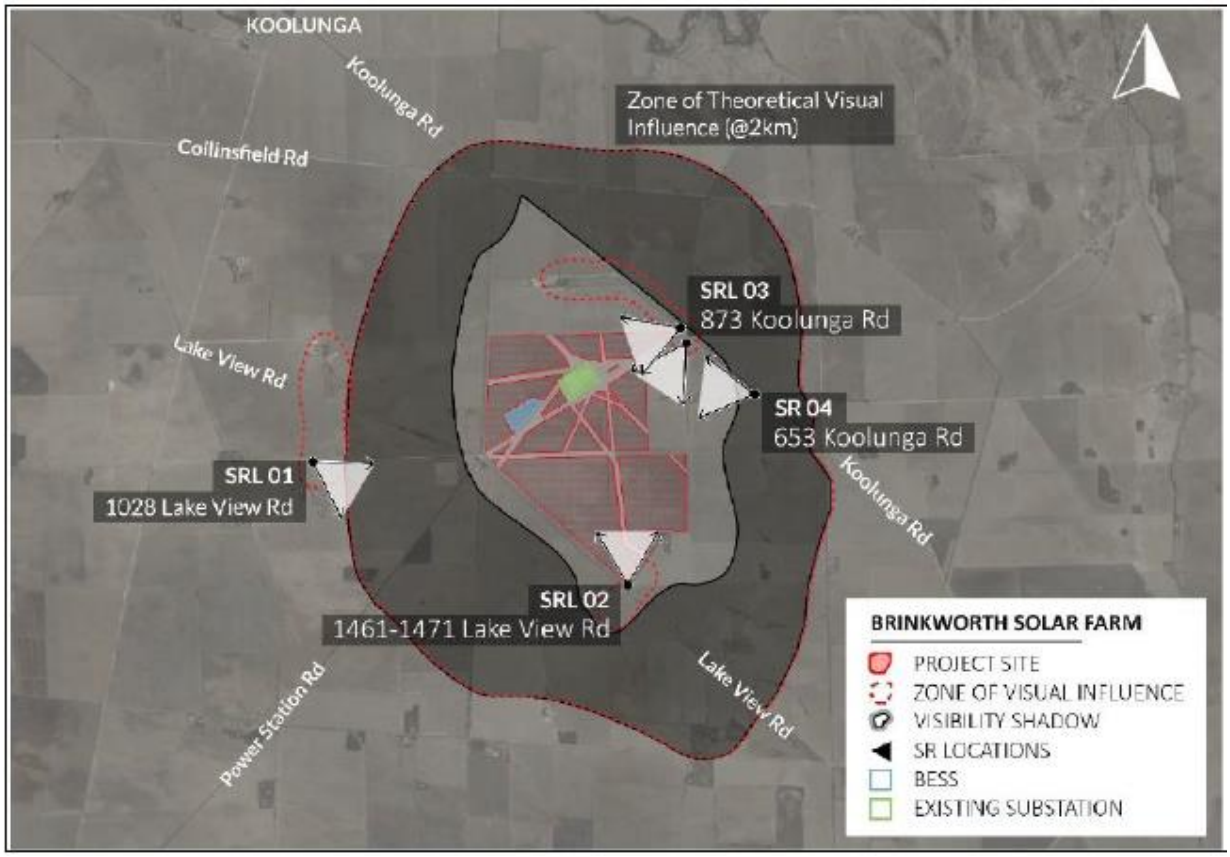


Figure 13: Sensitive receivers considered in the visual impact assessment

Image 11: Photomontage for Sensitive Receptor Locality 03 (SRL 03), looking west and south-west

Image 12: Photomontage for Sensitive Receptor Locality 03 (SRL 03), looking west

Figure 14: Photomontage of a typical view of the solar arrays

9.4 Glint and Glare

Buildings and structures should be designed using low-reflective materials and finishes that blend with the surrounding landscape (PO10.1b – Rural Zone; PO7.1 – Infrastructure & Renewable Energy Facilities).

Solar panels are designed to absorb as much light as possible and minimise reflection. The amount of reflection from the panel surface depends on the angle at which the solar ray hits the panel and the amount of refraction from the panel surface (impacted by surface texture). Glare from solar panels has the potential to impact on airfields / air traffic, motorists and sensitive receivers (i.e. dwellings).

An Aeronautical Impact Assessment and Glare and Glint Analysis was undertaken for the application indicated that indicated there are no certified or known uncertified aerodromes were present with 15km of the site. Thus, the potential glare to aviation traffic does not require assessment.

9.5 Transport Impacts and Network Integration

The Code provisions set out in the Transport, Access and Parking module and the Major Urban Transport Routes Overlay seek to ensure that development is integrated within the existing transport system and minimises network impacts.

A Traffic Impact Assessment was included in the application (Appendix H) that considered the four phases of the project - civil works phase, construction phase, commissioning phase and site operation. The majority the increased traffic volumes will occur during the construction phase, in the order of up to 400 vehicles per day, with large components such as transformers, switch rooms and control rooms potentially needing to be transported to site via Over Size/Over Mass (OSOM) routes and vehicles. Outside of the peak periods during the civil and construction phase, traffic movements are anticipated to reduce to in the order of 150 vehicles per day during the operation period of the site.

The assessment concluded that estimated vehicular movements during peak construction periods will be in the order of 400 vehicles per day, which would not result in any detrimental impacts to the safety or function of the surrounding road network where unsealed roads can carry up to 500 vehicles per day. The transport of Over Size/Over Mass loads (i.e. for the largest project components) from Outer Harbour to the site would use gazetted roads for such vehicles via Port Wakefield Road and Koolunga Road.

The code does not provide specific rates for car parking for a renewable energy facility. During the construction period, on-site parking for light vehicles (staff, visitors) and heavy vehicles will be required. During the operational period, on-site parking for operational staff, temporary contractors, and visitors will be located within the Operations and Maintenance compound, accessible from Power Station Road. The location, number, design and configuration of temporary and permanent on-site car parking would need to be determined during the detailed design phase. The project area is large with sufficient space to accommodate car parking and manoeuvring areas within site boundaries, during both construction and operation.

The final design should have regard to:

- Consideration of the occasional heavy vehicle which may access the site.
- Movement of vehicles between the project areas.
- Proximity to the nearest sensitive receiver.
- After hours lighting (if necessary).

Overall, it is anticipated that the development can satisfy the relevant GDPs with respect to on-site car parking and manoeuvring. A condition of approval is recommended to consider the final design (both temporary and permanent) with respect to car parking.

9.6 Water, Soils and Flooding

The development site is within the Water Resources and Hazards (Flooding - Evidence Required). Overlay that seeks a precautionary approach to mitigate potential impacts on people, property, infrastructure and the environment from potential flood risk. The Water Resources Overlay seeks to protect surface water quality.

Rainfall at the subject site is moderate and variable and the majority infiltrates the ground, with drainage of the site is west to south-west. There are no permanent watercourses traversing the subject site, with the nearest being the Broughton River, which is an ephemeral river being located 4km to the north.

For this reason, the proposed development is not at risk of flooding, nor will it impact on flooding or catchments in the local area.

The proposed construction, involving earthworks / surface disturbance and installation of permanent infrastructure may result in soil erosion, loss of topsoil, and physical degradation of soil. Disturbed soils can be easily eroded and be moved off-site by wind and water, with the potential for sediment pollution of waterways (low risk due to absence of permanent waterways) and general dust nuisance.

Mitigation measures associated with surface water, ground water and soils during construction should be detailed in a Construction Environmental Management Plan (CEMP) and include:

- Preparation of a Soil Erosion Drainage Management Plan (SEDMP) comprising controls to minimise soil erosion, and sediment controls to capture soil particles once disturbed.
- Storage of fuels and chemicals to prevent environmental contamination, including bunding as required.
- Appropriate storage of wastes to prevent environmental contamination.
- Major access tracks to be gravelled to reduce water and wind erosion.
- Watering of exposed surfaces including access tracks and car parking areas.
- Appropriate operation and maintenance of heavy vehicles.
- Provision of emergency spill kits.
- Provision of a wastewater treatment system for the construction workforce.

Post construction, disturbed areas should be rehabilitated to stabilise soils. Around the solar modules, the ground will remain pervious and provide for rainfall infiltration.

New impervious surfaces will include hardstand areas and various buildings at the operations and maintenance compound. Surface run-off from these areas should be appropriately diverted to pervious surface and existing drainage lines if possible. Run-off from the switchyard / substation would require separate stormwater management arrangements, including bunding.

Mitigation measures associated with surface water, ground water and soils during operation of the renewable energy facility should be detailed in an Operational Environmental Management Plan (OEMP) and include:

- Storage of fuels and chemicals to prevent environmental contamination, including bunding as required.
- Appropriate storage of wastes to prevent environmental contamination.

- Provision of a wastewater treatment system for the operational workforce. The Code seeks that on-site wastewater services be located wholly within the development site and complies with the *SA Public Health Act 2011*.

9.7 Interface between Land Uses

The Code seeks that renewable energy facilities are located and designed to minimise nuisance to adjacent development and land uses, and residential amenity.

9.7.1 Noise

The Code provisions seek that development that emits noise does not unreasonably impact the amenity of sensitive receivers.

The development site is located within an agricultural area with low levels of background noise, with noise emitted from vehicle movements and farm machinery. Existing electricity infrastructure in the locality, including the Brinkworth Substation and associated transmission lines, would emit low levels of noise including corona effect from time to time (the crackling sound made when electricity leaks into the air).

The development will generate noise emissions during the construction and operational stages. Noise emissions are expected to be greatest during the construction period with potential noise sources to include:

- traffic movements, particularly heavy vehicles
- site preparation works (may include earthmoving)
- use of machinery and equipment
- general activity noise and persons working at the site

Potential noise sources during operation of the solar farm include:

- traffic movements associated with staff, contractors and visitors to the site (expected to be minimal, generally light vehicles, with the occasional heavy vehicle as required)
- tracking motors of the solar panels
- power conversion units (co-located inverters and transformers) and any associated cooling equipment
- onsite substation / switchyard
- maintenance activities such as weed control and repairs

The application included a noise assessment that concluded the noise criteria of the *Environment Protection (Noise) Policy 2007* would be achieved at all nearby noise sensitive receptors. Thus, the construction and operation of a solar farm would emit noise emissions that are not expected to cause nuisance to sensitive receivers, beyond what would already be experienced in this rural locality.

9.7.2 Solar Reflectivity / Glare

The Code provisions seek that development is designed and comprised of materials and finishes that do not cause a distraction to road uses or cause unreasonable heat loading and/or micro-climate impacts on adjacent building and land uses (PO7.1 – Infrastructure & Renewable Energy Facilities).

The ‘heat island’ effect from photovoltaic modules has previously been the subject of studies with the rapid rise of large-scale solar installations in Australia and around the world, most of which are sited in more open agricultural areas and pasture lands. Studies have shown that heat island effect may occur within the perimeter of solar arrays, but remains a localised phenomenon, with the affect dissipating within close proximity of the solar field. Consequently, use of appropriate setbacks from property

boundaries should prevent any impacts on non-involved landholders (such as to more sensitive crops). A 30m setback was recommended to ensure that any potential impacts from this affect are fully contained within a solar development site, although a lesser distance could be considered based on existing vegetation, roadways or similar buffer feature to neighbouring land.

The design of the development provides a minimum 30m setback from all site boundaries to any solar infrastructure.

9.7.3 Light Spill

The Code provisions seek that external lighting is positioned and designed to not cause unreasonable light spill impact on adjacent sensitive receivers or cause a hazard to motorists (PO6.1, 6.2 – Interface between Land Uses).

The development proposes low-level security lighting around the perimeter of the site. Thus, lighting is not expected to affect nearby residents or cause a distraction for motorists.

A general condition of approval is recommended that the final design of lighting be in accordance with AS/NZS 4282-2023.

9.7.4 Construction Impacts

Potential impacts during construction include dust, noise, increased traffic movements (light and heavy vehicles) and general amenity impacts.

A condition of approval is recommended that a final CEMP be prepared in consultation with the local Council and DIT.

9.8 Hazards

Hazard management for renewable energy facilities focuses on fire risk, bushfire, public safety and air transport safety. Relevant Code policies are set out in the Hazards (Bushfire – Regional) Overlay, and Infrastructure and Renewable Energy Facilities modules.

9.8.1 Air Safety

The Infrastructure and Renewable Energy Facilities module seek that renewable energy facilities are located and operated to not adversely impact on air transport safety, including the operation of airfields and landing strips (PO 4.3).

There are no registered airfields, and no known unregistered landing strips within the locality. Potential impacts from glare to aviation traffic is not considered relevant to the development.

The tallest structure associated with the development will be componentry within the on-site substation, which is generally not considered a risk to aviation traffic.

9.8.2 Bushfire

The Hazards (Bushfire – Regional) Overlay seeks that development is sited and designed to mitigate the threat and impact of bushfires on life and property (DO1). Access for emergency services should be provided to aid the protection of lives and assets (DO2).

Solar farms and ancillary infrastructure generally pose a low risk of initiating fires. The solar modules, and all ancillary infrastructure must meet relevant standards and performance will be monitored throughout the operational phase. Inverters will include thermal overload protection.

The subject site is not located within a high bushfire risk area. In accordance with PO 1.1 of the overlay, the site office, laydown area, and the on-site substation / switchyard are not sited in areas that pose an unacceptable bushfire risk.

The application included a Fire Risk Management Plan detailed in the Fire Risk Analysis (Appendix L), which outlined the requirements for the provision and maintenance of fire management treatments as summarised below:

- access to the site to include full perimeter access including appropriate widths and load limits
- perimeter fire breaks that ensures a sterile area for a distance of at least 10 metres
- static water supplies at all access gates
- fire management plan
- emergency management plan
- emergency information books located within emergency information containers

During construction, emergency response planning including bushfire risk should be incorporated into a Construction Environmental Management Plan.

Operation of the facility will require ongoing maintenance to minimise bushfire risk. It is recommended that these management measures be incorporated into Bushfire Management Plan prepared in consultation with Country Fire Service (CFS).

9.9 Biodiversity

The Native Vegetation Overlay seeks that development avoids, or where it cannot be practically avoided, minimises the clearance of native vegetation (PO 1.1).

The Infrastructure and Renewable Energy PDCs seek that solar farms are not located on land requiring the clearance of areas of intact native vegetation (PO9.1). Facilities should allow for wildlife movement by incorporating wildlife corridors and habitat refuges and incorporating fencing that enables the passage of small animals (PO 9.2).

The subject site is predominantly cleared, with native vegetation restricted to property boundaries / roadsides. Minimal clearance would be required to provide access, which would have minimal impact on local biodiversity. The ecological assessment in the application identified the clearance to be 'low impact' and a Level 3 clearance category.

10. CONCLUSION

The development of a 209MW generation capacity solar farm facility and associated infrastructure is consistent with the provisions of the Rural Zone, which supports establishment of renewable energy facilities where they minimise significant fragmentation and displacement of existing primary production and are located in proximity to the existing electricity transmission network. In particular, the facility is located next to the Brinkworth Substation, so does not require an overhead transmission line connection, and the project includes a 300MW battery (an exempt development) that would provide a strategic benefit to the electricity network.

During the public notification period, six representations from neighbouring landowners were received that were opposed to the development. The main concerns raised were loss of food production land, 'heat island' effect on adjoining properties, construction traffic, fire risk and potential property devaluation. An interstate representation was also received, objecting to renewable energy development and electricity transmission infrastructure in general. These concerns, along with the requirements of the Code, were considered in the assessment.

The proposed renewable energy facility is envisaged within the Rural Zone. The development has been sited and designed in general accordance with Code requirements, to minimise localised and cumulative impacts as follows:

- Proximity to existing substation and electricity transmission and distribution infrastructure.
- Proximity to public roads and the arterial road network.
- Suitable setback from sensitive receivers in the locality, with solar arrays being relocated further away from a residence close to the site boundary in response to a representation.
- The site and locality are not identified as environmentally, culturally or visually sensitive.
- Not within a high bushfire risk area.

Consideration of impacts on local amenity included a visual impact assessment and a glint / glare assessment. The assessments demonstrate that while the proposal does represent a significant change to the appearance of the subject site, the local topography, existing vegetation, proposed setbacks and lack of sensitive receptors limit the potential visual and glare impacts to an acceptable level for nearby dwellings, public roads and aircraft. New landscaping is proposed along the western and south-western site boundary to provide additional visual screening for nearby landowners.

The traffic assessment prepared for the development considered the suitability of the haulage route to accommodate the expected vehicle movements / day during the construction period. Whilst the applicant's assessment concludes that road and/or intersection upgrades are not required to accommodate the size and volume of traffic, final requirements must meet Council and Commissioner of Highway requirements.

Ongoing interface impacts are expected to be minimal during operation of the facility. However, during the construction period there will be noise, traffic and amenity impacts associated with heavy vehicles, machinery and earthworks. It is recommended that provision of a Construction Environmental Management Plan be a condition attached to of any approval granted to ensure appropriate management measures are taken.

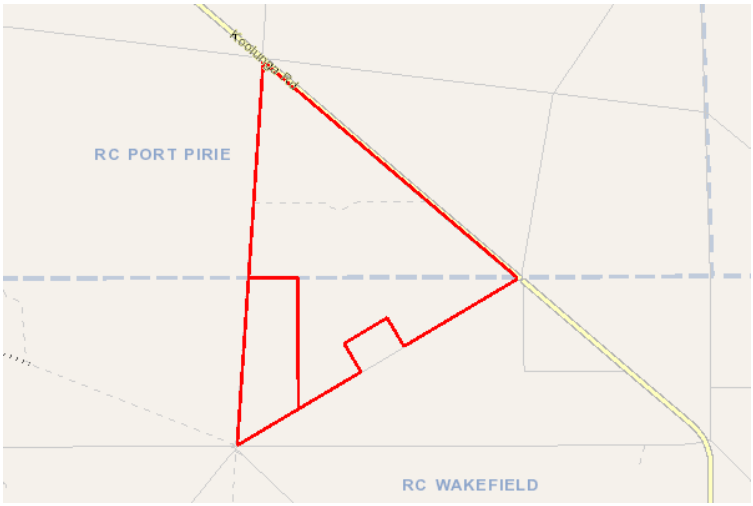
Pursuant to Section 131 of the *Planning, Development and Infrastructure Act 2016,* and having undertaken an assessment of the application against the relevant provisions of the Planning and Design Code and State Planning Policies, the application is generally in accordance with its provisions for the reasons outlined.

APPENDIX 1B - RELEVANT PLANNING AND DESIGN CODE POLICIES

Planning and Design Code (Version 2024. 11 - 20/06/2024)		
Zone		
Rural Zone	DO1, DO2	*Land Use and Intensity - PO1.1* *Siting and Design - PO2.1* *Renewable Energy Facilities - PO9.1*
Overlays		
Hazards (Bushfire – Regional)	DO1, DO2	*Siting - PO1.1* *Built Form - PO2.1* *Vehicle Access-Roads /Driveways - PO5.1, PO5.3*
Hazards (Flooding – Evidence Required)	DO1	*Flood Resilience - PO2.1* *Environmental Protection - PO2.1*
Native Vegetation	DO1	*Environmental Protection - PO1.1, PO1.2, PO1.4*
Water Resources	DO1, DO2	*PO1.1, PO1.5, PO1.7, PO1.8*
General Development Policies		
Clearance from Overhead Powerlines	DO1	*PO1.1*
Design	DO1	*Landscaping - PO3.1, PO3.2* *Water Sensitive Design - PO5.1*
Infrastructure and Renewable Energy Facilities	DO1	*General - PO1.1* *Visual Amenity - PO2.1, PO2.2, PO2.3* *Hazard Management - PO4.2, PO4.3* *Electricity Infrastructure & Battery Storage - PO5.1, PO5.3* *Renewable Energy Facilities - PO7.1* *Renewable Energy Facilities (Solar Power) - PO9.1, PO9.2, PO9.3, PO9.4* *Temporary Facilities - PO13.1, PO13.2*
Interface between Land Uses	DO1	*General Land Use Compatibility - PO1.2* *Hours of Operation - PO2.1* *Noise and Vibration - PO4.1, PO4.2* *Light Spill - PO6.1* *Solar Reflectivity / Glare - PO7.1* *Electrical Interference - PO8.1*
Transport, Access and Parking	DO1	*Movement Systems - PO1.1, PO1.2, PO1.4* *Sightlines - PO2.1* *Vehicle Access - PO3.1, PO3.3, PO3.4, PO3.8, PO3.9* *Vehicle Parking Rates - PO5.1* *Vehicle Parking Areas - PO6.2, PO6.6*

Address: LOT 256W POWER STATION RD BRINKWORTH SA 5464

To view a detailed interactive property map in SAPPA click on the map below



Property Zoning Details

Zone

Rural

Overlay

Dwelling Excision
Hazards (Bushfire - General)
Hazards (Flooding - Evidence Required)
Limited Land Division
Native Vegetation
Water Resources

Local Variation (TNV)

Minimum Site Area *(Minimum site area is 100 ha)*
Minimum Site Area *(Minimum site area is 40 ha)*
Minimum Dwelling Allotment Size *(Minimum dwelling allotment size is 100 ha)*

Development Pathways

- Rural

1. Accepted Development
   Means that the development type does not require planning consent (planning approval). Please ensure compliance with relevant land use and development controls in the Code.

   - Agricultural building
   - Air handling unit, air conditioning system or exhaust fan
   - Brush fence
   - Building alterations
   - Building work on railway land
   - Carport
   - Farming
   - Outbuilding
   - Partial demolition of a building or structure
   - Private bushfire shelter
   - Protective tree netting structure
   - Shade sail
   - Solar photovoltaic panels (ground mounted)
   - Solar photovoltaic panels (roof mounted)
   - Swimming pool or spa pool and associated swimming pool safety features

- Verandah
- Water tank (above ground)
- Water tank (underground)

2. Code Assessed - Deemed to Satisfy
Means that the development type requires consent (planning approval). Please ensure compliance with relevant land use and development controls in the Code.

- Advertisement
- Agricultural building
- Carport
- Deck
- Horticulture
- Outbuilding
- Replacement building
- Shop
- Temporary accommodation in an area affected by bushfire
- Verandah

3. Code Assessed - Performance Assessed
Performance Assessed development types listed below are those for which the Code identifies relevant policies.
Additional development types that are not listed as Accepted, Deemed to Satisfy or Restricted default to a Performance assessed Pathway. Please contact your local council for more information.

- Advertisement
- Agricultural building
- Ancillary accommodation
- Brewery
- Carport
- Cidery
- Deck
- Demolition
- Detached dwelling
- Distillery
- Dwelling addition
- Fence
- Horticulture
- Industry
- Land division
- Outbuilding
- Retaining wall
- Shop
- Store
- Tourist accommodation
- Tree-damaging activity
- Verandah
- Warehouse
- Winery
- Workers' accommodation

4. Impact Assessed - Restricted
Means that the development type requires approval. Classes of development that are classified as Restricted are listed in Table 4 of the relevant Zones.

Part 2 - Zones and Sub Zones

Rural Zone

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	A zone supporting the economic prosperity of South Australia primarily through the production, processing, storage and distribution of primary produce, forestry and the generation of energy from renewable sources.
DO 2	A zone supporting diversification of existing businesses that promote value-adding such as industry, storage and warehousing activities, the sale and consumption of primary produce, tourist development and accommodation.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Land Use and Intensity	
PO 1.1 The productive value of rural land for a range of primary production activities and associated value adding, processing, warehousing and distribution is supported, protected and maintained.	DTS/DPF 1.1 Development comprises one or more of the following: (a) Advertisement (b) Agricultural building (c) Brewery (d) Carport (e) Cidery (f) Commercial forestry (g) Dairy (h) Dam (i) Distillery (j) Dwelling (k) Dwelling addition (l) Farming (m) Horse keeping (n) Horticulture (o) Industry (p) Intensive animal husbandry (q) Low intensity animal husbandry (r) Outbuilding (s) Renewable energy facility (t) Shop (u) Small-scale ground mounted solar power facility (v) Stock slaughter works (w) Tourist accommodation (x) Transport distribution (y) Verandah (z) Warehouse (aa) Winery (ab) Workers' accommodation
Siting and Design	
PO 2.1 Development is provided with suitable vehicle access.	DTS/DPF 2.1 Development is serviced by an all-weather trafficable public road.
PO 2.2 Buildings are generally located on flat land to minimise cut and fill and	DTS/DPF 2.2 Buildings:

the associated visual impacts.	(a) are located on sites with a slope not greater than 10% (1-in-10) (b) do not result in excavation and/or filling of land greater than 1.5m from natural ground level.
Horticulture	
PO 3.1 Horticulture is located and conducted on land that has the physical capability of supporting the activity and in a sustainable manner that: (a) enhances the productivity of the land for the growing of food and produce in a sustainable manner (b) avoids adverse interface conflicts with other land uses (c) utilises sound environmental practices to mitigate negative impacts on natural resources and water quality (d) is sympathetic to surrounding rural landscape character and amenity where horticulture is proposed to be carried out in enclosed buildings such as such as greenhouses.	DTS/DPF 3.1 Horticultural activities: (a) are conducted on an allotment with an area of at least 1ha (b) are sited on land with a slope not greater than 10% (1-in-10) (c) are not conducted within 50m of a watercourse or native vegetation (d) are not conducted within 100m of a sensitive receiver in other ownership (e) provide for a headland area between plantings and property boundaries of at least 10m in width (f) where carried out in an enclosed building such as a greenhouse, the building has a total floor area not greater than 250m^2 (g) where in the form of olive growing are not located within 500m of a conservation or national park.
Rural Industry	
PO 4.1 Small-scale industry (including beverage production and washing, processing, bottling and packaging activities), storage, warehousing, produce grading and packing, transport distribution or similar activities provide opportunities for diversification and value adding to locally sourced primary production activities.	DTS/DPF 4.1 Industries, storage, warehousing, produce grading and packing and transport distribution activities and similar activities (or any combination thereof): (a) are directly related and ancillary to a primary production use on the same or adjoining allotment (b) are located on an allotment not less than 20ha in area (c) have a total floor area not exceeding 500m^2.
PO 4.2 Expansion of established small-scale or new large scale industry (including beverage production and washing, processing, bottling and packaging activities), storage, warehousing, produce grading and packing, transport distribution or similar activities: (a) are commensurate with the allotment on which it is situated to mitigate adverse impacts on the amenity of land in other ownership and the character of the locality (b) realise efficiencies in primary production related storage, sorting, packaging, manufacturing and the like (c) primarily involve primary production commodities sourced from the same allotment and /or surrounding rural areas.	DTS/DPF 4.2 None are applicable.
PO 4.3 Industry, storage, warehousing, transport distribution or similar activities are sited, designed and of a scale that maintains rural character and function and respects landscape amenity.	DTS/DPF 4.3 Buildings and associated activities: (a) are set back at least 100m from all road and allotment boundaries (b) are not sited within 200m of a sensitive receiver in other ownership (c) have a building height not greater than 10m above natural ground level (d) incorporate the loading and unloading of vehicles within the confines of the allotment.
Dwellings	
PO 5.1 Dwellings provide a convenient base for landowners to conduct and	DTS/DPF 5.1 Dwellings:

manage commercial scale primary production and rural related value adding activities without compromising the use of the allotment, adjacent land or long term purpose of the zone for primary production or related tourism values due to a proliferation of dwellings.	(a) are located on an allotment with an area not less than: **Minimum Dwelling Allotment Size** Minimum dwelling allotment size is 100 ha (b) are located on an allotment used for and is ancillary to primary production and/or primary production related value-adding activities (c) will not result in more than one dwelling on an allotment. In relation to DTS/DPF 5.1, in instances where: (d) more than one value is returned in the same field, refer to the *Minimum Dwelling Allotment Size Technical and Numeric Variation layer* in the SA planning database to determine the applicable value relevant to the site of the proposed development (e) no value is returned for DTS/DPF 5.1(a) (ie there is a blank field), then there is no minimum dwelling allotment size applicable and DTS/DPF 5.1(a) is met.
PO 5.2 Development resulting in more than one dwelling on an allotment supports ageing in place for the owner of the allotment or multi-generational management of farms in a manner that minimises the potential loss of land available for primary production.	DTS/DPF 5.2 Dwelling that will result in more than one dwelling on an allotment where all the following are satisfied: (a) it is located within 20m of an existing dwelling (b) shares the same utilities of the existing dwelling (c) will use the same access point from a public road as the existing dwelling (d) it is located on an allotment not less than 40ha in area (e) will not result in more than two dwellings on the allotment.
PO 5.3 Dwelling are sited, designed and of a scale that maintains a pleasant rural character and amenity.	DTS/DPF 5.3 Dwellings: (a) are set back from all allotment boundaries by at least 40m (b) do not exceed 2 building levels and 9m measured from the top of the footings (c) have a wall height that is no greater than 6m.
PO 5.4 Dwelling additions are sited, designed and of a scale that maintains a pleasant rural character and amenity.	DTS/DPF 5.4 Additions or alterations to an existing dwelling: (a) are set back from all allotment boundaries by at least 40m (b) do not exceed 2 building levels and 9m measured from the top of the footings (c) have a wall height that is no greater than 6m.
Shops, Tourism and Function Venues	
PO 6.1 Shops are associated with an existing primary production use or primary production related value adding industry to support diversification of employment, provide services to visitors and showcase local and regional products.	DTS/DPF 6.1 Shops: (a) are ancillary to and located on the same allotment or an adjoining allotment used for primary production or primary production related value adding industries (b) offer for sale or consumption produce or goods that are primarily sourced, produced or manufactured on the same allotment or adjoining allotments (c) have a gross leasable floor area not exceeding 100m^2 or 250m^2 in the case of a cellar door (d) have an area for the display of produce or goods external to a building not exceeding 25m^2.
PO 6.2	DTS/DPF 6.2

Shops that are proposed in new buildings are sited, designed and of a scale that maintains a pleasant rural character and amenity.	Shops in new buildings: (a) are set back from all allotment boundaries by at least 40m (b) are not sited within 100m of a sensitive receiver in other ownership (c) have a building height that does not exceed 9m above natural ground level.
PO 6.3 Tourist accommodation is associated with the primary use of the land for primary production or primary production related value adding industry to enhance and provide authentic visitor experiences.	DTS/DPF 6.3 Tourist accommodation: (a) is ancillary to and located on the same allotment or an adjoining allotment used for primary production or primary production related value adding industry (b) in relation to the area used for accommodation: (i) where in a new building, or buildings, does not exceed a cumulative total floor area of 100m^2 or (ii) where in an existing building, does not exceed a total floor area of 150m^2 and (c) does not result in more than one tourist accommodation facility being located on the same allotment.
PO 6.4 Tourist accommodation proposed in a new building or buildings is sited, designed and of a scale that maintains a pleasant rural character and amenity.	DTS/DPF 6.4 Tourist accommodation in new buildings: (a) is set back from all allotment boundaries by at least 40m (b) has a building height that does not exceed 7m above natural ground level.
PO 6.5 Function venues are associated with the primary use of the land for primary production or primary production related value adding industry.	DTS/DPF 6.5 Function venues: (a) are ancillary to and located on the same allotment or an adjoining allotment used for primary production or primary production related value adding industry (b) do not result in more than 75 persons for customer dining purposes.
PO 6.6 Function venues are sited, designed and of a scale that maintains a pleasant natural and rural character and amenity.	DTS/DPF 6.6 Function venues: (a) are located on an allotment having an area of at least 5ha (b) are set back from all property boundaries by at least 40m (c) are not sited within 100m of a sensitive receiver in other ownership (d) have a building height that does not exceed 9m above natural ground level.
Offices	
PO 7.1 Offices are directly related to and associated with the primary use of the land for primary production or primary production related value adding industry.	DTS/DPF 7.1 Offices: (a) are ancillary to and located on the same allotment or an adjoining allotment used for primary production or primary production related value adding industry (b) have a gross leasable floor area not exceeding 100m^2.
Adaptive Reuse of Existing Buildings	
PO 8.1 Adaptive reuse of existing buildings for small-scale shops, offices,	DTS/DPF 8.1 Development within an existing building is for any of the following:

tourist accommodation or ancillary rural activities.	(a) a shop (b) office (c) tourist accommodation.
Renewable Energy Facilities	
PO 9.1 Renewable energy facilities and ancillary development minimises significant fragmentation or displacement of existing primary production.	DTS/DPF 9.1 None are applicable.
PO 9.2 Small-scale, ground-mounted solar power facilities support rural production or value-adding industries.	DTS/DPF 9.2 None are applicable.
Built Form and Character	
PO 10.1 Large buildings are designed and sited to reduce impacts on scenic and rural vistas by: (a) having substantial setbacks from boundaries and adjacent public roads (b) using low-reflective materials and finishes that blend with the surrounding landscape (c) being located below ridgelines.	DTS/DPF 10.1 None are applicable.
Land Division	
PO 11.1 Land division, including boundary realignments, promotes productive, efficient and sustainable primary production.	DTS/DPF 11.1 Allotments have an area not less than: **Minimum Site Area** Minimum site area is 100 ha Minimum site area is 40 ha In relation to DTS/DPF 11.1, in instances where: (a) more than one value is returned in the same field, refer to the *Minimum Site Area Technical and Numeric Variation* layer in the SA planning database to determine the applicable value relevant to the site of the proposed development (b) no value is returned (i.e. there is a blank field), then none are applicable and the relevant development cannot be classified as deemed-to-satisfy.
PO 11.2 Land division, including boundary realignments, which facilitates the more intensive use of the land should occur only where: (a) the allotments are of a size and configuration to support the existing and proposed land uses (b) water of sufficient quality and quantity is available to sustain the proposed use (c) the use will be compatible with adjacent or nearby uses of land.	DTS/DPF 11.2 None are applicable.
PO 11.3 Allotment boundaries, including by realignment, are positioned to incorporate sufficient space around existing residential, tourist accommodation and other habitable buildings (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) to: (a) maintain a pleasant rural character and amenity for occupants (b) manage vegetation within the same allotment to mitigate bushfire hazard.	DTS/DPF 11.3 Allotment boundaries are located no closer to an existing residential, tourist accommodation or other habitable building than the greater of the following: (a) 40m (b) the distance required to accommodate an asset protection zone wholly within the relevant allotment.

Agricultural Buildings	
PO 12.1 Agricultural buildings and associated activities are sited, designed and of a scale that maintains a pleasant rural character and function.	DTS/DPF 12.1 Agricultural buildings: (a) are located on an allotment having an area of at least 10ha (b) are set back at least 50m from an allotment boundary (c) have a building height not exceeding 10m above natural ground level (d) do not exceed 500m^2 in total floor area (e) incorporate the loading and unloading of vehicles within the confines of the allotment.
Outbuildings, Carports and Verandahs	
PO 13.1 Outbuildings are sited, designed and of a scale that maintains a pleasant rural character and amenity.	DTS/DPF 13.1 Outbuildings: (a) have a primary street setback that is at least as far back as the building to which it is ancillary (b) have a combined total floor area that does not exceed 150m^2 (c) do not exceed 5m in wall height measured from natural ground level (not including a gable end) (d) have a total roof height that does not exceed 6m measured from natural ground level (e) if clad in sheet metal, it is pre-colour treated or painted in a non-reflective colour (f) will not result in more than 2 outbuildings on the same allotment .
PO 13.2 Carports and verandahs are sited, designed and of a scale to maintain a pleasant rural character and amenity.	DTS/DPF 13.2 Carports and verandahs: (a) are set back from the primary street at least as far back as the building to which it is ancillary (b) have a total floor area that does not exceed 80m^2 (c) have a post height that does not exceed 3m measured from natural ground level (not including a gable end) (d) have a total roof height that does not exceed 5m measured from natural ground level (e) if clad in sheet metal, it is pre-colour treated or painted in a non-reflective colour.
Concept Plans	
PO 14.1 Development is compatible with the outcomes sought by any relevant Concept Plan contained within Part 12 - Concept Plans of the Planning and Design Code to support the orderly development of land through staging of development and provision of infrastructure.	DTS/DPF 14.1 The site of the development is wholly located outside any relevant Concept Plan boundary. The following Concept Plans are relevant: In relation to DTS/DPF 14.1, in instances where: (a) one or more Concept Plan is returned, refer to Part 12 - Concept Plans in the Planning and Design Code to determine if a Concept Plan is relevant to the site of the proposed development. Note: multiple concept plans may be relevant. (b) in instances where 'no value' is returned, there is no relevant concept plan and DTS/DPF 14.1 is met.
Advertisements	
PO 15.1 Freestanding advertisements that identify the associated business without creating a visually dominant element within the locality.	DTS/DPF 15.1 Freestanding advertisements: (a) do not exceed 2m in height (b) do not have a sign face that exceeds 2m^2 per side.

Table 5 - Procedural Matters (PM) - Notification

The following table identifies, pursuant to section 107(6) of the *Planning, Development and Infrastructure Act 2016*, classes of performance assessed development that are excluded from notification. The table also identifies any exemptions to the placement of notices when notification is required.

Interpretation

Notification tables exclude the classes of development listed in Column A from notification provided that they do not fall within a corresponding exclusion prescribed in Column B.

Where a development or an element of a development falls within more than one class of development listed in Column A, it will be excluded from notification if it is excluded (in its entirety) under any of those classes of development. It need not be excluded under all applicable classes of development.

Where a development involves multiple performance assessed elements, all performance assessed elements will require notification (regardless of whether one or more elements are excluded in the applicable notification table) unless every performance assessed element of the application is excluded in the applicable notification table, in which case the application will not require notification.

A relevant authority may determine that a variation to 1 or more corresponding exclusions prescribed in Column B is minor in nature and does not require notification.

Class of Development (Column A)	Exceptions (Column B)
1. Development which, in the opinion of the relevant authority, is of a minor nature only and will not unreasonably impact on the owners or occupiers of land in the locality of the site of the development.	None specified.
2. Any development involving any of the following (or of any combination of any of the following): (a) advertisement (b) agricultural building (c) air handling unit, air conditioning system or exhaust fan (d) ancillary accommodation (e) carport (f) deck (g) dwelling (h) dwelling addition (i) farming (j) fence (k) horse keeping (l) internal building works (m) land division (n) outbuilding (o) pergola (p) private bushfire shelter (q) protective tree netting structure (r) replacement building (s) retaining wall (t) shade sail (u) solar photovoltaic panels (roof mounted) (v) swimming pool or spa pool and associated swimming pool safety features (w) temporary accommodation in an area affected by bushfire (x) tree damaging activity (y) verandah (z) water tank.	None specified.

3. Any development involving any of the following (or of any combination of any of the following): (a) industry (b) store (c) warehouse.	Except development that exceeds the total floor area limit expressed in Rural Zone DTS/DPF 4.1(c) or does not satisfy Rural Zone DTS/DPF 4.3.
4. Demolition.	Except any of the following: 1. the demolition (or partial demolition) of a State or Local Heritage Place (other than an excluded building) 2. the demolition (or partial demolition) of a building in a Historic Area Overlay (other than an excluded building).
5. Function venue.	Except function venue that does not satisfy any of the following: 1. Rural Zone DTS/DPF 6.5(b) 2. Rural Zone DTS/DPF 6.6.
6. Horticulture.	Except horticulture that does not satisfy any of the following: 1. Rural Zone DTS/DPF 3.1(d) 2. Rural Zone DTS/DPF 3.1(e) 3. Rural Zone DTS/DPF 3.1(f).
7. Railway line.	Except where located outside of a rail corridor or rail reserve.
8. Shop.	Except shop that exceeds the gross leasable floor area limit expressed in Rural Zone DTS/DPF 6.1(c) or does not satisfy Rural Zone DTS/DPF 6.2.
9. Tourist accommodation.	Except tourist accommodation that does not satisfy any of the following: 1. Rural Zone DTS/DPF 6.3(b) 2. Rural Zone DTS/DPF 6.4.

Placement of Notices - Exemptions for Performance Assessed Development

Pursuant to regulation 47(6)(c) of the Planning, Development and Infrastructure (General) Regulations 2017, the requirement to place a notice on the relevant land under section 107(3)(a)(ii) of the *Planning, Development and Infrastructure Act 2016* does not apply in the Rural Zone.

Placement of Notices - Exemptions for Restricted Development

Pursuant to regulation 47(6)(c) of the Planning, Development and Infrastructure (General) Regulations 2017, the requirement to place a notice on the relevant land under section 110(2)(a)(iv) of *the Planning, Development and Infrastructure Act 2016* does not apply in the Rural Zone.

Part 3 - Overlays

Dwelling Excision Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

	Desired Outcome
DO 1	Creation of allotments to accommodate existing habitable dwellings in primary production areas is limited to avoid undermining primary production.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Land Division	
PO 1.1 Land division creating an additional allotment to accommodate an existing dwelling does not undermine the role of primary production areas by being limited and designed to achieve the following: (a) accommodate a dwelling that has had a long term association with primary production on the same allotment (b) contain the excised dwelling within an allotment capable of providing a suitable rural residential amenity (c) maintain all other land (ie land outside the allotment containing the excised dwelling) in suitably sized allotments to support primary production (d) no other dwelling has been excised from the primary production allotment.	DTS/DPF 1.1 Land division satisfies all the following: (a) no other dwelling has previously been excised from the allotment by creating an additional allotment (b) it does not create more than one additional allotment where the resultant allotments satisfy (i) and (ii): (i) one allotment will contain a single existing lawful dwelling that existed prior to 1 December 2011 and meets all of the following: A. no allotment boundary is closer than 40m to an existing dwelling B. the allotment is no less than 1 hectare and no greater than 4 hectares in area C. if the allotment is of a battle-axe configuration, the driveway 'handle' is no more than 50 metres in length (ii) any other allotment has an area not less than that identified in the Minimum Site Area Technical and Numeric Variation layer in the SA planning database.

Procedural Matters (PM) - Referrals

The following table identifies classes of development / activities that require referral in this Overlay and the applicable referral body. It sets out the purpose of the referral as well as the relevant statutory reference from Schedule 9 of the Planning, Development and Infrastructure (General) Regulations 2017.

Class of Development / Activity	Referral Body	Purpose of Referral	Statutory Reference
None	None	None	None

Hazards (Bushfire - General Risk) Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

	Desired Outcome
DO 1	Development, including land division responds to the general level of bushfire risk by siting and designing buildings in a manner that mitigates the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.
DO 2	To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Siting	
PO 1.1 Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.	DTS/DPF 1.1 None are applicable.
Built Form	
PO 2.1 Buildings and structures are designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of transportable buildings and buildings on stilts.	DTS/DPF 2.1 None are applicable.
PO 2.2 Extensions to buildings, outbuildings and other ancillary structures are sited and constructed using materials to minimise the threat of fire spread to residential and tourist accommodation (including boarding houses, hostels, dormitory style accommodation, student accommodation and Workers' accommodation) in the event of bushfire.	DTS/DPF 2.2 Outbuildings and other ancillary structures are sited no closer than 6m from the habitable building.
Habitable Buildings	
PO 3.1 To minimise the threat, impact and exposure to bushfires on life and property, residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited on the flatter portion of allotments away from steep slopes.	DTS/DPF 3.1 None are applicable.
PO 3.2 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited away from vegetated areas that pose an unacceptable bushfire risk.	DTS/DPF 3.2 Residential and tourist accommodation and habitable buildings for vulnerable communities are provided with asset protection zone(s) in accordance with (a) and (b): (a) the asset protection zone has a minimum width of at least: (i) 50 metres to unmanaged grasslands (ii) 100 metres to hazardous bushland vegetation (b) the asset protection zone is contained wholly within the allotment of the development.
PO 3.3 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) has a dedicated area available that is capable of accommodating a bushfire protection system comprising firefighting equipment and water supply in accordance with *Ministerial Building Standard MBS 008 - Designated bushfire prone areas - additional requirements*.	DTS/DPF 3.3 None are applicable.
Land Division	
PO 4.1 Land division is designed and incorporates measures to minimise the danger of fire hazard to residents and occupants of buildings, and to protect buildings and property from physical damage in the event of a bushfire.	DTS/DPF 4.1 None are applicable.

PO 4.2 Land division is designed to provide a continuous street pattern to facilitate the safe movement and evacuation of emergency vehicles, residents, occupants and visitors.	DTS/DPF 4.2 None are applicable.
PO 4.3 Where 10 or more new allotments are proposed, land division includes at least two separate and safe exit points to enable multiple avenues of evacuation in the event of a bushfire.	DTS/DPF 4.3 None are applicable.
PO 4.4 Land division incorporates perimeter roads of adequate design in conjunction with bushfire buffer zones to achieve adequate separation between residential allotments and areas of unacceptable bushfire risk and to support safe access for the purposes of fire-fighting.	DTS/DPF 4.4 None are applicable.
Vehicle Access – Roads, Driveways and Fire Tracks	
PO 5.1 Roads are designed and constructed to facilitate the safe and effective: (a) access, operation and evacuation of fire-fighting vehicles and emergency personnel (b) evacuation of residents, occupants and visitors.	DTS/DPF 5.1 Roads: (a) are constructed with a formed, all-weather surface (b) have a gradient of not more than 16 degrees (1-in-3.5) at any point along the road (c) have a cross fall of not more than 6 degrees (1-in-9.5) at any point along the road (d) have a minimum formed road width of 6m (e) provide overhead clearance of not less than 4m between the road surface and overhanging branches or other obstructions including buildings and/or structures (Figure 1) (f) allow fire-fighting services (personnel and vehicles) to travel in a continuous forward movement around road curves by constructing the curves with a minimum external radius of 12.5m (Figure 2) (g) incorporating cul-de-sac endings or dead end roads do not exceed 200m in length and the end of the road has either: (i) a turning area with a minimum formed surface radius of 12.5m (Figure 3) or (ii) a 'T' or 'Y' shaped turning area with a minimum formed surface length of 11m and minimum internal radii of 9.5m (Figure 4) (h) incorporate solid, all-weather crossings over any watercourse that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes.
PO 5.2 Access to habitable buildings is designed and constructed to facilitate the safe and effective: (a) access, operation and evacuation of fire-fighting vehicles and emergency personnel (b) evacuation of residents, occupants and visitors	DTS/DPF 5.2 Access is in accordance with (a) or (b): (a) a clear and unobstructed vehicle or pedestrian pathway of not greater than 60 metres in length is available between the most distant part of the habitable building and the nearest part of a formed public access road (b) driveways: (i) do not exceed 600m in length (ii) are constructed with a formed, all-weather surface (iii) are connected to a formed, all-weather public road with the transition area between the road and driveway having a gradient of not more than 7 degrees (1-in-8) (iv) have a gradient of not more than 16 degrees (1-in-3.5) at any point along the driveway (v) have a cross fall of not more than 6 degrees (1-in-9.5) at any point along the driveway

	(vi) have a minimum formed width of 3m (4m where the gradient of the driveway is steeper than 12 degrees (1-in-4.5)) plus 0.5 metres clearance either side of the driveway from overhanging branches or other obstructions, including buildings and/or structures (Figure 1) (vii) incorporate passing bays with a minimum width of 6m and length of 17m every 200m (Figure 5) (viii) provide overhead clearance of not less than 4.0m between the driveway surface and overhanging branches or other obstructions, including buildings and/or structures (Figure 1) (ix) allow fire-fighting services (personnel and vehicles) to travel in a continuous forward movement around driveway curves by constructing the curves with a minimum external radius of 12.5m (Figure 2) (x) allow fire-fighting vehicles to safely enter and exit an allotment in a forward direction by using a 'U' shaped drive through design or by incorporating at the end of the driveway either: A. a loop road around the building B. a turning area with a minimum radius of 12.5m (Figure 3) C. a 'T' or 'Y' shaped turning area with a minimum formed length of 11m and minimum internal radii of 9.5m (Figure 4) (xi) incorporate solid, all-weather crossings over any watercourse that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes.
PO 5.3 Development does not rely on fire tracks as means of evacuation or access for fire-fighting purposes unless there are no safe alternatives available.	DTS/DPF 5.3 None are applicable.

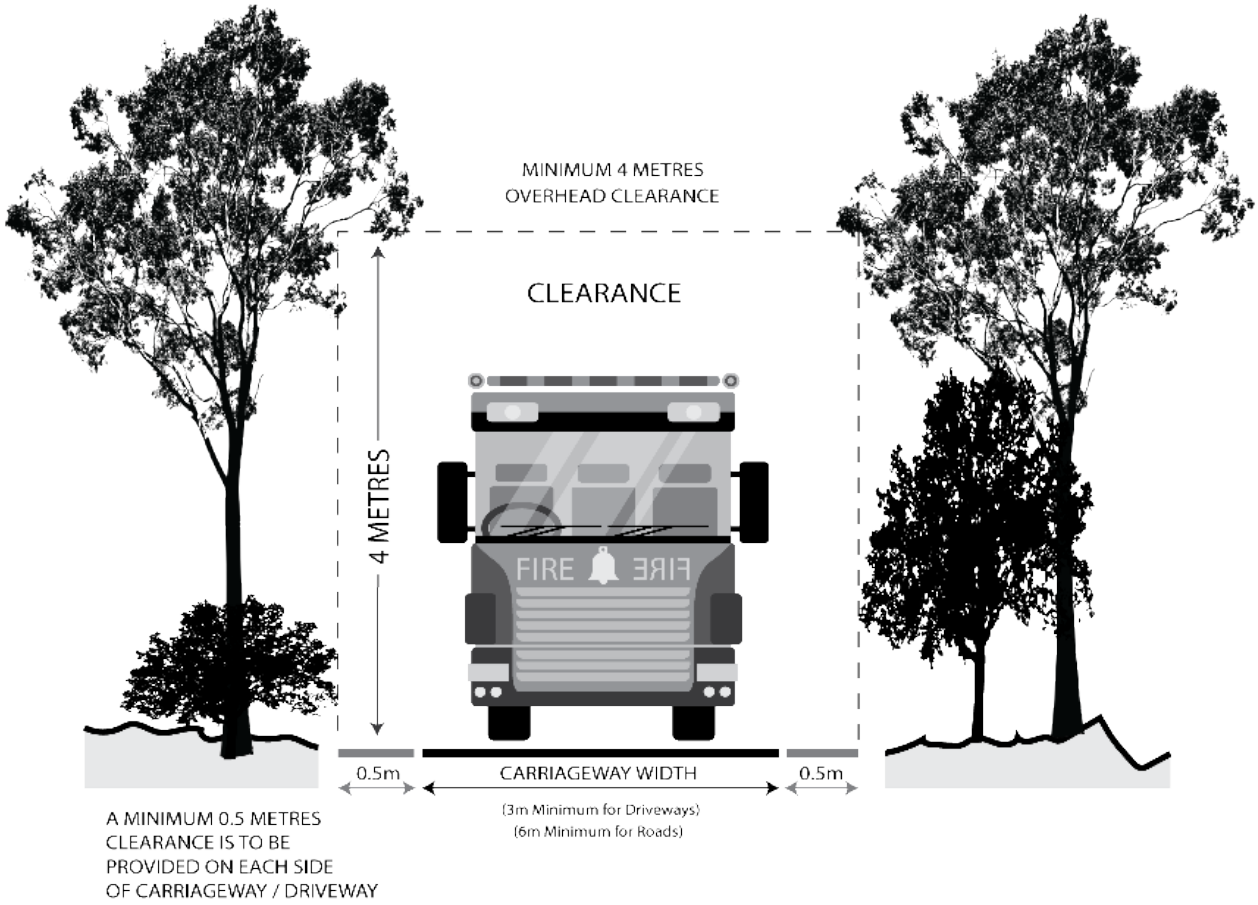
Procedural Matters (PM) - Referrals

The following table identifies classes of development / activities that require referral in this Overlay and the applicable referral body. It sets out the purpose of the referral as well as the relevant statutory reference from Schedule 9 of the Planning, Development and Infrastructure (General) Regulations 2017.

Class of Development / Activity	Referral Body	Purpose of Referral	Statutory Reference
None	None	None	None

Figures and Diagrams

Land Division
Fire Appliance Clearances
Figure 1 - Overhead and Side Clearances



Roads and Driveway Design

Figure 2 - Road and Driveway Curves

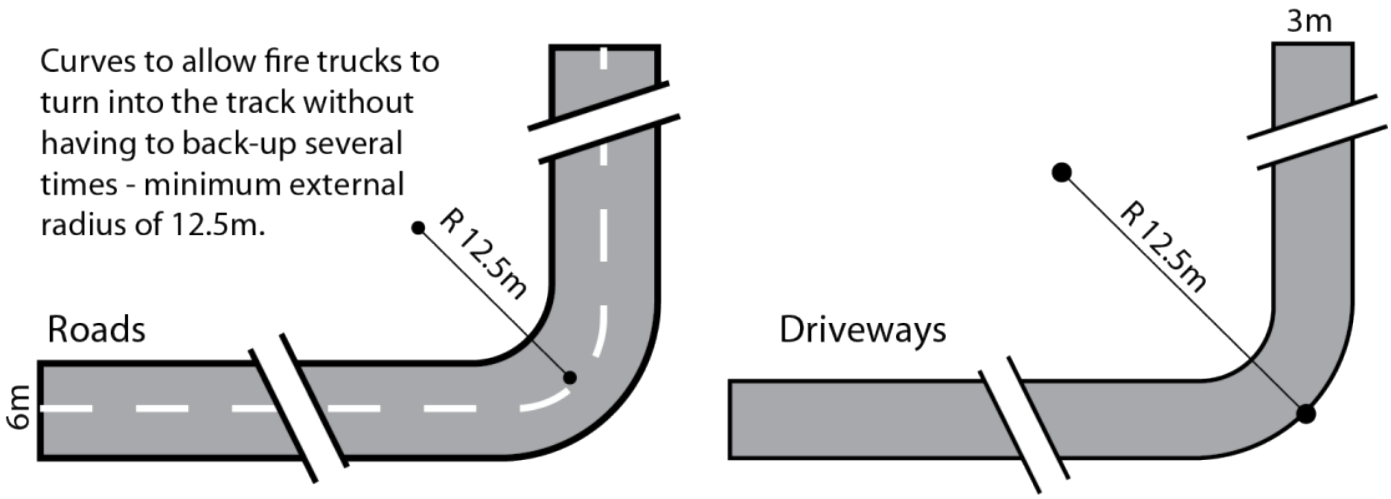


Figure 3 - Full Circle Turning Area

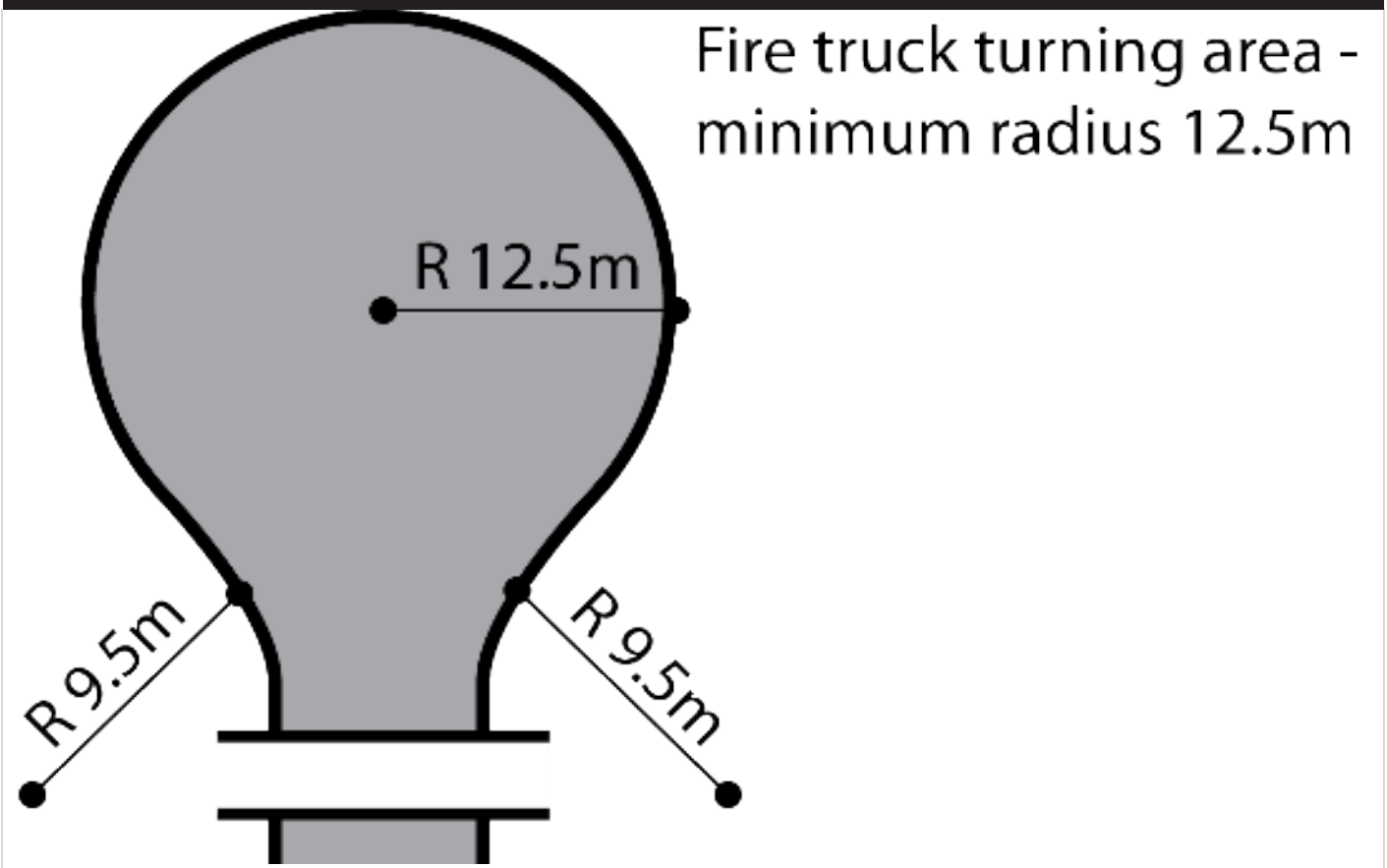
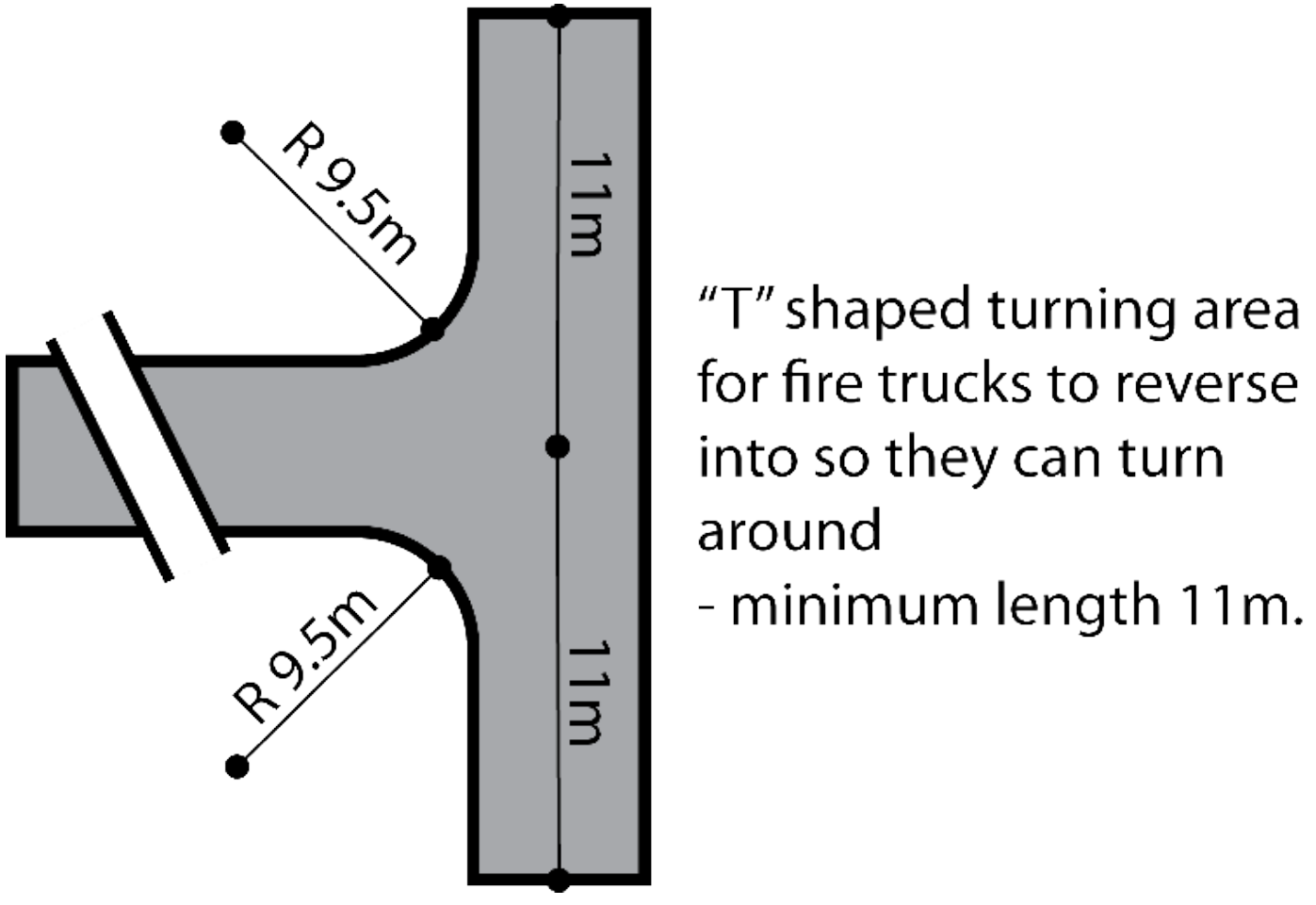


Figure 4 - 'T' or 'Y' Shaped Turning Head



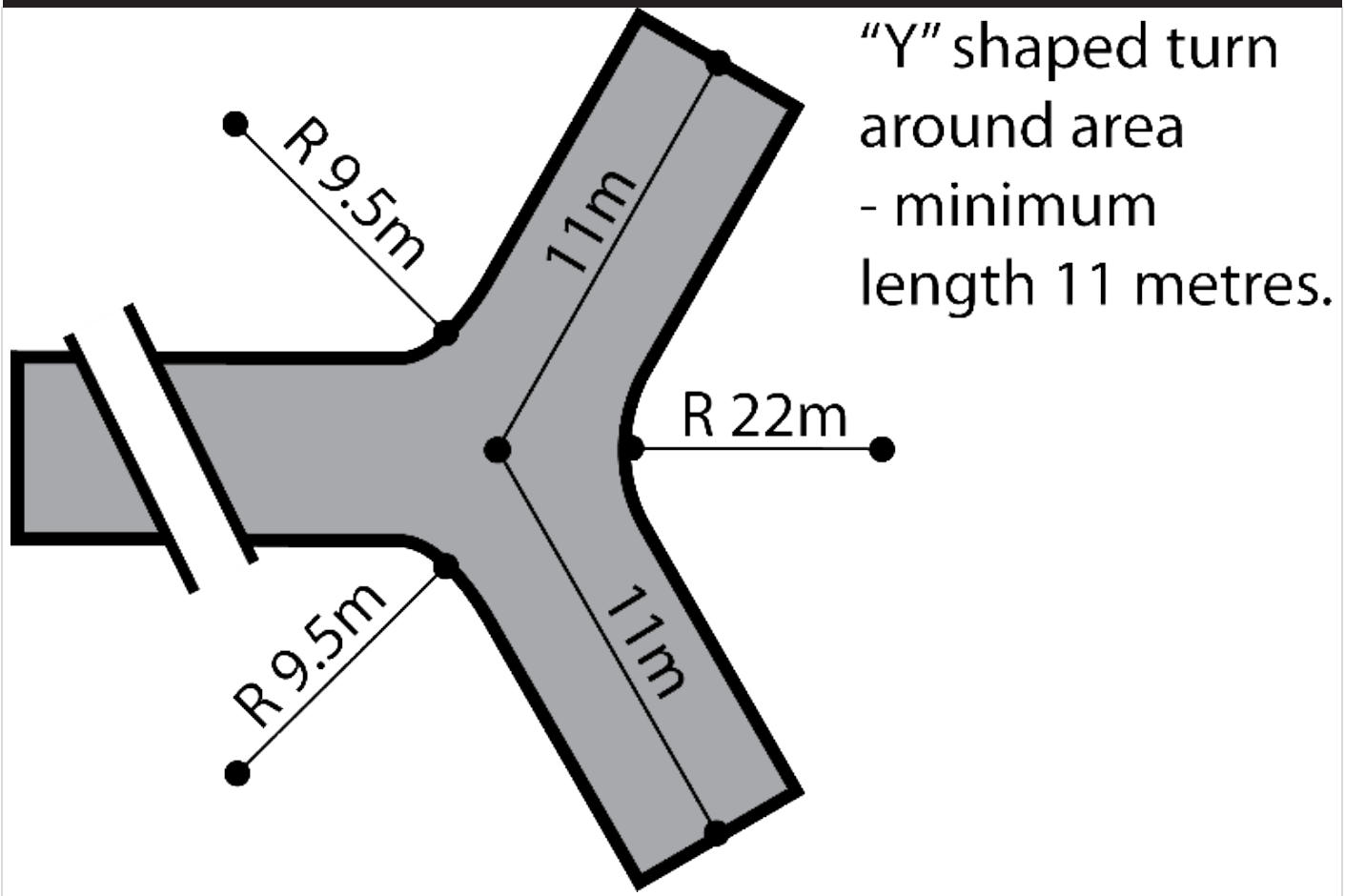
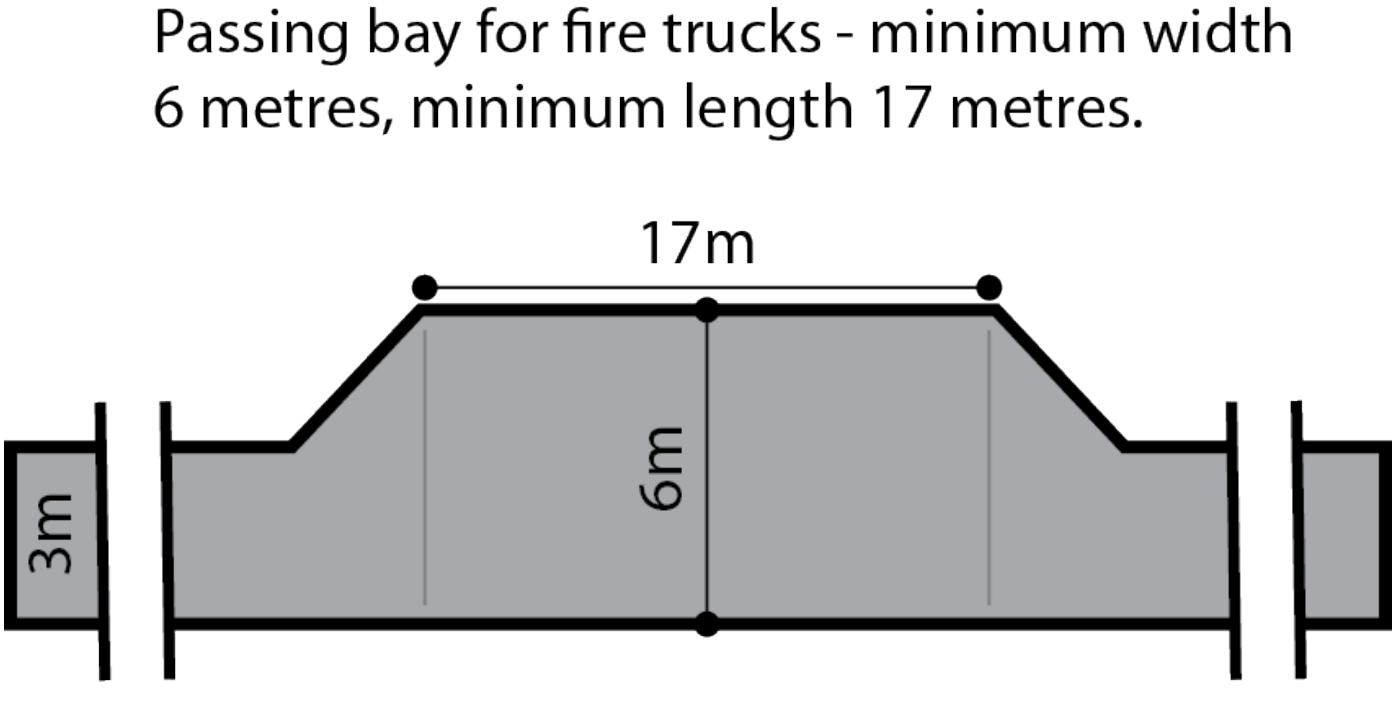


Figure 5 - Driveway Passing Bays



Hazards (Flooding - Evidence Required) Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Development adopts a precautionary approach to mitigate potential impacts on people, property, infrastructure and the environment from potential flood risk through the appropriate siting and design of development.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Flood Resilience	
PO 1.1 Development is sited, designed and constructed to minimise the risk of entry of potential floodwaters where the entry of flood waters is likely to result in undue damage to or compromise ongoing activities within buildings.	DTS/DPF 1.1 Habitable buildings, commercial and industrial buildings, and buildings used for animal keeping incorporate a finished floor level at least 300mm above: (a) the highest point of top of kerb of the primary street or (b) the highest point of natural ground level at the primary street boundary where there is no kerb
Environmental Protection	
PO 2.1 Buildings and structures used either partly or wholly to contain or store hazardous materials are designed to prevent spills or leaks leaving the confines of the building.	DTS/DPF 2.1 Development does not involve the storage of hazardous materials.

Procedural Matters (PM) - Referrals

The following table identifies classes of development / activities that require referral in this Overlay and the applicable referral body. It sets out the purpose of the referral as well as the relevant statutory reference from Schedule 9 of the Planning, Development and Infrastructure (General) Regulations 2017.

Class of Development / Activity	Referral Body	Purpose of Referral	Statutory Reference
None	None	None	None

Limited Land Division Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	The long term use of land for primary production is maintained by minimising fragmentation through division of land.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
General	
PO 1.1 Land division does not result in the creation of an additional allotment.	DTS/DPF 1.1 No additional allotments are created.
PO 1.2 Land division involving boundary realignments occurs only where the	DTS/DPF 1.2 None are applicable.

number of resulting allotments with a site area less than that specified in the relevant Zone is not greater than the number that existed prior to the realignment.	

Procedural Matters (PM) - Referrals

The following table identifies classes of development / activities that require referral in this Overlay and the applicable referral body. It sets out the purpose of the referral as well as the relevant statutory reference from Schedule 9 of the Planning, Development and Infrastructure (General) Regulations 2017.

Class of Development / Activity	Referral Body	Purpose of Referral	Statutory Reference
None	None	None	None

Native Vegetation Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Areas of native vegetation are protected, retained and restored in order to sustain biodiversity, threatened species and vegetation communities, fauna habitat, ecosystem services, carbon storage and amenity values.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Environmental Protection	
PO 1.1 Development avoids, or where it cannot be practically avoided, minimises the clearance of native vegetation taking into account the siting of buildings, access points, bushfire protection measures and building maintenance.	DTS/DPF 1.1 An application is accompanied by: (a) a declaration stating that the proposal will not, or would not, involve clearance of native vegetation under the Native Vegetation Act 1991, including any clearance that may occur: (i) in connection with a relevant access point and / or driveway (ii) within 10m of a building (other than a residential building or tourist accommodation) (iii) within 20m of a dwelling or addition to an existing dwelling for fire prevention and control (iv) within 50m of residential or tourist accommodation in connection with a requirement under a relevant overlay to establish an asset protection zone in a bushfire prone area or (b) a report prepared in accordance with Regulation 18(2)(a) of the Native Vegetation Regulations 2017 that establishes that the clearance is categorised as 'Level 1 clearance'.
PO 1.2 Native vegetation clearance in association with development avoids the following:	DTS/DPF 1.2 None are applicable.

(a) significant wildlife habitat and movement corridors (b) rare, vulnerable or endangered plants species (c) native vegetation that is significant because it is located in an area which has been extensively cleared (d) native vegetation that is growing in, or in association with, a wetland environment.	
PO 1.3 Intensive animal husbandry, commercial forestry and agricultural activities are sited, set back and designed to minimise impacts on native vegetation, including impacts on native vegetation in an adjacent State Significant Native Vegetation Area, from: (a) in the case of commercial forestry, the spread of fires from a plantation (b) the spread of pest plants and phytophthora (c) the spread of non-indigenous plants species (d) excessive nutrient loading of the soil or loading arising from surface water runoff (e) soil compaction (f) chemical spray drift.	DTS/DPF 1.3 Development within 500 metres of a boundary of a State Significant Native Vegetation Area does not involve any of the following: (a) horticulture (b) intensive animal husbandry (c) dairy (d) commercial forestry (e) aquaculture.
PO 1.4 Development restores and enhances biodiversity and habitat values through revegetation using locally indigenous plant species.	DTS/DPF 1.4 None are applicable.
Land division	
PO 2.1 Land division does not result in the fragmentation of land containing native vegetation, or necessitate the clearance of native vegetation, unless such clearance is considered minor, taking into account the location of allotment boundaries, access ways, fire breaks, boundary fencing and potential building siting or the like.	DTS/DPF 2.1 Land division where: (a) an application is accompanied by one of the following: (i) a declaration stating that none of the allotments in the proposed plan of division contain native vegetation under the *Native Vegetation Act 1991* (ii) a declaration stating that no native vegetation clearance under the *Native Vegetation Act 1991* will be required as a result of the division of land (iii) a report prepared in accordance with Regulation 18(2)(a) of the Native Vegetation Regulations 2017 that establishes that the vegetation to be cleared is categorised as 'Level 1 clearance' or (b) an application for land division which is being considered concurrently with a proposal to develop each allotment which will satisfy, or would satisfy, the requirements of DTS/DPF 1.1, including any clearance that may occur or (c) the division is to support a Heritage Agreement under the Native Vegetation Act 1991 or the *Heritage Places Act 1993*.

Procedural Matters (PM) - Referrals

The following table identifies classes of development / activities that require referral in this Overlay and the applicable referral body. It sets out the purpose of the referral as well as the relevant statutory reference from Schedule 9 of the Planning, Development and Infrastructure (General) Regulations 2017.

Class of Development / Activity	Referral Body	Purpose of Referral	Statutory Reference
Development that is the subject of a report prepared in accordance with Regulation 18(2)(a) of the *Native Vegetation Regulations 2017* that categorises the clearance, or potential clearance, as 'Level 3 clearance'	Native Vegetation Council	To provide expert assessment and direction to the relevant authority on the potential impacts of development on native vegetation.	Development of a class to which Schedule 9

or 'Level 4 clearance'.			clause 3 item 11 of the Planning, Development and Infrastructure (General) Regulations 2017 applies.

Water Resources Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

	Desired Outcome
DO 1	Protection of the quality of surface waters considering adverse water quality impacts associated with projected reductions in rainfall and warmer air temperatures as a result of climate change.
DO 2	Maintain the conveyance function and natural flow paths of watercourses to assist in the management of flood waters and stormwater runoff.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Water Catchment	
PO 1.1 Watercourses and their beds, banks, wetlands and floodplains (1% AEP flood extent) are not damaged or modified and are retained in their natural state, except where modification is required for essential access or maintenance purposes.	DTS/DPF 1.1 None are applicable.
PO 1.2 Development avoids interfering with the existing hydrology or water regime of swamps and wetlands other than to improve the existing conditions to enhance environmental values.	DTS/DPF 1.2 None are applicable.
PO 1.3 Wetlands and low-lying areas providing habitat for native flora and fauna are not drained, except temporarily for essential management purposes to enhance environmental values.	DTS/DPF 1.3 None are applicable.
PO 1.4 Watercourses, areas of remnant native vegetation, or areas prone to erosion that are capable of natural regeneration are fenced off to limit stock access.	DTS/DPF 1.4 None are applicable.
PO 1.5 Development that increases surface water run-off includes a suitably sized strip of vegetated land on each side of a watercourse to filter runoff to: (a) reduce the impacts on native aquatic ecosystems	DTS/DPF 1.5 A strip of land 20m or more wide measured from the top of existing banks on each side of the watercourse is free from development, livestock use and revegetated with locally indigenous vegetation.

(b) minimise soil loss eroding into the watercourse.	
PO 1.6 Development resulting in the depositing or placing of an object or solid material in a watercourse or lake occurs only where it involves any of the following: (a) the construction of an erosion control structure (b) devices or structures used to extract or regulate water flowing in a watercourse (c) devices used for scientific purposes (d) the rehabilitation of watercourses.	DTS/DPF 1.6 None are applicable.
PO 1.7 Watercourses, floodplains (1% AEP flood extent) and wetlands protected and enhanced by retaining and protecting existing native vegetation.	DTS/DPF 1.7 None are applicable.
PO 1.8 Watercourses, floodplains (1% AEP flood extent) and wetlands are protected and enhanced by stabilising watercourse banks and reducing sediments and nutrients entering the watercourse.	DTS/DPF 1.8 None are applicable.
PO 1.9 Dams, water tanks and diversion drains are located and constructed to maintain the quality and quantity of flows required to meet environmental and downstream needs.	DTS/DPF 1.9 None are applicable.

Procedural Matters (PM) - Referrals

The following table identifies classes of development / activities that require referral in this Overlay and the applicable referral body. It sets out the purpose of the referral as well as the relevant statutory reference from Schedule 9 of the Planning, Development and Infrastructure (General) Regulations 2017.

Class of Development / Activity	Referral Body	Purpose of Referral	Statutory Reference
None	None	None	None

Part 4 - General Development Policies

Advertisements

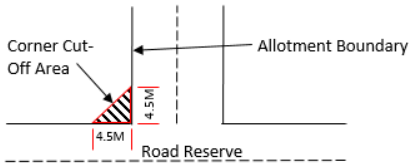
Assessment Provisions (AP)

Desired Outcome (DO)

	Desired Outcome
DO 1	Advertisements and advertising hoardings are appropriate to context, efficient and effective in communicating with the public, limited in number to avoid clutter, and do not create hazard.

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Appearance	
PO 1.1 Advertisements are compatible and integrated with the design of the building and/or land they are located on.	DTS/DPF 1.1 Advertisements attached to a building satisfy all of the following: (a) are not located in a Neighbourhood-type zone (b) where they are flush with a wall: (i) if located at canopy level, are in the form of a fascia sign (ii) if located above canopy level: A. do not have any part rising above parapet height B. are not attached to the roof of the building (c) where they are not flush with a wall: (i) if attached to a verandah, no part of the advertisement protrudes beyond the outer limits of the verandah structure (ii) if attached to a two-storey building: A. has no part located above the finished floor level of the second storey of the building B. does not protrude beyond the outer limits of any verandah structure below C. does not have a sign face that exceeds 1m2 per side. (d) if located below canopy level, are flush with a wall (e) if located at canopy level, are in the form of a fascia sign (f) if located above a canopy: (i) are flush with a wall (ii) do not have any part rising above parapet height (iii) are not attached to the roof of the building. (g) if attached to a verandah, no part of the advertisement protrudes beyond the outer limits of the verandah structure (h) if attached to a two-storey building, have no part located above the finished floor level of the second storey of the building (i) where they are flush with a wall, do not, in combination with any other existing sign, cover more than 15% of the building facade to which they are attached.
PO 1.2 Advertising hoardings do not disfigure the appearance of the land upon which they are situated or the character of the locality.	DTS/DPF 1.2 Where development comprises an advertising hoarding, the supporting structure is: (a) concealed by the associated advertisement and decorative detailing or (b) not visible from an adjacent public street or thoroughfare, other than a support structure in the form of a single or dual post design.
PO 1.3 Advertising does not encroach on public land or the land of an adjacent allotment.	DTS/DPF 1.3 Advertisements and/or advertising hoardings are contained within the boundaries of the site.
PO 1.4 Where possible, advertisements on public land are integrated with	DTS/DPF 1.4 Advertisements on public land that meet at least one of the following:

existing structures and infrastructure.	(a) achieves Advertisements DTS/DPF 1.1 (b) are integrated with a bus shelter.
PO 1.5 Advertisements and/or advertising hoardings are of a scale and size appropriate to the character of the locality.	DTS/DPF 1.5 None are applicable.
Proliferation of Advertisements	
PO 2.1 Proliferation of advertisements is minimised to avoid visual clutter and untidiness.	DTS/DPF 2.1 No more than one freestanding advertisement is displayed per occupancy.
PO 2.2 Multiple business or activity advertisements are co-located and coordinated to avoid visual clutter and untidiness.	DTS/DPF 2.2 Advertising of a multiple business or activity complex is located on a single advertisement fixture or structure.
PO 2.3 Proliferation of advertisements attached to buildings is minimised to avoid visual clutter and untidiness.	DTS/DPF 2.3 Advertisements satisfy all of the following: (a) are attached to a building (b) other than in a Neighbourhood-type zone, where they are flush with a wall, cover no more than 15% of the building facade to which they are attached (c) do not result in more than one sign per occupancy that is not flush with a wall.
Advertising Content	
PO 3.1 Advertisements are limited to information relating to the lawful use of land they are located on to assist in the ready identification of the activity or activities on the land and avoid unrelated content that contributes to visual clutter and untidiness.	DTS/DPF 3.1 Advertisements contain information limited to a lawful existing or proposed activity or activities on the same site as the advertisement.
Amenity Impacts	
PO 4.1 Light spill from advertisement illumination does not unreasonably compromise the amenity of sensitive receivers.	DTS/DPF 4.1 Advertisements do not incorporate any illumination.
Safety	
PO 5.1 Advertisements and/or advertising hoardings erected on a verandah or projecting from a building wall are designed and located to allow for safe and convenient pedestrian access.	DTS/DPF 5.1 Advertisements have a minimum clearance of 2.5m between the top of the footpath and base of the underside of the sign.
PO 5.2 Advertisements and/or advertising hoardings do not distract or create a hazard to drivers through excessive illumination.	DTS/DPF 5.2 No advertisement illumination is proposed.
PO 5.3 Advertisements and/or advertising hoardings do not create a hazard to	DTS/DPF 5.3 Advertisements satisfy all of the following:

drivers by: (a) being liable to interpretation by drivers as an official traffic sign or signal (b) obscuring or impairing drivers' view of official traffic signs or signals (c) obscuring or impairing drivers' view of features of a road that are potentially hazardous (such as junctions, bends, changes in width and traffic control devices) or other road or rail vehicles at/or approaching level crossings.	(a) are not located in a public road or rail reserve (b) are located wholly outside the land shown as 'Corner Cut-Off Area' in the following diagram 
PO 5.4 Advertisements and/or advertising hoardings do not create a hazard by distracting drivers from the primary driving task at a location where the demands on driver concentration are high.	DTS/DPF 5.4 Advertisements and/or advertising hoardings are not located along or adjacent to a road having a speed limit of 80km/h or more.
PO 5.5 Advertisements and/or advertising hoardings provide sufficient clearance from the road carriageway to allow for safe and convenient movement by all road users.	DTS/DPF 5.5 Where the advertisement or advertising hoarding is: (a) on a kerbed road with a speed zone of 60km/h or less, the advertisement or advertising hoarding is located at least 0.6m from the roadside edge of the kerb (b) on an unkerbed road with a speed zone of 60km/h or less, the advertisement or advertising hoarding is located at least 5.5m from the edge of the seal (c) on any other kerbed or unkerbed road, the advertisement or advertising hoarding is located a minimum of the following distance from the roadside edge of the kerb or the seal: (a) 110 km/h road - 14m (b) 100 km/h road - 13m (c) 90 km/h road - 10m (d) 70 or 80 km/h road - 8.5m.
PO 5.6 Advertising near signalised intersections does not cause unreasonable distraction to road users through illumination, flashing lights, or moving or changing displays or messages.	DTS/DPF 5.6 Advertising: (a) is not illuminated (b) does not incorporate a moving or changing display or message (c) does not incorporate a flashing light(s).

Animal Keeping and Horse Keeping

Assessment Provisions (AP)

Desired Outcome (DO)

	Desired Outcome
DO 1	Animals are kept at a density that is not beyond the carrying capacity of the land and in a manner that minimises their adverse effects on the environment, local amenity and surrounding development.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature

Siting and Design	
PO 1.1 Animal keeping, horse keeping and associated activities do not create adverse impacts on the environment or the amenity of the locality.	DTS/DPF 1.1 None are applicable.
PO 1.2 Animal keeping and horse keeping is located and managed to minimise the potential transmission of disease to other operations where animals are kept.	DTS/DPF 1.2 None are applicable.
Horse Keeping	
PO 2.1 Water from stable wash-down areas is directed to appropriate absorption areas and/or drainage pits to minimise pollution of land and water.	DTS/DPF 2.1 None are applicable.
PO 2.2 Stables, horse shelters or associated yards are sited appropriate distances away from sensitive receivers and/or allotments in other ownership to avoid adverse impacts from dust, erosion and odour.	DTS/DPF 2.2 Stables, horse shelters and associated yards are sited in accordance with all of the following: (a) 30m or more from any sensitive receivers (existing or approved) on land in other ownership (b) where an adjacent allotment is vacant and in other ownership, 30m or more from the boundary of that allotment.
PO 2.3 All areas accessible to horses are separated from septic tank effluent disposal areas to protect the integrity of that system. Stable flooring is constructed with an impervious material to facilitate regular cleaning.	DTS/DPF 2.3 Septic tank effluent disposal areas are enclosed with a horse-proof barrier such as a fence to exclude horses from this area.
PO 2.4 To minimise environmental harm and adverse impacts on water resources, stables, horse shelters and associated yards are appropriately set back from a watercourse.	DTS/DPF 2.4 Stables, horse shelters and associated yards are set back 50m or more from a watercourse.
PO 2.5 Stables, horse shelters and associated yards are located on slopes that are stable to minimise the risk of soil erosion and water runoff.	DTS/DPF 2.5 Stables, horse shelters and associated yards are not located on land with a slope greater than 10% (1-in-10).
Kennels	
PO 3.1 Kennel flooring is constructed with an impervious material to facilitate regular cleaning.	DTS/DPF 3.1 The floors of kennels satisfy all of the following: (a) are constructed of impervious concrete (b) are designed to be self-draining when washed down.
PO 3.2 Kennels and exercise yards are designed and sited to minimise noise nuisance to neighbours through measures such as: (a) adopting appropriate separation distances (b) orientating openings away from sensitive receivers.	DTS/DPF 3.2 Kennels are sited 500m or more from the nearest sensitive receiver on land in other ownership.
PO 3.3 Dogs are regularly observed and managed to minimise nuisance impact on adjoining sensitive receivers from animal behaviour.	DTS/DPF 3.3 Kennels are sited in association with a permanent dwelling on the land.
Wastes	
PO 4.1 Storage of manure, used litter and other wastes (other than wastewater lagoons) is designed, constructed and managed to	DTS/DPF 4.1 None are applicable.

minimise attracting and harbouring vermin.	
PO 4.2 Facilities for the storage of manure, used litter and other wastes (other than wastewater lagoons) are located to minimise the potential for polluting water resources.	DTS/DPF 4.2 Waste storage facilities (other than wastewater lagoons) are located outside the 1% AEP flood event areas.

Aquaculture

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Aquaculture facilities are developed in an ecologically, economically and socially sustainable manner to support an equitable sharing of marine, coastal and inland resources and mitigate conflict with other water-based and land-based uses.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Land-based Aquaculture	
PO 1.1 Land-based aquaculture and associated components are sited and designed to mitigate adverse impacts on nearby sensitive receivers.	DTS/DPF 1.1 Land-based aquaculture and associated components are located to satisfy all of the following: (a) 200m or more from a sensitive receiver in other ownership (b) 500m or more from the boundary of a zone primarily intended to accommodate sensitive receivers or The development is the subject of an aquaculture lease and/or licence (as applicable) granted under the *Aquaculture Act 2001*.
PO 1.2 Land-based aquaculture and associated components are sited and designed to prevent surface flows from entering ponds in a 1% AEP sea flood level event.	DTS/DPF 1.2 None are applicable.
PO 1.3 Land-based aquaculture and associated components are sited and designed to prevent pond leakage that would pollute groundwater.	DTS/DPF 1.3 The development is the subject of an aquaculture lease and/or licence (as applicable) granted under the *Aquaculture Act 2001*.
PO 1.4 Land-based aquaculture and associated components are sited and designed to prevent farmed species escaping and entering into any waters.	DTS/DPF 1.4 The development is the subject of an aquaculture lease and/or licence (as applicable) granted under the *Aquaculture Act 2001*.
PO 1.5 Land-based aquaculture and associated components, including intake and discharge pipes, are designed to minimise the need to traverse sensitive areas to minimise impact on the natural environment.	DTS/DPF 1.5 None are applicable.
PO 1.6	DTS/DPF 1.6

Pipe inlets and outlets associated with land-based aquaculture are sited and designed to minimise the risk of disease transmission.	The development is the subject of an aquaculture lease and/or licence (as applicable) granted under the *Aquaculture Act 2001*.
PO 1.7 Storage areas associated with aquaculture activity are integrated with the use of the land and sited and designed to minimise their visual impact on the surrounding environment.	DTS/DPF 1.7 None are applicable.
Marine Based Aquaculture	
PO 2.1 Marine aquaculture is sited and designed to minimise its adverse impacts on sensitive ecological areas including: (a) creeks and estuaries (b) wetlands (c) significant seagrass and mangrove communities (d) marine habitats and ecosystems.	DTS/DPF 2.1 None are applicable.
PO 2.2 Marine aquaculture is sited in areas with adequate water current to disperse sediments and dissolve particulate wastes to prevent the build-up of waste that may cause environmental harm.	DTS/DPF 2.2 The development is the subject of an aquaculture lease and/or licence (as applicable) granted under the *Aquaculture Act 2001*.
PO 2.3 Marine aquaculture is designed to not involve discharge of human waste on the site, on any adjacent land or into nearby waters.	DTS/DPF 2.3 The development does not include toilet facilities located over water.
PO 2.4 Marine aquaculture (other than inter-tidal aquaculture) is located an appropriate distance seaward of the high water mark.	DTS/DPF 2.4 Marine aquaculture development is located 100m or more seaward of the high water mark or The development is the subject of an aquaculture lease and/or licence (as applicable) granted under the *Aquaculture Act 2001*.
PO 2.5 Marine aquaculture is sited and designed to not obstruct or interfere with: (a) areas of high public use (b) areas, including beaches, used for recreational activities such as swimming, fishing, skiing, sailing and other water sports (c) areas of outstanding visual or environmental value (d) areas of high tourism value (e) areas of important regional or state economic activity, including commercial ports, wharfs and jetties (f) the operation of infrastructure facilities including inlet and outlet pipes associated with the desalination of sea water.	DTS/DPF 2.5 None are applicable.
PO 2.6 Marine aquaculture is sited and designed to minimise interference and obstruction to the natural processes of the coastal and marine environment.	DTS/DPF 2.6 None are applicable.
PO 2.7 Marine aquaculture is designed to be as unobtrusive as practicable by incorporating measures such as: (a) using feed hoppers painted in subdued colours and suspending them as close as possible to the surface of the water (b) positioning structures to protrude the minimum distance practicable above the surface of the water	DTS/DPF 2.7 None are applicable.

(c) avoiding the use of shelters and structures above cages and platforms unless necessary to exclude predators and protected species from interacting with the farming structures and/or stock inside the cages, or for safety reasons (d) positioning racks, floats and other farm structures in unobtrusive locations landward from the shoreline.	
PO 2.8 Access, launching and maintenance facilities utilise existing established roads, tracks, ramps and paths to or from the sea where possible to minimise environmental and amenity impacts.	DTS/DPF 2.8 The development utilises existing established roads, tracks, ramps and/or paths (as applicable) to access the sea.
PO 2.9 Access, launching and maintenance facilities are developed as common user facilities and are co-located where practicable to mitigate adverse impacts on coastal areas.	DTS/DPF 2.9 The development utilises existing established roads, tracks, ramps and/or paths (as applicable) to access the sea.
PO 2.10 Marine aquaculture is sited to minimise potential impacts on, and to protect the integrity of, reserves under the *National Parks and Wildlife Act 1972*.	DTS/DPF 2.10 Marine aquaculture is located 1000m or more seaward of the boundary of any reserve under the *National Parks and Wildlife Act 1972*.
PO 2.11 Onshore storage, cooling and processing facilities do not impair the coastline and its visual amenity by: (a) being sited, designed, landscaped and of a scale to reduce the overall bulk and appearance of buildings and complement the coastal landscape (b) making provision for appropriately sited and designed vehicular access arrangements, including using existing vehicular access arrangements as far as practicable (c) incorporating appropriate waste treatment and disposal.	DTS/DPF 2.11 The development does not include any onshore facilities in conjunction with a proposal for marine aquaculture.
Navigation and Safety	
PO 3.1 Marine aquaculture sites are suitably marked to maintain navigational safety.	DTS/DPF 3.1 The development is the subject of an aquaculture lease and/or licence (as applicable) granted under the *Aquaculture Act 2001*.
PO 3.2 Marine aquaculture is sited to provide adequate separation between farms for safe navigation.	DTS/DPF 3.2 The development is the subject of an aquaculture lease and/or licence (as applicable) granted under the *Aquaculture Act 2001*.
Environmental Management	
PO 4.1 Marine aquaculture is maintained to prevent hazards to people and wildlife, including breeding grounds and habitats of native marine mammals and terrestrial fauna, especially migratory species.	DTS/DPF 4.1 None are applicable.
PO 4.2 Marine aquaculture is designed to facilitate the relocation or removal of structures in the case of emergency such as oil spills, algal blooms and altered water flows.	DTS/DPF 4.2 None are applicable.
PO 4.3 Marine aquaculture provides for progressive or future reclamation of disturbed areas ahead of, or upon, decommissioning.	DTS/DPF 4.3 None are applicable.
PO 4.4 Aquaculture operations incorporate measures for the removal and disposal of litter, disused material, shells, debris, detritus, dead animals and animal waste to prevent pollution of waters, wetlands, or the	DTS/DPF 4.4 The development is the subject of an aquaculture lease and/or licence (as applicable) granted under the *Aquaculture Act 2001*.

nearby coastline.	

Beverage Production in Rural Areas

Assessment Provisions (AP)

Desired Outcome (DO)

	Desired Outcome
DO 1	Mitigation of potential amenity and environmental impacts of value-adding beverage production facilities such as wineries, distilleries, cideries and breweries.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Odour and Noise	
PO 1.1 Beverage production activities are designed and sited to minimise odour impacts on rural amenity.	DTS/DPF 1.1 None are applicable.
PO 1.2 Beverage production activities are designed and sited to minimise noise impacts on sensitive receivers.	DTS/DPF 1.2 None are applicable.
PO 1.3 Fermentation, distillation, manufacturing, storage, packaging and bottling activities occur within enclosed buildings to improve the visual appearance within a locality and manage noise associated with these activities.	DTS/DPF 1.3 None are applicable.
PO 1.4 Breweries are designed to minimise odours emitted during boiling and fermentation stages of production.	DTS/DPF 1.4 Brew kettles are fitted with a vapour condenser.
PO 1.5 Beverage production solid wastes are stored in a manner that minimises odour impacts on sensitive receivers in other ownership.	DTS/DPF 1.5 Solid waste from beverage production is collected and stored in sealed containers and removed from the site within 48 hours.
Water Quality	
PO 2.1 Beverage production wastewater management systems (including wastewater irrigation) are set back from watercourses to minimise adverse impacts on water resources.	DTS/DPF 2.1 Wastewater management systems are set back 50m or more from the banks of watercourses and bores.
PO 2.2 The storage or disposal of chemicals or hazardous substances is undertaken in a manner to prevent pollution of water resources.	DTS/DPF 2.2 None are applicable.
PO 2.3 Stormwater runoff from areas that may cause contamination due to beverage production activities (including vehicle movements and machinery operations) is drained to an onsite stormwater treatment	DTS/DPF 2.3 None are applicable.

system to manage potential environmental impacts.	
PO 2.4 Stormwater runoff from areas unlikely to cause contamination by beverage production and associated activities (such as roof catchments and clean hard-paved surfaces) is diverted away from beverage production areas and wastewater management systems.	DTS/DPF 2.4 None are applicable.
Wastewater Irrigation	
PO 3.1 Beverage production wastewater irrigation systems are designed and located to not contaminate soil and surface and ground water resources or damage crops.	DTS/DPF 3.1 None are applicable.
PO 3.2 Beverage production wastewater irrigation systems are designed and located to minimise impact on amenity and avoid spray drift onto adjoining land.	DTS/DPF 3.2 Beverage production wastewater is not irrigated within 50m of any dwelling in other ownership.
PO 3.3 Beverage production wastewater is not irrigated onto areas that pose an undue risk to the environment or amenity such as: (a) waterlogged areas (b) land within 50m of a creek, swamp or domestic or stock water bore (c) land subject to flooding (d) steeply sloping land (e) rocky or highly permeable soil overlaying an unconfined aquifer.	DTS/DPF 3.3 None are applicable.

Bulk Handling and Storage Facilities

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Facilities for the bulk handling and storage of agricultural, mineral, petroleum, rock, ore or other similar commodities are designed to minimise adverse impacts on transport networks, the landscape and surrounding land uses.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Siting and Design	
PO 1.1 Bulk handling and storage facilities are sited and designed to minimise risks of adverse air quality and noise impacts on sensitive receivers.	DTS/DPF 1.1 Facilities for the handling, storage and dispatch of commodities in bulk (excluding processing) meet the following minimum separation distances from sensitive receivers:

	(a) bulk handling of agricultural crop products, rock, ores, minerals, petroleum products or chemicals at a wharf or wharf side facility (including sea-port grain terminals), where the handling of these materials into or from vessels does not exceed 100 tonnes per day: 300m or more from residential premises not associated with the facility (b) bulk handling of agricultural crop products, rock, ores, minerals, petroleum products or chemicals to or from any commercial storage facility: 300m or more from residential premises not associated with the facility (c) bulk petroleum storage involving individual containers with a capacity up to 200 litres and a total on-site storage capacity not exceeding 1,000 cubic metres: 500m or more (d) coal handling with: a. capacity up to 1 tonne per day or a storage capacity up to 50 tonnes: 500m or more b. capacity exceeding 1 tonne per day but not exceeding 100 tonnes per day or a storage capacity exceeding 50 tonnes but not exceeding 5000 tonnes: 1000m or more.
Buffers and Landscaping	
PO 2.1 Bulk handling and storage facilities incorporate a buffer area for the establishment of dense landscaping adjacent road frontages to enhance the appearance of land and buildings from public thoroughfares.	DTS/DPF 2.1 None are applicable.
PO 2.2 Bulk handling and storage facilities incorporate landscaping to assist with screening and dust filtration.	DTS/DPF 2.2 None are applicable.
Access and Parking	
PO 3.1 Roadways and vehicle parking areas associated with bulk handling and storage facilities are designed and surfaced to control dust emissions and prevent drag out of material from the site.	DTS/DPF 3.1 Roadways and vehicle parking areas are sealed with an all-weather surface.
Slipways, Wharves and Pontoons	
PO 4.1 Slipways, wharves and pontoons used for the handling of bulk materials (such as fuel, oil, catch, bait and the like) incorporate catchment devices to avoid the release of materials into adjacent waters.	DTS/DPF 4.1 None are applicable.

Clearance from Overhead Powerlines

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Protection of human health and safety when undertaking development in the vicinity of overhead transmission powerlines.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
PO 1.1	DTS/DPF 1.1

Buildings are adequately separated from aboveground powerlines to minimise potential hazard to people and property.	One of the following is satisfied: (a) a declaration is provided by or on behalf of the applicant to the effect that the proposal would not be contrary to the regulations prescribed for the purposes of section 86 of the *Electricity Act 1996* (b) there are no aboveground powerlines adjoining the site that are the subject of the proposed development.

Design

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Development is: (a) contextual - by considering, recognising and carefully responding to its natural surroundings or built environment and positively contributes to the character of the immediate area (b) durable - fit for purpose, adaptable and long lasting (c) inclusive - by integrating landscape design to optimise pedestrian and cyclist usability, privacy and equitable access, and promoting the provision of quality spaces integrated with the public realm that can be used for access and recreation and help optimise security and safety both internally and within the public realm, for occupants and visitors (d) sustainable - by integrating sustainable techniques into the design and siting of development and landscaping to improve community health, urban heat, water management, environmental performance, biodiversity and local amenity and to minimise energy consumption.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
All development	
External Appearance	
PO 1.1 Buildings reinforce corners through changes in setback, articulation, materials, colour and massing (including height, width, bulk, roof form and slope).	DTS/DPF 1.1 None are applicable.
PO 1.2 Where zero or minor setbacks are desirable, development provides shelter over footpaths (in the form of verandahs, awnings, canopies and the like, with adequate lighting) to positively contribute to the walkability, comfort and safety of the public realm.	DTS/DPF 1.2 None are applicable.
PO 1.3 Building elevations facing the primary street (other than ancillary buildings) are designed and detailed to convey purpose, identify main access points and complement the streetscape.	DTS/DPF 1.3 None are applicable.
PO 1.4 Plant, exhaust and intake vents and other technical equipment is integrated into the building design to minimise visibility from the public realm and negative impacts on residential amenity by: (a) positioning plant and equipment in unobtrusive locations viewed from public roads and spaces	DTS/DPF 1.4 Development does not incorporate any structures that protrude beyond the roofline.

(b) screening rooftop plant and equipment from view (c) when located on the roof of non-residential development, locating the plant and equipment as far as practicable from adjacent sensitive land uses.	
PO 1.5 The negative visual impact of outdoor storage, waste management, loading and service areas is minimised by integrating them into the building design and screening them from public view (such as fencing, landscaping and built form) taking into account the form of development contemplated in the relevant zone.	DTS/DPF 1.5 None are applicable.
Safety	
PO 2.1 Development maximises opportunities for passive surveillance of the public realm by providing clear lines of sight, appropriate lighting and the use of visually permeable screening wherever practicable.	DTS/DPF 2.1 None are applicable.
PO 2.2 Development is designed to differentiate public, communal and private areas.	DTS/DPF 2.2 None are applicable.
PO 2.3 Buildings are designed with safe, perceptible and direct access from public street frontages and vehicle parking areas.	DTS/DPF 2.3 None are applicable.
PO 2.4 Development at street level is designed to maximise opportunities for passive surveillance of the adjacent public realm.	DTS/DPF 2.4 None are applicable.
PO 2.5 Common areas and entry points of buildings (such as the foyer areas of residential buildings), and non-residential land uses at street level, maximise passive surveillance from the public realm to the inside of the building at night.	DTS/DPF 2.5 None are applicable.
Landscaping	
PO 3.1 Soft landscaping and tree planting is incorporated to: (a) minimise heat absorption and reflection (b) maximise shade and shelter (c) maximise stormwater infiltration (d) enhance the appearance of land and streetscapes (e) contribute to biodiversity.	DTS/DPF 3.1 None are applicable.
PO 3.2 Soft landscaping and tree planting maximises the use of locally indigenous plant species, incorporates plant species best suited to current and future climate conditions and avoids pest plant and weed species.	DTS/DPF 3.2 None are applicable.
Environmental Performance	
PO 4.1 Buildings are sited, oriented and designed to maximise natural sunlight access and ventilation to main activity areas, habitable rooms, common areas and open spaces.	DTS/DPF 4.1 None are applicable.
PO 4.2 Buildings are sited and designed to maximise passive environmental performance and minimise energy consumption and reliance on	DTS/DPF 4.2 None are applicable.

mechanical systems, such as heating and cooling.	
PO 4.3 Buildings incorporate climate-responsive techniques and features such as building and window orientation, use of eaves, verandahs and shading structures, water harvesting, at ground landscaping, green walls, green roofs and photovoltaic cells.	DTS/DPF 4.3 None are applicable.
Water Sensitive Design	
PO 5.1 Development is sited and designed to maintain natural hydrological systems without negatively impacting: (a) the quantity and quality of surface water and groundwater (b) the depth and directional flow of surface water and groundwater (c) the quality and function of natural springs.	DTS/DPF 5.1 None are applicable.
On-site Waste Treatment Systems	
PO 6.1 Dedicated on-site effluent disposal areas do not include any areas to be used for, or could be reasonably foreseen to be used for, private open space, driveways or car parking.	DTS/DPF 6.1 Effluent disposal drainage areas do not: (a) encroach within an area used as private open space or result in less private open space than that specified in Design Table 1 - Private Open Space (b) use an area also used as a driveway (c) encroach within an area used for on-site car parking or result in less on-site car parking than that specified in Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements or Table 2 - Off-Street Car Parking Requirements in Designated Areas.
Carparking Appearance	
PO 7.1 Development facing the street is designed to minimise the negative impacts of any semi-basement and undercroft car parking on the streetscapes through techniques such as: (a) limiting protrusion above finished ground level (b) screening through appropriate planting, fencing and mounding (c) limiting the width of openings and integrating them into the building structure.	DTS/DPF 7.1 None are applicable.
PO 7.2 Vehicle parking areas are appropriately located, designed and constructed to minimise impacts on adjacent sensitive receivers through measures such as ensuring they are attractively developed and landscaped, screen fenced and the like.	DTS/DPF 7.2 None are applicable.
PO 7.3 Safe, legible, direct and accessible pedestrian connections are provided between parking areas and the development.	DTS/DPF 7.3 None are applicable.
PO 7.4 Street level vehicle parking areas incorporate tree planting to provide shade and reduce solar heat absorption and reflection.	DTS/DPF 7.4 None are applicable.
PO 7.5 Street level parking areas incorporate soft landscaping to improve visual appearance when viewed from within the site and from public places.	DTS/DPF 7.5 None are applicable.

PO 7.6 Vehicle parking areas and associated driveways are landscaped to provide shade and positively contribute to amenity.	DTS/DPF 7.6 None are applicable.
PO 7.7 Vehicle parking areas and access ways incorporate integrated stormwater management techniques such as permeable or porous surfaces, infiltration systems, drainage swales or rain gardens that integrate with soft landscaping.	DTS/DPF 7.7 None are applicable.
Earthworks and sloping land	
PO 8.1 Development, including any associated driveways and access tracks, minimises the need for earthworks to limit disturbance to natural topography.	DTS/DPF 8.1 Development does not involve any of the following: (a) excavation exceeding a vertical height of 1m (b) filling exceeding a vertical height of 1m (c) a total combined excavation and filling vertical height of 2m or more.
PO 8.2 Driveways and access tracks are designed and constructed to allow safe and convenient access on sloping land (with a gradient exceeding 1 in 8).	DTS/DPF 8.2 Driveways and access tracks on sloping land (with a gradient exceeding 1 in 8) satisfy (a) and (b): (a) do not have a gradient exceeding 25% (1-in-4) at any point along the driveway (b) are constructed with an all-weather trafficable surface.
PO 8.3 Driveways and access tracks on sloping land (with a gradient exceeding 1 in 8): (a) do not contribute to the instability of embankments and cuttings (b) provide level transition areas for the safe movement of people and goods to and from the development (c) are designed to integrate with the natural topography of the land.	DTS/DPF 8.3 None are applicable.
PO 8.4 Development on sloping land (with a gradient exceeding 1 in 8) avoids the alteration of natural drainage lines and includes on-site drainage systems to minimise erosion.	DTS/DPF 8.4 None are applicable.
PO 8.5 Development does not occur on land at risk of landslip nor increases the potential for landslip or land surface instability.	DTS/DPF 8.5 None are applicable.
Fences and Walls	
PO 9.1 Fences, walls and retaining walls are of sufficient height to maintain privacy and security without unreasonably impacting the visual amenity and adjoining land's access to sunlight or the amenity of public places.	DTS/DPF 9.1 None are applicable.
PO 9.2 Landscaping incorporated on the low side of retaining walls is visible from public roads and public open space to minimise visual impacts.	DTS/DPF 9.2 A vegetated landscaped strip 1m wide or more is provided against the low side of a retaining wall.
Overlooking / Visual Privacy (in building 3 storeys or less)	
PO 10.1 Development mitigates direct overlooking from upper level windows to	DTS/DPF 10.1 Upper level windows facing side or rear boundaries shared with a

habitable rooms and private open spaces of adjoining residential uses.	residential allotment/site satisfy one of the following: (a) are permanently obscured to a height of 1.5m above finished floor level and are fixed or not capable of being opened more than 200mm (b) have sill heights greater than or equal to 1.5m above finished floor level (c) incorporate screening with a maximum of 25% openings, permanently fixed no more than 500mm from the window surface and sited adjacent to any part of the window less than 1.5 m above the finished floor level.
PO 10.2 Development mitigates direct overlooking from balconies, terraces and decks to habitable rooms and private open space of adjoining residential uses.	DTS/DPF 10.2 One of the following is satisfied: (a) the longest side of the balcony or terrace will face a public road, public road reserve or public reserve that is at least 15m wide in all places faced by the balcony or terrace or (b) all sides of balconies or terraces on upper building levels are permanently obscured by screening with a maximum 25% transparency/openings fixed to a minimum height of: (i) 1.5m above finished floor level where the balcony is located at least 15 metres from the nearest habitable window of a dwelling on adjacent land or (ii) 1.7m above finished floor level in all other cases
All Residential development	
Front elevations and passive surveillance	
PO 11.1 Dwellings incorporate windows along primary street frontages to encourage passive surveillance and make a positive contribution to the streetscape.	DTS/DPF 11.1 Each dwelling with a frontage to a public street: (a) includes at least one window facing the primary street from a habitable room that has a minimum internal room dimension of 2.4m (b) has an aggregate window area of at least $2m^2$ facing the primary street.
PO 11.2 Dwellings incorporate entry doors within street frontages to address the street and provide a legible entry point for visitors.	DTS/DPF 11.2 Dwellings with a frontage to a public street have an entry door visible from the primary street boundary.
Outlook and amenity	
PO 12.1 Living rooms have an external outlook to provide a high standard of amenity for occupants.	DTS/DPF 12.1 A living room of a dwelling incorporates a window with an outlook towards the street frontage or private open space, public open space, or waterfront areas.
PO 12.2 Bedrooms are separated or shielded from active communal recreation areas, common access areas and vehicle parking areas and access ways to mitigate noise and artificial light intrusion.	DTS/DPF 12.2 None are applicable.
Ancillary Development	
PO 13.1 Residential ancillary buildings and structures are sited and designed to not detract from the streetscape or appearance of buildings on the site or neighbouring properties.	DTS/DPF 13.1 Ancillary buildings: (a) are ancillary to a dwelling erected on the same site (b) have a floor area not exceeding 60m2 (c) are not constructed, added to or altered so that any part is situated:

(i) in front of any part of the building line of the dwelling to which it is ancillary
or
(ii) within 900mm of a boundary of the allotment with a secondary street (if the land has boundaries on two or more roads)

(d) in the case of a garage or carport, the garage or carport:
(i) is set back at least 5.5m from the boundary of the primary street
(ii) when facing a primary street or secondary street, has a total door / opening not exceeding:
A. for dwellings of single building level - 7m in width or 50% of the site frontage, whichever is the lesser
B. for dwellings comprising two or more building levels at the building line fronting the same public street - 7m in width

(e) if situated on a boundary (not being a boundary with a primary street or secondary street), do not exceed a length of 11.5m unless:
(i) a longer wall or structure exists on the adjacent site and is situated on the same allotment boundary
and
(ii) the proposed wall or structure will be built along the same length of boundary as the existing adjacent wall or structure to the same or lesser extent

(f) if situated on a boundary of the allotment (not being a boundary with a primary street or secondary street), all walls or structures on the boundary will not exceed 45% of the length of that boundary

(g) will not be located within 3m of any other wall along the same boundary unless on an adjacent site on that boundary there is an existing wall of a building that would be adjacent to or about the proposed wall or structure

(h) have a wall height or post height not exceeding 3m above natural ground level (and not including a gable end)

(i) have a roof height where no part of the roof is more than 5m above the natural ground level

(j) if clad in sheet metal, is pre-colour treated or painted in a non-reflective colour

(k) retains a total area of soft landscaping in accordance with (i) or (ii), whichever is less:
(i) a total area as determined by the following table:

Dwelling site area (or in the case of residential flat building or group dwelling(s), average site area) (m^2)	Minimum percentage of site
<150	10%
150-200	15%
201-450	20%
>450	25%

(ii) the amount of existing soft landscaping prior to the development occurring.

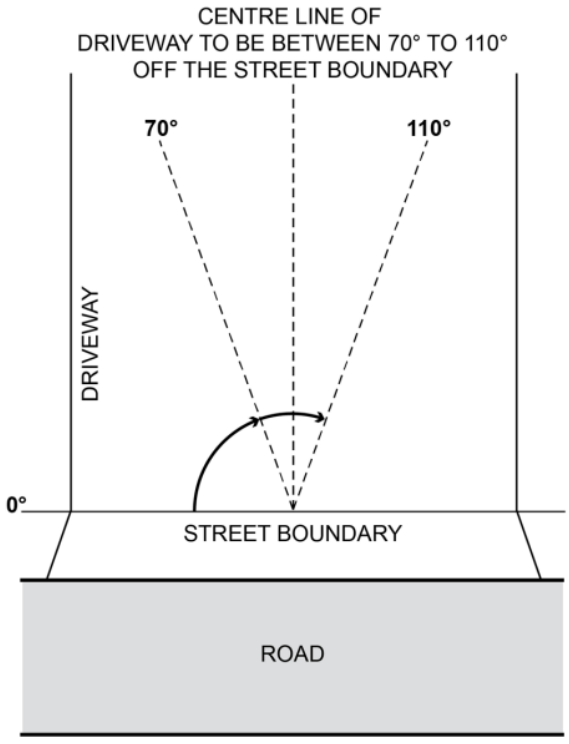
(l) in relation to ancillary accommodation in the Rural Zone, Productive Rural Landscape Zone, or Rural Horticulture Zone, is located within 20m of an existing dwelling.

PO 13.2	DTS/DPF 13.2

Ancillary buildings and structures do not impede on-site functional requirements such as private open space provision or car parking requirements and do not result in over-development of the site.	Ancillary buildings and structures do not result in: (a) less private open space than specified in Design in Urban Areas Table 1 - Private Open Space (b) less on-site car parking than specified in Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements or Table 2 - Off-Street Car Parking Requirements in Designated Areas.
PO 13.3 Fixed plant and equipment in the form of pumps and/or filtration systems for a swimming pool or spa is positioned and/or housed to not cause unreasonable noise nuisance to adjacent sensitive receivers.	DTS/DPF 13.3 The pump and/or filtration system is ancillary to a dwelling erected on the same site and is: (a) enclosed in a solid acoustic structure that is located at least 5m from the nearest habitable room located on an adjoining allotment or (b) located at least 12m from the nearest habitable room located on an adjoining allotment.
PO 13.4 Buildings and structures that are ancillary to an existing non-residential use do not detract from the streetscape character, appearance of buildings on the site of the development, or the amenity of neighbouring properties.	DTS/DPF 13.4 Non-residential ancillary buildings and structures: (a) are ancillary and subordinate to an existing non-residential use on the same site (b) have a floor area not exceeding the following: Allotment size / Floor area ≤500m2 / 60m2 >500m2 / 80m2 (c) are not constructed, added to or altered so that any part is situated: (i) in front of any part of the building line of the main building to which it is ancillary or (ii) within 900mm of a boundary of the allotment with a secondary street (if the land has boundaries on two or more roads) (d) in the case of a garage or carport, the garage or carport: (i) is set back at least 5.5m from the boundary of the primary street (e) if situated on a boundary (not being a boundary with a primary street or secondary street), do not exceed a length of 11.5m unless: (i) a longer wall or structure exists on the adjacent site and is situated on the same allotment boundary (ii) the proposed wall or structure will be built along the same length of boundary as the existing adjacent wall or structure to the same or lesser extent (f) if situated on a boundary of the allotment (not being a boundary with a primary street or secondary street), all walls or structures on the boundary will not exceed 45% of the length of that boundary (g) will not be located within 3m of any other wall along the same boundary unless on an adjacent site on that boundary there is an existing wall of a building that would be adjacent to or about the proposed wall or structure (h) have a wall height (or post height) not exceeding 3m (and not including a gable end) (i) have a roof height where no part of the roof is more than 5m above the natural ground level (j) if clad in sheet metal, is pre-colour treated or painted in a non-reflective colour.
Garage appearance	
PO 14.1	DTS/DPF 14.1

Garaging is designed to not detract from the streetscape or appearance of a dwelling.	Garages and carports facing a street: (a) are situated so that no part of the garage or carport is in front of any part of the building line of the dwelling (b) are set back at least 5.5m from the boundary of the primary street (c) have a garage door / opening not exceeding 7m in width (d) have a garage door /opening width not exceeding 50% of the site frontage unless the dwelling has two or more building levels at the building line fronting the same public street.
Massing	
PO 15.1 The visual mass of larger buildings is reduced when viewed from adjoining allotments or public streets.	DTS/DPF 15.1 None are applicable
Dwelling additions	
PO 16.1 Dwelling additions are sited and designed to not detract from the streetscape or amenity of adjoining properties and do not impede on-site functional requirements.	DTS / DPF 16.1 Dwelling additions: (a) are not constructed, added to or altered so that any part is situated closer to a public street (b) do not result in: (i) excavation exceeding a vertical height of 1m (ii) filling exceeding a vertical height of 1m (iii) a total combined excavation and filling vertical height of 2m or more (iv) less Private Open Space than specified in Design Table 1 - Private Open Space (v) less on-site parking than specified in Transport Access and Parking Table 1 - General Off-Street Car Parking Requirements or Table 2 - Off-Street Car Parking Requirements in Designated Areas (vi) upper level windows facing side or rear boundaries unless: A. they are permanently obscured to a height of 1.5m above finished floor level that is fixed or not capable of being opened more than 200mm or B. have sill heights greater than or equal to 1.5m above finished floor level or C. incorporate screening to a height of 1.5m above finished floor level (vii) all sides of balconies or terraces on upper building levels are permanently obscured by screening with a maximum 25% transparency/openings fixed to a minimum height of: A. 1.5m above finished floor level where the balcony is located at least 15 metres from the nearest habitable window of a dwelling on adjacent land B. 1.7m above finished floor level in all other cases.
Private Open Space	
PO 17.1 Dwellings are provided with suitable sized areas of usable private open space to meet the needs of occupants.	DTS/DPF 17.1 Private open space is provided in accordance with Design Table 1 - Private Open Space.
Water Sensitive Design	

PO 18.1 Residential development creating a common driveway / access includes stormwater management systems that minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system, watercourses or other water bodies.	DTS/DPF 18.1 Residential development creating a common driveway / access that services 5 or more dwellings achieves the following stormwater runoff outcomes: (a) 80 per cent reduction in average annual total suspended solids (b) 60 per cent reduction in average annual total phosphorus (c) 45 per cent reduction in average annual total nitrogen.
PO 18.2 Residential development creating a common driveway / access includes a stormwater management system designed to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure that the development does not increase the peak flows in downstream systems.	DTS/DPF 18.2 Development creating a common driveway / access that services 5 or more dwellings: (a) maintains the pre-development peak flow rate from the site based upon a 0.35 runoff coefficient for the 18.1% AEP 30-minute storm and the stormwater runoff time to peak is not increased or captures and retains the difference in pre-development runoff volume (based upon a 0.35 runoff coefficient) vs post development runoff volume from the site for an 18.1% AEP 30-minute storm; and (b) manages site generated stormwater runoff up to and including the 1% AEP flood event to avoid flooding of buildings.
Car parking, access and manoeuvrability	
PO 19.1 Enclosed parking spaces are of a size and dimensions to be functional, accessible and convenient.	DTS/DPF 19.1 Residential car parking spaces enclosed by fencing, walls or other structures have the following internal dimensions (separate from any waste storage area): (a) single width car parking spaces: (i) a minimum length of 5.4m per space (ii) a minimum width of 3.0m (iii) a minimum garage door width of 2.4m (b) double width car parking spaces (side by side): (i) a minimum length of 5.4m (ii) a minimum width of 5.4m (iii) minimum garage door width of 2.4m per space.
PO 19.2 Uncovered parking spaces are of a size and dimensions to be functional, accessible and convenient.	DTS/DPF 19.2 Uncovered car parking spaces have: (a) a minimum length of 5.4m (b) a minimum width of 2.4m (c) a minimum width between the centre line of the space and any fence, wall or other obstruction of 1.5m
PO 19.3 Driveways and access points are located and designed to facilitate safe access and egress while maximising land available for street tree planting, pedestrian movement, domestic waste collection, landscaped street frontages and on-street parking.	DTS/DPF 19.3 Driveways and access points on sites with a frontage to a public road of 10m or less have a width between 3.0 and 3.2 metres measured at the property boundary and are the only access point provided on the site.
PO 19.4 Vehicle access is safe, convenient, minimises interruption to the operation of public roads and does not interfere with street infrastructure or street trees.	DTS/DPF 19.4 Vehicle access to designated car parking spaces satisfy (a) or (b): (a) is provided via a lawfully existing or authorised access point or an access point for which consent has been granted as part of an application for the division of land (b) where newly proposed:

	(i) is set back 6m or more from the tangent point of an intersection of 2 or more roads (ii) is set back outside of the marked lines or infrastructure dedicating a pedestrian crossing (iii) does not involve the removal, relocation or damage to of mature street trees, street furniture or utility infrastructure services.
PO 19.5 Driveways are designed to enable safe and convenient vehicle movements from the public road to on-site parking spaces.	DTS/DPF 19.5 Driveways are designed and sited so that: (a) the gradient of the driveway does not exceed a grade of 1 in 4 and includes transitions to ensure a maximum grade change of 12.5% (1 in 8) for summit changes, and 15% (1 in 6.7) for sag changes, in accordance with AS 2890.1:2004 to prevent vehicles bottoming or scraping (b) the centreline of the driveway has an angle of no less than 70 degrees and no more than 110 degrees from the street boundary to which it takes its access as shown in the following diagram:  (c) if located to provide access from an alley, lane or right of way - the alley, land or right or way is at least 6.2m wide along the boundary of the allotment / site
PO 19.6 Driveways and access points are designed and distributed to optimise the provision of on-street visitor parking.	DTS/DPF 19.6 Where on-street parking is available abutting the site's street frontage, on-street parking is retained in accordance with the following requirements: (a) minimum 0.33 on-street spaces per dwelling on the site (rounded up to the nearest whole number) (b) minimum car park length of 5.4m where a vehicle can enter or exit a space directly (c) minimum carpark length of 6m for an intermediate space located between two other parking spaces or to an end obstruction where the parking is indented.
Waste storage	
PO 20.1	DTS/DPF 20.1

Provision is made for the adequate and convenient storage of waste bins in a location screened from public view.	None are applicable.
Design of Transportable Dwellings	
PO 21.1 The sub-floor space beneath transportable buildings is enclosed to give the appearance of a permanent structure.	DTS/DPF 21.1 Buildings satisfy (a) or (b): (a) are not transportable or (b) the sub-floor space between the building and ground level is clad in a material and finish consistent with the building.
Group dwelling, residential flat buildings and battle-axe development	
Amenity	
PO 22.1 Dwellings are of a suitable size to accommodate a layout that is well organised and provides a high standard of amenity for occupants.	DTS/DPF 22.1 Dwellings have a minimum internal floor area in accordance with the following table: **Number of bedrooms** / **Minimum internal floor area** Studio / 35m^2 1 bedroom / 50m^2 2 bedroom / 65m^2 3+ bedrooms / 80m^2 and any dwelling over 3 bedrooms provides an additional 15m^2 for every additional bedroom
PO 22.2 The orientation and siting of buildings minimises impacts on the amenity, outlook and privacy of occupants and neighbours.	DTS/DPF 22.2 None are applicable.
PO 22.3 Development maximises the number of dwellings that face public open space and public streets and limits dwellings oriented towards adjoining properties.	DTS/DPF 22.3 None are applicable.
PO 22.4 Battle-axe development is appropriately sited and designed to respond to the existing neighbourhood context.	DTS/DPF 22.4 Dwelling sites/allotments are not in the form of a battle-axe arrangement.
Communal Open Space	
PO 23.1 Private open space provision may be substituted for communal open space which is designed and sited to meet the recreation and amenity needs of residents.	DTS/DPF 23.1 None are applicable.
PO 23.2 Communal open space is of sufficient size and dimensions to cater for group recreation.	DTS/DPF 23.2 Communal open space incorporates a minimum dimension of 5 metres.
PO 23.3 Communal open space is designed and sited to: (a) be conveniently accessed by the dwellings which it services (b) have regard to acoustic, safety, security and wind effects.	DTS/DPF 23.3 None are applicable.

PO 23.4 Communal open space contains landscaping and facilities that are functional, attractive and encourage recreational use.	DTS/DPF 23.4 None are applicable.
PO 23.5 Communal open space is designed and sited to: (a) in relation to rooftop or elevated gardens, minimise overlooking into habitable room windows or onto the useable private open space of other dwellings (b) in relation to ground floor communal space, be overlooked by habitable rooms to facilitate passive surveillance.	DTS/DPF 23.5 None are applicable.
Carparking, access and manoeuvrability	
PO 24.1 Driveways and access points are designed and distributed to optimise the provision of on-street visitor parking.	DTS/DPF 24.1 Where on-street parking is available directly adjacent the site, on-street parking is retained adjacent the subject site in accordance with the following requirements: (a) minimum 0.33 on-street car parks per proposed dwellings (rounded up to the nearest whole number) (b) minimum car park length of 5.4m where a vehicle can enter or exit a space directly (c) minimum carpark length of 6m for an intermediate space located between two other parking spaces or to an end obstruction where the parking is indented.
PO 24.2 The number of vehicular access points onto public roads is minimised to reduce interruption of the footpath and positively contribute to public safety and walkability.	DTS/DPF 24.2 Access to group dwellings or dwellings within a residential flat building is provided via a single common driveway.
PO 24.3 Residential driveways that service more than one dwelling are designed to allow safe and convenient movement.	DTS/DPF 24.3 Driveways that service more than 1 dwelling or a dwelling on a battle-axe site: (a) have a minimum width of 3m (b) for driveways servicing more than 3 dwellings: (i) have a width of 5.5m or more and a length of 6m or more at the kerb of the primary street (ii) where the driveway length exceeds 30m, incorporate a passing point at least every 30 metres with a minimum width of 5.5m and a minimum length of 6m.
PO 24.4 Residential driveways in a battle-axe configuration are designed to allow safe and convenient movement.	DTS/DPF 24.4 Where in a battle-axe configuration, a driveway servicing one dwelling has a minimum width of 3m.
PO 24.5 Residential driveways that service more than one dwelling are designed to allow passenger vehicles to enter and exit the site and manoeuvre within the site in a safe and convenient manner.	DTS/DPF 24.5 Driveways providing access to more than one dwelling, or a dwelling on a battle-axe site, allow a B85 passenger vehicle to enter and exit the garages or parking spaces in no more than a three-point turn manoeuvre.
PO 24.6 Dwellings are adequately separated from common driveways and manoeuvring areas.	DTS/DPF 24.6 Dwelling walls with entry doors or ground level habitable room windows are set back at least 1.5m from any driveway or area designated for the movement and manoeuvring of vehicles.
Soft Landscaping	
PO 25.1 Soft landscaping is provided between dwellings and common driveways to improve the outlook for occupants and appearance of common	DTS/DPF 25.1 Other than where located directly in front of a garage or a building entry, soft landscaping with a minimum dimension of 1m is provided

areas.	between a dwelling and common driveway.
PO 25.2 Soft landscaping is provided that improves the appearance of common driveways.	DTS/DPF 25.2 Where a common driveway is located directly adjacent the side or rear boundary of the site, soft landscaping with a minimum dimension of 1m is provided between the driveway and site boundary (excluding along the perimeter of a passing point).
Site Facilities / Waste Storage	
PO 26.1 Provision is made for suitable mailbox facilities close to the major pedestrian entry to the site or conveniently located considering the nature of accommodation and mobility of occupants.	DTS/DPF 26.1 None are applicable.
PO 26.2 Provision is made for suitable external clothes drying facilities.	DTS/DPF 26.2 None are applicable.
PO 26.3 Provision is made for suitable household waste and recyclable material storage facilities which are: (a) located away, or screened, from public view, and (b) conveniently located in proximity to dwellings and the waste collection point.	DTS/DPF 26.3 None are applicable.
PO 26.4 Waste and recyclable material storage areas are located away from dwellings.	DTS/DPF 26.4 Dedicated waste and recyclable material storage areas are located at least 3m from any habitable room window.
PO 26.5 Where waste bins cannot be conveniently collected from the street, provision is made for on-site waste collection, designed to accommodate the safe and convenient access, egress and movement of waste collection vehicles.	DTS/DPF 26.5 None are applicable.
PO 26.6 Services including gas and water meters are conveniently located and screened from public view.	DTS/DPF 26.6 None are applicable.
Supported accommodation and retirement facilities	
Siting and Configuration	
PO 27.1 Supported accommodation and housing for aged persons and people with disabilities is located where on-site movement of residents is not unduly restricted by the slope of the land.	DTS/DPF 27.1 None are applicable.
Movement and Access	
PO 28.1 Development is designed to support safe and convenient access and movement for residents by providing: (a) ground-level access or lifted access to all units (b) level entry porches, ramps, paths, driveways, passenger loading areas and areas adjacent to footpaths that allow for the passing of wheelchairs and resting places (c) car parks with gradients no steeper than 1-in-40 and of sufficient area to provide for wheelchair manoeuvrability (d) kerb ramps at pedestrian crossing points.	DTS/DPF 28.1 None are applicable.
Communal Open Space	
PO 29.1	DTS/DPF 29.1

Development is designed to provide attractive, convenient and comfortable indoor and outdoor communal areas to be used by residents and visitors.	None are applicable.
PO 29.2 Private open space provision may be substituted for communal open space which is designed and sited to meet the recreation and amenity needs of residents.	DTS/DPF 29.2 None are applicable.
PO 29.3 Communal open space is of sufficient size and dimensions to cater for group recreation.	DTS/DPF 29.3 Communal open space incorporates a minimum dimension of 5 metres.
PO 29.4 Communal open space is designed and sited to: (a) be conveniently accessed by the dwellings which it services (b) have regard to acoustic, safety, security and wind effects.	DTS/DPF 29.4 None are applicable.
PO 29.5 Communal open space contains landscaping and facilities that are functional, attractive and encourage recreational use.	DTS/DPF 29.5 None are applicable.
PO 29.6 Communal open space is designed and sited to: (a) in relation to rooftop or elevated gardens, minimise overlooking into habitable room windows or onto the useable private open space of other dwellings (b) in relation to ground floor communal space, be overlooked by habitable rooms to facilitate passive surveillance.	DTS/DPF 29.6 None are applicable.
Site Facilities / Waste Storage	
PO 30.1 Development is designed to provide storage areas for personal items and specialised equipment such as small electric powered vehicles, including facilities for the recharging of small electric powered vehicles.	DTS/DPF 30.1 None are applicable.
PO 30.2 Provision is made for suitable mailbox facilities close to the major pedestrian entry to the site or conveniently located considering the nature of accommodation and mobility of occupants.	DTS/DPF 30.2 None are applicable.
PO 30.3 Provision is made for suitable external clothes drying facilities.	DTS/DPF 30.3 None are applicable.
PO 30.4 Provision is made for suitable household waste and recyclable material storage facilities conveniently located and screened from public view.	DTS/DPF 30.4 None are applicable.
PO 30.5 Waste and recyclable material storage areas are located away from dwellings.	DTS/DPF 30.5 Dedicated waste and recyclable material storage areas are located at least 3m from any habitable room window.
PO 30.6 Provision is made for on-site waste collection where 10 or more bins are to be collected at any one time.	DTS/DPF 30.6 None are applicable.
PO 30.7 Services including gas and water meters are conveniently located and screened from public view.	DTS/DPF 30.7 None are applicable.

All non-residential development	
Water Sensitive Design	
PO 31.1 Development likely to result in significant risk of export of litter, oil or grease includes stormwater management systems designed to minimise pollutants entering stormwater.	DTS/DPF 31.1 None are applicable.
PO 31.2 Water discharged from a development site is of a physical, chemical and biological condition equivalent to or better than its pre-developed state.	DTS/DPF 31.2 None are applicable.
Wash-down and Waste Loading and Unloading	
PO 32.1 Areas for activities including loading and unloading, storage of waste refuse bins in commercial and industrial development or wash-down areas used for the cleaning of vehicles, vessels, plant or equipment are: (a) designed to contain all wastewater likely to pollute stormwater within a bunded and roofed area to exclude the entry of external surface stormwater run-off (b) paved with an impervious material to facilitate wastewater collection (c) of sufficient size to prevent 'splash-out' or 'over-spray' of wastewater from the wash-down area (d) designed to drain wastewater to either: (i) a treatment device such as a sediment trap and coalescing plate oil separator with subsequent disposal to a sewer, private or Community Wastewater Management Scheme or (ii) a holding tank and its subsequent removal off-site on a regular basis.	DTS/DPF 32.1 None are applicable.
Decks	
Design and Siting	
PO 33.1 Decks are designed and sited to: (a) complement the associated building form (b) minimise impacts on the streetscape through siting behind the building line of the principal building (unless on a significant allotment or open space) (c) minimise cut and fill and overall massing when viewed from adjacent land.	DTS/DPF 33.1 Decks: (a) where ancillary to a dwelling: (i) are not constructed, added to or altered so that any part is situated: A. in front of any part of the building line of the dwelling to which it is ancillary or B. within 900mm of a boundary of the allotment with a secondary street (if the land has boundaries on two or more roads) (ii) are set back at least 900mm from side or rear allotment boundaries (iii) when attached to the dwelling, has a finished floor level consistent with the finished ground floor level of the dwelling (iv) where associated with a residential use, retains a total area of soft landscaping for the entire development site, including any common property, with a minimum dimension of 700mm in accordance with (A) or (B), whichever is less: A. a total area is determined by the following table: **Site area (or in the case of residential flat building or** **Minimum percentage of**

	group dwelling(s), average site area) (m^2) / site <150 / 10% 150-200 / 15% >200-450 / 20% >450 / 25% B. the amount of existing soft landscaping prior to the development occurring. (b) where in association with a non-residential use: (i) are set back at least 2 metres from the boundary of an allotment used for residential purposes. (ii) are set back at least 2 metres from a public road. (iii) have a floor area not exceeding $25m^2$ (c) in all cases, has a finished floor level not exceeding 1 metre above natural ground level at any point.
PO 33.2 Decks are designed and sited to minimise direct overlooking of habitable rooms and private open spaces of adjoining residential uses in neighbourhood-type zones through suitable floor levels, screening and siting taking into account the slope of the subject land, existing vegetation on the subject land, and fencing.	DTS/DPF 33.2 Decks with a finished floor level/s 500mm or more above natural ground level facing side or rear boundaries shared with a residential use in a neighbourhood-type zone incorporate screening with a maximum of 25% transparency/openings, permanently fixed to the outer edge of the deck not less than 1.5 m above the finished floor level/s.
PO 33.3 Decks used for outdoor dining, entertainment or other commercial uses provide carparking in accordance with the primary use of the deck.	DTS/DPF 33.3 Decks used for commercial purposes do not result in less on-site car parking for the primary use of the subject land than specified in Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements or Table 2 - Off-Street Car Parking Requirements in Designated Areas.

Table 1 - Private Open Space

Dwelling Type	Minimum Rate
Dwelling (at ground level)	Total private open space area: (a) Site area <$301m^2$: $24m^2$ located behind the building line. (b) Site area ≥ $301m^2$: $60m^2$ located behind the building line. Minimum directly accessible from a living room: $16m^2$ / with a minimum dimension 3m.
Dwelling (above ground level)	Studio (no separate bedroom): $4m^2$ with a minimum dimension 1.8m One bedroom: $8m^2$ with a minimum dimension 2.1m Two bedroom dwelling: $11m^2$ with a minimum dimension 2.4m Three + bedroom dwelling: $15m^2$ with a minimum dimension 2.6m
Cabin or caravan (permanently fixed to the ground) in a residential park or a caravan and tourist park	Total area: $16m^2$, which may be used as second car parking space, provided on each site intended for residential occupation.

Design in Urban Areas

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Development is: (a) contextual - by considering, recognising and carefully responding to its natural surroundings or built environment and positively contributing to the character of the locality (b) durable - fit for purpose, adaptable and long lasting (c) inclusive - by integrating landscape design to optimise pedestrian and cyclist usability, privacy and equitable access and promoting the provision of quality spaces integrated with the public realm that can be used for access and recreation and help optimise security and safety both internally and within the public realm, for occupants and visitors (d) sustainable - by integrating sustainable techniques into the design and siting of development and landscaping to improve community health, urban heat, water management, environmental performance, biodiversity and local amenity and to minimise energy consumption.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
All Development	
External Appearance	
PO 1.1 Buildings reinforce corners through changes in setback, articulation, materials, colour and massing (including height, width, bulk, roof form and slope).	DTS/DPF 1.1 None are applicable.
PO 1.2 Where zero or minor setbacks are desirable, development provides shelter over footpaths (in the form of verandahs, awnings, canopies and the like, with adequate lighting) to positively contribute to the walkability, comfort and safety of the public realm.	DTS/DPF 1.2 None are applicable.
PO 1.3 Building elevations facing the primary street (other than ancillary buildings) are designed and detailed to convey purpose, identify main access points and complement the streetscape.	DTS/DPF 1.3 None are applicable.
PO 1.4 Plant, exhaust and intake vents and other technical equipment are integrated into the building design to minimise visibility from the public realm and negative impacts on residential amenity by: (a) positioning plant and equipment discretely, in unobtrusive locations as viewed from public roads and spaces (b) screening rooftop plant and equipment from view (c) when located on the roof of non-residential development, locating the plant and equipment as far as practicable from adjacent sensitive land uses.	DTS/DPF 1.4 Development does not incorporate any structures that protrude beyond the roofline.
PO 1.5 The negative visual impact of outdoor storage, waste management,	DTS/DPF 1.5 None are applicable.

loading and service areas is minimised by integrating them into the building design and screening them from public view (such as fencing, landscaping and built form), taking into account the form of development contemplated in the relevant zone.	
Safety	
PO 2.1 Development maximises opportunities for passive surveillance of the public realm by providing clear lines of sight, appropriate lighting and the use of visually permeable screening wherever practicable.	DTS/DPF 2.1 None are applicable.
PO 2.2 Development is designed to differentiate public, communal and private areas.	DTS/DPF 2.2 None are applicable.
PO 2.3 Buildings are designed with safe, perceptible and direct access from public street frontages and vehicle parking areas.	DTS/DPF 2.3 None are applicable.
PO 2.4 Development at street level is designed to maximise opportunities for passive surveillance of the adjacent public realm.	DTS/DPF 2.4 None are applicable.
PO 2.5 Common areas and entry points of buildings (such as the foyer areas of residential buildings) and non-residential land uses at street level, maximise passive surveillance from the public realm to the inside of the building at night.	DTS/DPF 2.5 None are applicable.
Landscaping	
PO 3.1 Soft landscaping and tree planting are incorporated to: (a) minimise heat absorption and reflection (b) maximise shade and shelter (c) maximise stormwater infiltration (d) enhance the appearance of land and streetscapes.	DTS/DPF 3.1 None are applicable.
Environmental Performance	
PO 4.1 Buildings are sited, oriented and designed to maximise natural sunlight access and ventilation to main activity areas, habitable rooms, common areas and open spaces.	DTS/DPF 4.1 None are applicable.
PO 4.2 Buildings are sited and designed to maximise passive environmental performance and minimise energy consumption and reliance on mechanical systems, such as heating and cooling.	DTS/DPF 4.2 None are applicable.
PO 4.3 Buildings incorporate climate responsive techniques and features such as building and window orientation, use of eaves, verandahs and shading structures, water harvesting, at ground landscaping, green walls, green roofs and photovoltaic cells.	DTS/DPF 4.3 None are applicable.
Water Sensitive Design	
PO 5.1 Development is sited and designed to maintain natural hydrological systems without negatively impacting: (a) the quantity and quality of surface water and groundwater	DTS/DPF 5.1 None are applicable.

(b) the depth and directional flow of surface water and groundwater (c) the quality and function of natural springs.	
On-site Waste Treatment Systems	
PO 6.1 Dedicated on-site effluent disposal areas do not include any areas to be used for, or could be reasonably foreseen to be used for, private open space, driveways or car parking.	DTS/DPF 6.1 Effluent disposal drainage areas do not: (a) encroach within an area used as private open space or result in less private open space than that specified in Design in Urban Areas Table 1 - Private Open Space (b) use an area also used as a driveway (c) encroach within an area used for on-site car parking or result in less on-site car parking than that specified in Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements or Table 2 - Off-Street Car Parking Requirements in Designated Areas.
Car parking appearance	
PO 7.1 Development facing the street is designed to minimise the negative impacts of any semi-basement and undercroft car parking on streetscapes through techniques such as: (a) limiting protrusion above finished ground level (b) screening through appropriate planting, fencing and mounding (c) limiting the width of openings and integrating them into the building structure.	DTS/DPF 7.1 None are applicable.
PO 7.2 Vehicle parking areas appropriately located, designed and constructed to minimise impacts on adjacent sensitive receivers through measures such as ensuring they are attractively developed and landscaped, screen fenced and the like.	DTS/DPF 7.2 None are applicable.
PO 7.3 Safe, legible, direct and accessible pedestrian connections are provided between parking areas and the development.	DTS/DPF 7.3 None are applicable.
PO 7.4 Street-level vehicle parking areas incorporate tree planting to provide shade, reduce solar heat absorption and reflection.	DTS/DPF 7.4 Vehicle parking areas that are open to the sky and comprise 10 or more car parking spaces include a shade tree with a mature canopy of 4m diameter spaced for each 10 car parking spaces provided and a landscaped strip on any road frontage of a minimum dimension of 1m.
PO 7.5 Street level parking areas incorporate soft landscaping to improve visual appearance when viewed from within the site and from public places.	DTS/DPF 7.5 Vehicle parking areas comprising 10 or more car parking spaces include soft landscaping with a minimum dimension of: (a) 1m along all public road frontages and allotment boundaries (b) 1m between double rows of car parking spaces.
PO 7.6 Vehicle parking areas and associated driveways are landscaped to provide shade and positively contribute to amenity.	DTS/DPF 7.6 None are applicable.
PO 7.7 Vehicle parking areas and access ways incorporate integrated stormwater management techniques such as permeable or porous surfaces, infiltration systems, drainage swales or rain gardens that integrate with soft landscaping.	DTS/DPF 7.7 None are applicable.
Earthworks and sloping land	
PO 8.1	DTS/DPF 8.1

Development, including any associated driveways and access tracks, minimises the need for earthworks to limit disturbance to natural topography.	Development does not involve any of the following: (a) excavation exceeding a vertical height of 1m (b) filling exceeding a vertical height of 1m (c) a total combined excavation and filling vertical height of 2m or more.
PO 8.2 Driveways and access tracks designed and constructed to allow safe and convenient access on sloping land.	DTS/DPF 8.2 Driveways and access tracks on sloping land (with a gradient exceeding 1 in 8) satisfy (a) and (b): (a) do not have a gradient exceeding 25% (1-in-4) at any point along the driveway (b) are constructed with an all-weather trafficable surface.
PO 8.3 Driveways and access tracks on sloping land (with a gradient exceeding 1 in 8): (a) do not contribute to the instability of embankments and cuttings (b) provide level transition areas for the safe movement of people and goods to and from the development (c) are designed to integrate with the natural topography of the land.	DTS/DPF 8.3 None are applicable.
PO 8.4 Development on sloping land (with a gradient exceeding 1 in 8) avoids the alteration of natural drainage lines and includes on site drainage systems to minimise erosion.	DTS/DPF 8.4 None are applicable.
PO 8.5 Development does not occur on land at risk of landslip or increase the potential for landslip or land surface instability.	DTS/DPF 8.5 None are applicable.
Fences and walls	
PO 9.1 Fences, walls and retaining walls of sufficient height maintain privacy and security without unreasonably impacting visual amenity and adjoining land's access to sunlight or the amenity of public places.	DTS/DPF 9.1 None are applicable.
PO 9.2 Landscaping is incorporated on the low side of retaining walls that are visible from public roads and public open space to minimise visual impacts.	DTS/DPF 9.2 A vegetated landscaped strip 1m wide or more is provided against the low side of a retaining wall.
Overlooking / Visual Privacy (low rise buildings)	
PO 10.1 Development mitigates direct overlooking from upper level windows to habitable rooms and private open spaces of adjoining residential uses in neighbourhood-type zones.	DTS/DPF 10.1 Upper level windows facing side or rear boundaries shared with a residential use in a neighbourhood-type zone: (a) are permanently obscured to a height of 1.5m above finished floor level and are fixed or not capable of being opened more than 125mm (b) have sill heights greater than or equal to 1.5m above finished floor level (c) incorporate screening with a maximum of 25% openings, permanently fixed no more than 500mm from the window surface and sited adjacent to any part of the window less than 1.5 m above the finished floor level.
PO 10.2	DTS/DPF 10.2

Development mitigates direct overlooking from balconies to habitable rooms and private open space of adjoining residential uses in neighbourhood type zones.	One of the following is satisfied: (a) the longest side of the balcony or terrace will face a public road, public road reserve or public reserve that is at least 15m wide in all places faced by the balcony or terrace or (b) all sides of balconies or terraces on upper building levels are permanently obscured by screening with a maximum 25% transparency/openings fixed to a minimum height of: (i) 1.5m above finished floor level where the balcony is located at least 15 metres from the nearest habitable window of a dwelling on adjacent land or (ii) 1.7m above finished floor level in all other cases
Site Facilities / Waste Storage (excluding low rise residential development)	
PO 11.1 Development provides a dedicated area for on-site collection and sorting of recyclable materials and refuse, green organic waste and wash bay facilities for the ongoing maintenance of bins that is adequate in size considering the number and nature of the activities they will serve and the frequency of collection.	DTS/DPF 11.1 None are applicable.
PO 11.2 Communal waste storage and collection areas are located, enclosed and designed to be screened from view from the public domain, open space and dwellings.	DTS/DPF 11.2 None are applicable.
PO 11.3 Communal waste storage and collection areas are designed to be well ventilated and located away from habitable rooms.	DTS/DPF 11.3 None are applicable.
PO 11.4 Communal waste storage and collection areas are designed to allow waste and recycling collection vehicles to enter and leave the site without reversing.	DTS/DPF 11.4 None are applicable.
PO 11.5 For mixed use developments, non-residential waste and recycling storage areas and access provide opportunities for on-site management of food waste through composting or other waste recovery as appropriate.	DTS/DPF 11.5 None are applicable.
All Development - Medium and High Rise	
External Appearance	
PO 12.1 Buildings positively contribute to the character of the local area by responding to local context.	DTS/DPF 12.1 None are applicable.
PO 12.2 Architectural detail at street level and a mixture of materials at lower building levels near the public interface are provided to reinforce a human scale.	DTS/DPF 12.2 None are applicable.
PO 12.3 Buildings are designed to reduce visual mass by breaking up building elevations into distinct elements.	DTS/DPF 12.3 None are applicable.
PO 12.4 Boundary walls visible from public land include visually interesting treatments to break up large blank elevations.	DTS/DPF 12.4 None are applicable.
PO 12.5 External materials and finishes are durable and age well to minimise ongoing maintenance requirements.	DTS/DPF 12.5 Buildings utilise a combination of the following external materials and finishes: (a) masonry (b) natural stone

	(c) pre-finished materials that minimise staining, discolouring or deterioration.
PO 12.6 Street-facing building elevations are designed to provide attractive, high quality and pedestrian-friendly street frontages.	DTS/DPF 12.6 Building street frontages incorporate: (a) active uses such as shops or offices (b) prominent entry areas for multi-storey buildings (where it is a common entry) (c) habitable rooms of dwellings (d) areas of communal public realm with public art or the like, where consistent with the zone and/or subzone provisions.
PO 12.7 Entrances to multi-storey buildings are safe, attractive, welcoming, functional and contribute to streetscape character.	DTS/DPF 12.7 Entrances to multi-storey buildings are: (a) oriented towards the street (b) clearly visible and easily identifiable from the street and vehicle parking areas (c) designed to be prominent, accentuated and a welcoming feature if there are no active or occupied ground floor uses (d) designed to provide shelter, a sense of personal address and transitional space around the entry (e) located as close as practicable to the lift and / or lobby access to minimise the need for long access corridors (f) designed to avoid the creation of potential areas of entrapment.
PO 12.8 Building services, plant and mechanical equipment are screened from the public realm.	DTS/DPF 12.8 None are applicable.
Landscaping	
PO 13.1 Development facing a street provides a well landscaped area that contains a deep soil space to accommodate a tree of a species and size adequate to provide shade, contribute to tree canopy targets and soften the appearance of buildings.	DTS/DPF 13.1 Buildings provide a 4m by 4m deep soil space in front of the building that accommodates a medium to large tree, except where no building setback from front property boundaries is desired.
PO 13.2 Deep soil zones are provided to retain existing vegetation or provide areas that can accommodate new deep root vegetation, including tall trees with large canopies to provide shade and soften the appearance of multi-storey buildings.	DTS/DPF 13.2 Multi-storey development provides deep soil zones and incorporates trees at not less than the following rates, except in a location or zone where full site coverage is desired.

Site area	Minimum deep soil area	Minimum dimension	Tree / deep soil zones
<300 m^2	10 m^2	1.5m	1 small tree / 10 m^2
300-1500 m^2	7% site area	3m	1 medium tree / 30 m^2
>1500 m^2	7% site area	6m	1 large or medium tree / 60 m^2

Tree size and site area definitions	
Small tree	4-6m mature height and 2-4m canopy spread
Medium tree	6-12m mature height and 4-8m canopy spread
Large tree	12m mature height and >8m canopy spread

	Site area: The total area for development site, not average area per dwelling
PO 13.3 Deep soil zones with access to natural light are provided to assist in maintaining vegetation health.	DTS/DPF 13.3 None are applicable.
PO 13.4 Unless separated by a public road or reserve, development sites adjacent to any zone that has a primary purpose of accommodating low-rise residential development incorporate a deep soil zone along the common boundary to enable medium to large trees to be retained or established to assist in screening new buildings of 3 or more building levels in height.	DTS/DPF 13.4 Building elements of 3 or more building levels in height are set back at least 6m from a zone boundary in which a deep soil zone area is incorporated.
Environmental	
PO 14.1 Development minimises detrimental micro-climatic impacts on adjacent land and buildings.	DTS/DPF 14.1 None are applicable.
PO 14.2 Development incorporates sustainable design techniques and features such as window orientation, eaves and shading structures, water harvesting and use, green walls and roof designs that enable the provision of rain water tanks (where they are not provided elsewhere on site), green roofs and photovoltaic cells.	DTS/DPF 14.2 None are applicable.
PO 14.3 Development of 5 or more building levels, or 21m or more in height (as measured from natural ground level and excluding roof-mounted mechanical plant and equipment) is designed to minimise the impacts of wind through measures such as: (a) a podium at the base of a tall tower and aligned with the street to deflect wind away from the street (b) substantial verandahs around a building to deflect downward travelling wind flows over pedestrian areas (c) the placement of buildings and use of setbacks to deflect the wind at ground level (d) avoiding tall shear elevations that create windy conditions at street level.	DTS/DPF 14.3 None are applicable.
Car Parking	
PO 15.1 Multi-level vehicle parking structures are designed to contribute to active street frontages and complement neighbouring buildings.	DTS/DPF 15.1 Multi-level vehicle parking structures within buildings: (a) provide land uses such as commercial, retail or other non-car parking uses along ground floor street frontages (b) incorporate facade treatments in building elevations facing along major street frontages that are sufficiently enclosed and detailed to complement adjacent buildings.
PO 15.2 Multi-level vehicle parking structures within buildings complement the surrounding built form in terms of height, massing and scale.	DTS/DPF 15.2 None are applicable.
Overlooking/Visual Privacy	
PO 16.1 Development mitigates direct overlooking of habitable rooms and private open spaces of adjacent residential uses in neighbourhood-type zones through measures such as:	DTS/DPF 16.1 None are applicable.

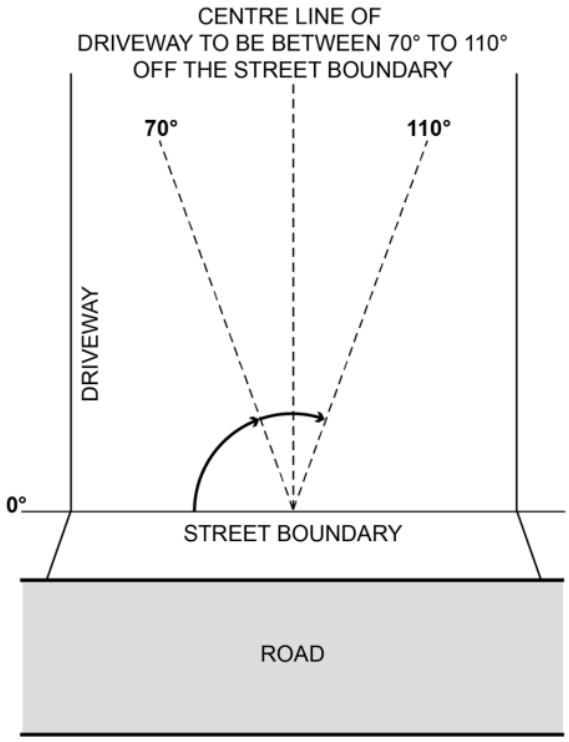
(a) appropriate site layout and building orientation (b) off-setting the location of balconies and windows of habitable rooms or areas with those of other buildings so that views are oblique rather than direct to avoid direct line of sight (c) building setbacks from boundaries (including building boundary to boundary where appropriate) that interrupt views or that provide a spatial separation between balconies or windows of habitable rooms (d) screening devices that are integrated into the building design and have minimal negative effect on residents' or neighbours' amenity.	
All residential development	
Front elevations and passive surveillance	
PO 17.1 Dwellings incorporate windows facing primary street frontages to encourage passive surveillance and make a positive contribution to the streetscape.	DTS/DPF 17.1 Each dwelling with a frontage to a public street: (a) includes at least one window facing the primary street from a habitable room that has a minimum internal room dimension of 2.4m (b) has an aggregate window area of at least $2m^2$ facing the primary street.
PO 17.2 Dwellings incorporate entry doors within street frontages to address the street and provide a legible entry point for visitors.	DTS/DPF 17.2 Dwellings with a frontage to a public street have an entry door visible from the primary street boundary.
Outlook and Amenity	
PO 18.1 Living rooms have an external outlook to provide a high standard of amenity for occupants.	DTS/DPF 18.1 A living room of a dwelling incorporates a window with an external outlook of the street frontage, private open space, public open space, or waterfront areas.
PO 18.2 Bedrooms are separated or shielded from active communal recreation areas, common access areas and vehicle parking areas and access ways to mitigate noise and artificial light intrusion.	DTS/DPF 18.2 None are applicable.
Ancillary Development	
PO 19.1 Residential ancillary buildings are sited and designed to not detract from the streetscape or appearance of primary residential buildings on the site or neighbouring properties.	DTS/DPF 19.1 Ancillary buildings: (a) are ancillary to a dwelling erected on the same site (b) have a floor area not exceeding 60m2 (c) are not constructed, added to or altered so that any part is situated: (i) in front of any part of the building line of the dwelling to which it is ancillary or (ii) within 900mm of a boundary of the allotment with a secondary street (if the land has boundaries on two or more roads) (d) in the case of a garage or carport, the garage or carport: (i) is set back at least 5.5m from the boundary of the primary street (ii) when facing a primary street or secondary street, has a total door / opening not exceeding: A. for dwellings of single building level - 7m in width or 50% of the site frontage, whichever is the lesser B. for dwellings comprising two or more building levels at the building line fronting the same public street - 7m in width

	(e) if situated on a boundary (not being a boundary with a primary street or secondary street), do not exceed a length of 11.5m unless: (i) a longer wall or structure exists on the adjacent site and is situated on the same allotment boundary and (ii) the proposed wall or structure will be built along the same length of boundary as the existing adjacent wall or structure to the same or lesser extent (f) if situated on a boundary of the allotment (not being a boundary with a primary street or secondary street), all walls or structures on the boundary will not exceed 45% of the length of that boundary (g) will not be located within 3m of any other wall along the same boundary unless on an adjacent site on that boundary there is an existing wall of a building that would be adjacent to or about the proposed wall or structure (h) have a wall height or post height not exceeding 3m above natural ground level (and not including a gable end) (i) have a roof height where no part of the roof is more than 5m above the natural ground level (j) if clad in sheet metal, is pre-colour treated or painted in a non-reflective colour (k) retains a total area of soft landscaping in accordance with (i) or (ii), whichever is less: (i) a total area as determined by the following table: **Dwelling site area (or in the case of residential flat building or group dwelling(s), average site area) (m^2)** / **Minimum percentage of site** <150 / 10% 150-200 / 15% 201-450 / 20% >450 / 25% (ii) the amount of existing soft landscaping prior to the development occurring. (l) in relation to ancillary accommodation in the Rural Zone, Productive Rural Landscape Zone, or Rural Horticulture Zone, is located within 20m of an existing dwelling.
PO 19.2 Ancillary buildings and structures do not impede on-site functional requirements such as private open space provision, car parking requirements or result in over-development of the site.	DTS/DPF 19.2 Ancillary buildings and structures do not result in: (a) less private open space than specified in Design in Urban Areas Table 1 - Private Open Space (b) less on-site car parking than specified in Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements or Table 2 - Off-Street Car Parking Requirements in Designated Areas.
PO 19.3 Fixed plant and equipment in the form of pumps and/or filtration systems for a swimming pool or spa positioned and/or housed to not cause unreasonable noise nuisance to adjacent sensitive receivers.	DTS/DPF 19.3 The pump and/or filtration system is ancillary to a dwelling erected on the same site and is: (a) enclosed in a solid acoustic structure that is located at least 5m from the nearest habitable room located on an adjoining allotment or (b) located at least 12m from the nearest habitable room located on an adjoining allotment.

PO 19.4 Buildings and structures that are ancillary to an existing non-residential use do not detract from the streetscape character, appearance of buildings on the site of the development, or the amenity of neighbouring properties.	DTS/DPF 19.4 Non-residential ancillary buildings and structures: (a) are ancillary and subordinate to an existing non-residential use on the same site (b) have a floor area not exceeding the following: Allotment size: ≤500m2 — Floor area: 60m2; >500m2 — 80m2 (c) are not constructed, added to or altered so that any part is situated: (i) in front of any part of the building line of the main building to which it is ancillary or (ii) within 900mm of a boundary of the allotment with a secondary street (if the land has boundaries on two or more roads) (d) in the case of a garage or carport, the garage or carport: (i) is set back at least 5.5m from the boundary of the primary street (e) if situated on a boundary (not being a boundary with a primary street or secondary street), do not exceed a length of 11.5m unless: (i) a longer wall or structure exists on the adjacent site and is situated on the same allotment boundary (ii) the proposed wall or structure will be built along the same length of boundary as the existing adjacent wall or structure to the same or lesser extent (f) if situated on a boundary of the allotment (not being a boundary with a primary street or secondary street), all walls or structures on the boundary will not exceed 45% of the length of that boundary (g) will not be located within 3m of any other wall along the same boundary unless on an adjacent site on that boundary there is an existing wall of a building that would be adjacent to or about the proposed wall or structure (h) have a wall height (or post height) not exceeding 3m (and not including a gable end) (i) have a roof height where no part of the roof is more than 5m above the natural ground level (j) if clad in sheet metal, is pre-colour treated or painted in a non-reflective colour.
Residential Development - Low Rise	
External appearance	
PO 20.1 Garaging is designed to not detract from the streetscape or appearance of a dwelling.	DTS/DPF 20.1 Garages and carports facing a street: (a) are situated so that no part of the garage or carport will be in front of any part of the building line of the dwelling (b) are set back at least 5.5m from the boundary of the primary street (c) have a garage door / opening width not exceeding 7m (d) have a garage door / opening width not exceeding 50% of the site frontage unless the dwelling has two or more building levels at the building line fronting the same public street.
PO 20.2 Dwelling elevations facing public streets and common driveways make a positive contribution to the streetscape and the appearance of common driveway areas.	DTS/DPF 20.2 Each dwelling includes at least 3 of the following design features within the building elevation facing a primary street, and at least 2 of the following design features within the building elevation facing any other public road (other than a laneway) or a common driveway:

	(a) a minimum of 30% of the building wall is set back an additional 300mm from the building line (b) a porch or portico projects at least 1m from the building wall (c) a balcony projects from the building wall (d) a verandah projects at least 1m from the building wall (e) eaves of a minimum 400mm width extend along the width of the front elevation (f) a minimum 30% of the width of the upper level projects forward from the lower level primary building line by at least 300mm (g) a minimum of two different materials or finishes are incorporated on the walls of the front building elevation, with a maximum of 80% of the building elevation in a single material or finish.
PO 20.3 The visual mass of larger buildings is reduced when viewed from adjoining allotments or public streets.	DTS/DPF 20.3 None are applicable
Private Open Space	
PO 21.1 Dwellings are provided with suitable sized areas of usable private open space to meet the needs of occupants.	DTS/DPF 21.1 Private open space is provided in accordance with Design in Urban Areas Table 1 - Private Open Space.
PO 21.2 Private open space is positioned to provide convenient access from internal living areas.	DTS/DPF 21.2 Private open space is directly accessible from a habitable room.
Landscaping	
PO 22.1 Soft landscaping is incorporated into development to: (a) minimise heat absorption and reflection (b) contribute shade and shelter (c) provide for stormwater infiltration and biodiversity (d) enhance the appearance of land and streetscapes.	DTS/DPF 22.1 Residential development incorporates soft landscaping with a minimum dimension of 700mm provided in accordance with (a) and (b): (a) a total area for the entire development site, including any common property, as determined by the following table: **Site area (or in the case of residential flat building or group dwelling(s), average site area) (m^2)** / **Minimum percentage of site** <150 / 10% 150-200 / 15% >200-450 / 20% >450 / 25% (b) at least 30% of any land between the primary street boundary and the primary building line.
Car parking, access and manoeuvrability	
PO 23.1 Enclosed car parking spaces are of dimensions to be functional, accessible and convenient.	DTS/DPF 23.1 Residential car parking spaces enclosed by fencing, walls or other structures have the following internal dimensions (separate from any waste storage area):

	(a) single width car parking spaces: (i) a minimum length of 5.4m per space (ii) a minimum width of 3.0m (iii) a minimum garage door width of 2.4m (b) double width car parking spaces (side by side): (i) a minimum length of 5.4m (ii) a minimum width of 5.4m (iii) minimum garage door width of 2.4m per space.
PO 23.2 Uncovered car parking space are of dimensions to be functional, accessible and convenient.	DTS/DPF 23.2 Uncovered car parking spaces have: (a) a minimum length of 5.4m (b) a minimum width of 2.4m (c) a minimum width between the centre line of the space and any fence, wall or other obstruction of 1.5m.
PO 23.3 Driveways and access points are located and designed to facilitate safe access and egress while maximising land available for street tree planting, pedestrian movement, domestic waste collection, landscaped street frontages and on-street parking.	DTS/DPF 23.3 Driveways and access points satisfy (a) or (b): (a) sites with a frontage to a public road of 10m or less, have a width between 3.0 and 3.2 metres measured at the property boundary and are the only access point provided on the site (b) sites with a frontage to a public road greater than 10m: (i) have a maximum width of 5m measured at the property boundary and are the only access point provided on the site; (ii) have a width between 3.0 metres and 3.2 metres measured at the property boundary and no more than two access points are provided on site, separated by no less than 1m.
PO 23.4 Vehicle access is safe, convenient, minimises interruption to the operation of public roads and does not interfere with street infrastructure or street trees.	DTS/DPF 23.4 Vehicle access to designated car parking spaces satisfy (a) or (b): (a) is provided via a lawfully existing or authorised access point or an access point for which consent has been granted as part of an application for the division of land (b) where newly proposed, is set back: (i) 0.5m or more from any street furniture, street pole, infrastructure services pit, or other stormwater or utility infrastructure unless consent is provided from the asset owner (ii) 2m or more from the base of the trunk of a street tree unless consent is provided from the tree owner for a lesser distance (iii) 6m or more from the tangent point of an intersection of 2 or more roads (iv) outside of the marked lines or infrastructure dedicating a pedestrian crossing.
PO 23.5 Driveways are designed to enable safe and convenient vehicle movements from the public road to on-site parking spaces.	DTS/DPF 23.5 Driveways are designed and sited so that: (a) the gradient of the driveway does not exceed a grade of 1 in 4 and includes transitions to ensure a maximum grade change of 12.5% (1 in 8) for summit changes, and 15% (1 in 6.7) for sag changes, in accordance with AS 2890.1:2004 to prevent vehicles bottoming or scraping

	(b) the centreline of the driveway has an angle of no less than 70 degrees and no more than 110 degrees from the street boundary to which it takes its access as shown in the following diagram:  (c) if located to provide access from an alley, lane or right of way - the alley, land or right or way is at least 6.2m wide along the boundary of the allotment / site.
PO 23.6 Driveways and access points are designed and distributed to optimise the provision of on-street visitor parking.	DTS/DPF 23.6 Where on-street parking is available abutting the site's street frontage, on-street parking is retained in accordance with the following requirements: (a) minimum 0.33 on-street spaces per dwelling on the site (rounded up to the nearest whole number) (b) minimum car park length of 5.4m where a vehicle can enter or exit a space directly (c) minimum carpark length of 6m for an intermediate space located between two other parking spaces or to an end obstruction where the parking is indented.
Waste storage	
PO 24.1 Provision is made for the convenient storage of waste bins in a location screened from public view.	DTS/DPF 24.1 Where dwellings abut both side boundaries a waste bin storage area is provided behind the building line of each dwelling that: (a) has a minimum area of $2m^2$ with a minimum dimension of 900mm (separate from any designated car parking spaces or private open space); and (b) has a continuous unobstructed path of travel (excluding moveable objects like gates, vehicles and roller doors) with a minimum width of 800mm between the waste bin storage area and the street.
Design of Transportable Buildings	
PO 25.1 The sub-floor space beneath transportable buildings is enclosed to give the appearance of a permanent structure.	DTS/DPF 25.1 Buildings satisfy (a) or (b): (a) are not transportable

	(b) the sub-floor space between the building and ground level is clad in a material and finish consistent with the building.
Residential Development - Medium and High Rise (including serviced apartments)	
Outlook and Visual Privacy	
PO 26.1 Ground level dwellings have a satisfactory short range visual outlook to public, communal or private open space.	DTS/DPF 26.1 Buildings: (a) provide a habitable room at ground or first level with a window facing toward the street (b) limit the height / extent of solid walls or fences facing the street to 1.2m high above the footpath level or, where higher, to 50% of the site frontage.
PO 26.2 The visual privacy of ground level dwellings within multi-level buildings is protected.	DTS/DPF 26.2 The finished floor level of ground level dwellings in multi-storey developments is raised by up to 1.2m.
Private Open Space	
PO 27.1 Dwellings are provided with suitable sized areas of usable private open space to meet the needs of occupants.	DTS/DPF 27.1 Private open space provided in accordance with Design in Urban Areas Table 1 - Private Open Space.
Residential amenity in multi-level buildings	
PO 28.1 Residential accommodation within multi-level buildings have habitable rooms, windows and balconies designed and positioned to be separated from those of other dwellings and accommodation to provide visual and acoustic privacy and allow for natural ventilation and the infiltration of daylight into interior and outdoor spaces.	DTS/DPF 28.1 Habitable rooms and balconies of independent dwellings and accommodation are separated by at least 6m from one another where there is a direct line of sight between them and 3m or more from a side or rear property boundary.
PO 28.2 Balconies are designed, positioned and integrated into the overall architectural form and detail of the development to: (a) respond to daylight, wind, and acoustic conditions to maximise comfort and provide visual privacy (b) allow views and casual surveillance of the street while providing for safety and visual privacy of nearby living spaces and private outdoor areas.	DTS/DPF 28.2 Balconies utilise one or a combination of the following design elements: (a) sun screens (b) pergolas (c) louvres (d) green facades (e) openable walls.
PO 28.3 Balconies are of sufficient size and depth to accommodate outdoor seating and promote indoor / outdoor living.	DTS/DPF 28.3 Balconies open directly from a habitable room and incorporate a minimum dimension of 2m.
PO 28.4 Dwellings are provided with sufficient space for storage to meet likely occupant needs.	DTS/DPF 28.4 Dwellings (not including student accommodation or serviced apartments) are provided with storage at the following rates with at least 50% or more of the storage volume to be provided within the dwelling: (a) studio: not less than $6m^3$ (b) 1 bedroom dwelling / apartment: not less than $8m^3$ (c) 2 bedroom dwelling / apartment: not less than $10m^3$ (d) 3+ bedroom dwelling / apartment: not less than $12m^3$.
PO 28.5 Dwellings that use light wells for access to daylight, outlook and ventilation for habitable rooms, are designed to ensure a reasonable living amenity is provided.	DTS/DPF 28.5 Light wells: (a) are not used as the primary source of outlook for living rooms

	(b) up to 18m in height have a minimum horizontal dimension of 3m, or 6m if overlooked by bedrooms (c) above 18m in height have a minimum horizontal dimension of 6m, or 9m if overlooked by bedrooms.
PO 28.6 Attached or abutting dwellings are designed to minimise the transmission of sound between dwellings and, in particular, to protect bedrooms from possible noise intrusions.	DTS/DPF 28.6 None are applicable.
PO 28.7 Dwellings are designed so that internal structural columns correspond with the position of internal walls to ensure that the space within the dwelling/apartment is useable.	DTS/DPF 28.7 None are applicable.
Dwelling Configuration	
PO 29.1 Buildings containing in excess of 10 dwellings provide a variety of dwelling sizes and a range in the number of bedrooms per dwelling to contribute to housing diversity.	DTS/DPF 29.1 Buildings containing in excess of 10 dwellings provide at least one of each of the following: (a) studio (where there is no separate bedroom) (b) 1 bedroom dwelling / apartment with a floor area of at least $50m^2$ (c) 2 bedroom dwelling / apartment with a floor area of at least $65m^2$ (d) 3+ bedroom dwelling / apartment with a floor area of at least $80m^2$, and any dwelling over 3 bedrooms provides an additional $15m^2$ for every additional bedroom.
PO 29.2 Dwellings located on the ground floor of multi-level buildings with 3 or more bedrooms have the windows of their habitable rooms overlooking internal courtyard space or other public space, where possible.	DTS/DPF 29.2 None are applicable.
Common Areas	
PO 30.1 The size of lifts, lobbies and corridors is sufficient to accommodate movement of bicycles, strollers, mobility aids and visitor waiting areas.	DTS/DPF 30.1 Common corridor or circulation areas: (a) have a minimum ceiling height of 2.7m (b) provide access to no more than 8 dwellings (c) incorporate a wider section at apartment entries where the corridors exceed 12m in length from a core.
Group Dwellings, Residential Flat Buildings and Battle axe Development	
Amenity	
PO 31.1 Dwellings are of a suitable size to provide a high standard of amenity for occupants.	DTS/DPF 31.1 Dwellings have a minimum internal floor area in accordance with the following table:

Number of bedrooms	Minimum internal floor area
Studio	$35m^2$
1 bedroom	$50m^2$
2 bedroom	$65m^2$
3+ bedrooms	$80m^2$ and any dwelling over 3 bedrooms provides an additional $15m^2$ for every additional bedroom

PO 31.2 The orientation and siting of buildings minimises impacts on the amenity, outlook and privacy of occupants and neighbours.	DTS/DPF 31.2 None are applicable.
PO 31.3 Development maximises the number of dwellings that face public open space and public streets and limits dwellings oriented towards adjoining properties.	DTS/DPF 31.3 None are applicable.
PO 31.4 Battle-axe development is appropriately sited and designed to respond to the existing neighbourhood context.	DTS/DPF 31.4 Dwelling sites/allotments are not in the form of a battle-axe arrangement.
Communal Open Space	
PO 32.1 Private open space provision may be substituted for communal open space which is designed and sited to meet the recreation and amenity needs of residents.	DTS/DPF 32.1 None are applicable.
PO 32.2 Communal open space is of sufficient size and dimensions to cater for group recreation.	DTS/DPF 32.2 Communal open space incorporates a minimum dimension of 5 metres.
PO 32.3 Communal open space is designed and sited to: (a) be conveniently accessed by the dwellings which it services (b) have regard to acoustic, safety, security and wind effects.	DTS/DPF 32.3 None are applicable.
PO 32.4 Communal open space contains landscaping and facilities that are functional, attractive and encourage recreational use.	DTS/DPF 32.4 None are applicable.
PO 32.5 Communal open space is designed and sited to: (a) in relation to rooftop or elevated gardens, minimise overlooking into habitable room windows or onto the useable private open space of other dwellings (b) in relation to ground floor communal space, be overlooked by habitable rooms to facilitate passive surveillance.	DTS/DPF 32.5 None are applicable.
Car parking, access and manoeuvrability	
PO 33.1 Driveways and access points are designed and distributed to optimise the provision of on-street visitor parking.	DTS/DPF 33.1 Where on-street parking is available directly adjacent the site, on-street parking is retained adjacent the subject site in accordance with the following requirements: (a) minimum 0.33 on-street car parks per proposed dwelling (rounded up to the nearest whole number) (b) minimum car park length of 5.4m where a vehicle can enter or exit a space directly (c) minimum carpark length of 6m for an intermediate space located between two other parking spaces or to an end obstruction where the parking is indented.
PO 33.2 The number of vehicular access points onto public roads is minimised to reduce interruption of the footpath and positively contribute to public safety and walkability.	DTS/DPF 33.2 Access to group dwellings or dwellings within a residential flat building is provided via a single common driveway.
PO 33.3 Residential driveways that service more than one dwelling are designed to allow safe and convenient movement.	DTS/DPF 33.3 Driveways that service more than 1 dwelling or a dwelling on a battle-axe site:

	(a) have a minimum width of 3m (b) for driveways servicing more than 3 dwellings: (i) have a width of 5.5m or more and a length of 6m or more at the kerb of the primary street (ii) where the driveway length exceeds 30m, incorporate a passing point at least every 30 metres with a minimum width of 5.5m and a minimum length of 6m.
PO 33.4 Residential driveways that service more than one dwelling or a dwelling on a battle-axe site are designed to allow passenger vehicles to enter and exit and manoeuvre within the site in a safe and convenient manner.	DTS/DPF 33.4 Driveways providing access to more than one dwelling, or a dwelling on a battle-axe site, allow a B85 passenger vehicle to enter and exit the garages or parking spaces in no more than a three-point turn manoeuvre.
PO 33.5 Dwellings are adequately separated from common driveways and manoeuvring areas.	DTS/DPF 33.5 Dwelling walls with entry doors or ground level habitable room windows are set back at least 1.5m from any driveway or area designated for the movement and manoeuvring of vehicles.
Soft landscaping	
PO 34.1 Soft landscaping is provided between dwellings and common driveways to improve the outlook for occupants and appearance of common areas.	DTS/DPF 34.1 Other than where located directly in front of a garage or building entry, soft landscaping with a minimum dimension of 1m is provided between a dwelling and common driveway.
PO 34.2 Battle-axe or common driveways incorporate landscaping and permeability to improve appearance and assist in stormwater management.	DTS/DPF 34.2 Battle-axe or common driveways satisfy (a) and (b): (a) are constructed of a minimum of 50% permeable or porous material (b) where the driveway is located directly adjacent the side or rear boundary of the site, soft landscaping with a minimum dimension of 1m is provided between the driveway and site boundary (excluding along the perimeter of a passing point).
Site Facilities / Waste Storage	
PO 35.1 Provision is made for suitable mailbox facilities close to the major pedestrian entry to the site or conveniently located considering the nature of accommodation and mobility of occupants.	DTS/DPF 35.1 None are applicable.
PO 35.2 Provision is made for suitable external clothes drying facilities.	DTS/DPF 35.2 None are applicable.
PO 35.3 Provision is made for suitable household waste and recyclable material storage facilities which are: (a) located away, or screened, from public view, and (b) conveniently located in proximity to dwellings and the waste collection point.	DTS/DPF 35.3 None are applicable.
PO 35.4 Waste and recyclable material storage areas are located away from dwellings.	DTS/DPF 35.4 Dedicated waste and recyclable material storage areas are located at least 3m from any habitable room window.
PO 35.5 Where waste bins cannot be conveniently collected from the street, provision is made for on-site waste collection, designed to accommodate the safe and convenient access, egress and movement of waste collection vehicles.	DTS/DPF 35.5 None are applicable.

PO 35.6 Services including gas and water meters are conveniently located and screened from public view.	DTS/DPF 35.6 None are applicable.
Water sensitive urban design	
PO 36.1 Residential development creating a common driveway / access includes stormwater management systems that minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system, watercourses or other water bodies.	DTS/DPF 36.1 None are applicable.
PO 36.2 Residential development creating a common driveway / access includes a stormwater management system designed to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure that the development does not increase the peak flows in downstream systems.	DTS/DPF 36.2 None are applicable.
Supported Accommodation and retirement facilities	
Siting, Configuration and Design	
PO 37.1 Supported accommodation and housing for aged persons and people with disabilities is located where on-site movement of residents is not unduly restricted by the slope of the land.	DTS/DPF 37.1 None are applicable.
PO 37.2 Universal design features are incorporated to provide options for people living with disabilities or limited mobility and / or to facilitate ageing in place.	DTS/DPF 37.2 None are applicable.
Movement and Access	
PO 38.1 Development is designed to support safe and convenient access and movement for residents by providing: (a) ground-level access or lifted access to all units (b) level entry porches, ramps, paths, driveways, passenger loading areas and areas adjacent to footpaths that allow for the passing of wheelchairs and resting places (c) car parks with gradients no steeper than 1-in-40, and of sufficient area to provide for wheelchair manoeuvrability (d) kerb ramps at pedestrian crossing points.	DTS/DPF 38.1 None are applicable.
Communal Open Space	
PO 39.1 Development is designed to provide attractive, convenient and comfortable indoor and outdoor communal areas to be used by residents and visitors.	DTS/DPF 39.1 None are applicable.
PO 39.2 Private open space provision may be substituted for communal open space which is designed and sited to meet the recreation and amenity needs of residents.	DTS/DPF 39.2 None are applicable.
PO 39.3 Communal open space is of sufficient size and dimensions to cater for group recreation.	DTS/DPF 39.3 Communal open space incorporates a minimum dimension of 5 metres.
PO 39.4 Communal open space is designed and sited to:	DTS/DPF 39.4 None are applicable.

(a) be conveniently accessed by the dwellings which it services (b) have regard to acoustic, safety, security and wind effects.	
PO 39.5 Communal open space contains landscaping and facilities that are functional, attractive and encourage recreational use.	DTS/DPF 39.5 None are applicable.
PO 39.6 Communal open space is designed and sited to: (a) in relation to rooftop or elevated gardens, minimise overlooking into habitable room windows or onto the useable private open space of other dwellings (b) in relation to ground floor communal space, be overlooked by habitable rooms to facilitate passive surveillance.	DTS/DPF 39.6 None are applicable.
Site Facilities / Waste Storage	
PO 40.1 Development is designed to provide storage areas for personal items and specialised equipment such as small electric powered vehicles, including facilities for the recharging of small electric-powered vehicles.	DTS/DPF 40.1 None are applicable.
PO 40.2 Provision is made for suitable mailbox facilities close to the major pedestrian entry to the site or conveniently located considering the nature of accommodation and mobility of occupants.	DTS/DPF 40.2 None are applicable.
PO 40.3 Provision is made for suitable external clothes drying facilities.	DTS/DPF 40.3 None are applicable.
PO 40.4 Provision is made for suitable household waste and recyclable material storage facilities conveniently located away, or screened, from view.	DTS/DPF 40.4 None are applicable.
PO 40.5 Waste and recyclable material storage areas are located away from dwellings.	DTS/DPF 40.5 Dedicated waste and recyclable material storage areas are located at least 3m from any habitable room window.
PO 40.6 Provision is made for on-site waste collection where 10 or more bins are to be collected at any one time.	DTS/DPF 40.6 None are applicable.
PO 40.7 Services, including gas and water meters, are conveniently located and screened from public view.	DTS/DPF 40.7 None are applicable.
Student Accommodation	
PO 41.1 Student accommodation is designed to provide safe, secure, attractive, convenient and comfortable living conditions for residents, including an internal layout and facilities that are designed to provide sufficient space and amenity for the requirements of student life and promote social interaction.	DTS/DPF 41.1 Student accommodation provides: (a) a range of living options to meet a variety of accommodation needs, such as one-bedroom, two-bedroom and disability access units (b) common or shared facilities to enable a more efficient use of space, including: (i) shared cooking, laundry and external drying facilities (ii) internal and external communal and private open space provided in accordance with Design in Urban Areas Table 1 - Private Open Space (iii) common storage facilities at the rate of $8m^3$ for every 2 dwellings or students

	(iv) common on-site parking in accordance with Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements or Table 2 - Off-Street Car Parking Requirements in Designated Areas (v) bicycle parking at the rate of one space for every 2 students.
PO 41.2 Student accommodation is designed to provide easy adaptation of the building to accommodate an alternative use of the building in the event it is no longer required for student housing.	DTS/DPF 41.2 None are applicable.
All non-residential development	
Water Sensitive Design	
PO 42.1 Development likely to result in risk of export of sediment, suspended solids, organic matter, nutrients, oil and grease include stormwater management systems designed to minimise pollutants entering stormwater.	DTS/DPF 42.1 None are applicable.
PO 42.2 Water discharged from a development site is of a physical, chemical and biological condition equivalent to or better than its pre-developed state.	DTS/DPF 42.2 None are applicable.
PO 42.3 Development includes stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure that development does not increase peak flows in downstream systems.	DTS/DPF 42.3 None are applicable.
Wash-down and Waste Loading and Unloading	
PO 43.1 Areas for activities including loading and unloading, storage of waste refuse bins in commercial and industrial development or wash-down areas used for the cleaning of vehicles, plant or equipment are: (a) designed to contain all wastewater likely to pollute stormwater within a bunded and roofed area to exclude the entry of external surface stormwater run-off (b) paved with an impervious material to facilitate wastewater collection (c) of sufficient size to prevent 'splash-out' or 'over-spray' of wastewater from the wash-down area (d) are designed to drain wastewater to either: (i) a treatment device such as a sediment trap and coalescing plate oil separator with subsequent disposal to a sewer, private or Community Wastewater Management Scheme or (ii) a holding tank and its subsequent removal off-site on a regular basis.	DTS/DPF 43.1 None are applicable.
Laneway Development	
Infrastructure and Access	
PO 44.1 Development with a primary street comprising a laneway, alley, lane, right of way or similar minor thoroughfare only occurs where: (a) existing utility infrastructure and services are capable of accommodating the development	DTS/DPF 44.1 Development with a primary street frontage that is not an alley, lane, right of way or similar public thoroughfare.

(b) the primary street can support access by emergency and regular service vehicles (such as waste collection) (c) it does not require the provision or upgrading of infrastructure on public land (such as footpaths and stormwater management systems) (d) safety of pedestrians or vehicle movement is maintained (e) any necessary grade transition is accommodated within the site of the development to support an appropriate development intensity and orderly development of land fronting minor thoroughfares.	
Decks	
Design and Siting	
PO 45.1 Decks are designed and sited to: (a) complement the associated building form (b) minimise impacts on the streetscape through siting behind the building line of the principal building (unless on a significant allotment or open space) (c) minimise cut and fill and overall massing when viewed from adjacent land.	DTS/DPF 45.1 Decks: (a) where ancillary to a dwelling: (i) are not constructed, added to or altered so that any part is situated: A. in front of any part of the building line of the dwelling to which it is ancillary or B. within 900mm of a boundary of the allotment with a secondary street (if the land has boundaries on two or more roads) (ii) are set back at least 900mm from side or rear allotment boundaries (iii) when attached to the dwelling, has a finished floor level consistent with the finished ground floor level of the dwelling (iv) where associated with a residential use, retains a total area of soft landscaping for the entire development site, including any common property, with a minimum dimension of 700mm in accordance with (A) or (B), whichever is less: A. a total area is determined by the following table: Site area (or in the case of residential flat building or group dwelling(s), average site area) (m^2) / Minimum percentage of site <150 / 10% 150-200 / 15% >200-450 / 20% >450 / 25% B. the amount of existing soft landscaping prior to the development occurring. (b) where in association with a non-residential use: (i) are set back at least 2 metres from the boundary of an allotment used for residential purposes. (ii) are set back at least 2 metres from a public road. (iii) have a floor area not exceeding 25m^2 (c) in all cases, has a finished floor level not exceeding 1 metre above natural ground level at any point.
PO 45.2 Decks are designed and sited to minimise direct overlooking of	DTS/DPF 45.2 Decks with a finished floor level/s 500mm or more above natural

habitable rooms and private open spaces of adjoining residential uses in neighbourhood-type zones through suitable floor levels, screening and siting taking into account the slope of the subject land, existing vegetation on the subject land, and fencing.	ground level facing side or rear boundaries shared with a residential use in a neighbourhood-type zone incorporate screening with a maximum of 25% transparency/openings, permanently fixed to the outer edge of the deck not less than 1.5 m above the finished floor level/s.
PO 45.3 Decks used for outdoor dining, entertainment or other commercial uses provide carparking in accordance with the primary use of the deck.	DTS/DPF 45.3 Decks used for commercial purposes do not result in less on-site car parking for the primary use of the subject land than specified in Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements or Table 2 - Off-Street Car Parking Requirements in Designated Areas.

Table 1 - Private Open Space

Dwelling Type	Dwelling / Site Configuration	Minimum Rate
Dwelling (at ground level, other than a residential flat building that includes above ground dwellings)		Total private open space area: (a) Site area <301m^2: 24m^2 located behind the building line. (b) Site area ≥ 301m^2: 60m^2 located behind the building line. Minimum directly accessible from a living room: 16m^2 / with a minimum dimension 3m.
Cabin or caravan (permanently fixed to the ground) in a residential park or caravan and tourist park		Total area: 16m^2, which may be uses as second car parking space, provided on each site intended for residential occupation.
Dwelling in a residential flat building or mixed use building which incorporate above ground level dwellings	Dwellings at ground level:	15m^2 / minimum dimension 3m
	Dwellings above ground level:	
	Studio (no separate bedroom)	4m^2 / minimum dimension 1.8m
	One bedroom dwelling	8m^2 / minimum dimension 2.1m
	Two bedroom dwelling	11m^2 / minimum dimension 2.4m
	Three + bedroom dwelling	15 m^2 / minimum dimension 2.6m

Forestry

Assessment Provisions (AP)

Desired Outcome (DO)

	Desired Outcome
DO 1	Commercial forestry is designed and sited to maximise economic benefits whilst managing potential negative impacts on the environment, transport networks, surrounding land uses and landscapes.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Siting	
PO 1.1 Commercial forestry plantations are established where there is no detrimental effect on the physical environment or scenic quality of the rural landscape.	DTS/DPF 1.1 None are applicable.
PO 1.2 Commercial forestry plantations are established on slopes that are stable to minimise the risk of soil erosion.	DTS/DPF 1.2 Commercial forestry plantations are not located on land with a slope exceeding 20% (1-in-5).
PO 1.3 Commercial forestry plantations and operations associated with their establishment, management and harvesting are appropriately set back from any sensitive receiver to minimise fire risk and noise disturbance.	DTS/DPF 1.3 Commercial forestry plantations and operations associated with their establishment, management and harvesting are set back 50m or more from any sensitive receiver.
Water Protection	
PO 2.1 Commercial forestry plantations incorporate artificial drainage lines (i.e. culverts, runoffs and constructed drains) integrated with natural drainage lines to minimise concentrated water flows onto or from plantation areas.	DTS/DPF 2.1 None are applicable.
PO 2.2 Appropriate siting, layout and design measures are adopted to minimise the impact of commercial forestry plantations on surface water resources.	DTS/DPF 2.2 Commercial forestry plantations: (a) do not involve cultivation (excluding spot cultivation) in drainage lines (b) are set back 20m or more from the banks of any major watercourse (a third order or higher watercourse), lake, reservoir, wetland or sinkhole (with direct connection to an aquifer) (c) are set back 10m or more from the banks of any first or second order watercourse or sinkhole (with no direct connection to an aquifer).
Fire Management	
PO 3.1 Commercial forestry plantations incorporate appropriate firebreaks and fire management design elements.	DTS/DPF 3.1 Commercial forestry plantations provide: (a) 7m or more wide external boundary firebreaks for plantations of 40ha or less (b) 10m or more wide external boundary firebreaks for plantations of between 40ha and 100ha (c) 20m or more wide external boundary firebreaks, or 10m with an additional 10m or more of fuel-reduced plantation, for plantations of 100ha or greater. Note: Firebreaks prescribed above (as well as access tracks) may be included within the setback buffer distances prescribed by other policies of the Code.
PO 3.2 Commercial forestry plantations incorporate appropriate fire management access tracks.	DTS/DPF 3.2 Commercial forestry plantation fire management access tracks: (a) are incorporated within all firebreaks (b) are 7m or more wide with a vertical clearance of 4m or more

	(c) are aligned to provide straight through access at junctions, or if they are a no through access track are appropriately signposted and provide suitable turnaround areas for fire-fighting vehicles (d) partition the plantation into units of 40ha or less in area.
Power-line Clearances	
PO 4.1 Commercial forestry plantations achieve and maintain appropriate clearances from aboveground powerlines.	DTS/DPF 4.1 Commercial forestry plantations incorporating trees with an expected mature height of greater than 6m meet the clearance requirements listed in the following table:

Voltage of transmission line	Tower or Pole	Minimum horizontal clearance distance between plantings and transmission lines
500 kV	Tower	38m
275 kV	Tower	25m
132 kV	Tower	30m
132 kV	Pole	20m
66 kV	Pole	20m
Less than 66 kV	Pole	20m

Housing Renewal

Assessment Provisions (AP)

The Housing Renewal General Development Policies are only applicable to dwellings or residential flat building undertaken by:

(a) the South Australian Housing Trust either individually or jointly with other persons or bodies
or
(b) a provider registered under the Community Housing National Law participating in a program relating to the renewal of housing endorsed by the South Australian Housing Trust.

Desired Outcome (DO)

Desired Outcome	
DO 1	Renewed residential environments replace older social housing and provide new social housing infrastructure and other housing options and tenures to enhance the residential amenity of the local area.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Land Use and Intensity	
PO 1.1 Residential development provides a range of housing choices.	DTS/DPF 1.1 Development comprises one or more of the following: (a) detached dwellings (b) semi-detached dwellings (c) row dwellings (d) group dwellings

	(e) residential flat buildings.
PO 1.2 Medium-density housing options or higher are located in close proximity to public transit, open space and/or activity centres.	DTS/DPF 1.2 None are applicable.
Building Height	
PO 2.1 Buildings generally do not exceed 3 building levels unless in locations close to public transport, centres and/or open space.	DTS/DPF 2.1 Building height (excluding garages, carports and outbuildings) does not exceed 3 building levels and 12m and wall height does not exceed 9m (not including a gable end).
PO 2.2 Medium or high rise residential flat buildings located within or at the interface with zones which restrict heights to a maximum of 2 building levels transition down in scale and height towards the boundary of that zone, other than where it is a street boundary.	DTS/DPF 2.2 None are applicable.
Primary Street Setback	
PO 3.1 Buildings are set back from the primary street boundary to contribute to an attractive streetscape character.	DTS/DPF 3.1 Buildings are no closer to the primary street (excluding any balcony, verandah, porch, awning or similar structure) than 3m.
Secondary Street Setback	
PO 4.1 Buildings are set back from secondary street boundaries to maintain separation between building walls and public streets and contribute to a suburban streetscape character.	DTS/DPF 4.1 Buildings are set back at least 900mm from the boundary of the allotment with a secondary street frontage.
Boundary Walls	
PO 5.1 Boundary walls are limited in height and length to manage visual impacts and access to natural light and ventilation.	DTS/DPF 5.1 Except where the dwelling is located on a central site within a row dwelling or terrace arrangement, dwellings with side boundary walls are sited on only one side boundary and satisfy (a) or (b): (a) adjoin or abut a boundary wall of a building on adjoining land for the same length and height (b) do not: (i) exceed 3.2m in height from the lower of the natural or finished ground level (ii) exceed 11.5m in length (iii) when combined with other walls on the boundary of the subject development site, a maximum 45% of the length of the boundary (iv) encroach within 3 metres of any other existing or proposed boundary walls on the subject land.
PO 5.2 Dwellings in a semi-detached, row or terrace arrangement maintain space between buildings consistent with a suburban streetscape character.	DTS/DPF 5.2 Dwellings in a semi-detached or row arrangement are set back 900mm or more from side boundaries shared with allotments outside the development site, except for a carport or garage.
Side Boundary Setback	
PO 6.1 Buildings are set back from side boundaries to provide:	DTS/DPF 6.1 Other than walls located on a side boundary, buildings are set back

(a) separation between dwellings in a way that contributes to a suburban character (b) access to natural light and ventilation for neighbours.	from side boundaries in accordance with the following: (a) where the wall height does not exceed 3m - at least 900mm (b) for a wall that is not south facing and the wall height exceeds 3m - at least 900mm from the boundary of the site plus a distance of 1/3 of the extent to which the height of the wall exceeds 3m from the top of the footings (c) for a wall that is south facing and the wall height exceeds 3m - at least 1.9m from the boundary of the site plus a distance of 1/3 of the extent to which the height of the wall exceeds 3m from the top of the footings.
Rear Boundary Setback	
PO 7.1 Buildings are set back from rear boundaries to provide: (a) separation between dwellings in a way that contributes to a suburban character (b) access to natural light and ventilation for neighbours (c) private open space (d) space for landscaping and vegetation.	DTS/DPF 7.1 Dwellings are set back from the rear boundary: (a) 3m or more for the first building level (b) 5m or more for any subsequent building level.
Buildings elevation design	
PO 8.1 Dwelling elevations facing public streets and common driveways make a positive contribution to the streetscape and common driveway areas.	DTS/DPF 8.1 Each dwelling includes at least 3 of the following design features within the building elevation facing a primary street, and at least 2 of the following design features within the building elevation facing any other public road (other than a laneway) or a common driveway: (a) a minimum of 30% of the building elevation is set back an additional 300mm from the building line (b) a porch or portico projects at least 1m from the building elevation (c) a balcony projects from the building elevation (d) a verandah projects at least 1m from the building elevation (e) eaves of a minimum 400mm width extend along the width of the front elevation (f) a minimum 30% of the width of the upper level projects forward from the lower level primary building line by at least 300mm. (g) a minimum of two different materials or finishes are incorporated on the walls of the building elevation, with a maximum of 80% of the building elevation in a single material or finish.
PO 8.2 Dwellings incorporate windows along primary street frontages to encourage passive surveillance and make a positive contribution to the streetscape.	DTS/DPF 8.2 Each dwelling with a frontage to a public street: (a) includes at least one window facing the primary street from a habitable room that has a minimum internal room dimension of 2.4m (b) has an aggregate window area of at least $2m^2$ facing the primary street
PO 8.3 The visual mass of larger buildings is reduced when viewed from adjoining allotments or public streets.	DTS/DPF 8.3 None are applicable.
PO 8.4 Built form considers local context and provides a quality design response through scale, massing, materials, colours and architectural expression.	DTS/DPF 8.4 None are applicable.
PO 8.5	DTS/DPF 8.5

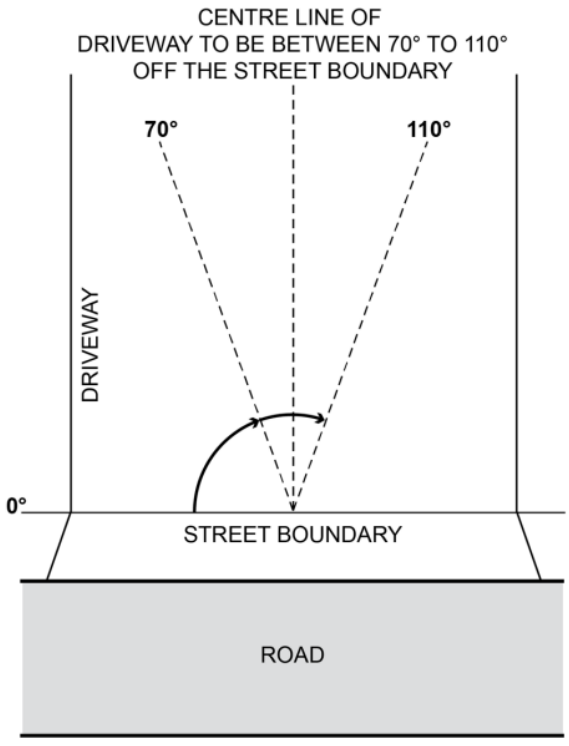
Entrances to multi-storey buildings are: (a) oriented towards the street (b) visible and easily identifiable from the street (c) designed to include a common mail box structure.	None are applicable.
Outlook and amenity	
PO 9.1 Living rooms have an external outlook to provide a high standard of amenity for occupants.	DTS/DPF 9.1 A living room of a dwelling incorporates a window with an external outlook towards the street frontage or private open space.
PO 9.2 Bedrooms are separated or shielded from active communal recreation areas, common access areas and vehicle parking areas and access ways to mitigate noise and artificial light intrusion.	DTS/DPF 9.2 None are applicable.
Private Open Space	
PO 10.1 Dwellings are provided with suitable sized areas of usable private open space to meet the needs of occupants.	DTS/DPF 10.1 Private open space is provided in accordance with the following table:

Dwelling Type	Dwelling / Site Configuration	Minimum Rate
Dwelling (at ground level)		Total area: 24m^2 located behind the building line Minimum adjacent to a living room: 16m^2 with a minimum dimension 3m
Dwelling (above ground level)	Studio	4m^2 / minimum dimension 1.8m
	One bedroom dwelling	8m^2 / minimum dimension 2.1m
	Two bedroom dwelling	11m^2 / minimum dimension 2.4m
	Three + bedroom dwelling	15 m^2 / minimum dimension 2.6m

PO 10.2 Private open space positioned to provide convenient access from internal living areas.	DTS/DPF 10.2 At least 50% of the required area of private open space is accessible from a habitable room.
PO 10.3 Private open space is positioned and designed to: (a) provide useable outdoor space that suits the needs of occupants; (b) take advantage of desirable orientation and vistas; and (c) adequately define public and private space.	DTS/DPF 10.3 None are applicable.
Visual privacy	
PO 11.1 Development mitigates direct overlooking from upper level windows to habitable rooms and private open spaces of adjoining residential uses.	DTS/DPF 11.1 Upper level windows facing side or rear boundaries shared with another residential allotment/site satisfy one of the following:

	(a) are permanently obscured to a height of 1.5m above finished floor level and are fixed or not capable of being opened more than 200mm (b) have sill heights greater than or equal to 1.5m above finished floor level (c) incorporate screening with a maximum of 25% openings, permanently fixed no more than 500mm from the window surface and sited adjacent to any part of the window less than 1.5m above the finished floor.
PO 11.2 Development mitigates direct overlooking from upper level balconies and terraces to habitable rooms and private open space of adjoining residential uses.	DTS/DPF 11.2 One of the following is satisfied: (a) the longest side of the balcony or terrace will face a public road, public road reserve or public reserve that is at least 15m wide in all places faced by the balcony or terrace or (b) all sides of balconies or terraces on upper building levels are permanently obscured by screening with a maximum 25% transparency/openings fixed to a minimum height of: (i) 1.5m above finished floor level where the balcony is located at least 15 metres from the nearest habitable window of a dwelling on adjacent land or (ii) 1.7m above finished floor level in all other cases
Landscaping	
PO 12.1 Soft landscaping is incorporated into development to: (a) minimise heat absorption and reflection (b) maximise shade and shelter (c) maximise stormwater infiltration and biodiversity (d) enhance the appearance of land and streetscapes.	DTS/DPF 12.1 Residential development incorporates pervious areas for soft landscaping with a minimum dimension of 700mm provided in accordance with (a) and (b): (a) a total area as determined by the following table: Dwelling site area (or in the case of residential flat building or group dwelling(s), average site area) (m2) / Minimum percentage of site <150 / 10% <200 / 15% 200-450 / 20% >450 / 25% (b) at least 30% of land between the road boundary and the building line.
Water Sensitive Design	
PO 13.1 Residential development is designed to capture and use stormwater to: (a) maximise efficient use of water resources (b) manage peak stormwater runoff flows and volume to ensure the carrying capacities of downstream systems are not overloaded (c) manage runoff quality to maintain, as close as practical, pre-development conditions.	DTS/DPF 13.1 None are applicable.
Car Parking	
PO 14.1 On-site car parking is provided to meet the anticipated demand of residents, with less on-site parking in areas in close proximity to public transport.	DTS/DPF 14.1 On-site car parking is provided at the following rates per dwelling: (a) 2 or fewer bedrooms - 1 car parking space (b) 3 or more bedrooms - 2 car parking spaces.
PO 14.2	DTS/DPF 14.2

Enclosed car parking spaces are of dimensions to be functional, accessible and convenient.	Residential parking spaces enclosed by fencing, walls or other obstructions with the following internal dimensions (separate from any waste storage area): (a) single parking spaces: (i) a minimum length of 5.4m (ii) a minimum width of 3.0m (iii) a minimum garage door width of 2.4m (b) double parking spaces (side by side): (i) a minimum length of 5.4m (ii) a minimum width of 5.5m (iii) minimum garage door width of 2.4m per space.
PO 14.3 Uncovered car parking spaces are of dimensions to be functional, accessible and convenient.	DTS/DPF 14.3 Uncovered car parking spaces have: (a) a minimum length of 5.4m (b) a minimum width of 2.4m (c) a minimum width between the centre line of the space and any fence, wall or other obstruction of 1.5m.
PO 14.4 Residential flat buildings and group dwelling developments provide sufficient on-site visitor car parking to cater for anticipated demand.	DTS/DPF 14.4 Visitor car parking for group and residential flat buildings incorporating 4 or more dwellings is provided on-site at a minimum ratio of 0.25 car parking spaces per dwelling.
PO 14.5 Residential flat buildings provide dedicated areas for bicycle parking.	DTS/DPF 14.5 Residential flat buildings provide one bicycle parking space per dwelling.
Overshadowing	
PO 15.1 Development minimises overshadowing of the private open spaces of adjoining land by ensuring that ground level open space associated with residential buildings receive direct sunlight for a minimum of 2 hours between 9am and 3pm on 21 June.	DTS/DPF 15.1 None are applicable.
Waste	
PO 16.1 Provision is made for the convenient storage of waste bins in a location screened from public view.	DTS/DPF 16.1 A waste bin storage area is provided behind the primary building line that: (a) has a minimum area of $2m^2$ with a minimum dimension of 900mm (separate from any designated car parking spaces or private open space).; and (b) has a continuous unobstructed path of travel (excluding moveable objects like gates, vehicles and roller doors) with a minimum width of 800mm between the waste bin storage area and the street.
PO 16.2 Residential flat buildings provide a dedicated area for the on-site storage of waste which is: (a) easily and safely accessible for residents and for collection vehicles (b) screened from adjoining land and public roads (c) of sufficient dimensions to be able to accommodate the waste storage needs of the development considering the intensity and nature of the development and the frequency of collection.	DTS/DPF 16.2 None are applicable.

Vehicle Access	
PO 17.1 Driveways are located and designed to facilitate safe access and egress while maximising land available for street tree planting, landscaped street frontages and on-street parking.	DTS/DPF 17.1 None are applicable.
PO 17.2 Vehicle access is safe, convenient, minimises interruption to the operation of public roads and does not interfere with street infrastructure or street trees.	DTS/DPF 17.2 Vehicle access to designated car parking spaces satisfy (a) or (b): (a) is provided via a lawfully existing or authorised access point or an access point for which consent has been granted as part of an application for the division of land (b) where newly proposed, is set back: (i) 0.5m or more from any street furniture, street pole, infrastructure services pit, or other stormwater or utility infrastructure unless consent is provided from the asset owner (ii) 2m or more from the base of the trunk of a street tree unless consent is provided from the tree owner for a lesser distance (iii) 6m or more from the tangent point of an intersection of 2 or more roads (iv) outside of the marked lines or infrastructure dedicating a pedestrian crossing.
PO 17.3 Driveways are designed to enable safe and convenient vehicle movements from the public road to on-site parking spaces.	DTS/DPF 17.3 Driveways are designed and sited so that: (a) the gradient of the driveway does not exceed a grade of 1 in 4 and includes transitions to ensure a maximum grade change of 12.5% (1 in 8) for summit changes, and 15% (1 in 6.7) for sag changes, in accordance with AS 2890.1:2004 to prevent vehicles bottoming or scraping (b) the centreline of the driveway has an angle of no less than 70 degrees and no more than 110 degrees from the street boundary to which it takes its access as shown in the following diagram: 

	(c) if located to provide access from an alley, lane or right of way - the alley, land or right or way is at least 6.2m wide along the boundary of the allotment / site.
PO 17.4 Driveways and access points are designed and distributed to optimise the provision of on-street parking.	DTS/DPF 17.4 Where on-street parking is available abutting the site's street frontage, on-street parking is retained in accordance with the following requirements: (a) minimum 0.33 on-street spaces per dwelling on the site (rounded up to the nearest whole number) (b) minimum car park length of 5.4m where a vehicle can enter or exit a space directly (c) minimum carpark length of 6m for an intermediate space located between two other parking spaces or to an end obstruction where the parking is indented.
PO 17.5 Residential driveways that service more than one dwelling of a dimension to allow safe and convenient movement.	DTS/DPF 17.5 Driveways that service more than 1 dwelling or a dwelling on a battle-axe site: (a) have a minimum width of 3m (b) for driveways servicing more than 3 dwellings: (i) have a width of 5.5m or more and a length of 6m or more at the kerb of the primary street (ii) where the driveway length exceeds 30m, incorporate a passing point at least every 30 metres with a minimum width of 5.5m and a minimum length of 6m.
PO 17.6 Residential driveways that service more than one dwelling are designed to allow passenger vehicles to enter and exit the site and manoeuvre within the site in a safe and convenient manner.	DTS/DPF 17.6 Driveways providing access to more than one dwelling, or a dwelling on a battle-axe site, allow a B85 passenger vehicle to enter and exit the garages or parking spaces in no more than a three-point turn manoeuvre
PO 17.7 Dwellings are adequately separated from common driveways and manoeuvring areas.	DTS/DPF 17.7 Dwelling walls with entry doors or ground level habitable room windows are set back at least 1.5m from any driveway or area designated for the movement and manoeuvring of vehicles.
Storage	
PO 18.1 Dwellings are provided with sufficient and accessible space for storage to meet likely occupant needs.	DTS/DPF 18.1 Dwellings are provided with storage at the following rates and 50% or more of the storage volume is provided within the dwelling: (a) studio: not less than $6m^3$ (b) 1 bedroom dwelling / apartment: not less than $8m^3$ (c) 2 bedroom dwelling / apartment: not less than $10m^3$ (d) 3+ bedroom dwelling / apartment: not less than $12m^3$.
Earthworks	
PO 19.1 Development, including any associated driveways and access tracks, minimises the need for earthworks to limit disturbance to natural topography.	DTS/DPF 19.1 The development does not involve: (a) excavation exceeding a vertical height of 1m or (b) filling exceeding a vertical height of 1m or (c) a total combined excavation and filling vertical height exceeding 2m.
Service connections and infrastructure	
PO 20.1 Dwellings are provided with appropriate service connections and	DTS/DPF 20.1 The site and building:

infrastructure.	(a) have the ability to be connected to a permanent potable water supply (b) have the ability to be connected to a sewerage system, or a wastewater system approved under the *South Australian Public Health Act 2011* (c) have the ability to be connected to electricity supply (d) have the ability to be connected to an adequate water supply (and pressure) for fire-fighting purposes (e) would not be contrary to the Regulations prescribed for the purposes of Section 86 of the *Electricity Act 1996*.
Site contamination	
PO 21.1 Land that is suitable for sensitive land uses to provide a safe environment.	DTS/DPF 21.1 Development satisfies (a), (b), (c) or (d): (a) does not involve a change in the use of land (b) involves a change in the use of land that does not constitute a change to a more sensitive use (c) involves a change in the use of land to a more sensitive use on land at which site contamination does not exist (as demonstrated in a site contamination declaration form) (d) involves a change in the use of land to a more sensitive use on land at which site contamination exists, or may exist (as demonstrated in a site contamination declaration form), and satisfies both of the following: (i) a site contamination audit report has been prepared under Part 10A of the *Environment Protection Act 1993* in relation to the land within the previous 5 years which states that A. site contamination does not exist (or no longer exists) at the land or B. the land is suitable for the proposed use or range of uses (without the need for any further remediation) or C. where remediation is, or remains, necessary for the proposed use (or range of uses), remediation work has been carried out or will be carried out (and the applicant has provided a written undertaking that the remediation works will be implemented in association with the development) and (ii) no other class 1 activity or class 2 activity has taken place at the land since the preparation of the site contamination audit report (as demonstrated in a site contamination declaration form).

Infrastructure and Renewable Energy Facilities

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that

	minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
General	
PO 1.1 Development is located and designed to minimise hazard or nuisance to adjacent development and land uses.	DTS/DPF 1.1 None are applicable.
Visual Amenity	
PO 2.1 The visual impact of above-ground infrastructure networks and services (excluding high voltage transmission lines), renewable energy facilities (excluding wind farms), energy storage facilities and ancillary development is minimised from townships, scenic routes and public roads by: (a) utilising features of the natural landscape to obscure views where practicable (b) siting development below ridgelines where practicable (c) avoiding visually sensitive and significant landscapes (d) using materials and finishes with low-reflectivity and colours that complement the surroundings (e) using existing vegetation to screen buildings (f) incorporating landscaping or landscaped mounding around the perimeter of a site and between adjacent allotments accommodating or zoned to primarily accommodate sensitive receivers.	DTS/DPF 2.1 None are applicable.
PO 2.2 Pumping stations, battery storage facilities, maintenance sheds and other ancillary structures incorporate vegetation buffers to reduce adverse visual impacts on adjacent land.	DTS/DPF 2.2 None are applicable.
PO 2.3 Surfaces exposed by earthworks associated with the installation of storage facilities, pipework, penstock, substations and other ancillary plant are reinstated and revegetated to reduce adverse visual impacts on adjacent land.	DTS/DPF 2.3 None are applicable.
Rehabilitation	
PO 3.1 Progressive rehabilitation (incorporating revegetation) of disturbed areas, ahead of or upon decommissioning of areas used for renewable energy facilities and transmission corridors.	DTS/DPF 3.1 None are applicable.
Hazard Management	
PO 4.1 Infrastructure and renewable energy facilities and ancillary development located and operated to not adversely impact maritime or air transport safety, including the operation of ports, airfields and landing strips.	DTS/DPF 4.1 None are applicable.
PO 4.2 Facilities for energy generation, power storage and transmission are separated as far as practicable from dwellings, tourist accommodation and frequently visited public places	DTS/DPF 4.2 None are applicable.

(such as viewing platforms / lookouts) to reduce risks to public safety from fire or equipment malfunction.	
PO 4.3 Bushfire hazard risk is minimised for renewable energy facilities by providing appropriate access tracks, safety equipment and water tanks and establishing cleared areas around substations, battery storage and operations compounds.	DTS/DPF 4.3 None are applicable.
Electricity Infrastructure and Battery Storage Facilities	
PO 5.1 Electricity infrastructure is located to minimise visual impacts through techniques including: (a) siting utilities and services: (i) on areas already cleared of native vegetation (ii) where there is minimal interference or disturbance to existing native vegetation or biodiversity (b) grouping utility buildings and structures with non-residential development, where practicable.	DTS/DPF 5.1 None are applicable.
PO 5.2 Electricity supply (excluding transmission lines) serving new development in urban areas and townships installed underground, excluding lines having a capacity exceeding or equal to 33kV.	DTS/DPF 5.2 None are applicable.
PO 5.3 Battery storage facilities are co-located with substation infrastructure where practicable to minimise the development footprint and reduce environmental impacts.	DTS/DPF 5.3 None are applicable.
Telecommunication Facilities	
PO 6.1 The proliferation of telecommunications facilities in the form of towers/monopoles in any one locality is managed, where technically feasible, by co-locating a facility with other communications facilities to mitigate impacts from clutter on visual amenity.	DTS/DPF 6.1 None are applicable.
PO 6.2 Telecommunications antennae are located as close as practicable to support structures to manage overall bulk and mitigate impacts on visual amenity.	DTS/DPF 6.2 None are applicable.
PO 6.3 Telecommunications facilities, particularly towers/monopoles, are located and sized to mitigate visual impacts by the following methods: (a) where technically feasible, incorporating the facility within an existing structure that may serve another purpose or all of the following: (b) using existing buildings and landscape features to obscure or interrupt views of a facility from nearby public roads, residential areas and places of high public amenity to the extent practical without unduly hindering the effective provision of telecommunications services	DTS/DPF 6.3 None are applicable.

(c) using materials and finishes that complement the environment (d) screening using landscaping and vegetation, particularly for equipment shelters and huts.	
Renewable Energy Facilities	
PO 7.1 Renewable energy facilities are located as close as practicable to existing transmission infrastructure to facilitate connections and minimise environmental impacts as a result of extending transmission infrastructure.	DTS/DPF 7.1 None are applicable.
Renewable Energy Facilities (Wind Farm)	
PO 8.1 Visual impact of wind turbine generators on the amenity of residential and tourist development is reduced through appropriate separation.	DTS/DPF 8.1 Wind turbine generators are: (a) set back at least 2000m from the base of a turbine to any of the following zones: (i) Rural Settlement Zone (ii) Township Zone (iii) Rural Living Zone (iv) Rural Neighbourhood Zone with an additional 10m setback per additional metre over 150m overall turbine height (measured from the base of the turbine). (b) set back at least 1500m from the base of the turbine to non-associated (non-stakeholder) dwellings and tourist accommodation
PO 8.2 The visual impact of wind turbine generators on natural landscapes is managed by: (a) designing wind turbine generators to be uniform in colour, size and shape (b) coordinating blade rotation and direction (c) mounting wind turbine generators on tubular towers as opposed to lattice towers.	DTS/DPF 8.2 None are applicable.
PO 8.3 Wind turbine generators and ancillary development minimise potential for bird and bat strike.	DTS/DPF 8.3 None are applicable.
PO 8.4 Wind turbine generators incorporate recognition systems or physical markers to minimise the risk to aircraft operations.	DTS/DPF 8.4 No Commonwealth air safety (CASA / ASA) or Defence requirement is applicable.
PO 8.5 Meteorological masts and guidewires are identifiable to aircraft through the use of colour bands, marker balls, high visibility sleeves or flashing strobes.	DTS/DPF 8.5 None are applicable.
Renewable Energy Facilities (Solar Power)	
PO 9.1 Ground mounted solar power facilities generating 5MW or more are not located on land requiring the clearance of areas of intact native vegetation or on land of high environmental, scenic or cultural value.	DTS/DPF 9.1 None are applicable.
PO 9.2 Ground mounted solar power facilities allow for movement of wildlife by:	DTS/DPF 9.2 None are applicable.

(a) incorporating wildlife corridors and habitat refuges (b) avoiding the use of extensive security or perimeter fencing or incorporating fencing that enables the passage of small animals without unreasonably compromising the security of the facility.	
PO 9.3 Amenity impacts of solar power facilities are minimised through separation from conservation areas and sensitive receivers in other ownership.	DTS/DPF 9.3 Ground mounted solar power facilities are set back from land boundaries, conservation areas and relevant zones in accordance with the following criteria: **Generation Capacity** / **Approximate size of array** / **Setback from adjoining land boundary** / **Setback from conservation areas** / **Setback from Township, Rural Settlement, Rural Neighbourhood and Rural Living Zones[1]** 50MW> / 80ha+ / 30m / 500m / 2km 10MW<50MW / 16ha-<80ha / 25m / 500m / 1.5km 5MW<10MW / 8ha to <16ha / 20m / 500m / 1km 1MW<5MW / 1.6ha to <8ha / 15m / 500m / 500m 100kW<1MW / 0.5ha<1.6ha / 10m / 500m / 100m <100kW / <0.5ha / 5m / 500m / 25m Notes: 1. Does not apply when the site of the proposed ground mounted solar power facility is located within one of these zones.
PO 9.4 Ground mounted solar power facilities incorporate landscaping within setbacks from adjacent road frontages and boundaries of adjacent allotments accommodating non-host dwellings, where balanced with infrastructure access and bushfire safety considerations.	DTS/DPF 9.4 None are applicable.
Hydropower / Pumped Hydropower Facilities	
PO 10.1 Hydropower / pumped hydropower facility storage is designed and operated to minimise the risk of storage dam failure.	DTS/DPF 10.1 None are applicable.
PO 10.2 Hydropower / pumped hydropower facility storage is designed and operated to minimise water loss through increased evaporation or system leakage, with the incorporation of appropriate liners, dam covers, operational measures or detection systems.	DTS/DPF 10.2 None are applicable.
PO 10.3 Hydropower / pumped hydropower facilities on existing or former mine sites minimise environmental impacts from site contamination, including from mine operations or water sources subject to such processes, now or in the future.	DTS/DPF 10.3 None are applicable.
Water Supply	
PO 11.1	DTS/DPF 11.1

Development is connected to an appropriate water supply to meet the ongoing requirements of the intended use.	Development is connected, or will be connected, to a reticulated water scheme or mains water supply with the capacity to meet the on-going requirements of the development.
PO 11.2 Dwellings are connected to a reticulated water scheme or mains water supply with the capacity to meet the requirements of the intended use. Where this is not available an appropriate rainwater tank or storage system for domestic use is provided.	DTS/DPF 11.2 A dwelling is connected, or will be connected, to a reticulated water scheme or mains water supply with the capacity to meet the requirements of the development. Where this is not available it is serviced by a rainwater tank or tanks capable of holding at least 50,000 litres of water which is: (a) exclusively for domestic use (b) connected to the roof drainage system of the dwelling.
Wastewater Services	
PO 12.1 Development is connected to an approved common wastewater disposal service with the capacity to meet the requirements of the intended use. Where this is not available an appropriate on-site service is provided to meet the ongoing requirements of the intended use in accordance with the following: (a) it is wholly located and contained within the allotment of the development it will service (b) in areas where there is a high risk of contamination of surface, ground, or marine water resources from on-site disposal of liquid wastes, disposal systems are included to minimise the risk of pollution to those water resources (c) septic tank effluent drainage fields and other wastewater disposal areas are located away from watercourses and flood prone, sloping, saline or poorly drained land to minimise environmental harm.	DTS/DPF 12.1 Development is connected, or will be connected, to an approved common wastewater disposal service with the capacity to meet the requirements of the development. Where this is not available it is instead capable of being serviced by an on-site waste water treatment system in accordance with the following: (a) the system is wholly located and contained within the allotment of development it will service; and (b) the system will comply with the requirements of the South Australian Public Health Act 2011.
PO 12.2 Effluent drainage fields and other wastewater disposal areas are maintained to ensure the effective operation of waste systems and minimise risks to human health and the environment.	DTS/DPF 12.2 Development is not built on, or encroaches within, an area that is, or will be, required for a sewerage system or waste control system.
Temporary Facilities	
PO 13.1 In rural and remote locations, development that is likely to generate significant waste material during construction, including packaging waste, makes provision for a temporary on-site waste storage enclosure to minimise the incidence of wind-blown litter.	DTS/DPF 13.1 A waste collection and disposal service is used to dispose of the volume of waste at the rate it is generated.
PO 13.2 Temporary facilities to support the establishment of renewable energy facilities (including borrow pits, concrete batching plants, laydown, storage, access roads and worker amenity areas) are sited and operated to minimise environmental impact.	DTS/DPF 13.2 None are applicable.

Intensive Animal Husbandry and Dairies

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Development of intensive animal husbandry and dairies in locations that are protected from encroachment by sensitive receivers and in a manner that minimises their adverse effects on amenity and the environment.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Siting and Design	
PO 1.1 Intensive animal husbandry, dairies and associated activities are sited, designed, constructed and managed to not unreasonably impact on the environment or amenity of the locality.	DTS/DPF 1.1 None are applicable.
PO 1.2 Intensive animal husbandry, dairies and associated activities are sited, designed, constructed and managed to prevent the potential transmission of disease to other operations where animals are kept.	DTS/DPF 1.2 None are applicable.
PO 1.3 Intensive animal husbandry and associated activities such as wastewater lagoons and liquid/solid waste disposal areas are sited, designed, constructed and managed to not unreasonably impact on sensitive receivers in other ownership in terms of noise and air emissions.	DTS/DPF 1.3 None are applicable.
PO 1.4 Dairies and associated activities such as wastewater lagoons and liquid/solid waste disposal areas are sited, designed, constructed and managed to not unreasonably impact on sensitive receivers in other ownership in terms of noise and air emissions.	DTS/DPF 1.4 Dairies, associated wastewater lagoon(s) and liquid/solid waste storage and disposal facilities are located 500m or more from the nearest sensitive receiver in other ownership.
PO 1.5 Lagoons for the storage or treatment of milking shed effluent is adequately separated from roads to minimise impacts from odour on the general public.	DTS/DPF 1.5 Lagoons for the storage or treatment of milking shed effluent are set back 20m or more from public roads.
Waste	
PO 2.1 Storage of manure, used litter and other wastes (other than waste water lagoons) is sited, designed, constructed and managed to: (a) avoid attracting and harbouring vermin (b) avoid polluting water resources (c) be located outside 1% AEP flood event areas.	DTS/DPF 2.1 None are applicable.
Soil and Water Protection	
PO 3.1 To avoid environmental harm and adverse effects on water resources, intensive animal husbandry operations are appropriately set back from: (a) public water supply reservoirs (b) major watercourses (third order or higher stream) (c) any other watercourse, bore or well used for domestic or stock water supplies.	DTS/DPF 3.1 Intensive animal husbandry operations are set back: (a) 800m or more from a public water supply reservoir (b) 200m or more from a major watercourse (third order or higher stream) (c) 100m or more from any other watercourse, bore or well used for domestic or stock water supplies.
PO 3.2 Intensive animal husbandry operations and dairies incorporate	DTS/DPF 3.2 None are applicable.

appropriately designed effluent and run-off facilities that: (a) have sufficient capacity to hold effluent and runoff from the operations on site (b) ensure effluent does not infiltrate and pollute groundwater, soil or other water resources.	

Interface between Land Uses

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
General Land Use Compatibility	
PO 1.1 Sensitive receivers are designed and sited to protect residents and occupants from adverse impacts generated by lawfully existing land uses (or lawfully approved land uses) and land uses desired in the zone.	DTS/DPF 1.1 None are applicable.
PO 1.2 Development adjacent to a site containing a sensitive receiver (or lawfully approved sensitive receiver) or zone primarily intended to accommodate sensitive receivers is designed to minimise adverse impacts.	DTS/DPF 1.2 None are applicable.
Hours of Operation	
PO 2.1 Non-residential development does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers) or an adjacent zone primarily for sensitive receivers through its hours of operation having regard to: (a) the nature of the development (b) measures to mitigate off-site impacts (c) the extent to which the development is desired in the zone (d) measures that might be taken in an adjacent zone primarily for sensitive receivers that mitigate adverse impacts without unreasonably compromising the intended use of that land.	DTS/DPF 2.1 Development operating within the following hours: **Class of Development** / **Hours of operation** Consulting room: 7am to 9pm, Monday to Friday; 8am to 5pm, Saturday Office: 7am to 9pm, Monday to Friday; 8am to 5pm, Saturday Shop, other than any one or combination of the following: (a) restaurant: 7am to 9pm, Monday to Friday; 8am to 5pm, Saturday and Sunday

	(b) cellar door in the Productive Rural Landscape Zone, Rural Zone or Rural Horticulture Zone	

Overshadowing	
PO 3.1 Overshadowing of habitable room windows of adjacent residential land uses in: a. a neighbourhood-type zone is minimised to maintain access to direct winter sunlight b. other zones is managed to enable access to direct winter sunlight.	DTS/DPF 3.1 North-facing windows of habitable rooms of adjacent residential land uses in a neighbourhood-type zone receive at least 3 hours of direct sunlight between 9.00am and 3.00pm on 21 June.
PO 3.2 Overshadowing of the primary area of private open space or communal open space of adjacent residential land uses in: a. a neighbourhood type zone is minimised to maintain access to direct winter sunlight b. other zones is managed to enable access to direct winter sunlight.	DTS/DPF 3.2 Development maintains 2 hours of direct sunlight between 9.00 am and 3.00 pm on 21 June to adjacent residential land uses in a neighbourhood-type zone in accordance with the following: a. for ground level private open space, the smaller of the following: i. half the existing ground level open space or ii. 35m2 of the existing ground level open space (with at least one of the area's dimensions measuring 2.5m) b. for ground level communal open space, at least half of the existing ground level open space.
PO 3.3 Development does not unduly reduce the generating capacity of adjacent rooftop solar energy facilities taking into account: (a) the form of development contemplated in the zone (b) the orientation of the solar energy facilities (c) the extent to which the solar energy facilities are already overshadowed.	DTS/DPF 3.3 None are applicable.
PO 3.4 Development that incorporates moving parts, including windmills and wind farms, are located and operated to not cause unreasonable nuisance to nearby dwellings and tourist accommodation caused by shadow flicker.	DTS/DPF 3.4 None are applicable.
Activities Generating Noise or Vibration	
PO 4.1 Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.1 Noise that affects sensitive receivers achieves the relevant Environment Protection (Commercial and Industrial Noise) Policy criteria.
PO 4.2 Areas for the on-site manoeuvring of service and delivery vehicles, plant and equipment, outdoor work spaces (and the like) are designed and sited to not unreasonably impact the amenity of adjacent sensitive receivers (or lawfully approved sensitive receivers) and zones primarily intended to accommodate sensitive receivers due to noise and vibration by adopting techniques including: (a) locating openings of buildings and associated services away from the interface with the adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers	DTS/DPF 4.2 None are applicable.

(b) when sited outdoors, locating such areas as far as practicable from adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers (c) housing plant and equipment within an enclosed structure or acoustic enclosure (d) providing a suitable acoustic barrier between the plant and / or equipment and the adjacent sensitive receiver boundary or zone.	
PO 4.3 Fixed plant and equipment in the form of pumps and/or filtration systems for a swimming pool or spa are positioned and/or housed to not cause unreasonable noise nuisance to adjacent sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.3 The pump and/or filtration system ancillary to a dwelling erected on the same site is: (a) enclosed in a solid acoustic structure located at least 5m from the nearest habitable room located on an adjoining allotment or (b) located at least 12m from the nearest habitable room located on an adjoining allotment.
PO 4.4 External noise into bedrooms is minimised by separating or shielding these rooms from service equipment areas and fixed noise sources located on the same or an adjoining allotment.	DTS/DPF 4.4 Adjacent land is used for residential purposes.
PO 4.5 Outdoor areas associated with licensed premises (such as beer gardens or dining areas) are designed and/or sited to not cause unreasonable noise impact on existing adjacent sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.5 None are applicable.
PO 4.6 Development incorporating music achieves suitable acoustic amenity when measured at the boundary of an adjacent sensitive receiver (or lawfully approved sensitive receiver) or zone primarily intended to accommodate sensitive receivers.	DTS/DPF 4.6 Development incorporating music includes noise attenuation measures that will achieve the following noise levels: **Assessment location** / **Music noise level** Externally at the nearest existing or envisaged noise sensitive location / Less than 8dB above the level of background noise ($L_{90,15min}$) in any octave band of the sound spectrum (LOCT10,15 < LOCT90,15 + 8dB)
Air Quality	
PO 5.1 Development with the potential to emit harmful or nuisance-generating air pollution incorporates air pollution control measures to prevent harm to human health or unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers) within the locality and zones primarily intended to accommodate sensitive receivers.	DTS/DPF 5.1 None are applicable.
PO 5.2 Development that includes chimneys or exhaust flues (including cafes, restaurants and fast food outlets) is designed to minimise nuisance or adverse health impacts to sensitive receivers (or lawfully approved sensitive receivers) by: (a) incorporating appropriate treatment technology before exhaust emissions are released (b) locating and designing chimneys or exhaust flues to maximise the dispersion of exhaust emissions, taking into account the location of sensitive receivers.	DTS/DPF 5.2 None are applicable.
Light Spill	
PO 6.1	DTS/DPF 6.1

External lighting is positioned and designed to not cause unreasonable light spill impact on adjacent sensitive receivers (or lawfully approved sensitive receivers).	None are applicable.
PO 6.2 External lighting is not hazardous to motorists and cyclists.	DTS/DPF 6.2 None are applicable.
Solar Reflectivity / Glare	
PO 7.1 Development is designed and comprised of materials and finishes that do not unreasonably cause a distraction to adjacent road users and pedestrian areas or unreasonably cause heat loading and micro-climatic impacts on adjacent buildings and land uses as a result of reflective solar glare.	DTS/DPF 7.1 None are applicable.
Electrical Interference	
PO 8.1 Development in rural and remote areas does not unreasonably diminish or result in the loss of existing communication services due to electrical interference.	DTS/DPF 8.1 The building or structure: (a) is no greater than 10m in height, measured from existing ground level or (b) is not within a line of sight between a fixed transmitter and fixed receiver (antenna) other than where an alternative service is available via a different fixed transmitter or cable.
Interface with Rural Activities	
PO 9.1 Sensitive receivers are located and designed to mitigate impacts from lawfully existing horticultural and farming activities (or lawfully approved horticultural and farming activities), including spray drift and noise and do not prejudice the continued operation of these activities.	DTS/DPF 9.1 None are applicable.
PO 9.2 Sensitive receivers are located and designed to mitigate potential impacts from lawfully existing intensive animal husbandry activities and do not prejudice the continued operation of these activities.	DTS/DPF 9.2 None are applicable.
PO 9.3 Sensitive receivers are located and designed to mitigate potential impacts from lawfully existing land-based aquaculture activities and do not prejudice the continued operation of these activities.	DTS/DPF 9.3 Sensitive receivers are located at least 200m from the boundary of a site used for land-based aquaculture and associated components in other ownership.
PO 9.4 Sensitive receivers are located and designed to mitigate potential impacts from lawfully existing dairies including associated wastewater lagoons and liquid/solid waste storage and disposal facilities and do not prejudice the continued operation of these activities.	DTS/DPF 9.4 Sensitive receivers are sited at least 500m from the boundary of a site used for a dairy and associated wastewater lagoon(s) and liquid/solid waste storage and disposal facilities in other ownership.
PO 9.5 Sensitive receivers are located and designed to mitigate the potential impacts from lawfully existing facilities used for the handling, transportation and storage of bulk commodities (recognising the potential for extended hours of operation) and do not prejudice the continued operation of these activities.	DTS/DPF 9.5 Sensitive receivers are located away from the boundary of a site used for the handling, transportation and/or storage of bulk commodities in other ownership in accordance with the following: (a) 300m or more, where it involves the handling of agricultural crop products, rock, ores, minerals, petroleum products or chemicals to or from any commercial storage facility (b) 300m or more, where it involves the handling of agricultural crop products, rock, ores, minerals, petroleum products or chemicals at a wharf or wharf side facility (including sea-port grain terminals) where the handling of these materials into or from vessels does not exceed 100 tonnes per day

	(c) 500m or more, where it involves the storage of bulk petroleum in individual containers with a capacity up to 200 litres and a total on-site storage capacity not exceeding 1000 cubic metres (d) 500m or more, where it involves the handling of coal with a capacity up to 1 tonne per day or a storage capacity up to 50 tonnes (e) 1000m or more, where it involves the handling of coal with a capacity exceeding 1 tonne per day but not exceeding 100 tonnes per day or a storage capacity exceeding 50 tonnes but not exceeding 5000 tonnes.
PO 9.6 Setbacks and vegetation plantings along allotment boundaries should be incorporated to mitigate the potential impacts of spray drift and other impacts associated with agricultural and horticultural activities.	DTS/DPF 9.6 None are applicable.
PO 9.7 Urban development does not prejudice existing agricultural and horticultural activities through appropriate separation and design techniques.	DTS/DPF 9.7 None are applicable.
Interface with Mines and Quarries (Rural and Remote Areas)	
PO 10.1 Sensitive receivers are separated from existing mines to minimise the adverse impacts from noise, dust and vibration.	DTS/DPF 10.1 Sensitive receivers are located no closer than 500m from the boundary of a Mining Production Tenement under the *Mining Act 1971.*

Land Division

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Land division: (a) creates allotments with the appropriate dimensions and shape for their intended use (b) allows efficient provision of new infrastructure and the optimum use of underutilised infrastructure (c) integrates and allocates adequate and suitable land for the preservation of site features of value, including significant vegetation, watercourses, water bodies and other environmental features (d) facilitates solar access through allotment orientation (e) creates a compact urban form that supports active travel, walkability and the use of public transport (f) avoids areas of high natural hazard risk.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
All land division	
Allotment configuration	
PO 1.1 Land division creates allotments suitable for their intended use.	DTS/DPF 1.1 Division of land satisfies (a) or (b):

	(a) reflects the site boundaries illustrated and approved in an operative or existing development authorisation for residential development under the *Development Act 1993* or *Planning, Development and Infrastructure Act 2016* where the allotments are used or are proposed to be used solely for residential purposes (b) is proposed as part of a combined land division application with deemed-to-satisfy dwellings on the proposed allotments.
PO 1.2 Land division considers the physical characteristics of the land, preservation of environmental and cultural features of value and the prevailing context of the locality.	DTS/DPF 1.2 None are applicable.
Design and Layout	
PO 2.1 Land division results in a pattern of development that minimises the likelihood of future earthworks and retaining walls.	DTS/DPF 2.1 None are applicable.
PO 2.2 Land division enables the appropriate management of interface impacts between potentially conflicting land uses and/or zones.	DTS/DPF 2.2 None are applicable.
PO 2.3 Land division maximises the number of allotments that face public open space and public streets.	DTS/DPF 2.3 None are applicable.
PO 2.4 Land division is integrated with site features, adjacent land uses, the existing transport network and available infrastructure.	DTS/DPF 2.4 None are applicable.
PO 2.5 Development and infrastructure is provided and staged in a manner that supports an orderly and economic provision of land, infrastructure and services.	DTS/DPF 2.5 None are applicable.
PO 2.6 Land division results in watercourses being retained within open space and development taking place on land not subject to flooding.	DTS/DPF 2.6 None are applicable.
PO 2.7 Land division results in legible street patterns connected to the surrounding street network.	DTS/DPF 2.7 None are applicable.
PO 2.8 Land division is designed to preserve existing vegetation of value including native vegetation and regulated and significant trees.	DTS/DPF 2.8 None are applicable.
Roads and Access	
PO 3.1 Land division provides allotments with access to an all-weather public road.	DTS/DPF 3.1 None are applicable.
PO 3.2 Street patterns and intersections are designed to enable the safe and efficient movement of pedestrian, cycle and vehicular traffic.	DTS/DPF 3.2 None are applicable.
PO 3.3 Land division does not impede access to publicly owned open space and/or recreation facilities.	DTS/DPF 3.3 None are applicable.
PO 3.4	DTS/DPF 3.4

Road reserves provide for safe and convenient movement and parking of projected volumes of vehicles and allow for the efficient movement of service and emergency vehicles.	None are applicable.
PO 3.5 Road reserves are designed to accommodate pedestrian and cycling infrastructure, street tree planting, landscaping and street furniture.	DTS/DPF 3.5 None are applicable.
PO 3.6 Road reserves accommodate stormwater drainage and public utilities.	DTS/DPF 3.6 None are applicable.
PO 3.7 Road reserves provide unobstructed vehicular access and egress to and from individual allotments and sites.	DTS/DPF 3.7 None are applicable.
PO 3.8 Roads, open space and thoroughfares provide safe and convenient linkages to the surrounding open space and transport network.	DTS/DPF 3.8 None are applicable.
PO 3.9 Public streets are designed to enable tree planting to provide shade and enhance the amenity of streetscapes.	DTS/DPF 3.9 None are applicable.
PO 3.10 Local streets are designed to create low-speed environments that are safe for cyclists and pedestrians.	DTS/DPF 3.10 None are applicable.
Infrastructure	
PO 4.1 Land division incorporates public utility services within road reserves or dedicated easements.	DTS/DPF 4.1 None are applicable.
PO 4.2 Waste water, sewage and other effluent is capable of being disposed of from each allotment without risk to public health or the environment.	DTS/DPF 4.2 Each allotment can be connected to: (a) a waste water treatment plant that has the hydraulic volume and pollutant load treatment and disposal capacity for the maximum predicted wastewater volume generated by subsequent development of the proposed allotment or (b) a form of on-site waste water treatment and disposal that meets relevant public health and environmental standards.
PO 4.3 Septic tank effluent drainage fields and other waste water disposal areas are maintained to ensure the effective operation of waste systems and minimise risks to human health and the environment.	DTS/DPF 4.3 Development is not built on, or encroaches within, an area that is or will be, required for a sewerage system or waste control system.
PO 4.4 Constructed wetland systems, including associated detention and retention basins, are sited and designed to ensure public health and safety is protected, including by minimising potential public health risks arising from the breeding of mosquitoes.	DTS/DPF 4.4 None are applicable.
PO 4.5 Constructed wetland systems, including associated detention and retention basins, are sited and designed to allow sediments to settle prior to discharge into watercourses or the marine environment.	DTS/DPF 4.5 None are applicable.
PO 4.6 Constructed wetland systems, including associated detention and retention basins, are sited and designed to function as a landscape	DTS/DPF 4.6 None are applicable.

feature.	
Minor Land Division (Under 20 Allotments)	
Open Space	
PO 5.1 Land division proposing an additional allotment under 1 hectare provides or supports the provision of open space.	DTS/DPF 5.1 None are applicable.
Solar Orientation	
PO 6.1 Land division for residential purposes facilitates solar access through allotment orientation.	DTS/DPF 6.1 None are applicable.
Water Sensitive Design	
PO 7.1 Land division creating a new road or common driveway includes stormwater management systems that minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system, watercourses or other water bodies.	DTS/DPF 7.1 None are applicable.
PO 7.2 Land division designed to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure that the development does not increase the peak flows in downstream systems.	DTS/DPF 7.2 None are applicable.
Battle-Axe Development	
PO 8.1 Battle-axe development appropriately responds to the existing neighbourhood context.	DTS/DPF 8.1 Allotments are not in the form of a battle-axe arrangement.
PO 8.2 Battle-axe development designed to allow safe and convenient movement.	DTS/DPF 8.2 The handle of a battle-axe development: (a) has a minimum width of 4m or (b) where more than 3 allotments are proposed, a minimum width of 5.5m.
PO 8.3 Battle-axe allotments and/or common land are of a suitable size and dimension to allow passenger vehicles to enter and exit and manoeuvre within the site in a safe and convenient manner.	DTS/DPF 8.3 Battle-axe development allows a B85 passenger vehicle to enter and exit parking spaces in no more than a three-point turn manoeuvre.
PO 8.4 Battle-axe or common driveways incorporate landscaping and permeability to improve appearance and assist in stormwater management.	DTS/DPF 8.4 Battle-axe or common driveways satisfy (a) and (b): (a) are constructed of a minimum of 50% permeable or porous material (b) where the driveway is located directly adjacent the side or rear boundary of the site, soft landscaping with a minimum dimension of 1m is provided between the driveway and site boundary (excluding along the perimeter of a passing point).
Major Land Division (20+ Allotments)	
Open Space	
PO 9.1 Land division allocates or retains evenly distributed, high quality areas of open space to improve residential amenity and provide urban heat amelioration.	DTS/DPF 9.1 None are applicable.
PO 9.2	DTS/DPF 9.2

Land allocated for open space is suitable for its intended active and passive recreational use considering gradient and potential for inundation.	None are applicable.
PO 9.3 Land allocated for active recreation has dimensions capable of accommodating a range of active recreational activities.	DTS/DPF 9.3 None are applicable.
Water Sensitive Design	
PO 10.1 Land division creating 20 or more allotments includes a stormwater management system designed to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure that the development does not increase the peak flows in downstream systems.	DTS/DPF 10.1 None are applicable.
PO 10.2 Land division creating 20 or more allotments includes stormwater management systems that minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system, watercourses or other water bodies.	DTS/DPF 10.2 None are applicable.
Solar Orientation	
PO 11.1 Land division creating 20 or more allotments for residential purposes facilitates solar access through allotment orientation and allotment dimensions.	DTS/DPF 11.1 None are applicable.

Marinas and On-Water Structures

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Marinas and on-water structures are located and designed to minimise the impairment of commercial, recreational and navigational activities and adverse impacts on the environment.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Navigation and Safety	
PO 1.1 Safe public access is provided or maintained to the waterfront, public infrastructure and recreation areas.	DTS/DPF 1.1 None are applicable.
PO 1.2 The operation of wharves is not impaired by marinas and on-water structures.	DTS/DPF 1.2 None are applicable.
PO 1.3	DTS/DPF 1.3

Navigation and access channels are not impaired by marinas and on-water structures.	None are applicable.
PO 1.4 Commercial shipping lanes are not impaired by marinas and on-water structures.	DTS/DPF 1.4 Marinas and on-water structures are set back 250m or more from commercial shipping lanes.
PO 1.5 Marinas and on-water structures are located to avoid interfering with the operation or function of a water supply pumping station.	DTS/DPF 1.5 On-water structures are set back: (a) 3km or more from upstream water supply pumping station take-off points (b) 500m or more from downstream water supply pumping station take-off points.
PO 1.6 Maintenance of on-water infrastructure, including revetment walls, is not impaired by marinas and on-water structures.	DTS/DPF 1.6 None are applicable.
Environmental Protection	
PO 2.1 Development is sited and designed to facilitate water circulation and exchange.	DTS/DPF 2.1 None are applicable.

Open Space and Recreation

Assessment Provisions (AP)

Desired Outcome (DO)

	Desired Outcome
DO 1	Pleasant, functional and accessible open space and recreation facilities are provided at State, regional, district, neighbourhood and local levels for active and passive recreation, biodiversity, community health, urban cooling, tree canopy cover, visual amenity, gathering spaces, wildlife and waterway corridors, and a range of other functions and at a range of sizes that reflect the purpose of that open space.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Land Use and Intensity	
PO 1.1 Recreation facilities are compatible with surrounding land uses and activities.	DTS/DPF 1.1 None are applicable.
PO 1.2 Open space areas include natural or landscaped areas using locally indigenous plant species and large trees.	DTS/DPF 1.2 None are applicable.
Design and Siting	
PO 2.1 Open space and recreation facilities address adjacent public roads to optimise pedestrian access and visibility.	DTS/DPF 2.1 None are applicable.

PO 2.2 Open space and recreation facilities incorporate park furniture, shaded areas and resting places.	DTS/DPF 2.2 None are applicable.
PO 2.3 Open space and recreation facilities link habitats, wildlife corridors and existing open spaces and recreation facilities.	DTS/DPF 2.3 None are applicable.
Pedestrians and Cyclists	
PO 3.1 Open space incorporates: (a) pedestrian and cycle linkages to other open spaces, centres, schools and public transport nodes; (b) safe crossing points where pedestrian routes intersect the road network; (c) easily identified access points.	DTS/DPF 3.1 None are applicable.
Usability	
PO 4.1 Land allocated for open space is suitable for its intended active and passive recreational use taking into consideration its gradient and potential for inundation.	DTS/DPF 4.1 None are applicable.
Safety and Security	
PO 5.1 Open space is overlooked by housing, commercial or other development to provide casual surveillance where possible.	DTS/DPF 5.1 None are applicable.
PO 5.2 Play equipment is located to maximise opportunities for passive surveillance.	DTS/DPF 5.2 None are applicable.
PO 5.3 Landscaping provided in open space and recreation facilities maximises opportunities for casual surveillance throughout the park.	DTS/DPF 5.3 None are applicable.
PO 5.4 Fenced parks and playgrounds have more than one entrance or exit to minimise potential entrapment.	DTS/DPF 5.4 None are applicable.
PO 5.5 Adequate lighting is provided around toilets, telephones, seating, litter bins, bicycle storage, car parks and other such facilities.	DTS/DPF 5.5 None are applicable.
PO 5.6 Pedestrian and bicycle movement after dark is focused along clearly defined, adequately lit routes with observable entries and exits.	DTS/DPF 5.6 None are applicable.
Signage	
PO 6.1 Signage is provided at entrances to and within the open space and recreation facilities to provide clear orientation to major points of interest such as the location of public toilets, telephones, safe routes, park activities and the like.	DTS/DPF 6.1 None are applicable.
Buildings and Structures	
PO 7.1 Buildings and car parking areas in open space areas are designed, located and of a scale to be unobtrusive.	DTS/DPF 7.1 None are applicable.

PO 7.2 Buildings and structures in open space areas are clustered where practical to ensure that the majority of the site remains open.	DTS/DPF 7.2 None are applicable.
PO 7.3 Development in open space is constructed to minimise the extent of impervious surfaces.	DTS/DPF 7.3 None are applicable.
PO 7.4 Development that abuts or includes a coastal reserve or Crown land used for scenic, conservation or recreational purposes is located and designed to have regard to the purpose, management and amenity of the reserve.	DTS/DPF 7.4 None are applicable.
Landscaping	
PO 8.1 Open space and recreation facilities provide for the planting and retention of large trees and vegetation.	DTS/DPF 8.1 None are applicable.
PO 8.2 Landscaping in open space and recreation facilities provides shade and windbreaks: (a) along cyclist and pedestrian routes; (b) around picnic and barbecue areas; (c) in car parking areas.	DTS/DPF 8.2 None are applicable.
PO 8.3 Landscaping in open space facilitates habitat for local fauna and facilitates biodiversity.	DTS/DPF 8.3 None are applicable.
PO 8.4 Landscaping including trees and other vegetation passively watered with local rainfall run-off, where practicable.	DTS/DPF 8.4 None are applicable.

Out of Activity Centre Development

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO1	The role of Activity Centres in contributing to the form and pattern of development and enabling equitable and convenient access to a range of shopping, administrative, cultural, entertainment and other facilities in a single trip is maintained and reinforced.

Performance Outcomes and Deemed to Satisfy / Designated Performance Outcome Criteria

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
PO 1.1 Non-residential development outside Activity Centres of a scale and type that does not diminish the role of Activity Centres: (a) as primary locations for shopping, administrative, cultural, entertainment and community services (b) as a focus for regular social and business gatherings (c) in contributing to or maintaining a pattern of development that supports equitable community access to services and facilities.	DTS/DPF 1.1 None are applicable.

PO 1.2 Out-of-activity centre non-residential development complements Activity Centres through the provision of services and facilities: (a) that support the needs of local residents and workers, particularly in underserviced locations (b) at the edge of Activities Centres where they cannot readily be accommodated within an existing Activity Centre to expand the range of services on offer and support the role of the Activity Centre.	DTS/DPF 1.2 None are applicable.

Resource Extraction

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Resource extraction activities are developed in a manner that minimises human and environmental impacts.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Land Use and Intensity	
PO 1.1 Resource extraction activities minimise landscape damage outside of those areas unavoidably disturbed to access and exploit a resource and provide for the progressive reclamation and betterment of disturbed areas.	DTS/DPF 1.1 None are applicable.
PO 1.2 Resource extraction activities avoid damage to cultural sites or artefacts.	DTS/DPF 1.2 None are applicable.
Water Quality	
PO 2.1 Stormwater and/or wastewater from resource extraction activities is diverted into appropriately sized treatment and retention systems to enable reuse on site.	DTS/DPF 2.1 None are applicable.
Separation Treatments, Buffers and Landscaping	
PO 3.1 Resource extraction activities minimise adverse impacts upon sensitive receivers through incorporation of separation distances and/or mounding/vegetation.	DTS/DPF 3.1 None are applicable.
PO 3.2 Resource extraction activities are screened from view from adjacent land by perimeter landscaping and/or mounding.	DTS/DPF 3.2 None are applicable.

Site Contamination

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Ensure land is suitable for the proposed use in circumstances where it is, or may have been, subject to site contamination.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
PO 1.1 Ensure land is suitable for use when land use changes to a more sensitive use.	DTS/DPF 1.1 Development satisfies (a), (b), (c) or (d): (a) does not involve a change in the use of land (b) involves a change in the use of land that does not constitute a change to a more sensitive use (c) involves a change in the use of land to a more sensitive use on land at which site contamination is unlikely to exist (as demonstrated in a site contamination declaration form) (d) involves a change in the use of land to a more sensitive use on land at which site contamination exists, or may exist (as demonstrated in a site contamination declaration form), and satisfies both of the following: (i) a site contamination audit report has been prepared under Part 10A of the *Environment Protection Act 1993* in relation to the land within the previous 5 years which states that- A. site contamination does not exist (or no longer exists) at the land or B. the land is suitable for the proposed use or range of uses (without the need for any further remediation) or C. where remediation is, or remains, necessary for the proposed use (or range of uses), remediation work has been carried out or will be carried out (and the applicant has provided a written undertaking that the remediation works will be implemented in association with the development) and (ii) no other class 1 activity or class 2 activity has taken place at the land since the preparation of the site contamination audit report (as demonstrated in a site contamination declaration form).

Tourism Development

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Tourism development is built in locations that cater to the needs of visitors and positively contributes to South Australia's visitor economy.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
General	
PO 1.1 Tourism development complements and contributes to local, natural, cultural or historical context where: (a) it supports immersive natural experiences (b) it showcases South Australia's landscapes and produce (c) its events and functions are connected to local food, wine and nature.	DTS/DPF 1.1 None are applicable.
PO 1.2 Tourism development comprising multiple accommodation units (including any facilities and activities for use by guests and visitors) is clustered to minimise environmental and contextual impact.	DTS/DPF 1.2 None are applicable.
Caravan and Tourist Parks	
PO 2.1 Potential conflicts between long-term residents and short-term tourists are minimised through suitable siting and design measures.	DTS/DPF 2.1 None are applicable.
PO 2.2 Occupants are provided privacy and amenity through landscaping and fencing.	DTS/DPF 2.2 None are applicable.
PO 2.3 Communal open space and centrally located recreation facilities are provided for guests and visitors.	DTS/DPF 2.3 12.5% or more of a caravan park comprises clearly defined communal open space, landscaped areas and areas for recreation.
PO 2.4 Perimeter landscaping is used to enhance the amenity of the locality.	DTS/DPF 2.4 None are applicable.
PO 2.5 Amenity blocks (showers, toilets, laundry and kitchen facilities) are sufficient to serve the full occupancy of the development.	DTS/DPF 2.5 None are applicable.
PO 2.6 Long-term occupation does not displace tourist accommodation, particularly in important tourist destinations such as coastal and riverine locations.	DTS/DPF 2.6 None are applicable.
Tourist accommodation in areas constituted under the National Parks and Wildlife Act 1972	
PO 3.1 Tourist accommodation avoids delicate or environmentally sensitive areas such as sand dunes, cliff tops, estuaries, wetlands or substantially intact strata of native vegetation (including regenerated areas of native vegetation lost through bushfire).	DTS/DPF 3.1 None are applicable.
PO 3.2 Tourist accommodation is sited and designed in a manner that is	DTS/DPF 3.2 None are applicable.

subservient to the natural environment and where adverse impacts on natural features, landscapes, habitats and cultural assets are avoided.	
PO 3.3 Tourist accommodation and recreational facilities, including associated access ways and ancillary structures, are located on cleared (other than where cleared as a result of bushfire) or degraded areas or where environmental improvements can be achieved.	DTS/DPF 3.3 None are applicable.
PO 3.4 Tourist accommodation is designed to prevent conversion to private dwellings through: (a) comprising a minimum of 10 accommodation units (b) clustering separated individual accommodation units (c) being of a size unsuitable for a private dwelling (d) ensuring functional areas that are generally associated with a private dwelling such as kitchens and laundries are excluded from, or physically separated from individual accommodation units, or are of a size unsuitable for a private dwelling.	DTS/DPF 3.4 None are applicable.

Transport, Access and Parking

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	A comprehensive, integrated and connected transport system that is safe, sustainable, efficient, convenient and accessible to all users.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Movement Systems	
PO 1.1 Development is integrated with the existing transport system and designed to minimise its potential impact on the functional performance of the transport system.	DTS/DPF 1.1 None are applicable.
PO 1.2 Development is designed to discourage commercial and industrial vehicle movements through residential streets and adjacent other sensitive receivers.	DTS/DPF 1.2 None are applicable.
PO 1.3 Industrial, commercial and service vehicle movements, loading areas and designated parking spaces are separated from passenger vehicle car parking areas to ensure efficient and safe movement and minimise potential conflict.	DTS/DPF 1.3 None are applicable.
PO 1.4 Development is sited and designed so that loading, unloading and	DTS/DPF 1.4 All vehicle manoeuvring occurs onsite.

turning of all traffic avoids interrupting the operation of and queuing on public roads and pedestrian paths.	
Sightlines	
PO 2.1 Sightlines at intersections, pedestrian and cycle crossings, and crossovers to allotments for motorists, cyclists and pedestrians are maintained or enhanced to ensure safety for all road users and pedestrians.	DTS/DPF 2.1 None are applicable.
PO 2.2 Walls, fencing and landscaping adjacent to driveways and corner sites are designed to provide adequate sightlines between vehicles and pedestrians.	DTS/DPF 2.2 None are applicable.
Vehicle Access	
PO 3.1 Safe and convenient access minimises impact or interruption on the operation of public roads.	DTS/DPF 3.1 The access is: (a) provided via a lawfully existing or authorised driveway or access point or an access point for which consent has been granted as part of an application for the division of land or (b) not located within 6m of an intersection of 2 or more roads or a pedestrian activated crossing.
PO 3.2 Development incorporating vehicular access ramps ensures vehicles can enter and exit a site safely and without creating a hazard to pedestrians and other vehicular traffic.	DTS/DPF 3.2 None are applicable.
PO 3.3 Access points are sited and designed to accommodate the type and volume of traffic likely to be generated by the development or land use.	DTS/DPF 3.3 None are applicable.
PO 3.4 Access points are sited and designed to minimise any adverse impacts on neighbouring properties.	DTS/DPF 3.4 None are applicable.
PO 3.5 Access points are located so as not to interfere with street trees, existing street furniture (including directional signs, lighting, seating and weather shelters) or infrastructure services to maintain the appearance of the streetscape, preserve local amenity and minimise disruption to utility infrastructure assets.	DTS/DPF 3.5 Vehicle access to designated car parking spaces satisfy (a) or (b): (a) is provided via a lawfully existing or authorised access point or an access point for which consent has been granted as part of an application for the division of land (b) where newly proposed, is set back: (i) 0.5m or more from any street furniture, street pole, infrastructure services pit, or other stormwater or utility infrastructure unless consent is provided from the asset owner (ii) 2m or more from the base of the trunk of a street tree unless consent is provided from the tree owner for a lesser distance (iii) 6m or more from the tangent point of an intersection of 2 or more roads (iv) outside of the marked lines or infrastructure dedicating a pedestrian crossing.
PO 3.6 Driveways and access points are separated and minimised in number to optimise the provision of on-street visitor parking (where on-street parking is appropriate).	DTS/DPF 3.6 Driveways and access points: (a) for sites with a frontage to a public road of 20m or less, one access point no greater than 3.5m in width is provided

	(b) for sites with a frontage to a public road greater than 20m: (i) a single access point no greater than 6m in width is provided or (ii) not more than two access points with a width of 3.5m each are provided.
PO 3.7 Access points are appropriately separated from level crossings to avoid interference and ensure their safe ongoing operation.	DTS/DPF 3.7 Development does not involve a new or modified access or cause an increase in traffic through an existing access that is located within the following distance from a railway crossing: (a) 80 km/h road - 110m (b) 70 km/h road - 90m (c) 60 km/h road - 70m (d) 50km/h or less road - 50m.
PO 3.8 Driveways, access points, access tracks and parking areas are designed and constructed to allow adequate movement and manoeuvrability having regard to the types of vehicles that are reasonably anticipated.	DTS/DPF 3.8 None are applicable.
PO 3.9 Development is designed to ensure vehicle circulation between activity areas occurs within the site without the need to use public roads.	DTS/DPF 3.9 None are applicable.
Access for People with Disabilities	
PO 4.1 Development is sited and designed to provide safe, dignified and convenient access for people with a disability.	DTS/DPF 4.1 None are applicable.
Vehicle Parking Rates	
PO 5.1 Sufficient on-site vehicle parking and specifically marked accessible car parking places are provided to meet the needs of the development or land use having regard to factors that may support a reduced on-site rate such as: (a) availability of on-street car parking (b) shared use of other parking areas (c) in relation to a mixed-use development, where the hours of operation of commercial activities complement the residential use of the site, the provision of vehicle parking may be shared (d) the adaptive reuse of a State or Local Heritage Place.	DTS/DPF 5.1 Development provides a number of car parking spaces on-site at a rate no less than the amount calculated using one of the following, whichever is relevant: (a) Transport, Access and Parking Table 2 - Off-Street Vehicle Parking Requirements in Designated Areas if the development is a class of development listed in Table 2 and the site is in a Designated Area (b) Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements where (a) does not apply (c) if located in an area where a lawfully established carparking fund operates, the number of spaces calculated under (a) or (b) less the number of spaces offset by contribution to the fund.
Vehicle Parking Areas	
PO 6.1 Vehicle parking areas are sited and designed to minimise impact on the operation of public roads by avoiding the use of public roads when moving from one part of a parking area to another.	DTS/DPF 6.1 Movement between vehicle parking areas within the site can occur without the need to use a public road.
PO 6.2 Vehicle parking areas are appropriately located, designed and constructed to minimise impacts on adjacent sensitive receivers through measures such as ensuring they are attractively developed and landscaped, screen fenced, and the like.	DTS/DPF 6.2 None are applicable.
PO 6.3 Vehicle parking areas are designed to provide opportunity for	DTS/DPF 6.3 None are applicable.

integration and shared-use of adjacent car parking areas to reduce the total extent of vehicle parking areas and access points.	
PO 6.4 Pedestrian linkages between parking areas and the development are provided and are safe and convenient.	DTS/DPF 6.4 None are applicable.
PO 6.5 Vehicle parking areas that are likely to be used during non-daylight hours are provided with sufficient lighting to entry and exit points to ensure clear visibility to users.	DTS/DPF 6.5 None are applicable.
PO 6.6 Loading areas and designated parking spaces for service vehicles are provided within the boundary of the site.	DTS/DPF 6.6 Loading areas and designated parking spaces are wholly located within the site.
PO 6.7 On-site visitor parking spaces are sited and designed to be accessible to all visitors at all times.	DTS/DPF 6.7 None are applicable.
Undercroft and Below Ground Garaging and Parking of Vehicles	
PO 7.1 Undercroft and below ground garaging of vehicles is designed to enable safe entry and exit from the site without compromising pedestrian or cyclist safety or causing conflict with other vehicles.	DTS/DPF 7.1 None are applicable.
Internal Roads and Parking Areas in Residential Parks and Caravan and Tourist Parks	
PO 8.1 Internal road and vehicle parking areas are surfaced to prevent dust becoming a nuisance to park residents and occupants.	DTS/DPF 8.1 None are applicable.
PO 8.2 Traffic circulation and movement within the park is pedestrian friendly and promotes low speed vehicle movement.	DTS/DPF 8.2 None are applicable.
Bicycle Parking in Designated Areas	
PO 9.1 The provision of adequately sized on-site bicycle parking facilities encourages cycling as an active transport mode.	DTS/DPF 9.1 Areas and / or fixtures are provided for the parking and storage of bicycles at a rate not less than the amount calculated using Transport, Access and Parking Table 3 - Off Street Bicycle Parking Requirements.
PO 9.2 Bicycle parking facilities provide for the secure storage and tethering of bicycles in a place where casual surveillance is possible, is well lit and signed for the safety and convenience of cyclists and deters property theft.	DTS/DPF 9.2 None are applicable.
PO 9.3 Non-residential development incorporates end-of-journey facilities for employees such as showers, changing facilities and secure lockers, and signage indicating the location of the facilities to encourage cycling as a mode of journey-to-work transport.	DTS/DPF 9.3 None are applicable.
Corner Cut-Offs	
PO 10.1 Development is located and designed to ensure drivers can safely turn into and out of public road junctions.	DTS/DPF 10.1 Development does not involve building work, or building work is located wholly outside the land shown as Corner Cut-Off Area in the following diagram:

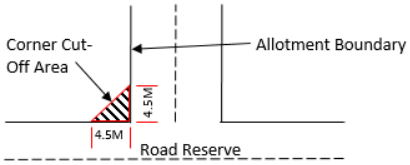
	
Heavy Vehicle Parking	
PO 11.1 Heavy vehicle parking and access is designed and sited so that the activity does not result in nuisance to adjoining neighbours as a result of dust, fumes, vibration, odour or potentially hazardous loads.	DTS/DPF 11.1 Heavy vehicle parking occurs in accordance with the following: (a) the site is not located within a Neighbourhood-type zone (except a Rural Living Zone) (b) the site is a minimum of 0.4 ha (c) where the site is 2 ha or more, no more than 2 vehicles exceeding 3,000 kilograms each (and trailers) are to be parked on the allotment at any time (d) where the site is between 0.4 ha and 2 ha, only one vehicle exceeding 3,000 kilograms (and one trailer) are to be parking on the allotment at any time (e) the vehicle parking area achieves the following setbacks: (i) behind the building line or 30m, whichever is greater (ii) 20m from the secondary street if it is a State Maintained Road (iii) 10m from the secondary street if it is a local road (iv) 10m from side and rear boundaries (f) parking and access areas (including internal driveways) should be sealed or have a surface that can be treated and maintained to minimise dust and mud nuisance (g) does not include refrigerated trailers or vehicles (h) vehicles only enter and exit the property in accordance with the following hours: (i) Monday to Saturday 6:00am and 9:30pm (ii) Sunday and public holidays between 9:30 am and 7:00 pm (i) the handling or trans-shipment of freight is not carried out on the property.
PO 11.2 Heavy vehicle parking ensures that vehicles can enter and exit a site safely and without creating a hazard to pedestrians and other vehicular traffic.	DTS/DPF 11.2 Heavy vehicles: (a) can enter and exit the site in a forward direction; and (b) operate within the statutory mass and dimension limited for General Access Vehicles (as prescribed by the National Heavy Vehicle Regulator).
PO 11.3 Heavy vehicle parking is screened through siting behind buildings, screening, landscaping or the like to obscure views from adjoining properties and public roads.	DTS/DPF 11.3 None are applicable.

Table 1 - General Off-Street Car Parking Requirements

The following parking rates apply and if located in an area where a lawfully established carparking fund operates, the number of spaces is reduced by an amount equal to the number of spaces offset by contribution to the fund.

Class of Development	Car Parking Rate (unless varied by Table 2 onwards)

	Where a development comprises more than one development type, then the overall car parking rate will be taken to be the sum of the car parking rates for each development type.
Residential Development	
Detached Dwelling	Dwelling with 1 bedroom (including rooms capable of being used as a bedroom) - 1 space per dwelling. Dwelling with 2 or more bedrooms (including rooms capable of being used as a bedroom) - 2 spaces per dwelling, 1 of which is to be covered.
Group Dwelling	Dwelling with 1 or 2 bedrooms (including rooms capable of being used as a bedroom) - 1 space per dwelling. Dwelling with 3 or more bedrooms (including rooms capable of being used as a bedroom) - 2 spaces per dwelling, 1 of which is to be covered. 0.33 spaces per dwelling for visitor parking where development involves 3 or more dwellings.
Residential Flat Building	Dwelling with 1 or 2 bedrooms (including rooms capable of being used as a bedroom) - 1 space per dwelling. Dwelling with 3 or more bedrooms (including rooms capable of being used as a bedroom) - 2 spaces per dwelling, 1 of which is to be covered. 0.33 spaces per dwelling for visitor parking where development involves 3 or more dwellings.
Row Dwelling where vehicle access is from the primary street	Dwelling with 1 bedroom (including rooms capable of being used as a bedroom) - 1 space per dwelling. Dwelling with 2 or more bedrooms (including rooms capable of being used as a bedroom) - 2 spaces per dwelling, 1 of which is to be covered.
Row Dwelling where vehicle access is not from the primary street (i.e. rear-loaded)	Dwelling with 1 or 2 bedrooms (including rooms capable of being used as a bedroom) - 1 space per dwelling. Dwelling with 3 or more bedrooms (including rooms capable of being used as a bedroom) - 2 spaces per dwelling, 1 of which is to be covered.
Semi-Detached Dwelling	Dwelling with 1 bedroom (including rooms capable of being used as a bedroom) - 1 space per dwelling. Dwelling with 2 or more bedrooms (including rooms capable of being used as a bedroom) - 2 spaces per dwelling, 1 of which is to be covered.
Aged / Supported Accommodation	
Retirement facility	Dwelling with 1 or 2 bedrooms (including rooms capable of being used as a bedroom) - 1 space per dwelling. Dwelling with 3 or more bedrooms (including rooms capable of being used as a bedroom) - 2 spaces per dwelling. 0.2 spaces per dwelling for visitor parking.
Supported accommodation	0.3 spaces per bed.
Residential Development (Other)	
Ancillary accommodation	No additional requirements beyond those associated with the main dwelling.
Residential park	Dwelling with 1 or 2 bedrooms (including rooms capable of being used as a bedroom) - 1 space per dwelling. Dwelling with 3 or more bedrooms (including rooms capable of being used as a bedroom) - 2 spaces per dwelling. 0.2 spaces per dwelling for visitor parking.
Student accommodation	0.3 spaces per bed.
Workers' accommodation	0.5 spaces per bed plus 0.2 spaces per bed for visitor parking.
Tourist	
Caravan and tourist park	Parks with 100 sites or less - a minimum of 1 space per 10 sites to be used for accommodation. Parks with more than 100 sites - a minimum of 1 space per 15 sites used for accommodation. A minimum of 1 space for every caravan (permanently fixed to the ground) or cabin.
Tourist accommodation other than a caravan and tourist park	1 car parking space per accommodation unit / guest room.
Commercial Uses	

Auction room/ depot	1 space per 100m2 of building floor area plus an additional 2 spaces.
Automotive collision repair	3 spaces per service bay.
Motor repair station	3 spaces per service bay.
Office	For a call centre, 8 spaces per 100m2 of gross leasable floor area In all other cases, 4 spaces per 100m2 of gross leasable floor area.
Retail fuel outlet	3 spaces per 100m2 gross leasable floor area.
Service trade premises	2.5 spaces per 100m2 of gross leasable floor area 1 space per 100m2 of outdoor area used for display purposes.
Shop (no commercial kitchen)	5.5 spaces per 100m2 of gross leasable floor area where not located in an integrated complex containing two or more tenancies (and which may comprise more than one building) where facilities for off-street vehicle parking, vehicle loading and unloading, and the storage and collection of refuse are shared. 5 spaces per 100m2 of gross leasable floor area where located in an integrated complex containing two or more tenancies (and which may comprise more than one building) where facilities for off-street vehicle parking, vehicle loading and unloading, and the storage and collection of refuse are shared.
Shop (in the form of a bulky goods outlet)	2.5 spaces per 100m2 of gross leasable floor area.
Shop (in the form of a restaurant or involving a commercial kitchen)	Premises with a dine-in service only (which may include a take-away component with no drive-through) - 0.4 spaces per seat. Premises with take-away service but with no seats - 12 spaces per 100m2 of total floor area plus a drive-through queue capacity of ten vehicles measured from the pick-up point. Premises with a dine-in and drive-through take-away service - 0.3 spaces per seat plus a drive through queue capacity of 10 vehicles measured from the pick-up point.
Community and Civic Uses	
Community facility	For a library, 4 spaces per 100m2 of total floor area. For a hall/meeting hall, 0.2 spaces per seat. In all other cases, 10 spaces per 100m2 of total floor area.
Educational facility	For a primary school - 1.1 space per full time equivalent employee plus 0.25 spaces per student for a pickup/set down area either on-site or on the public realm within 300m of the site. For a secondary school - 1.1 per full time equivalent employee plus 0.1 spaces per student for a pickup/set down area either on-site or on the public realm within 300m of the site. For a tertiary institution - 0.4 per student based on the maximum number of students on the site at any time.
Place of worship	1 space for every 3 visitor seats.
Child care facility	For a child care centre, 0.25 spaces per child In all other cases, 1 per employee plus 0.25 per child (drop off/pick up bays).
Health Related Uses	
Consulting room	4 spaces per consulting room excluding ancillary facilities.
Hospital	4.5 spaces per bed for a public hospital. 1.5 spaces per bed for a private hospital.
Recreational and Entertainment Uses	
Cinema complex	0.2 spaces per seat.
Concert hall / theatre	0.2 spaces per seat.
Hotel	1 space for every 2m2 of total floor area in a public bar plus 1 space for every 6m2 of total floor area available to the public in a lounge, beer garden plus 1 space per 2 gaming machines, plus 1 space per 3 seats in a restaurant.
Indoor recreation facility	6.5 spaces per 100m2 of total floor area for a Fitness Centre 4.5 spaces per 100m2 of total floor area for all other Indoor recreation facilities.

Industry/Employment Uses	
Fuel depot	1.5 spaces per 100m2 total floor area 1 spaces per 100m2 of outdoor area used for fuel depot activity purposes.
Industry	1.5 spaces per 100m2 of total floor area.
Store	0.5 spaces per 100m2 of total floor area.
Timber yard	1.5 spaces per 100m2 of total floor area 1 space per 100m2 of outdoor area used for display purposes.
Warehouse	0.5 spaces per 100m2 total floor area.
Other Uses	
Funeral Parlour	1 space per 5 seats in the chapel plus 1 space for each vehicle operated by the parlour.
Radio or Television Station	5 spaces per 100m2 of total building floor area.

Table 2 - Off-Street Car Parking Requirements in Designated Areas

The following parking rates apply in any zone, subzone or other area described in the 'Designated Areas' column.

Class of Development	Car Parking Rate Where a development comprises more than one development type, then the overall car parking rate will be taken to be the sum of the car parking rates for each development type.		Designated Areas
	Minimum number of spaces	Maximum number of spaces	
Development generally			
All classes of development	No minimum.	No maximum except in the Primary Pedestrian Area identified in the Primary Pedestrian Area Concept Plan, where the maximum is: 1 space for each dwelling with a total floor area less than 75 square metres 2 spaces for each dwelling with a total floor area between 75 square metres and 150 square metres 3 spaces for each dwelling with a total floor area greater than 150 square metres. Residential flat building or Residential component of a multi-storey building: 1 visitor space for each 6 dwellings.	Capital City Zone City Main Street Zone City Riverbank Zone Adelaide Park Lands Zone Business Neighbourhood Zone (within the City of Adelaide) The St Andrews Hospital Precinct Subzone and Women's and Children's Hospital Precinct Subzone of the Community Facilities Zone
Non-residential development			
Non-residential development excluding tourist accommodation	3 spaces per 100m2 of gross leasable floor area.	5 spaces per 100m2 of gross leasable floor area.	City Living Zone Urban Corridor (Boulevard) Zone Urban Corridor (Business) Zone Urban Corridor (Living) Zone Urban Corridor (Main Street) Zone Urban Neighbourhood Zone (except for Bowden, Brompton or Hindmarsh)
Non-residential development excluding tourist accommodation	3 spaces per 100m2 of gross leasable floor area.	6 spaces per 100m2 of gross leasable floor area.	Strategic Innovation Zone in the City of Burnside, City of Marion or City of Mitcham Strategic Innovation Zone outside the City of Burnside, City of Marion or City of Mitcham when the site is also in a high frequency public

			transit area Suburban Activity Centre Zone when the site is also in a high frequency public transit area Suburban Business Zone when the site is also in a high frequency public transit area Business Neighbourhood Zone outside of the City of Adelaide when the site is also in a high frequency public transit area Suburban Main Street Zone when the site is also in a high frequency public transit area Urban Activity Centre Zone
Non-residential development excluding tourist accommodation	3 spaces per 100 square metres of gross leasable floor area 1.5 spaces per 100 square metres of gross leasable floor area above ground floor level other than for a shop	3 spaces per 100 square metres of gross leasable floor area	Urban Neighbourhood Zone (in Bowden, Brompton or Hindmarsh)
Tourist accommodation	1 space for every 4 bedrooms up to 100 bedrooms plus 1 space for every 5 bedrooms over 100 bedrooms	1 space per 2 bedrooms up to 100 bedrooms and 1 space per 4 bedrooms over 100 bedrooms	City Living Zone Urban Activity Centre Zone when the site is also in a high frequency public transit area Urban Corridor (Boulevard) Zone Urban Corridor (Business) Zone Urban Corridor (Living) Zone Urban Corridor (Main Street) Zone Urban Neighbourhood Zone (except for Bowden, Brompton or Hindmarsh)
Residential development			
Residential component of a multi-storey building	Dwelling with no separate bedroom -0.25 spaces per dwelling 1 bedroom dwelling - 0.75 spaces per dwelling 2 bedroom dwelling - 1 space per dwelling 3 or more bedroom dwelling - 1.25 spaces per dwelling 0.25 spaces per dwelling for visitor parking.	None specified.	City Living Zone Strategic Innovation Zone in the City of Burnside, City of Marion or City of Mitcham Strategic Innovation Zone outside the City of Burnside, City of Marion or City of Mitcham when the site is also in a high frequency public transit area Urban Activity Centre Zone when the site is also in a high frequency public transit area Urban Corridor (Boulevard) Zone Urban Corridor (Business) Zone

			Urban Corridor (Living) Zone Urban Corridor (Main Street) Zone Urban Neighbourhood Zone (except for Bowden, Brompton or Hindmarsh)
Residential component of a multi-storey building	0.75 per dwelling	None specified	Urban Neighbourhood Zone (in Bowden, Brompton or Hindmarsh)
Residential flat building	Dwelling with no separate bedroom -0.25 spaces per dwelling 1 bedroom dwelling - 0.75 spaces per dwelling 2 bedroom dwelling - 1 space per dwelling 3 or more bedroom dwelling - 1.25 spaces per dwelling 0.25 spaces per dwelling for visitor parking.	None specified.	City Living Zone Urban Activity Centre Zone when the site is also in a high frequency public transit area Urban Corridor (Boulevard) Zone Urban Corridor (Business) Zone Urban Corridor (Living) Zone Urban Corridor (Main Street) Zone Urban Neighbourhood Zone (except for Bowden, Brompton or Hindmarsh)
Residential flat building	0.75 per dwelling	None specified	Urban Neighbourhood Zone (in Bowden, Brompton or Hindmarsh)
Detached dwelling	0.75 per dwelling	None specified	Urban Neighbourhood Zone (in Bowden, Brompton or Hindmarsh)
Row dwelling	0.75 per dwelling	None specified	Urban Neighbourhood Zone (in Bowden, Brompton or Hindmarsh)
Semi-detached dwelling	0.75 per dwelling	None specified	Urban Neighbourhood Zone (in Bowden, Brompton or Hindmarsh)

Table 3 - Off-Street Bicycle Parking Requirements

The bicycle parking rates apply within designated areas located within parts of the State identified in the Schedule to Table 3.

Class of Development	Bicycle Parking Rate Where a development comprises more than one development type, then the overall bicycle parking rate will be taken to be the sum of the bicycle parking rates for each development type.
Consulting room	1 space per 20 employees plus 1 space per 20 consulting rooms for customers.
Educational facility	For a secondary school - 1 space per 20 full-time time employees plus 10 percent of the total number of employee spaces for visitors.

	For tertiary education - 1 space per 20 employees plus 1 space per 10 full time students.
Hospital	1 space per 15 beds plus 1 space per 30 beds for visitors.
Indoor recreation facility	1 space per 4 employees plus 1 space per 200m2 of gross leasable floor area for visitors.
Licensed Premises	1 per 20 employees, plus 1 per 60 square metres total floor area, plus 1 per 40 square metres of bar floor area, plus 1 per 120 square metres lounge and beer garden floor area, plus 1 per 60 square metres dining floor area, plus 1 per 40 square metres gaming room floor area.
Office	1 space for every 200m2 of gross leasable floor area plus 2 spaces plus 1 space per 1000m2 of gross leasable floor area for visitors.
Child care facility	1 space per 20 full time employees plus 1 space per 40 full time children.
Recreation area	1 per 1500 spectator seats for employees plus 1 per 250 visitor and customers.
Residential flat building	Within the City of Adelaide 1 for every dwelling for residents with a total floor area less than 150 square metres, 2 for every dwelling for residents with a total floor area greater than 150 square metres, plus 1 for every 10 dwellings for visitors, and in all other cases 1 space for every 4 dwellings for residents plus 1 for every 10 dwellings for visitors.
Residential component of a multi-storey building	Within the City of Adelaide 1 for every dwelling for residents with a total floor area less than 150 square metres, 2 for every dwelling for residents with a total floor area greater than 150 square metres, plus 1 for every 10 dwellings for visitors, and in all other cases 1 space for every 4 dwellings for residents plus 1 space for every 10 dwellings for visitors.
Shop	1 space for every 300m2 of gross leasable floor area plus 1 space for every 600m2 of gross leasable floor area for customers.
Tourist accommodation	1 space for every 20 employees plus 2 for the first 40 rooms and 1 for every additional 40 rooms for visitors.

Schedule to Table 3

Designated Area	Relevant part of the State The bicycle parking rate applies to a designated area located in a relevant part of the State described below.
All zones	City of Adelaide
Business Neighbourhood Zone Strategic Innovation Zone Suburban Activity Centre Zone Suburban Business Zone Suburban Main Street Zone Urban Activity Centre Zone Urban Corridor (Boulevard) Zone Urban Corridor (Business) Zone Urban Corridor (Living) Zone Urban Corridor (Main Street) Zone Urban Neighbourhood Zone	Metropolitan Adelaide

Waste Treatment and Management Facilities

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Mitigation of the potential environmental and amenity impacts of waste treatment and management facilities.

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Siting	
PO 1.1 Waste treatment and management facilities incorporate separation distances and attenuation measures within the site between waste operations areas (including all closed, operating and future cells) and sensitive receivers and sensitive environmental features to mitigate off-site impacts from noise, air and dust emissions.	DTS/DPF 1.1 None are applicable.
Soil and Water Protection	
PO 2.1 Soil, groundwater and surface water are protected from contamination from waste treatment and management facilities through measures such as: (a) containing potential groundwater and surface water contaminants within waste operations areas (b) diverting clean stormwater away from waste operations areas and potentially contaminated areas (c) providing a leachate barrier between waste operations areas and underlying soil and groundwater.	DTS/DPF 2.1 None are applicable.
PO 2.2 Wastewater lagoons are set back from watercourses to minimise environmental harm and adverse effects on water resources.	DTS/DPF 2.2 Wastewater lagoons are set back 50m or more from watercourse banks.
PO 2.3 Wastewater lagoons are designed and sited to: (a) avoid intersecting underground waters; (b) avoid inundation by flood waters; (c) ensure lagoon contents do not overflow; (d) include a liner designed to prevent leakage.	DTS/DPF 2.3 None are applicable.
PO 2.4 Waste operations areas of landfills and organic waste processing facilities are set back from watercourses to minimise adverse impacts on water resources.	DTS/DPF 2.4 Waste operations areas are set back 100m or more from watercourse banks.
Amenity	
PO 3.1 Waste treatment and management facilities are screened, located and designed to minimise adverse visual impacts on amenity.	DTS/DPF 3.1 None are applicable.
PO 3.2 Access routes to waste treatment and management facilities via residential streets is avoided.	DTS/DPF 3.2 None are applicable.
PO 3.3 Litter control measures minimise the incidence of windblown litter.	DTS/DPF 3.3 None are applicable.
PO 3.4 Waste treatment and management facilities are designed to minimise adverse impacts on both the site and surrounding areas from weed and vermin infestation.	DTS/DPF 3.4 None are applicable.
Access	

PO 4.1 Traffic circulation movements within any waste treatment or management site are designed to enable vehicles to enter and exit the site in a forward direction.	DTS/DPF 4.1 None are applicable.
PO 4.2 Suitable access for emergency vehicles is provided to and within waste treatment or management sites.	DTS/DPF 4.2 None are applicable.
Fencing and Security	
PO 5.1 Security fencing provided around waste treatment and management facilities prevents unauthorised access to operations and potential hazard to the public.	DTS/DPF 5.1 Chain wire mesh or pre-coated painted metal fencing 2m or more in height is erected along the perimeter of the waste treatment or waste management facility site.
Landfill	
PO 6.1 Landfill gas emissions are managed in an environmentally acceptable manner.	DTS/DPF 6.1 None are applicable.
PO 6.2 Landfill facilities are separated from areas of environmental significance and land used for public recreation and enjoyment.	DTS/DPF 6.2 Landfill facilities are set back 250m or more from a public open space reserve, forest reserve, national park or Conservation Zone.
PO 6.3 Landfill facilities are located on land that is not subject to land slip.	DTS/DPF 6.3 None are applicable.
PO 6.4 Landfill facilities are separated from areas subject to flooding.	DTS/DPF 6.4 Landfill facilities are set back 500m or more from land inundated in a 1% AEP flood event.
Organic Waste Processing Facilities	
PO 7.1 Organic waste processing facilities are separated from the coast to avoid potential environment harm.	DTS/DPF 7.1 Organic waste processing facilities are set back 500m or more from the coastal high water mark.
PO 7.2 Organic waste processing facilities are located on land where the engineered liner and underlying seasonal water table cannot intersect.	DTS/DPF 7.2 None are applicable.
PO 7.3 Organic waste processing facilities are sited away from areas of environmental significance and land used for public recreation and enjoyment.	DTS/DPF 7.3 Organic waste processing facilities are set back 250m or more from a public open space reserve, forest reserve, national park or a Conservation Zone.
PO 7.4 Organic waste processing facilities are located on land that is not subject to land slip.	DTS/DPF 7.4 None are applicable.
PO 7.5 Organic waste processing facilities separated from areas subject to flooding.	DTS/DPF 7.5 Organic waste processing facilities are set back 500m or more from land inundated in a 1% AEP flood event.
Major Wastewater Treatment Facilities	
PO 8.1 Major wastewater treatment and disposal systems, including lagoons, are designed to minimise potential adverse odour impacts on sensitive receivers, minimise public and environmental health risks and protect water quality.	DTS/DPF 8.1 None are applicable.
PO 8.2	DTS/DPF 8.2

Artificial wetland systems for the storage of treated wastewater are designed and sited to minimise potential public health risks arising from the breeding of mosquitoes.	None are applicable.

Workers' accommodation and Settlements

Assessment Provisions (AP)

Desired Outcome (DO)

Desired Outcome	
DO 1	Appropriately designed and located accommodation for seasonal and short-term workers in rural areas that minimises environmental and social impacts.

Performance Outcomes (PO) and Deemed-to-Satisfy (DTS) Criteria / Designated Performance Feature (DPF)

Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
PO 1.1 Workers' accommodation and settlements are obscured from scenic routes, tourist destinations and areas of conservation significance or otherwise designed to complement the surrounding landscape.	DTS/DPF 1.1 None are applicable.
PO 1.2 Workers' accommodation and settlements are sited and designed to minimise nuisance impacts on the amenity of adjacent users of land.	DTS/DPF 1.2 None are applicable.
PO 1.3 Workers' accommodation and settlements are built with materials and colours that blend with the landscape.	DTS/DPF 1.3 None are applicable.
PO 1.4 Workers' accommodation and settlements are supplied with service infrastructure such as power, water and effluent disposal sufficient to satisfy the living requirements of workers.	DTS/DPF 1.4 None are applicable.

No criteria applies to this land use. Please check the definition of the land use for further detail.

Brinkworth Solar Farm Pty Ltd

BRINKWORTH SOLAR FARM

Development Application

VOLUME 1 - REPORT

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Tables

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Appendices *(please refer to Volume 2)*

Abbreviations

Abbreviation	Expanded form
ABN	Australian Business Number
ABS	Australian Bureau of Statistics
AC	Alternating Current
AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Probability
AGL	Above Ground Level
AHD	Australian Height Datum
Akaysha	Akaysha Energy Pty Ltd
ATC	Air Traffic Control
ALA	Aircraft Landing Areas
BAM	Bushland Assessment Method
BDBSA	Biological Databases of South Australia
BESS	Battery Energy Storage System
CASA	Civil Aviation and Safety Association
CCTV	Closed-Circuit Television
CEMP	Construction Environmental Management Plan
CFS	Country Fire Service
CHMP	Cultural Heritage Management Plan
CT	Certificate of Title
DAH	Designated Airspace Handbook
DC	Direct Current
DCCEEW	Department of Climate Change, Energy, and the Environment and Water
DIT	Department for Infrastructure and Transport
DO	Desired Outcome
DPF	Designated Performance Feature
DRP	Decommissioning and Rehabilitation Plan
DTS	Deemed to Satisfy
EPA	Environment and Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERSA	EnRoute Supplement Australia
FFR	Fast Frequency Response
FTE	Full-Time Equivalent
GRP	Gross Regional Product
GW	Gigawatt

Abbreviation	Expanded form
HVAC	High Voltage Alternating Current
IBRA	Interim Biogeographic Regionalisation for Australia
ILUA	Indigenous Land Use Agreement
IFR	Instrumental Flight Rules
ISP	Integrated System Plan
kV	Kilovolt
LCVIA	Landscape Character and Visual Assessment
LGA	Local Government Area
MNES	Matters of National Environmental Significance
MW	Megawatt
MWh	Megawatt Hour
NEM	National Electricity Market
NRM	Natural Resource Management
NVC	Native Vegetation Council
O&M	Operations and Maintenance
OEMP	Operations Environmental Management Plan
OSOM	Over Size/Over Mass
OTR	Office of Technical Regulator
PCS	Power Conversion Station (Inverter)
PDC	Planning and Design Code
PDI Act	*Planning, Development and Infrastructure Act 2016*
PMST	Protected Matters Search Tool
PO	Performance Outcome
PV	Photovoltaic
REZ	Renewable Energy Zone
SAPPA	South Australian Property and Planning Atlas
SARIG	South Australia Resources Information Gallery
SCADA	Supervisory Contril and Data Acquisition
SCAP	State Commission Assessment Panel
SEDMP	Soil Erosion and Drainage Management Plan
SEP	Stakeholder Engagement Plan
SGHAT	Sandia National Laboratories Solar Glare Hazard Analysis Tool
SIPS	System Integrity Protection Scheme
SISD	Safe Intersection Site Distance
SPL	Sensitive Receptor Location
SPPs	State Planning Policies
TAPR	Transmission Annual Planning Report

Abbreviation	Expanded form
TEC	Threatened Ecological Communities
ZTVI	Zone of Theoretical Visual Influence

Glossary of terms

Term	Definition
Carbon dioxide equivalent	A term describing different greenhouse gases in a common unit. Carbon dioxide equivalent or CO_2-e signifies the amount of CO_2, which would have the equivalent global warming impact for any quantity and type of greenhouse gas.
Construction footprint	Land which would be disturbed to construct the Project.
Crown land	Crown land is land that is owned and managed by the State Government, which is generally not freehold title.
Cumulative impact	Combination of effects on the existing environment from multiple projects (or activities) occurring in the same area and over similar timeframes.
dB(A)	A-weighted noise level measured in decibels (i.e., unit for expressing sound intensity).
Electromagnetic interference	Interference with radiocommunication services to communication signals such as television broadcast signals and fixed point-to-point signals.
Essential Infrastructure	As defined in the *Planning, Development and Infrastructure Act 2016* through endorsement by the SA Department of Energy and Mining.
Fast Frequency Response	Form of very fast services to help control power system frequency following sudden and unplanned generation or power system outage.
Frequency Control	Frequency control services stop frequency changing and bringing it back to inertia (50 hertz).
Industry-standard Multiplier	Industry-standard multipliers represent the indirect effects of direct employment or expenditure. The industry-standard multiplier for energy of 2.9 is used to calculate the numerous additional jobs indirectly supported. (ABS, 2022)
Interested parties	Those interested in the Project and/or could affect the Project in some way.
Inverter	A specialised type of substation which forms the terminal equipment for a high-voltage direct current transmission line. It converts direct current to alternating current or the reverse. Also referred to as a Power Conversion System.
Local community	Defined as being within 10 kilometres of proposed solar farm and battery locations.
Migratory species	Animals that move cyclically and at certain times of the year, passing through or migrating to Australia during their annual migration.
National Electricity Market	The wholesale generation of electricity, which is transported via transmission lines to industrial energy users and local energy distributors in all states and territories except Western Australia and Northern Territory. In total, the National Electricity Market supplies around 10 million customers.
Power Conversion System	Solar panels produce energy in the form of direct current, which must be converted to alternating current via a power conversion unit (inverter) to allow the solar generated energy to be fed into the electricity grid.
Photomontage	Photomontage is the process and the result of making a composite photograph whereby the visual representation of project infrastructure is incorporated to site-based photograph.
Point-to-point links	Often used for line-of-sight connections for data, voice and video (such as on mobile and television broadcast towers).
Project site	Land parcels (mostly defined by land titles) on which the Project is proposed.
Renewable Energy Zone	Regions identified in the AEMO 2020 Integrated System Plan with the greatest potential for renewable energy development, based on initial assessments of their resource, infrastructure and transmission capacity.
Single Axis Tracking	System using one axis of rotation to tilt Solar PV panel.

Term	Definition
Site of Development	All land within the Project, including land in private, public and Crown ownership along the transmission line route.

Executive summary

Introduction

Akaysha Energy proposes to develop a renewable energy facility comprising of 209MWp of output solar capacity and 300MW of battery energy storage capacity with 4-hour storage duration (1200MWh). The battery will be developed as “exempt development” pursuant to Schedule 13 of the *Planning, Development and Infrastructure Act 2016* (PDI Act). The planning approval exemption for the battery site was specified in the South Australian Government Gazette on 4 April 2024. This application is for the 209MW solar farm, referred to as “the Project”.

Situated approximately 7 kilometres to the north of Brinkworth and 145 kilometres north of Adelaide, in South Australia's Mid North region, this proposal will contribute to the region's sustainable energy needs. The solar farm component of the Project alone is estimated to generate approximately 454 GWh of renewable electricity every year for export, enough to power 55,000 homes in South Australia.

The site of development comprises of four land parcels (totalling approximately 470 hectares), primarily used for cropping and livestock farming and is favourably located in proximity to Brinkworth Substation and ElectraNet 275 kV transmission line.

Project site

The Project is located north of Brinkworth, southeast of Koolunga, and north of Adelaide. As shown on the locality plan below, the solar farm is located immediately to the west of Koolunga Road. The solar farm and supporting infrastructure is situated on open, cleared agricultural landscape dominated by cropping and grazing paddocks for livestock farming. A portion of the transmission line easement located north of the Project connects the transmission line to the ElectraNet 275kV transmission line.

The site of development is characterised by distant views of the Mount Lofty Ranges, Southern Flinders Ranges, Skilly Hills, and Burunga Range. The site of the development is located wholly within the Wakefield Regional Council and the solar farm and battery is wholly within the Primary Production Zone.

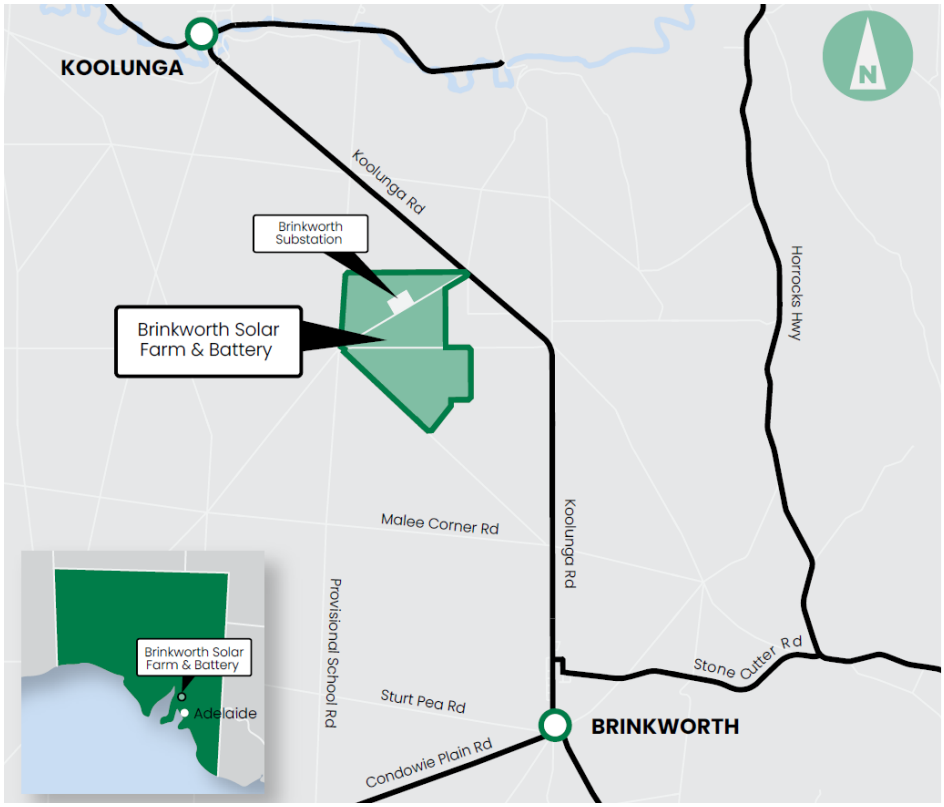

Figure ES.1 Project location

Strategic context

The Brinkworth Solar Farm aligns with the strategic policies of State, Commonwealth and regional renewable energy and climate change policies.

Federal and State Renewable Energy Targets

Australia has a formal emissions reduction target of 43% on 1990 levels by 2030 under the Paris Agreement. Australia also has a net zero emissions target by 2050, enshrined through the *Climate Change Act 2022*.

The government of South Australia's aspiration is to achieve 100% net renewables by 2027 and it is well on the way to achieving this target with renewable energy making up 70% of energy generation in the state.

The Brinkworth solar farm will help the SA Government and Federal Government achieve their targets by adding 209MWp of solar energy to the grid. The Brinkworth BESS, although exempt from planning approval, will provide valuable grid strengthening services and renewable energy storage capacity.

AEMO Integrated System Plan 2022

The AEMO Integrated System Plan (ISP) sets out a plan for a transformation of the National Electricity Market, from fossil fuels to firmed renewables while supplying affordable and reliable electricity.

The addition of 209MWp of solar energy will also make a significant contribution to the renewable energy targets for the Mid North Region. Through grid strengthening services being offered by the Project BESS (not subject of this application), the Project will help to address the most pressing needs of the grid.

ElectraNet 2023 Transmission Annual Planning Report

The Transmission Annual Planning report is ElectraNet's opportunity to review the capability of South Australia's electricity transmission network and its ability to meet the forecast demand for electricity transmission services. The Project is in a key region for both growing electricity demand and at the centre of a Renewable Energy Zone, which highlights the value of a utility scale solar farm at the Project location.

Mid North SA Renewable Energy Zone

The Mid North SA Renewable Energy Zone – Preparatory Activities report was prepared in response to the AEMO 2022 ISP. The Project would sit at the centre of the proposed upgrade works. The Project not only benefits from the redirected connection but can feed solar energy into the grid in both directions.

Wakefield 2030 – Our Community Plan

The Project aligns with the Wakefield 2030 plan and will contribute to a stronger and sustainable local economy.

Development Authorisation process

The *Planning, Development and Infrastructure Act 2016* (PDI Act) establishes a framework for planning the use, development and protection of land in South Australia in the present and long-term interests of all South Australians.

The PDI Act sets out the structure and administration of planning in South Australia and establishes the Planning and Design Code.

The Minister for Planning is the Responsible Authority for large energy generation facilities and utility installations, which includes solar farms, that classify as "public infrastructure" under the PDI Act, through the Crown Pathway.

On 9 September 2023, Department of Energy and Mining endorsed and supported Brinkworth Solar Farm and Battery as 'essential infrastructure' under section 131(2)(c) of the PDI. Referred to as Crown Sponsorship, the development application will be assessed as *"crown development"*. In October 2023, the

Department for Energy and Mining (DEM) invited Akaysha Energy to provide an Expressions of Interest (EOI) for the BESS component to be considered as an exempt form of development. The EOI application was subsequently supported by the DEM Chief Executive on 12 February 2024, endorsing the BESS component as 'essential infrastructure' under the *Planning, Development and Infrastructure Act 2016*, and the subject land was formally defined (via the Government Gazette) as being exempt of planning approvals to host the BESS.

The development application for the solar farm will be lodged by the Department of Energy and Mining on behalf of Akaysha Energy with State Commission Assessment Panel (SCAP). SCAP will process the development application and prepare a report to the Minister of Planning for a decision to approve or refuse the proposed development.

Project overview

The BESS is proposed to be developed from 2025. The solar farm (this application) is proposed to be built out from mid-2026, dependent on market conditions.

The BESS and solar farm will connect to the grid separately, enabling flexibility of operations of the two project components and enabling the BESS flexibility in the grid services it targets. To facilitate the staged development of the Project, an extended period of time in which to commence (2 years) and complete the Project (4 years) is likely to be requested at the time of submitting the development application.. A summary of the key project features is described in Table ES.1.

Table ES.1 Project summary

Aspect	Description
Applicant	Brinkworth Solar Farm Pty Ltd (ACN 630 724 579) (a member of the Akaysha Energy group)
Proposed Development	The Project will consist of a utility-scale solar farm and battery energy storage system with the following components: • solar photovoltaic (PV) modules (up to 209 MWp) mounted on single axis tracking racks • footings and racking for solar modules • Power Conversion Systems • an electrical substation including step up transformers stepping up the voltage to 275 kV • associated underground cables connecting groups of solar panels to inverter stations and underground and/or overhead transmission lines from inverter stations to the Project's switching substation • associated cables and poles to connect the Project to ElectraNet's Brinkworth Substation • operations and maintenance area including: – internal access roads; and – security fencing;
Property Location	Lot 256W Power Station Road, Brinkworth – Section 256W, H230400, Hundred of Boucaut in Certificate of Title Volume 5559 Folio 453 873 Koolunga Road, Koolunga – Allotment 96 F199935, Hundred of Boucaut in Certificate of Title Volume 5864 Folio 896 653 Koolunga Road, Brinkworth – Section 257, H230400, Hundred of Boucaut in Certificate of Title Volume 5588 Folio 666 Lot 102 Lakeview Road, Brinkworth – Allotment 102, D27337, Hundred of Boucaut in Certificate of Title Volume 6169 Folio 612
Valuation No's	Valuation No: 3004551006 3501313113 3004552009

Aspect	Description
	3004556608
Landowners	Eulunga Pty Ltd W & S Weckert
Land Type	Freehold
Local Government Area	Wakefield Regional Council
Subject Land	474 hectares (approximately)
Zoning	Rural Zone, Planning and Design Code (version 2023.7 dated 1 June 2023)
Land Use	Cropping and Grazing
Estimated Capital Expenditure	Approximately $420 million

Technical investigations

The design of the solar farm has shaped and developed following detailed technical, engineering, environmental investigations, and stakeholder engagement.

Details of the final infrastructure to be installed in the Project will be determined at the procurement stage. The technical investigations have been undertaken using specification of the candidate Solar PV panel, the JA Solar 'JAM72D40 570/GB'. Each of the technical reports use a "worst case scenario" of solar panel models.

Various investigations and assessment reports have been prepared to examine the Project's likely impacts and propose mitigations and management measures. These technical assessments have included: flora and fauna, Aboriginal and European heritage, landscape and visual impact, traffic and transport, noise impact, social and economic impact, fire risk, geotechnical conditions (soils and geology), and surface water.

The undertaken studies and assessments include:

- Landscape Character and Visual Impact Assessment – Landscape Character and Visual Impact Assessment; Brinkworth Solar Farm and Battery Project by Hemisphere Design (Aust) Pty Ltd dated 23 May 2023 (Appendix F)
- Environmental Noise Assessment – Brinkworth Solar Farm and Battery; Environmental Noise Assessment by Sonus dated June 2023 (Appendix G)
- Traffic Impact Assessment – Proposed Solar Farm; Brinkworth SA; Transport Impact Assessment by Empirical Traffic Advisory dated 28 June 2023 (Appendix H)
- Flooding and Surface Water Assessment – Brinkworth Solar Farm and Battery Surface Water Assessment by EMM dated July 2023 (Appendix I)
- Native Vegetation Clearance Data Report – Native Vegetation Clearance: Brinkworth Solar Farm Data Report by EBS Ecology dated 24 May 2024 (Appendix J)
- Socio-economic assessment – Brinkworth Solar Farm & BESS Socioeconomic Impact Assessment by BDO EconSearch dated 4 August 2023 (Appendix K)
- Socio-economic Impact Assessment – Brinkworth Solar Farm and Battery Energy Storage System: Fire Risk Management Plan and Fire Safety dated September by Fire Risk Consultants (Appendix L)
- Aeronautical Impact Assessment – Aeronautical Impact Assessment and Glare Analysis; Brinkworth Solar Farm by Chiron Aviation Consultants dated 28 July 2023 (Appendix M)
- Geotechnical Interpretative Report – Desktop Review – Brinkworth 200 MW Solar Farm by WSP dated 27 April 2023 (Appendix N)

- Aboriginal and European Heritage assessment – Brinkworth Solar Farm and Battery Project by EBS Ecology dated 2 March 2023 (EBS, 2023).

Each of these technical reports were prepared prior to the exemption of the BESS from requiring planning consent. The consultants have considered the exclusion of the BESS from the current application and provided supplementary correspondence regarding their assessments as part of the application documentation.

Stakeholder engagement

Engaging with stakeholders has played a key role in shaping the Project's design.

Akaysha Energy, through Wind Prospect, are actively engaging input from a wide range of stakeholders including landowners, neighbours, Wakefield Regional Council, State and Federal Government agencies, Traditional Owner groups, and other interested parties.

Stakeholders were engaged through various communication methods, such as regular project newsletters, drop-in information sessions, a project website, in-person meetings, phone calls, and email correspondence, as well as maintaining a stakeholder engagement database.

Assessment

The Brinkworth Solar Farm has been developed in accordance with the South Australian *Planning and Design Code*. A range of technical and environmental assessments have been undertaken to understand the potential impacts and benefits of the Project, and where required, identified measures to minimise any potential adverse impacts.

Comprehensive technical and environmental assessments were conducted. A summary of impact assessments is contained in Table ES.2.

Table ES.2 Summary of impact assessments

Aspect	Summary
Environmental	• The Project is in an area mainly used for cropping. Native vegetation and habitat for native fauna in the area is mostly located in road reserves. Through the Project design process, an objective of the Project is to avoid impacts to native vegetation and trees. There will be no threatened flora or fauna species impacted. There will, however, need to be some small clearing of vegetation with approximately 0.17 ha required. • The surface water assessment concluded that the site and development is not subject to flooding and would not impact watercourses. Potential issues relating to stormwater management (for example soil erosion and transport of sediment) during construction and operation are considered minor and can be adequately managed through the implementation of the mitigation measures as part of the Construction Environmental Management Plan. Impacts to groundwater were not predicted.
Noise	• The Project has been assessed for compliance with relevant statutory limits as required by the South Australian Government. • The design of the Project has considered the location of the closest sensitive receptors (homes) to minimise potential noise being heard near the Project. • Predictive noise modelling has shown that even under the worst-case operating scenario noise emissions will be significantly below statutory noise limits and therefore compliant.
Traffic and access	• A traffic study assessed potential impacts over the construction, commissioning, and operation of the Project. • The highest volume will occur during the construction phase, with up to 280 vehicle movements (to and from) per day (mostly light vehicles) at the peak of construction. • Four potential routes to the site were assessed for the delivery of project components. The preferred option follows gazetted B-double routes and maximises the use of suitably sealed roads.

Aspect	Summary
	• Based on the predicted traffic volumes and consideration of the existing road network, the assessment concluded that the Project is unlikely to have negative impacts on safety or function of surrounding roads.
Fire Risk	• The Project has adopted relevant guidelines to ensure the safe operation of the solar farm. These include making sure relevant fire breaks are incorporated into the design, that there are safe access points and committing to providing sufficient water storage. • With these measures in place and considering the existing bushfire prone landscape, the study concluded that the risks related to bushfire were low.
Landscape and Visual	• A landscape and visual assessment has been undertaken from key sensitive receptors and assessed the landscape scenic quality. • Visual impacts were assessed to be limited to areas immediately surrounding the Project. There will be no noticeable visual impact on the wider landscape beyond a 2 km radius. • Impacts to four homes surrounding the Project were predicted to range from no-change to moderate, depending on the location of the home. For these dwellings, landscape plantings will be offered and setback distances from proposed infrastructure significantly increased. • Mitigation measures including native vegetation screening and matte non-reflective finishes for buildings will be incorporated into the project design to help reduce the impact.
Cultural Heritage	• A desktop assessment was conducted and involved reviewing database and archival research to gain an understanding of Aboriginal and European history in the region. • While no heritage sites were recorded, discussions with Traditional Owners have been undertaken to understand the history of the site and any sensitive areas.
Socio-Economic	• A study of the socio-economic assessment of economic benefits has been assessed in two phases: construction and operation (and also included the development of the BESS component). • During the construction phase, there is an expected regional economic stimulation of approximately $54.3 million in Gross Regional Product, the creation of jobs (peaking at 180 full time positions), and $33.5 million of household income. • During the 20-year operation phase, an additional $2.1 million in Gross Regional Product, 15 FTE jobs, and $1.9 million of household income is anticipated. This is significantly higher compared to the estimated GRP and employment generated through cropping of the site. • The Project will contribute to the Federal and South Australian renewable energy targets by producing renewable energy from the solar component and providing significant renewable energy storage capacity from the BESS.
Aviation Safety	• An aviation assessment examined the potential impact of the proposed solar farm and battery on aviation safety including the need for obstacle marking and/or aviation safety lighting. • Through this assessment, no hazard to aircraft safety and no tall structures or glint/glare risk was identified.
Environmental	• The Project is in an area mainly used for cropping. Native vegetation and habitat for native fauna in the area is mostly located in road reserves. Through the Project design process, an objective of the Project is to avoid impacts to native vegetation and trees. There will be no threatened flora or fauna species impacted. There will, however, need to be some small clearing of vegetation with approximately 0.17 ha required. • The surface water assessment concluded that the site and development is not subject to flooding and would not impact watercourses. Potential issues relating to stormwater management (for example soil erosion and transport of sediment) during construction and operation are considered minor and can be adequately managed through the implementation of the mitigation measures as part of the Construction Environmental Management Plan. Impacts to groundwater were not predicted.

Aspect	Summary
Noise	• The Project has been assessed for compliance with relevant statutory limits as required by the South Australian Government. • The design of the Project has considered the location of the closest sensitive receptors (homes) to minimise potential noise being heard near the Project. • Predictive noise modelling has shown that even under the worst-case operating scenario noise emissions will be significantly below statutory noise limits and therefore compliant.
Traffic and access	• A traffic study assessed potential impacts over the construction, commissioning, and operation of the Project. • The highest volume will occur during the construction phase, with up to 280 vehicle movements (to and from) per day (mostly light vehicles) at the peak of construction. • Four potential routes to the site were assessed for the delivery of project components. The preferred option follows gazetted B-double routes and maximises the use of suitably sealed roads. • Based on the predicted traffic volumes and consideration of the existing road network, the assessment concluded that the Project is unlikely to have negative impacts on safety or function of surrounding roads.
Fire Risk	• The Project has adopted relevant guidelines to ensure the safe operation of the solar farm and BESS. These include making sure relevant fire breaks are incorporated into the design, that there are safe access points and committing to providing sufficient water storage. • With these measures in place and considering the existing bushfire prone landscape, the study concluded that the risks related to bushfire were low.

The Project's design aims to prevent adverse impacts and mitigate any potential negative environmental or social effects. It is through this design process that the Brinkworth Solar Farm project has minimal environmental and social impact and meets all requirements of the South Australian *Planning and Design Code*.

Considering all technical advice from independent assessments, feedback from community, council and government agencies, Akaysha Energy have prepared the development application now submitted for determination. On balance, we consider that the Brinkworth Solar Farm is an appropriate land use that warrants approval.

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Chapter 1
Introduction

1.1 Introduction

Wind Prospect was engaged by Akaysha Energy Pty Ltd, the proponent, to prepare this Development Application of the Brinkworth Solar Farm (the Project). The proposed development includes a solar farm, and associated infrastructure situated in the Mid North region of South Australia. Located in the Wakefield Regional Council, the Project is located approximately 7 km north of the town of Brinkworth, 4 km southeast of Koolunga, and 145 km north of Adelaide.

Under Section 131 of the *Planning, Development and Infrastructure Act 2016* (PDI Act), the Department of Energy and Mining has endorsed the development as 'essential infrastructure'. The application will be processed and determined as a "*Crown Development*".

The Project incorporates up to 209MWp of output solar capacity. Comprising of four land parcels (approximately 474 hectares in size), the site of the solar farm, battery and associated infrastructure is zoned Rural. The Project site consists of cleared land primarily used for cropping and livestock farming.

A battery comprising 300MW of energy storage capacity with 4-hour storage duration (1,200MWh), will be developed as "exempt development" pursuant to Schedule 13 of the *Planning, Development and Infrastructure Act 2016* (PDI Act). The exemption of planning approval for the designated battery site was specified in the South Australian Government Gazette on 4 April 2024.

This application relates solely to the 209MW solar farm and supporting infrastructure and is referred to as "the Project".

1.2 Applicant details

Applicant	Brinkworth Solar Farm Pty Ltd (ACN 630 724 579) (a member of the Akaysha Energy group) 11-13 Pearson St, Suite 1.01 Cremorne VIC 3121 Website: https://www.akayshaenergy.com
Project contact	Duwayno Robertson Technical Development Manager Phone: 0476 829 164 Email: duwayno.robertson@akayshaenergy.com

1.3 Project overview

The Project site has been selected for its proximity to the Brinkworth Substation and robust part of the ElectraNet 275 kV transmission system, with local advantages for development of this project including:

- supportive host landowners
- situated next to the to the existing Brinkworth electrical substation, a robust part of the ElectraNet 275 kV transmission system
- good solar resources providing the opportunity to both generate and store renewable energy
- reasonable separation from neighbouring dwellings and sparse distribution of dwellings proximate to the Project
- flat topography
- good road access; and
- few environmental constraints.

Within the region of Brinkworth Solar Farm and Battery (solar farm infrastructure and transmission line), the prominent features/elements include:

- solar Photovoltaic (solar PV) modules up to 209 MWp – mounted on single axis tracking racks
- module footings and racking for solar modules
- Power Conversion Systems (Inverters)
- an electrical substation that includes transformers stepping up the voltage to 275 kV
- associated underground cables connecting groups of solar panels to inverter stations and underground and/or overhead transmission lines from inverter stations to the Project's switching substation
- associated cables (and if necessary poles) to connect the Project to ElectraNet's Brinkworth Substation
- operations and maintenance area including:
  - control room and site office
  - operations and maintenance building with amenities
  - car parking sufficient for employees and contractors during operation
- internal access roads
- drainage works, including stormwater management systems
- security fencing; and
- low-level nighttime lighting.

1.4 Project timing

Akaysha Energy intends to commence construction of the Brinkworth Solar Farm and Battery project within two years of obtaining development authorisation. It is anticipated that construction will be staged, with the battery component beginning in 2025 (exempt from planning consent), while the construction of the solar farm is not planned to commence until 2026.

It is the intention of Akaysha Energy to proceed with the development upon receipt of the Development Authorisation, however, to provide certainty for the Project, Akaysha Energy seeks a period of two years in which to substantially commence the development from the operative date, with substantial completion to be extended to four years from the operative date of the authorisation.

Table 1.1 outlines the proposed timing for construction and operation of the Project.

Table 1.1 Project timing

Phase	Tasks
Stage 1 (2023) Feasibility	• Agreement with host landowners. • Concept design is developed. • Initial planning and environment studies commenced. • Community engagement commences.
Stage 2 (Current) Planning approvals	• Community and stakeholder engagement to gain understanding of key issues and concerns. • Comprehensive environmental, social, heritage, and engineering studies. • Preparation and lodgement of the Development Application. Including referral of the Project to relevant state agencies, public notification process and decision by the relevant authority.
Stage 3 (2024–2025) Pre-construction	• Grid connection studies and grid application process. • Obtain secondary approvals and complete detailed design. • Tendering for construction. • Financing and other commercial activities. • Community engagement continues.

Phase	Tasks
Stage 4 (2025–2027) Construction	• Enabling works, including construction of site access points. • Civil and electrical works. • Installation battery and transformer. • Installation of solar arrays. • Testing and commissioning. • Community engagement continues.

1.5 Locality of the Brinkworth Solar Farm and Battery

The proposed Brinkworth Solar Farm is situated approximately 7 km north of the town of Brinkworth, 4 km southeast of Koolunga, and 145 km north of Adelaide. Located in the Wakefield Regional Council, the Project site is immediately west of Koolunga Road.

The locality can be broadly defined around the extent to which the solar farm may be visible, however, this will vary from different positions and with varying degrees of clarity. As such, locality for the proposed development combines the height of the solar PV array. This incorporates the solar PV array, and associated infrastructure.

The site of development area is shown in Figure 1-1.

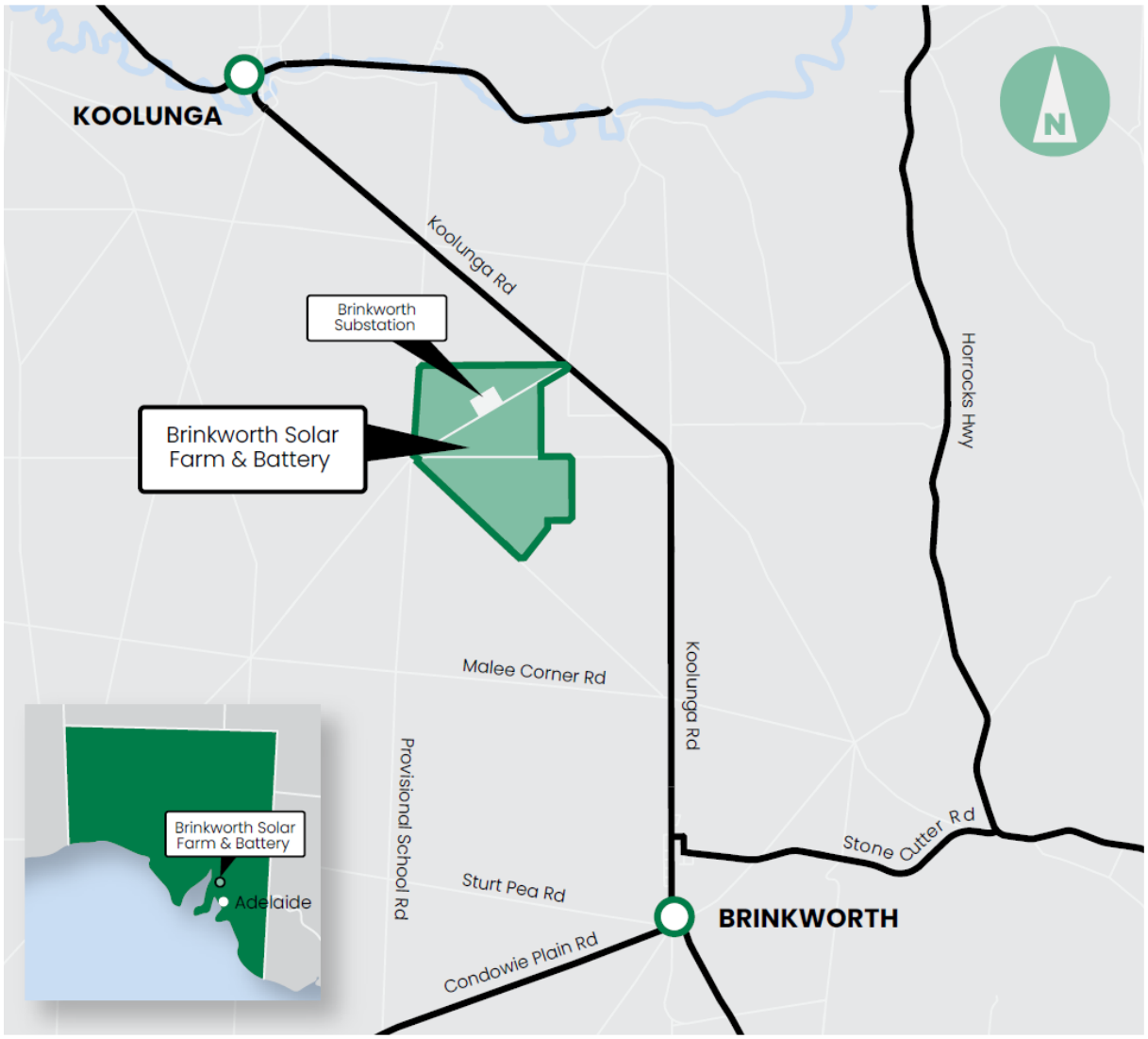


Figure 1-1 Project location

Within the locality of Brinkworth Solar Farm, the prominent features/elements include:

- open, cleared agricultural landscape dominated by cropping and grazing paddocks for livestock farming
- areas of scattered vegetation, generally along property boundaries and road verges
- farming buildings including dwellings and other structures
- electricity infrastructure including 275 kV transmission lines
- aboveground water pipeline
- the townships of Brinkworth and Koolunga
- a number of major regional roads, including Horrocks Highway, Augusta Highway, Blyth Plains Road
- a range of local roads
- Broughton Plains; and
- distant views of the Mount Lofty Ranges, Southern Flinders Ranges, Skilly Hills, and Burunga Range.

The "*site of development*" comprises of approximately 474 hectares (as defined by the subject land boundaries), which includes transmission line easement. Located in the north of the Project, the transmission line connects to the ElectraNet 275 kV transmission line.

Within the site of development, the "*infrastructure area*", is the land that accommodates project infrastructure, including the solar panels, BESS, access roads, substation, construction compound and associated infrastructure. This infrastructure area is estimated to be 320 hectares. This equates to 68 per cent of the site of development.

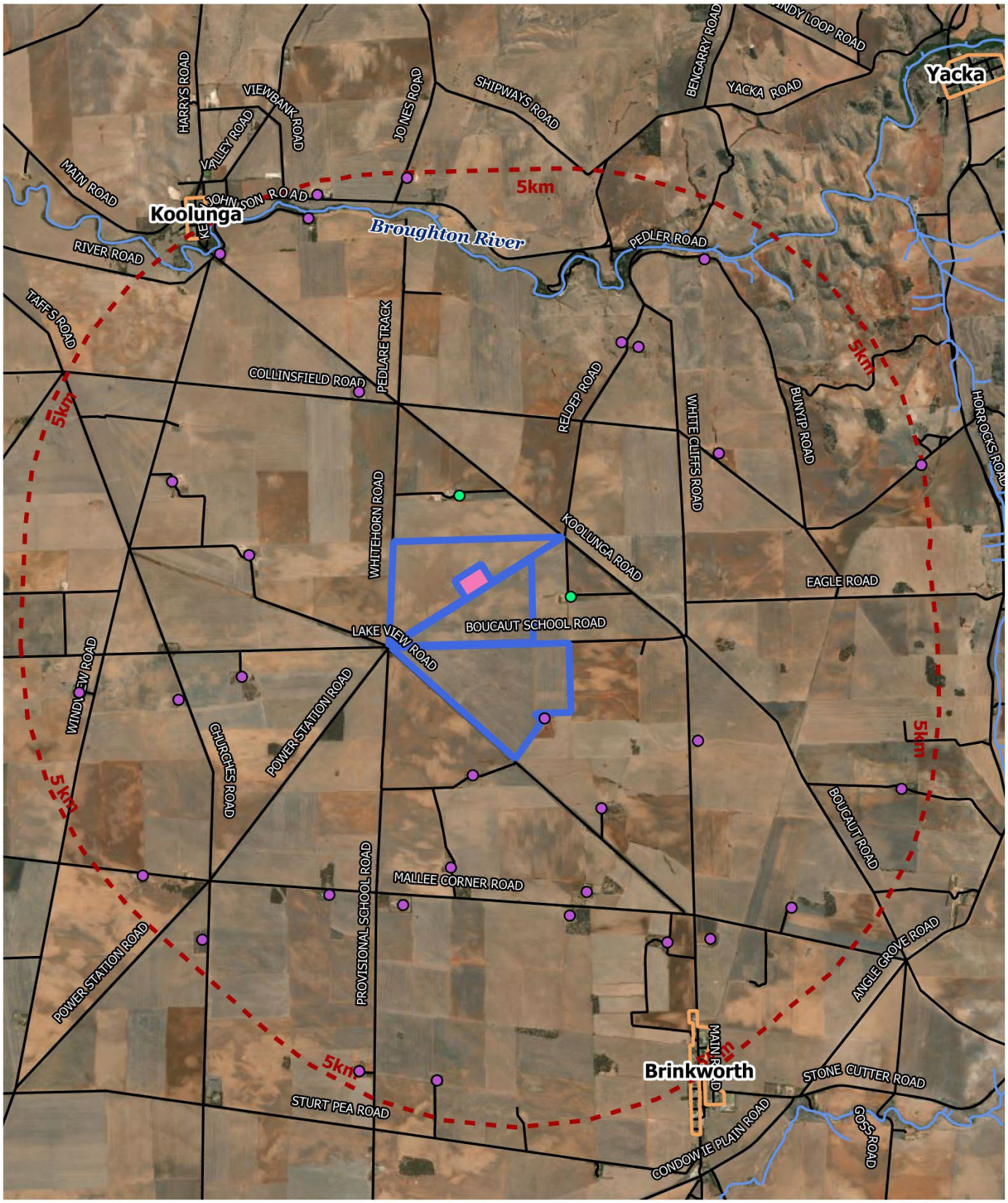
1.5.1 Social context and community

The site sits in the South Australian Mid North Region in the Wakefield Local Government Area (LGA). Proximate LGA's include Northern Areas, Port Pirie, Clare and Gilberts Valley. The Project is bound by Whitehorn, Koolunga and Lake View roads, with Boucaut School and Power Station roads passing through the Project site. The whole Project site is situated within the Hundred of Boucaut.

The 2021 census found 6,780 people living withing the Wakefield LGA, including 1,811 families across 3,334 dwellings with a median age of 45. Three per cent of the Wakefield LGA community identifies as indigenous. Currently there is no native title claim on the land proposed for the Project. Ngadjuri, Nukunu, Kaurna Meyunna Yerta Country are proximate to the site, with Ngadjuri Nation #2 Determination 1.5 kilometres to the east, Nukunu Part A Determination 4 kilometres to the north, and Kaurna Determination 82 kilometres to the south.

Koolunga is the closest township to the Project, being an estimated 4 kilometres northwest of the northern Project boundary. Koolunga is a small town of 183 persons with a median age of 46 which is distributed towards children (29.2 per cent) and over 45s (51.7 per cent) (ABS, 2022a). The next proximate town is Brinkworth located 7 kilometres south of the Project. Brinkworth has a population of 243, with a median age of 50 of which 20.2 per cent are under the age of 20 and 50.1 per cent are over 50 (ABS, 2022a). Other close townships include Yacka located approximately 21 kilometres northeast and Snowtown is a mid-sized township located approximately 22 kilometres southwest of the Project. The location of neighbouring dwellings and townships are shown in Figure 1-2.

The locality surrounding the Project site is characterised by primary production activities, particularly cropping and to a lesser extent sheep grazing, along with scattered dwellings and farm buildings (for example sees Figure 1-3, Figure 1-4 and Figure 1-5). Within the vicinity of the Project, notable features include open agricultural landscapes predominantly used for cropping and grazing, scattered vegetation along property boundaries and road verges, the Broughton Plains, as well as geographical formations such as the Mount Lofty Ranges, Southern Flinders Ranges, Skilly Hills, and Burunga Range. Other elements within the area consist of farming buildings, electricity infrastructure including 275 kV transmission lines, an aboveground water pipeline, major regional roads like Horrocks Highway, Augusta Highway, and Blyth Plains Road, as well as various local roads.



Sensitive receivers - Figure 1.2

- Project site boundary
- Township zone
- Existing Brinkworth substation
- Watercourse
- Road
- 5 km from project

Sensitive receivers:

- Involved landowner dwelling
- Neighbouring dwelling

Ref: DWG 030 A.5
Author: J. Mourier
Date created: 19.10.2023
Datum: GDA20 / MGA zone 54

2,500 m

WIND PROSPECT

Figure 1-3
Project site looking north

Figure 1-4
Project site looking east

Figure 1-5
Existing Brinkworth substation viewed from Power Station Road

1.5.2 Physical environment

The landform within the Project's locality is defined by north-south ridgelines, resulting in parallel ridges and wide valleys. The geological processes that have shaped the Southern Flinders Ranges and Northern Mount Lofty Ranges play a significant role in shaping the area.

The Project site is situated within the north-eastern section of the surface water sub-catchment of Lake View, spanning an area of 415 square kilometres. The Lake View watershed is defined by the Skilly Hills to the east, and the Burunga Range to the west. The drainage direction is primarily west to south-west, flowing towards Snowtown and Lake Bumbunga on the Condowie Plains. The Broughton River, located approximately 4 kilometres north of the site, is the nearest surface water feature. There are no defined watercourses within the Project site.

The site comprises undifferentiated quaternary alluvial/fluvial sediments, with a potential presence of Koolunga consisting of siliceous sands and gravels to the northern area. Groundwater has been encountered at a depth of about 17.5 metres below ground level at a location to the east of the site. However, limited groundwater data is available at locations close to the site.

1.5.3 Ecological and natural environment

The Brinkworth Solar Farm Project is in the Eyre Yorke Block IBRA bioregion, the St Vincent IBRA subregion and the Crystal Brook IBRA environmental association.

The Project site land is currently used primarily for cereals and pulses cropping and sheep grazing. The site is highly modified, being mostly cleared land for intensive agricultural use, primarily broad acre cropping. Through placement of the Project site within cropping paddocks, the Project area has largely avoided native vegetation and fauna habitat.

Four Red Gum trees were identified within the Project site. The properties within the Project area consist entirely of cropping land, with five amenity plantings. Four vegetation associations in roadside vegetation outside the properties were assessed for clearance to facilitate construction and operation access. The Bottled Fissure-plant, a state vulnerable species, was recorded in roadside vegetation, but would not be impacted by the Project. No introduced plant species declared under the *Natural Resources Management Act 2004* were observed.

1.5.4 Economic context and infrastructure

The Project falls within the Lower and Mid North Natural Resources Management district, located in the Northern and Yorke NRM region and the Hundred of Boucaut, and falls under the administrative boundaries of the County of Stanley. The Project area comprises four land parcels historically used for cropping and wool production. Currently, the site is primarily used for cropping various crops such as wheat, durum, barley, beans, peas, canola, and lentils. The region's economy is primarily agricultural, with the Agriculture, Forestry, and Fishing sector dominating the Gross Regional Product, although other industries such as Healthcare, Construction, Finance, and Professional Services have shown significant growth.

With the development of the Project (including the development of the BESS not subject to this application), the cropped land will shift from agricultural land to being used for renewable energy generation. The estimated economic loss of agriculture production to the region through existing cropping is estimated to be $0.5 million and 2 full time equivalent (FTE) jobs per year.

Despite the reduction in cropping, the Project offers a guaranteed rental income to landowners, ensuring a stable and diversified source of income during periods of drought and ongoing climate variability. Through the Project, the estimated economic impact of the Project’s operation to the region is an estimated $2.1 million in Gross Regional Project per year, totalling $41.5 million in total over 20 years. The average annual impact over the operational period on employment in the regional economy is estimated to be 15 FTE jobs. The average annual impact to household income over the operational period of the Project in the region is estimated to be $1.5 million, totalling $30.4 million over 20 years. These estimates include both direct and flow on effects.

1.6 Legal description of the site and the development

The site of development encompasses approximately 474 hectares of freehold land, predominantly used for cropping. The Project site is contained on four land parcels. The site is situated adjacent to the existing Brinkworth substation.

The land within the site of development has been secured by agreement from each of the landowners.

Table 1.2 Subject land – Solar farm, battery and infrastructure

Street address	Allotment	Volume	Folio
Lot 256W Power Station Road, Brinkworth, SA 5464	Eulunga Pty Ltd	5559	453
873 Koolunga Road, Koolunga, SA 5464		5864	896
653 Koolunga Road, Brinkworth, SA 5464	Sharon Ann Weckert, Wayne Andrew Weckert	5588	666
Lot 102 Lake View Road, Brinkworth, SA 5464		6169	612

The subject land is Zoned Rural and is primarily for cereals and pulses cropping and sheep grazing, with one parcel of land (CT/5776/58 Parcel ID D52787 A501) with the electricity sub-station. Open cropped fields are surrounded by rows of screen and windbreak plantings, with occasional clusters of native trees and shrubs.

Copies of the Certificates of Titles are included within the development application as Appendix A.

1.7 Application structure

The development application for the Brinkworth Solar and Battery is within three volumes including:

- Volume 1 – Development Application report
- Volume 2 – Appendices
  - Appendix A – Certificate of Title
  - Appendix B – Technical Regulator Certificate
  - Appendix C – Crown Sponsorship Letter
  - Appendix D – Proposed Plans
  - Appendix E – Development Assessment Report
  - Appendix F – Landscape Character and Visual Impact Assessment
  - Appendix G – Environmental Noise Assessment
  - Appendix H – Traffic Impact Assessment
  - Appendix I – Flooding and Surface Water Assessment
  - Appendix J – Native Vegetation Clearance Data Report
  - Appendix K – Socio-economic Impact Assessment
  - Appendix L – Fire Risk Management Plan and Fire Safety Study
  - Appendix M – Aeronautical Impact Assessment
  - Appendix N – Geotechnical Interpretative Report
  - Appendix O – Draft Construction Environment Management Plan.

Chapter 2
Strategic context

2.1 Overview

This section of the Development Application for the Brinkworth Solar Farm (the Project) considers the Commonwealth and South Australian legislation and policy setting including, but not limited to, the *Planning, Development and Infrastructure Act 2016, Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and *Aboriginal Heritage Act 1988*.

This section also outlines the alignment of the Project with the strategic policies of State, Commonwealth and regional renewable energy and climate change policies.

2.2 Strategic Policy context

2.2.1 State Planning Policy

The State Planning Policies (SPPs) are the highest order policy document in South Australia's planning system. They outline matters of importance to the state in land use planning and development and provide a policy environment aimed at enhancing our liveability, sustainability and prosperity. By expressing all state interests in land use planning and development in a single location, the SPPs provide efficiency, consistency and certainty in planning for South Australia's future. The SPPs build on the objectives and principles of good planning set out in the *Planning, Development and Infrastructure Act 2016* (the Act) and ensure these are embedded in all future decision making.

The Project is directly aligned with the SPP relating to energy, that is, the provision of sustainable, reliable and affordable energy:

> *State Planning Policy 12 – Energy*
>
> *The provision of sustainable, reliable and affordable energy is essential in meeting the basic needs of communities and ensuring the long-term supply of key services across South Australia. Industries and business rely on energy for their viability while households rely on it daily to support their lives, health and comfort. The production of energy and associated infrastructure also contributes significantly to the state's economy.*
>
> *Objective*
>
> *To support the ongoing provision of sustainable, reliable and affordable energy options that meet the needs of the community, business and industry.*
>
> *Policies*
>
> *12.1 Development of energy assets and infrastructure (including ancillary facilities) where the impact on surrounding land uses, regional communities and the natural and built environment can be minimised.*
>
> *12.2 Facilitate renewable sources of energy supply, such as solar and wind, at the local level.*
>
> *12.3 Provide for strategic energy infrastructure corridors to support the interconnection between South Australia and the National Electricity Market.*
>
> *12.4 Development in the vicinity of major energy infrastructure locations and corridors (including easements) is planned and implemented to maintain the safe and efficient delivery and function of the infrastructure.*
>
> *12.5 Enable industries to reduce carbon emissions by supporting energy efficient urban and building designs.*
>
> *12.6 Facilitate energy technologies that support a stable energy market and continued energy supply and do not adversely affect the amenity of regional communities.*

2.2.2 SA government renewable energy target

South Australia boasts world class wind and solar resources and is a global leader in the transition to renewable energy. The government of South Australia's aspiration is to achieve 100% net renewables by 2030 and it is well on the way to achieving this target with renewable energy making up 70% of energy generation in the state.

To achieve the 2030 target, a significant increase in the number of renewable energy projects connecting to the grid is required. This will also require significant investment in grid strengthening works completed by the state, and energy storage added to the grid. The Brinkworth solar farm and BESS project will help the SA Government achieve their target by adding 209 MWp of solar energy to the grid.

The South Australian government has also been vocal about seeking a renewable energy target of up to 500% by 2050, a goal that would facilitate energy exports, an electrified and expanded industry sector.

2.2.3 Commonwealth government renewable energy target

Australia has a formal emissions reduction target of 43% on 1990 levels by 2030 under the Paris Agreement. Australia also has a net zero emissions target by 2050, enshrined in legislation through the *Climate Change Act 2022*.

With the electricity sector considered one of the sectors with easier to abate emissions, where emissions reductions are considered relatively simple, the transition towards a renewable electricity sector has become a national priority.

To help achieve the nation's emission reduction targets, and as a pre-election promise, in 2021 the Federal Labour party announced their policy to increase the renewable energy target to 82% by 2030. This policy was implemented in 2022 and brought with it significant investment to help accelerate the transition to renewable energy.

2.2.4 AEMO Integrated System Plan 2022

The AEMO Integrated System Plan (ISP) is a biannual report which sets out a plan for a transformation of the National Electricity Market (NEM), from fossil fuels to firmed renewables while supplying affordable and reliable electricity.

To optimise this transition AEMO seeks to provide a development path which identifies investments that best meet the future needs of the NEM, including actionable and future transmission projects, and development opportunities in distribution assets, generation, storage projects or demand-side developments that are consistent with the efficient development of the power system. By developing the grid in a coordinated fashion, AEMO aims to guide investors and other decision-makers on the optimal timing and placement of resources in developing generation and storage projects.

The report dedicates significant time to outlining the modelled requirements for renewable energy generation, as well as on storage and dispatchable energy. The 2022 ISP notes that the NEM must triple its overall generation and storage capacity by 2050 if it is to meet the economy's electricity needs in the 'most likely' scenario that they tested. This is on top of the replacement of aging fossil fuel power stations that are set to be retired in the coming decades.

In South Australia, the report anticipates that an additional 15.5 GW of new renewable energy generation capacity will be required by 2050. In the Mid-North region of South Australia, they expect installations of 1.15 GW of additional renewable capacity by 2030, reaching 2.9 GW by 2040.

The report also states plainly "the most pressing need in the next decade (beyond what is already committed) is for dispatchable batteries, pumped hydro or alternative storage to manage daily and seasonal variations in the output from fast-growing solar and wind generation."

The ISP identifies Renewable Energy Zones (REZ), where due to renewable resources and grid network, development of renewable energy projects should be prioritised. The Project is located in the Mid-North SA REZ.

The ISP also identifies preparatory activities for future ISP projects, so that sound decisions can be made in their design and planning as early as possible. The 2022 ISP report identified the Mid-North SA REZ expansion as a project that would require ElectraNet complete preparatory activities.

The addition of 209MWp of solar will also make a significant contribution to the renewable energy targets for the Mid North Region. The Project will also help to address the most pressing needs of the grid, with additional storage, and grid strengthening services being offered by the Project BESS (exempt from planning approval).

2.2.5 ElectraNet 2023 Transmission Annual Planning Report

The Transmission Annual Planning Report (TAPR) is ElectraNet's opportunity to review the capability of South Australia's electricity transmission network and its ability to meet the forecast demand for electricity transmission services.

The TAPR report forecasts growing electricity demand with the potential connection of large new customer loads such as new or expanded mines, new industrial loads, other energy-intensive opportunities such as data centres and the production of "green steel". The report also points to the development of hydrogen facilities in line with the South Australian government's hydrogen strategy, and the future adoption of electrical vehicles, as likely contributors to the growing electricity demand in the state. Figure 2-1 shows the anticipated additional loads to be connected to the NEM in South Australia with a large load shown in the Mid-North Region.

To accommodate the additional loads anticipated on the grid, the TAPR report identifies a number of electrical transmission infrastructure projects that will be required to accommodate the growing energy demand, as well as balancing the electricity sources which would need to be connected onto the grid to supply these additional loads. Figure 2-2 depicts the Renewable Energy Zones in South Australia, where strong renewable resources such as high wind speeds, and good solar irradiation exist, and where the grid infrastructure exists or is able to be upgraded to accommodate the additional connections.

The TAPR report assesses and ranks the grid strengthening projects that may be required for the South Australian electricity grid and ranks each project's economic and strategic importance. The resultant rankings identify the Mid-North as the number one priority for ElectraNet to undertake works to unlock renewable energy capacity.

The report then outlines ElectraNet's near term priorities and proposed next steps which involves working in concert with AEMO and their processes to get the projects investment ready.

The report demonstrates that the Project is in a key region for both growing electricity demand and at the centre of a Renewable Energy Zone, which highlights the value of a utility scale solar farm and BESS at the Project location.

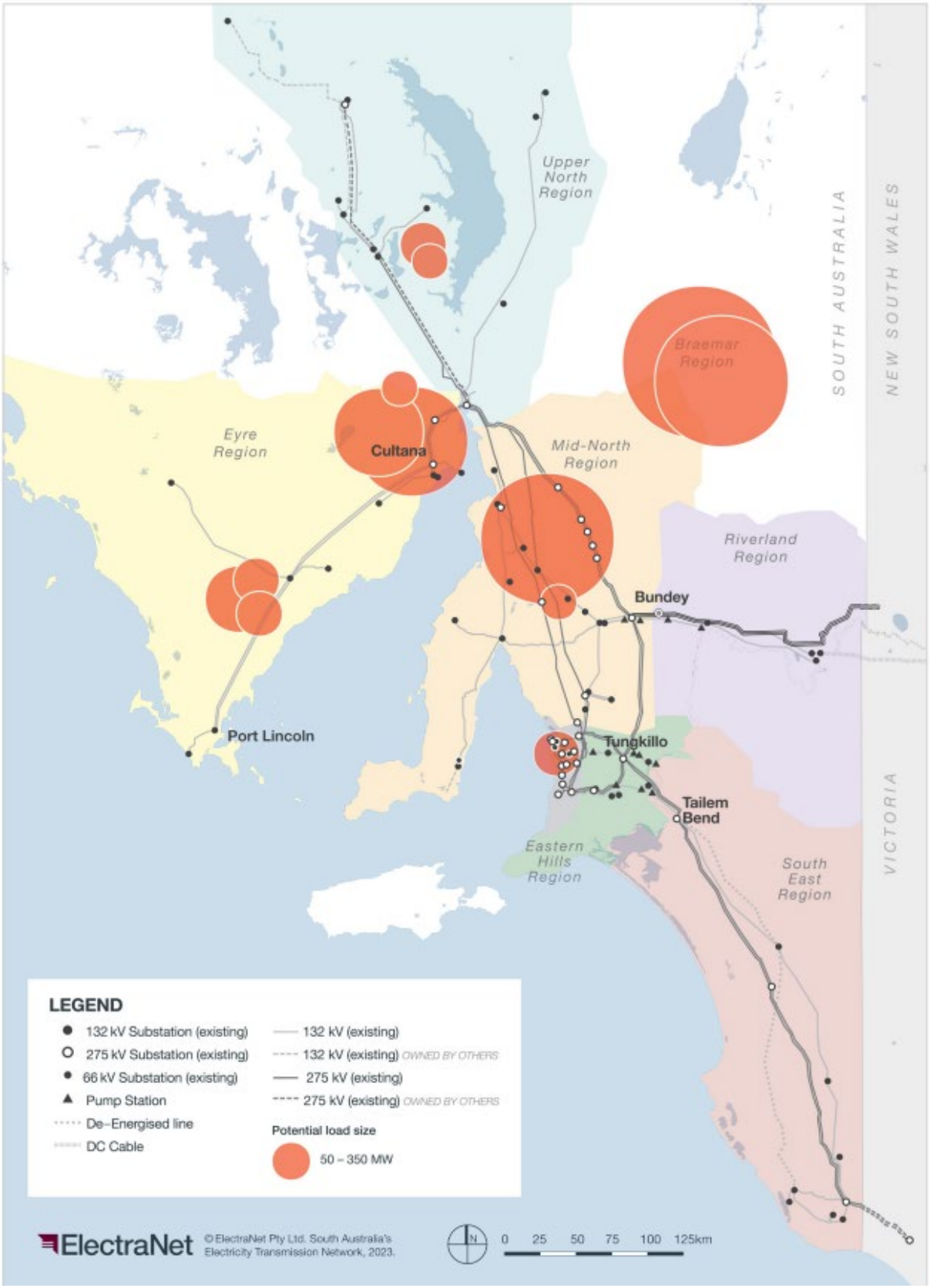


Figure 2-1 **Anticipated additional loads to be connected to the NEM in South Australia (source: ElectraNet, 2023)**

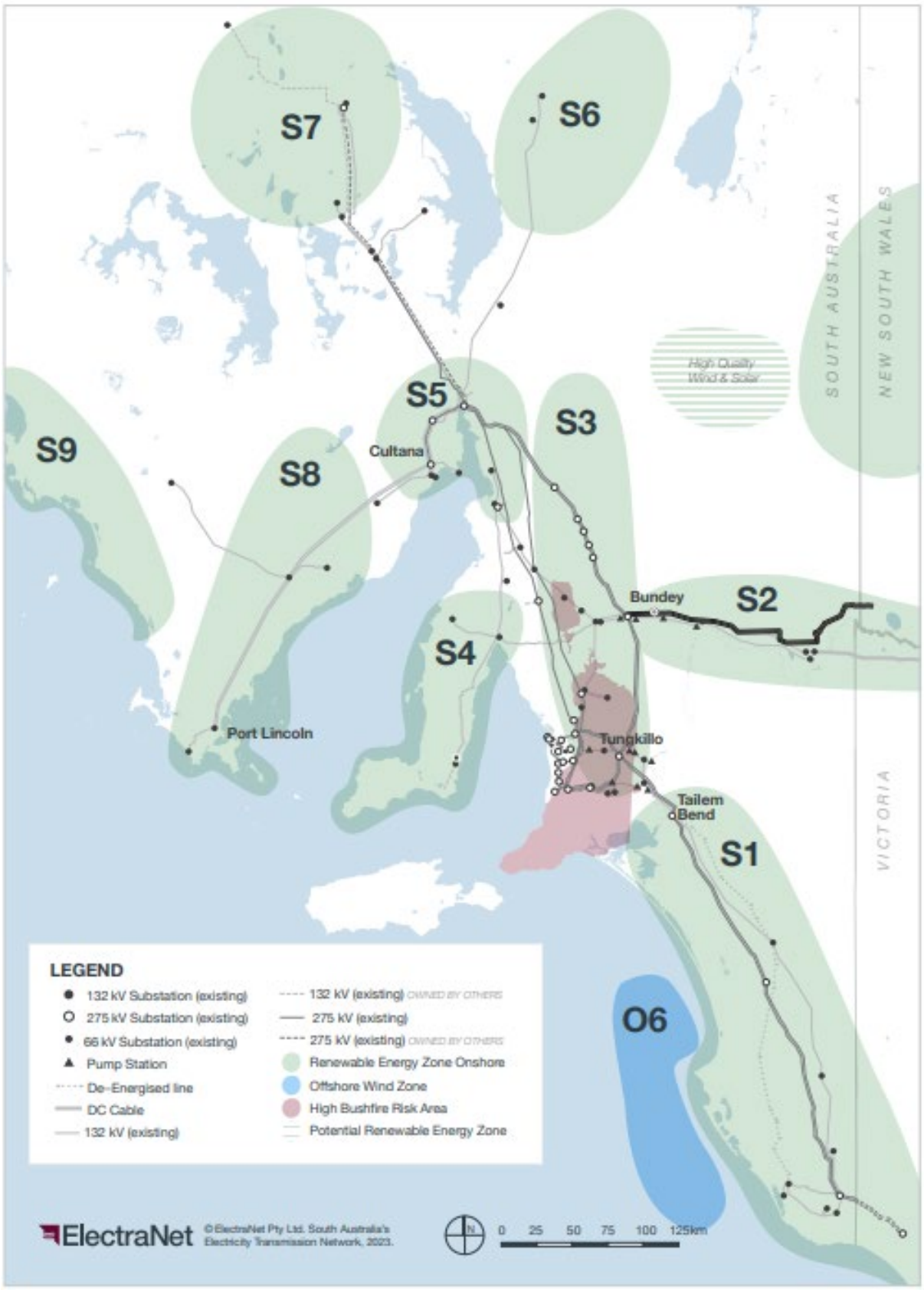


Figure 2-2 **Renewable Energy Zones in South Australia (source: ElectraNet, 2023)**

2.2.6 Mid North SA Renewable Energy Zone

The 'Mid North SA Renewable Energy Zone – Preparatory Activities' report was prepared in response to the AEMO 2022 Integrated System Plan (ISP) which required ElectraNet to undertake Preparatory Activities, which will inform development of AEMO's 2024 ISP.

The 2023 ISP identified that not only did the Mid-North region have high quality wind and solar resources, but it was also an important area for transmission infrastructure required to connect several REZ's to the Adelaide load centre.

One of the projects discussed in detail in the report is the connection of new double-circuit, single-conductor 275 kV lines from Brinkworth in South Australia's Mid North to cut into the existing Bungama – Blyth West 275 kV line, creating a Bungama – Brinkworth 275 kV line and a Brinkworth – Blyth West 275 kV line.

The Brinkworth Solar project would sit at the centre of the proposed upgrade works, and not only benefit from the redirected connection, with the ability to feed solar energy into the grid in both directions but would also provide significant improvements to the strength of the grid with the BESS able to perform a number of grid strengthening services.

2.2.7 Wakefield 2030 – Our Community Plan

The Wakefield Regional Council and members of the Wakefield community designed a "plan for our people, our places and our prosperity over the coming 10 years", Wakefield 2030. The plan looks to identify ways for Council, community and industries to work shoulder to shoulder, and seeks to promote the communities' attributes, "excite our people and entice new visitors, businesses and residents to our region".

Under the community plan theme **"**SUSTAINABLE FUTURE", the Wakefield 2030 plan includes a key strategy of attracting 'green' industries to the region which includes a priority action of *"Develop a prospectus that showcases the Wakefield region's potential to host renewable energy and waste recycling industries."*

The Project aligns with the Wakefield 2030 plan and will contribute to a stronger and sustainable local economy.

2.3 Primary approvals

2.3.1 *Planning, Development and Infrastructure Act 2016*

The purpose of the *Planning, Development and Infrastructure Act 2016 (PDI Act)* is to establish a framework for planning the use, development and protection of land in South Australia in the present and long-term interests of all South Australians. The *PDI Act* sets out the structure and administration of planning in South Australia and establishes the Planning and Design Code.

The Minister for Planning is the Responsible Authority for large energy generation facilities and utility installations, which includes wind farms, that classify as "essential infrastructure" under the PDI Act, through the Section 131 Crown development pathway.

Part 7 – Land Use Definition Table of the Planning and Design Code defines a renewable energy facility as follows:

> *Renewable energy facility: Means land and/or water used to generate electricity from a renewable source such as wind, solar, tidal, hydropower, biomass and/or geothermal.*
>
> *This use may also include:*
>
> *(a) any associated facility for the storage and/or transmission of the generated electricity;*
>
> *(b) any building or structure used in connection with the generation of electricity.*

The table specifically includes solar power facility as land uses and activities to be included in the meaning of a renewable energy facility. By definition, the proposed land use is therefore a renewable energy facility.

As ‘renewable energy facility’ is not listed as an accepted, deemed-to-satisfy, or restricted form of development within the Rural Zone, it is deemed to be a Code Assessed – Performance Assessed form of development in accordance with the Planning and Design Code.

Chapter 5 of this Development Application explores the planning controls that currently apply to the land to be developed for the Project and the responses to the planning controls that have been informed through expert assessment.

The Project, which constitutes a renewable energy facility also fits the definition of “essential infrastructure” in Section 3(1) of the *PDI Act:*

essential infrastructure means-

(a) infrastructure, equipment, structures, works and other facilities used in or in connection with –

(i) the generation of electricity or other forms of energy; or

(ii) the distribution or supply of electricity, gas or other forms of energy; and …

The Project is proposed to generate electricity for distribution through the National Electricity Market.

On 7 September 2023 the Department for Energy and Mining (DEM) endorsed and supported the Project as ‘essential infrastructure’ pursuant to Section 131 of the PDI Act. This process known as Crown Sponsorship, means that the development application will be assessed as “crown development” under the PDI Act. Refer to Appendix C for a copy of this sponsorship from DEM.

Development authorisation

The Development Application will be submitted to the State Planning Commission (via the State Commission Assessment Panel (SCAP)). SCAP will process the development application, including the referrals to government agencies and Wakefield Regional Council; and undertake public notification.

In accordance with Section 131 (6) of the PDI Act, the State Planning Commission (the Commission) must give notice to the Council. In the case of this development application, a referral will be forwarded to the Wakefield Regional Council. The Council will be provided with a 4-week period in which to provide a response to the Commission.

The Planning and Design Code specifies various forms of development which require referral in the relevant Overlays and in Part 9 – Referrals.

Native Vegetation Overlay

A referral to the Native Vegetation Council is required for clearance of vegetation categorised as Level 3 or Level 4 clearance. An assessment undertaken by EBS Ecology (Appendix J) identifies the 0.14 hectares (ha) of *Enchylaena tomentosa* (Ruby Saltbush) *Low Open Shrubland +/- Atriplex stipitata* (Bitter Saltbush) *+/- Lycium australe* (Australian Boxthorn) *+/- Maireana aphylla* (Cotton-bush) *+/- Senna artemisioides ssp. X artemisioides* (Desert Senna) +/- Planted Eucalypt Overstorey, and 0.03 ha of *Senna artemisioides* ssp. (Desert Senna) +/- *Eremophila longifolia* (Weeping Emubush) Shrubland. , to be cleared for the development. This is the result of a range of design efforts made to first avoid areas of native vegetation, and then minimise the extent of any required clearance. A Significant Environmental Benefit (SEB) will be achieved via payment into the Native Vegetation Fund.

There are no other referral requirements for any Overlays applicable to the Project site.

Part 9 – Referrals of the Planning and Design Code

No referral to the EPA or any other agency is required for the proposed development under Part 9 of the code.

In accordance with Section 131 (13) of the *Planning, Development and Infrastructure Act 2016,* as the proposed construction work will exceed $10,000,000.00, the State Commission Assessment Panel must make a public advertisement inviting interested persons to make written submissions on the proposal. Public notification allows interested persons to make written submission on the proposal. An opportunity is also provided for those people who have made a written submission (and expressed a desired to be heard) to make verbal presentation to the Commission.

An assessment report will be prepared and submitted to the Minister for Planning for a decision to approve or refuse the proposed development. A decision by the Minister approving the development will result in the issuing of a development authorisation, which may be subject to conditions.

For details of the assessment of the Project against the Planning and Design Code, please refer to the Development Assessment Report in Appendix E.

Office of the Technical Regulator

The *Planning, Development and Infrastructure (General) Regulations 2017* dictate that if the proposed development is for the purposes of a grid connected electricity generating plant with a generating capacity greater than 5 MW – a certificate from the Technical Regulator is required, certifying that the proposed development complies with the requirements of the Technical Regulator in relation to the security and stability of the State's power system.

On 14 June 2023 the Project secured a certificate from the Office of the Technical Regulator that the proposed development will appropriately provide for the security and stability of the State's power system. via services from the BESS (exempt from development approval). This Certificate forms part of this development application.

Refer to Appendix A for a copy of this certificate.

Time in which to commence and complete the development

In addition to seeking development authorisation for the land use and its elements, consent is also sought for an extension of time in which to commence and complete the development.

The Project will be developed in two stages, with the BESS components of the Project being developed from 2025 and the solar farm part of the Project being built out from mid-2026, and dependent on market conditions. The Project will connect these two sections of the Project to the grid separately, enabling flexibility of operations of the two project components and enabling the BESS flexibility in the grid services it targets.

To facilitate the staged development of the Project, an extended period of time in which to commence (2 years) and complete the Project (4 years) is requested as part of this development application.

2.3.2 *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a framework to protect nine defined matters of national environmental significance, which include nationally threatened species and ecological communities, migratory species, and wetlands of international importance.

A self-assessment against the referral requirements was conducted using the Protected Matters Search Tool (PMST). The search tool identified a number of Matters of National Environmental Significance (MNES) that may be present on the Project site. These included two (2) Listed Threatened Ecological Communities, eighteen (18) Listed Threatened Species, and ten (10) Listed Migratory Species. Sixteen (16) Listed Marine Species were also identified as potentially being present at the site by the PMST.

An ecological assessment of the Project found that there were unlikely to be impacts to MNES with the potential to occur in the Project Area (Appendix J), summarised in Chapter 5. Therefore, the Project was not referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment.

2.3.3 *Aboriginal Heritage Act 1988*

The *Aboriginal Heritage Act 1988* provides for the protection and preservation of the Aboriginal heritage in South Australia and makes it an offence to damage, disturb or interfere with an Aboriginal site, object or remains without an authorisation from the Minister for Aboriginal Affairs. The *Aboriginal Heritage Act* places a duty on Akaysha as the developer of the Project to address the likelihood of any impact on Aboriginal Heritage.

A heritage assessment has been undertaken for the Project by EBS Heritage (2023) and the results of this assessment are discussed in Chapter 4.

While no known Aboriginal Heritage values were identified at the site, there is still potential that the construction and operation of the Project uncovers an Aboriginal site, remains, or objects. An unexpected finds protocol will be developed prior to the commencement of works and incorporated into the Construction Environment Management Plan. This protocol will contain contingency plans for the unexpected discovery of Aboriginal heritage places or objects during Project construction. Site workers will be inducted as to the nature of unexpected finds and what action to take if any are found.

Engagement with local Traditional Owner groups is ongoing, with input being sought about the heritage values of Project site and the proposed Project. A Cultural Heritage Management Plan (CHMP) will be prepared with input from the local traditional owner groups and will recognise the potential for intrinsic values as well as the potential for previously undiscovered archaeological heritage items to be impacted by the Project and will establish procedures for any such instances.

Approvals required pursuant to the *Aboriginal Heritage Act 1998* are independent of the development approval process and are occurring in parallel.

2.3.4 *Native Vegetation Act 1991*

The clearance of any native vegetation in South Australia needs to be assessed against the Principles of Clearance under the *Native Vegetation Act 1991* and requires approval from the Native Vegetation Council (NVC). As part of this process of approval being granted by the NVC, the Project is required to demonstrate a net environmental benefit.

The total proposed area of clearance is 0.17 hectares (ha) of native vegetation, which includes two vegetation associations as assessed in the ecological assessment by EBS Ecology (refer to Appendix J).

2.4 Other relevant legislation and approvals

2.4.1 *Environment Protection Act 1993*

Akaysha Energy are aware of their general environmental duty pursuant to Section 25 of the *Environment Protection Act 1993* to *"not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm".* Practical and reasonable measures to minimise pollution and environmental harm are outlined in the Draft Construction Environmental Management Plan (Appendix O).

2.4.2 *Heritage Places Act 1993*

There are no registered places of State Heritage significance within the Project site, nor are there any places of State Heritage significance within proximity of the development.

Consequently, the Project application does not require referral to the Minister administering the *Heritage Places Act 1993*.

2.4.3 *Landscape South Australia Act 2019*

*T*he *Landscape South Australia Act 2019* seeks to *"promote sustainable and integrated management of the State's landscapes, to make provision for the protection of the State's natural resources, and for other purposes*". The Project will require consent for any impacts.

The Project is not predicted to impact groundwater during construction, operation and decommissioning due to the limited amount of subsurface disturbance activities required during the installation and decommissioning of infrastructure associated with the Project.

Appropriate consents will be sought should any changes to the design or construction plan involve groundwater interception, ingress, or dewatering.

2.4.4 *National Parks and Wildlife Act 1972*

Native plants and animals in South Australia are protected under the *National Parks and Wildlife Act 1972*. Under this Act, it is an offence to take a native plant or protected animal without approval. Conservation

significant flora and fauna species listed on Schedules 7, 8, or 9 of the *National Parks and Wildlife Act 1972* were assessed as unlikely to be directly impacted and therefore approval under this Act is not anticipated to be required.

2.4.5 *Road Traffic Act 1961*

Consent is required for the construction of works in, on or under roads pursuant to *Road Traffic Act 1961*.

The Project involves the development and upgrade of intersections and local roads to enable access to the site. There will also be the requirement for electricity transmission cables to cross Power Station Road. Consent for each upgrade and crossing will be required from the relevant authority prior to works commencing.

2.4.6 *Mining Act 1971*, and *Petroleum and Geothermal Energy Act 2000*

The Project site falls partly within an active Exploration License for Mineral and/or Opal Exploration held by Flinders Prospecting Pty Ltd and active Exploration License for Petroleum Exploration Licences/Permits held by Go Exploration Pty Ltd. There has been engagement with these companies with a focus on identifying their interest in the land proposed for this Project. At this stage, there have not been active exploration targets identified within the Project site. But ongoing communication will continue to ensure all stakeholders are informed of the Project updates.

2.5 Project benefits

2.5.1 Strategically located

The Project is located within the Mid North SA Renewable Energy Zone, which has high quality wind and solar resources as well as having the transmission infrastructure required to connect several REZ's to the Adelaide load centre. The Project placed nearby the Brinkworth substation and other renewable and storage projects which are active in the region.

The Project brings a range of benefits including:

- meeting the aims of the Mid North SA Renewable Energy Zone by being strategically located to maximise the benefits of and smooth the transition to greater renewable energy development
- builds on the aims of the AEMO Integrated System Plan to transition away from coal-fired energy, towards greater levels of renewable energy
- stabilises and secures the supply of electricity for residents, business owners and service providers
- assists to drive down the wholesale electricity prices for energy consumers
- providing a significant renewable source electricity to the National Energy Market
- generates local employment, economic stimulus and other local economic benefits.

The Project has been developed iteratively, with input from specialists to maximise the environmental and social sustainability of the Project and minimise potential impacts.

2.5.2 Suitable technology to complement the cleaner energy transition

Utility battery storage is recognised as an important part of Australia's transition away from coal-fired energy, towards renewable energy. They have a proven ability to complement and support the network and to allow storage of renewable energy during periods of abundant generation/low energy demand and then for export into the grid during periods of high demand.

The Project would benefit the electricity grid by balancing the network through the addition of energy storage. This stored energy would be utilised during periods of low renewable output into the energy grid. This is especially important during the State's transition from centralised to decentralised power generation as coal-fired plants are decommissioned. Greater use of large-scale battery storage in conjunction with other dispatchable energy resources may decrease peak wholesale prices.

Through the storage of energy for up to 4 hours and the release of energy during peak demand times and low renewable energy generation, the BESS component (exempt from planning approval) can address physical and market issues caused by high penetration of intermittent and variable renewable energy.

Additionally, battery storage can assist with consistency of energy supply during blackouts and load shedding, while BESS inverters improve grid strength and offer system security and virtual inertia.

2.5.3 Employment and local economic benefits

The estimated capital expenditure for the development of the Brinkworth Solar Farm is approximately $420 million. The major expenses are associated with the procurement of batteries, solar photovoltaic equipment, and related components. Substantial investments are also allocated for civil and electrical infrastructure, as well as grid connections.

Project employment is assessed in terms of direct jobs (site-related) and indirect jobs (flow-on) jobs in the local, regional, and wider economy. This includes expenditures such as worker wages, business contracts, and other project-related spending that contribute to the economic growth and support of the local area. The Project's employment opportunities vary between the construction and operational phases.

During the construction phase, a wide range of on-site and off-site activities will generate jobs, such as structural concrete foundations, earthworks, roads, fencing, landscaping, vehicle, and equipment hire, trade services, security, office cleaning, waste disposal, building maintenance, foundation laying, electrical transformer installation, crane works, cabling, temporary site facilities (power, water, telecommunications), and transportation of components and workers.

In addition to these construction-related jobs, various local and regional professional services may be involved, including civil engineering, mechanical engineering, environmental engineering, specialist consultants, employment agencies, electrical engineering, and legal and financial services.

Throughout the construction phase, the BESS will generate 135 full-time equivalent (FTE) jobs over a 12-week period, while the Solar PV installation will provide 225 FTE jobs over a 26-week period. These local employment opportunities include jobs in civil works, construction, and commissioning of the BESS and Solar PV systems, in addition to the associated infrastructure and grid connection.

The Project will also have a multiplier effect on job creation, indirectly supporting a significant number of additional jobs. A standard industry-standard multiplier of 2.9 (based on NSW Treasury, 2022 and ABS, 2022) is typically used to estimate the multiplier effect to the direct construction phase jobs, and therefore several hundred indirect jobs would be supported during the construction of the Project. These indirect jobs during the construction phase will be created within the State and National economies through existing supply chains and consumption impacts.

During the twenty-year operational phase, the Project will provide ongoing support for 10 FTE jobs at the local level. These operation-related jobs will include civil maintenance, electricians, land management and security.

2.6 Site and technology selection

2.6.1 Site selection and scale

Site selection for a project such as the Brinkworth Solar Farm and BESS, seeks to optimise:

- grid capacity
- proximity to grid connection
- interested land owners
- compatible existing land use
- manageable environmental constraint.

Having identified such a site, the Applicant has entered an exclusive, irrevocable, and exercisable option to lease the land required for the Project.

The scale of the Project has been determined after considering the following factors:

- a need to ensure that the Project is commercially viable
- the capacity of the electricity grid to absorb the energy generated and stored by the Project
- the opinions expressed by landowners and the local community
- the constraints identified during the preparation of this Development Application; and

- a desire to provide more secure energy and supporting Commonwealth and State level renewable energy targets.

The ability to connect to the solar farm and BESS almost directly to the grid via the Brinkworth substation brings significant benefits as the network has the capacity to absorb the energy stored within the BESS and deliver it anywhere in the network. A relatively short transmission line, about 200 metres in length, also reduces the costs of the development and the need for additional environmental impacts that may be associated with a site further from a connection point.

2.6.2 Technology

Solar PV

Single-axis track solar PV panels equivalent to the candidate model from JAM72D40-570/GB produced by JA Solar and using NEXTracker NX Horizon self-powered trackers were selected for the Project. The solar panels will be mounted on a north-south track and will be able to track the position of the sun from east-west over the course of the day.

Single-axis has a longer lifespan than dual-axis trackers. Single-axis trackers are more cost effective than dual-axis trackers because they have a simple mechanism and operate at a low cost. Single-axis horizontal trackers are also structurally more rigid and stable, and hence less likely to be damaged during storms.

Solar PV arrays on dual-axis trackers can produce more power than conventional solar PV on single-axis trackers; however, they are more complex and have lower reliability (more down time and more maintenance) than single axis.

Chapter 3
Project description

The Brinkworth Solar Farm consists of a utility-scale solar farm with a capacity of up to 209 MWp, While exempt from planning approval the broader development also includes, a Battery Energy Storage System (BESS) able to provide 300 MW of power for 4 hours (300 MW/1200 MWh) along with the auxiliary equipment required to connect the Project to the existing grid. The BESS component does not form part of this application.

Brinkworth Solar Farm Pty Ltd, a member of the Akaysha Energy group (the Proponent) is developing the proposed Brinkworth Solar Farm and Battery in Wakefield Regional Council, South Australia.

The Project is located approximately 7 km north of the township of Brinkworth, 4 km southeast of the township of Koolunga and approximately 150 km north of Adelaide. The Project is located within an area of freehold land that is cleared, largely used for cropping, and is zoned Rural. The Project is located on land surrounding the existing Brinkworth Substation enabling a simple connection to the existing National Electricity Market (NEM).

The solar farm component of the Project is estimated to generate approximately 454 GWh of renewable electricity every year for export, enough to power 55,000 homes. While not the subject of this application, the installation of a large BESS with four hours of storage proposed, will enable the energy generated from the solar panels during the day to supply the South Australian grid with renewable electricity well into the evening.

The two components of the Project (1. BESS; and 2. Solar farm) will be developed in separate stages, with the BESS to be developed first. The solar farm and BESS will be connected separately to the Brinkworth substation which will provide flexibility to the operation of the BESS, as well as flexibility with the timing of installation of the two Project components.

Akaysha Energy is seeking a period of two (2) years in which to substantially commence the development from the operative date with substantial completion to be extended to four (4) years from the operative date of the development authorisation.

The Project is anticipated to operate for a period of at least 20 years.

3.1 Overview

Table 3.1 Summary of the Project's main features

Feature	Details
Site details and land tenure	
Location	The Project is located within the Wakefield Regional Council approximately 7 kilometres north of the township of Brinkworth, 4 kilometres southeast of the township of Koolunga and approximately 150 kilometres north of Adelaide.
Subject Land	Lot 256W Power Station Road, Brinkworth – Section 256W, H230400, Hundred of Boucaut in Certificate of Title Volume 5559 Folio 453. 873 Koolunga Road, Koolunga – Allotment 96 F199935, Hundred of Boucaut in Certificate of Title Volume 5864 Folio 896. 653 Koolunga Road, Brinkworth – Section 257, H230400, Hundred of Boucaut in Certificate of Title Volume 5588 Folio 666. Lot 102 Lakeview Road, Brinkworth – Allotment 102, D27337, Hundred of Boucaut in Certificate of Title Volume 6169 Folio 612.
Renewable Energy Zone (REZ)	Mid-North SA Renewable Energy Zone
Local Government Area (LGA)	Wakefield Regional Council

Feature	Details
Zoning	Rural Zone
Setting	The main land use with the Project site is for cereals and pulses cropping and sheep grazing. Native vegetation is largely restricted to roadside vegetation, which would largely be avoided.
Landowners	2 landowners with project infrastructure on their land.
Infrastructure components	
Solar farm capacity and generation	Up to 209 MWp nameplate capacity. Generation of approximately 454 GWh per year.
Solar panels	Solar panels are approximately 2.28 m long by 1.13 m wide. An estimated 367,360 panels will be used in the Project.
On-site substations	A substation will connect the solar farm to the existing Brinkworth Substation. The substation would include a 275/33 kV transformer, earthing/auxiliary transformers, outdoor switchgear, control room and switch room, and cable termination structures.
Operations and maintenance facility	An operations and maintenance facility would be located adjacent to the on-site substation and provide office, storage, and maintenance facilities.
Site access and access roads	New primary access gates will be constructed for the operations and maintenance area off Power Station Road. Additional primary access gates will be installed to provide construction access across the Project site. Farm gates providing emergency access to the sections of land hosting the solar farm will also be upgraded. Primary and emergency access gates to sections of the solar farm shall remain locked at all times when not in active use. The site access to the Operations and Maintenance facility will be open during operational hours only.
Development footprint	The Project site encompasses an area of approximately 474 hectares of private land. The site is highly modified, being mostly cleared land for intensive agricultural use. Through placement of the Project site within cropping paddocks, the Project area has largely avoided native vegetation and fauna habitat.
Temporary components	A temporary construction compound would be located within the Project site and include office facilities, amenities, and car parking.
Transport route	Transport of solar panels, , and ancillary components would primarily be from the Port of Adelaide via the regional road network. The preferred Over Size Over Mass access route is from Port Adelaide, via Port River Expressway, Northern Connector, Port Wakefield Highway, Augusta Highway, Koolunga Rd via Red Hill and Koolunga, then onto Powers Station Road.
Workforce and accommodation	The construction phase workforce is anticipated to peak at 180 on-site personnel. The construction workforce is expected to originate from Port Pirie (40 per cent), Adelaide (30 per cent), Clare (10 per cent) and the remainder (20 per cent) from elsewhere in the region.
Timing	
Construction period	Approximately 2 years in total.
Operational life	Up to 20 years following a period of up to 2 years of pre-development and construction activities. Pre-development would include detailed design and early works, where permitted. An opportunity to refurbish or replace the Project infrastructure at the end of its operational life would be investigated and subsequent approvals will be sought at that time.
Decommissioning	Within 12 months of the solar farm and/or BESS permanently ceasing to generate electricity, the solar farm and battery would be decommissioned. This would include removing all above ground equipment, restoration of all areas associated with the Project, unless otherwise useful to the ongoing management of the land, and post-decommissioning revegetation with pasture or crop.

Feature	Details
Benefits	
Employment	The operation phase workforce is expected to be 10 FTE jobs.
Capital investment value	$420m over the construction period
Environmental benefits	The solar component of the Project would generate the equivalent to the average electricity usage of more than 55,000 South Australian households.
	The solar component will save approximately 272,400 tonnes of CO_2 equivalent annually.

The Project's integrated solar PV elements together with associated supporting and ancillary infrastructure are discussed below. Refer to Figure 3-1 for an overview of the indicative Project layout. Further detailed plans and designs of the Brinkworth solar PV, substation, and operations and maintenance buildings can be found in Appendix D.

Figure 3.1

Project overview

- Project site boundary
- Fence
- Existing Brinkworth substation
- BESS infrastructure (exempt from planning approval)
- Solar farm substation and connection
- Solar panels
- Inverter station
- Weather station
- Water tank
- Primary access
- Emergency access

Transmission Lines Electranet

- 132 kV
- 275 kV

Ref: DWG 027 B.5
Author: J. Mourier
Date created: 02.05.2024
Datum: GDA20 / MGA zone 54

600 m

WIND PROSPECT

3.2 Permanent infrastructure

3.2.1 Indicative layout and specification of components

This Development Application presents an indicative layout, with candidate equipment, to demonstrate the type and size of system that is proposed to be developed. The Project design would be subject to commercial tendering and procurement processes and would ensure the Project is optimised in terms of yield and efficiency, within the parameters of the approval obtained by the Project.

Submission of the final detailed design to the Minister and relevant agencies prior to construction is a standard feature of development approvals that progress through the Crown pathway. This provides the final check that the detailed design is consistent with the Development Application assumptions.

As the final specifications and location of infrastructure are subject to change during detailed design, where required in this section, upper limit quantities and power level estimates are provided below to ensure the assessment and any subsequent approval maintains the flexibility required in the detailed design stage, post approval. Similarly, while an indicative Infrastructure Layout provides a clearer understanding of what would be constructed, the delineation of a broader Development Footprint at this stage provides the assessment and approval some resilience to minor layout changes in the final design. Together this 'upper limit' or 'worst case' approach ensures that all impacts of construction, as well as operation and decommissioning are captured in the environmental assessment (Chapter 5 of this Development Application). Any recommendations and mitigation strategies would be appropriate to the final detailed design.

3.2.2 Solar farm

Solar farms turn the sun's energy into electricity, a form of energy that we are able to store in batteries, transport through the electricity grid, and then use for a variety of purposes.

A solar photovoltaic (solar PV) panel (also known as a module) is made up of multiple solar PV cells, and multiple panels connect together to form a string of modules (a collection of multiple solar panels that generate electricity as a system). Multiple strings are erected in long rows to form a solar farm and are connected to the grid via inverters and transformers.

When solar radiation (in the form of photons) from the sun hit a solar PV cell, it knocks electrons loose from their atoms within the solar PV cell, and when connected in a circuit, these electrons flow along conductors connecting the cells to form an electrical current. This current flowing through each panel can be connected to other panels in a string, increasing the flow of electrons, and this electrical current is carried via electrical cables to power conversion units (inverters) and transformers to enable the electric current to be transported via the grid.

The proposed Brinkworth solar farm will consist of a total of approximately 367,360 solar PV panels. These solar panels will be organised into strings of 28 modules, of which there will be 13,119 strings, which will feed into 42 power station units that include inverters and transformers, and ultimately connect to a substation that will step up the electricity to 275 kV to match the voltage of the existing grid at the ElectraNet owned Brinkworth substation. An overview of the proposed solar farm is shown in Figure 3-3 with the typical plan shown in Figure 3-4.

The arrays of solar panels will be single axis mounted, meaning the rows of solar panels will be installed in a north south direction, and the row of panels will rotate to follow the sun's path across the sky from east to west.

The Project has been designed with setbacks to neighbouring dwellings to manage visual impacts on these sensitive receivers. Setback distances from the closest neighbouring dwelling are shown in Figure 3-5. The Project will also offer visual amenity screening to neighbouring dwellings within the Project's Zone of Theoretical Visual Impact that could be affected by the Project, and space allowance has been made for this feature.

The following sections describe each component of the solar element of the Project.

Figure 3-2 Typical single axis tracking solar array

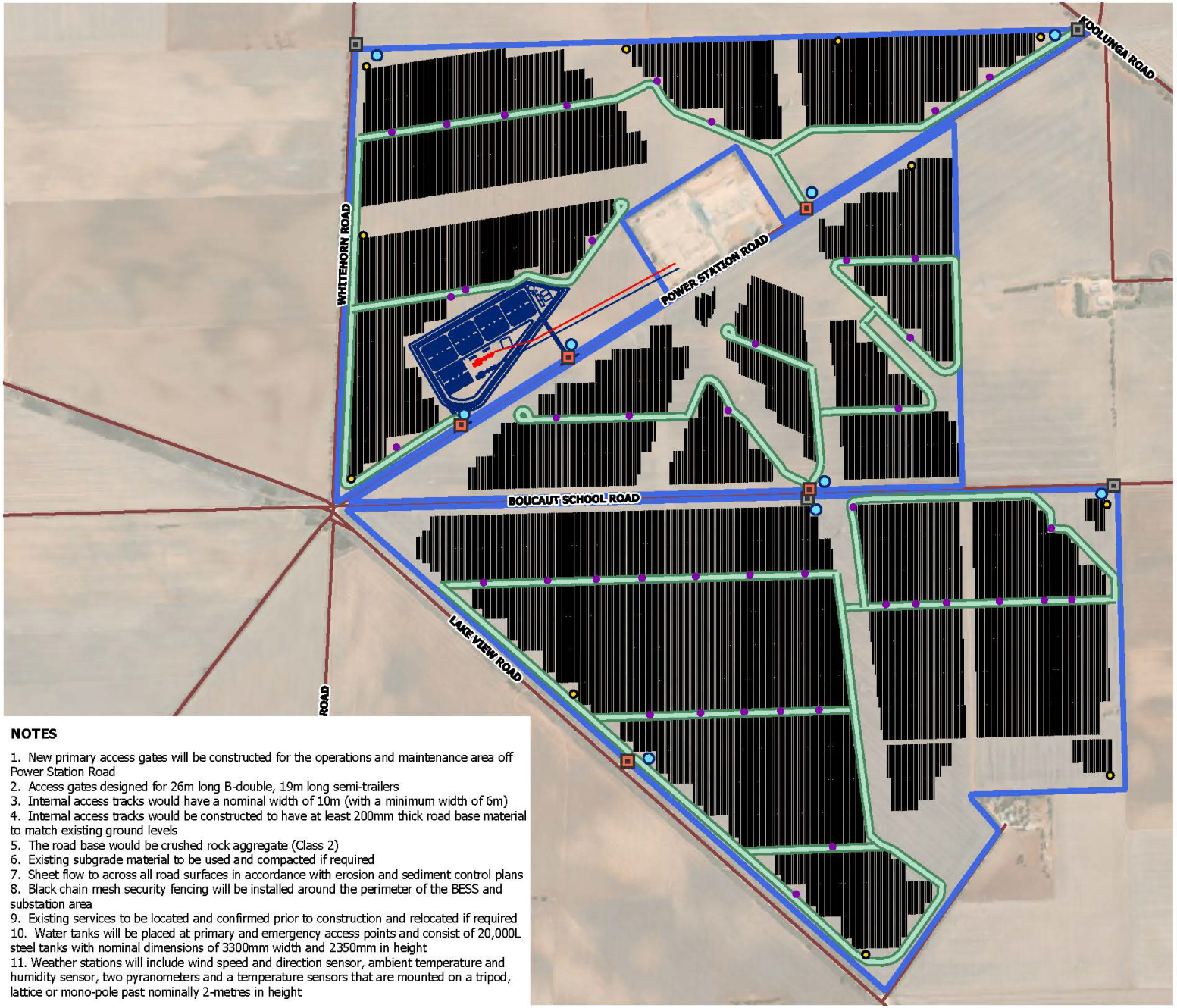


Figure 3.3

Solar farm overview and vehicle access

- Project site boundary
- Public road
- Fence
- Primary access
- Emergency access
- Water tank
- Weather station
- Inverter station
- Internal access track
- Solar panels
- Solar farm substation and connection
- BESS infrastructure (exempt from planning approval)

NOTES

1. New primary access gates will be constructed for the operations and maintenance area off Power Station Road
2. Access gates designed for 26m long B-double, 19m long semi-trailers
3. Internal access tracks would have a nominal width of 10m (with a minimum width of 6m)
4. Internal access tracks would be constructed to have at least 200mm thick road base material to match existing ground levels
5. The road base would be crushed rock aggregate (Class 2)
6. Existing subgrade material to be used and compacted if required
7. Sheet flow to across all road surfaces in accordance with erosion and sediment control plans
8. Black chain mesh security fencing will be installed around the perimeter of the BESS and substation area
9. Existing services to be located and confirmed prior to construction and relocated if required
10. Water tanks will be placed at primary and emergency access points and consist of 20,000L steel tanks with nominal dimensions of 3300mm width and 2350mm in height
11. Weather stations will include wind speed and direction sensor, ambient temperature and humidity sensor, two pyranometers and a temperature sensors that are mounted on a tripod, lattice or mono-pole past nominally 2-metres in height

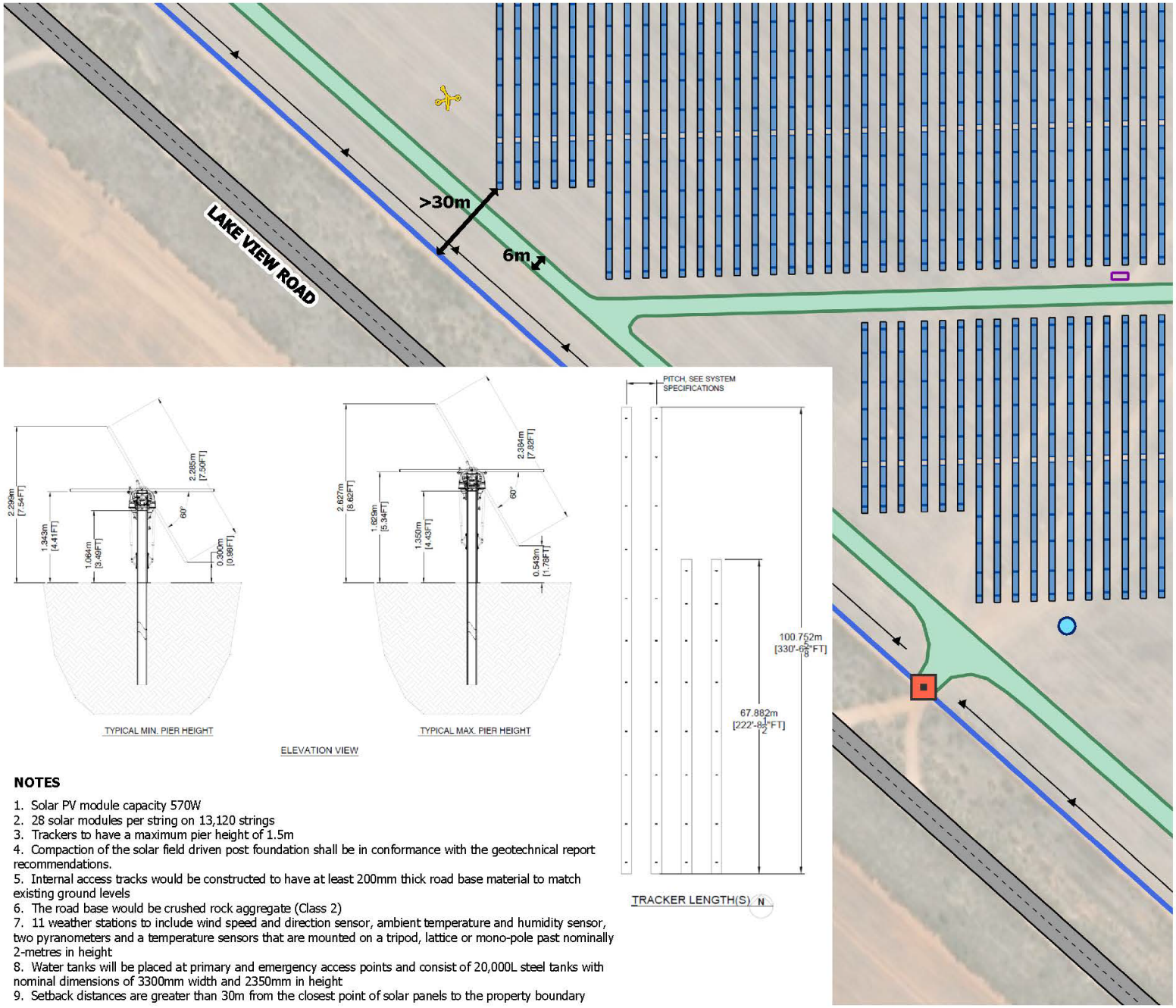
Ref: DWG 039 A.7
Author: J. Mourier
Date created: 02.05.2024
Datum: GDA20 / MGA zone 54

600 m

WIND PROSPECT

Figure 3.4

Solar farm typical plan



NOTES

1. Solar PV module capacity 570W
2. 28 solar modules per string on 13,120 strings
3. Trackers to have a maximum pier height of 1.5m
4. Compaction of the solar field driven post foundation shall be in conformance with the geotechnical report recommendations.
5. Internal access tracks would be constructed to have at least 200mm thick road base material to match existing ground levels
6. The road base would be crushed rock aggregate (Class 2)
7. 11 weather stations to include wind speed and direction sensor, ambient temperature and humidity sensor, two pyranometers and a temperature sensors that are mounted on a tripod, lattice or mono-pole past nominally 2-metres in height
8. Water tanks will be placed at primary and emergency access points and consist of 20,000L steel tanks with nominal dimensions of 3300mm width and 2350mm in height
9. Setback distances are greater than 30m from the closest point of solar panels to the property boundary

Ref: DWG 042 A.4
Author: J. Mourier
Date created: 19.10.2023
Datum: GDA20 / MGA zone 54

60.0 m

WIND PROSPECT

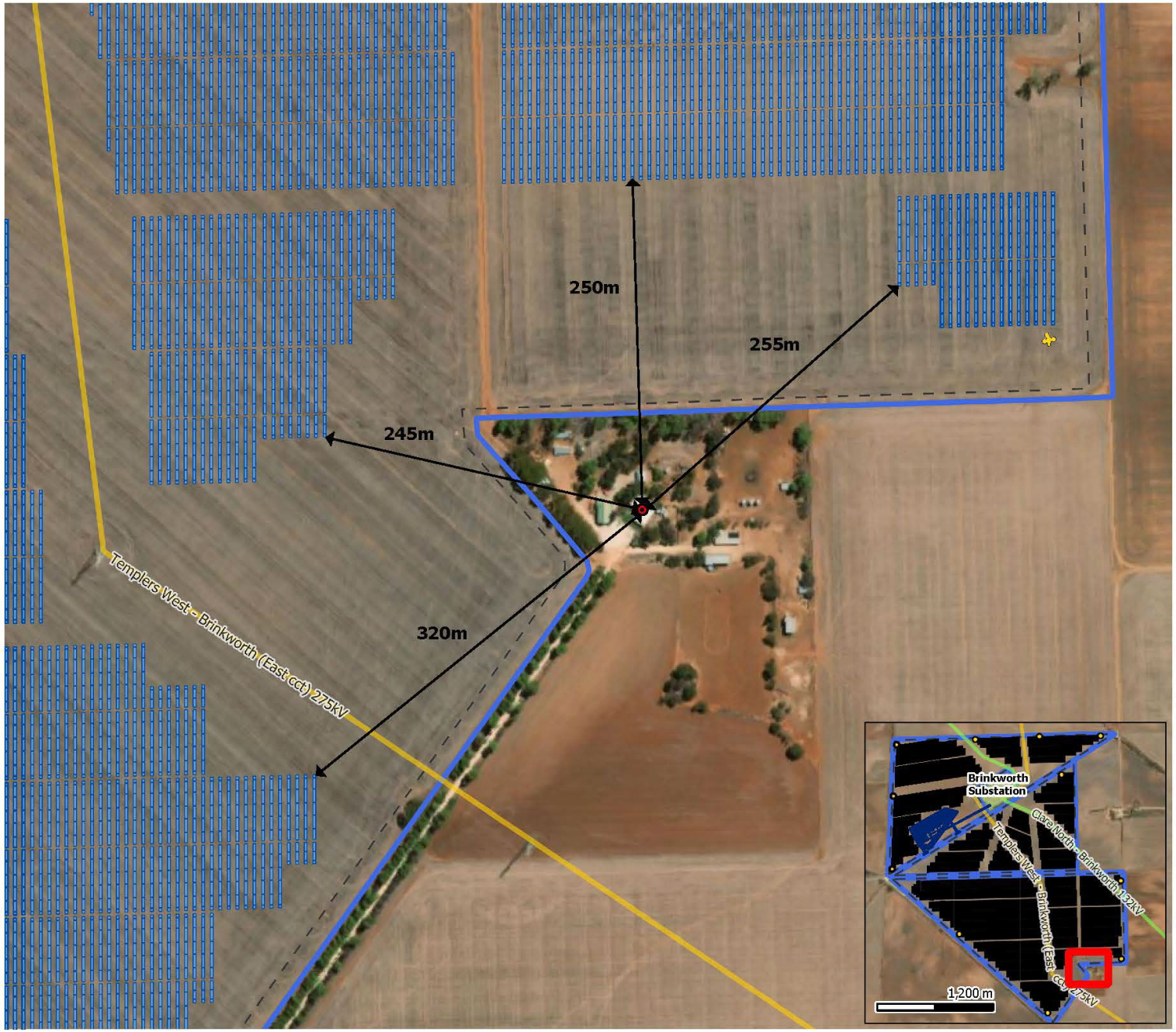


Figure 3.5

Solar farm separation distances to closest neighbouring dwelling

Project site boundary
Fence
Solar panels
Weather station
Existing 275 kV transmission line
Dwelling

Ref: DWG 043 A.3
Author: J. Mourier
Date created: 19.10.2023
Datum: GDA20 / MGA zone 54

150 m

WIND PROSPECT

Solar panels

The Project proposes installation of an estimated 367,360 panels which will provide a nameplate capacity of 209 MW of solar generation capacity across the Project site. The candidate solar PV panel is the JA Solar 'JAM72D40 570/GB' which are approximately 2.28 metres long by 1.13 metres wide and each rated to 570 watts.

The final height of the solar panels above ground height will be dependent on the selection of the solar panel and mounting rack. The maximum height of the panels to the higher edge from ground level at the maximum tilt angle is expected to be 4.5 metres, with the leading (lower) edge of each photovoltaic (PV) module up to 1.2 metres from the ground (when in a horizontal position) and no less than 0.3 metres (maximum tilt).

The racks of solar panels will vary in length, depending on their location within the Project site, but will range from 67 metres to 101 metres.

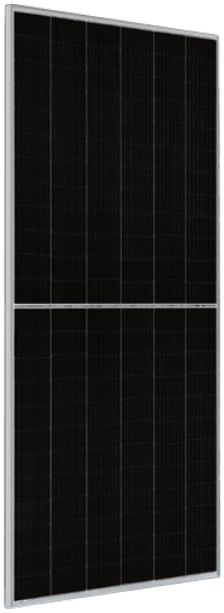


Figure 3-6 **The JA Solar "JAM72D40 570/GB" is the candidate solar PV panel modelled for the Project**

Tracking system

The modules will be mounted in large rows of solar panels, on single axis tracking racks that run approximately north south and are able to track the position of the sun east to west across the sky throughout the day to maximise electricity generation.

The racks of solar panels will be mounted on piers that can rotate the solar panel arrays approximately 60 degrees in each direction and will be spaced approximately 6.5 metres apart (refer Figure 3-8).

The solar design has been designed using the NEXTracker NX Horizon self-powered tracker.

The NX Horizon is a self-contained motorised unit which sits on each row of solar panels and includes its own dedicated PV panel to provide power to the controller. This controller drives the motor and hosts intelligent control electronics to position each tracker row for maximum yield. It also houses communications and Supervisory Control and Data Acquisition (SCADA) interfaces allowing the operations staff to continuously monitor and control the equipment.

A total of 4528 NEXTracker NX Horizon trackers are estimated to be required for the Brinkworth Solar Farm.

Figure 3-7 **NEXTracker NX Horizon is the proposed mounting and tracking system for the Project solar panels**

The NEXTracker systems are all-metal pivots requiring no lubricants. The Motor and Drive Slew is also fully sealed, meaning that it is lubricated for life and reducing the amount of lubricant and potentially hazardous chemicals that are required to be stored on-site.

The NX Horizon system sits atop piers and the drive systems can accommodate a row length of up to 90 panels. The installation of this tracking system avoids the need for welding, cutting, or drilling to install the system which enhances the safety of the Project solar installation. By including a drive shaft on each row of panels, the NEXTracker system also avoids the need for drive shafts linking rows which can inhibit the free movement of maintenance vehicles between rows of panels.

NEXTracker notes a maximum spacing between rows of panels as 6 m but recommends a spacing of ~3 m to maximise the solar generation of the Project site and fully utilise the system's ±60° degree tracking angle.

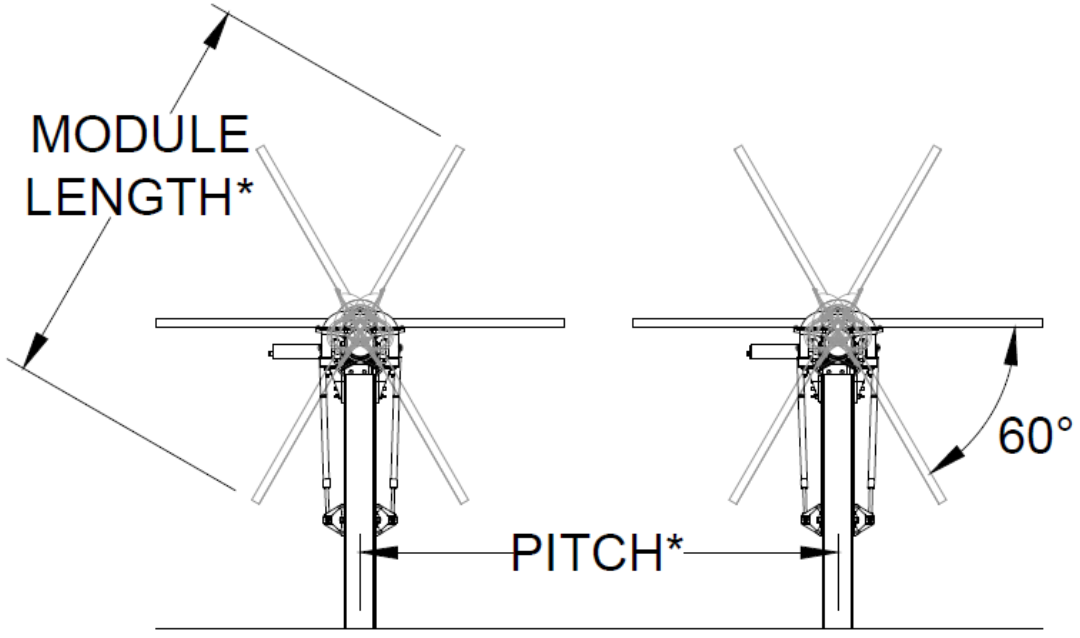


Figure 3-8 **The Project's tracking system allows the solar panels to rotate a total of 120 degrees, tracking the sun across the sky**

Foundations

Single axis tracking racks are typically anchored using piles that are either driven piles, screw piles or mass concrete, and are sized to ensure that uplift and lateral movements are prevented. The results of the preliminary geotechnical investigations indicate that very stiff to hard clays will be encountered and that driven post foundations will most likely be used as the foundations for the racks of solar modules.

Further geotechnical investigations undertaken with piling contractors to confirm the optimal foundation solution for the Project.

Power Conversion System

Solar panels produce energy in the form of direct current (DC), which must be converted to alternating current (AC) via a power conversion unit (inverter) to allow the solar generated energy to be fed into the electricity grid. Groups of solar panels are connected to an inverter by underground cabling and the inverters are linked together to collect the total energy being produced. The inverters are themselves connected to transformers that step-up the voltage, and then underground cables connect to the switching station.

The Project has used the SMA SunnyCentral 4200UP inverter as its candidate power conversion system. A commercial decision on the supplier of this equipment or equivalent alternatives has not been made. The final type, design and therefore quantity of the inverter stations to be used for the Project are yet to be finalised. Final selection will be dependent on several factors including suitability for the Project area, relative cost, maintenance requirements, efficiency, and reliability of units available on the market at the time of detailed design.

The SunnyCentral 4200UP system combines an inverter and medium voltage transformer onto a single 20-foot skid which simplifies transportation and installation.

Figure 3-9 **Example Power Conversion System contains an inverter and medium voltage transformer on a skid (SMA SunnyCentral 4200UP)**

The indicative placement of electrical equipment such as PCSs on east-west internal access tracks throughout the site seeks to minimise the distances between solar arrays by avoiding the irregular spacings created by the electrical equipment. The Project design honours this design objective in the majority of PCS locations. The irregular shape of the Project site, with existing transmission easements crossing the site means that true east-west internal access tracks are not practical across the entirety of the site and so some PCSs may be required to be located such that they affect the solar layout.

Reticulation lines will run from each inverter station/MV transformer unit to the Project's substation/ switchyard where the voltage is again stepped up via one or more transformers to match the voltage of the transmission network for export into the grid. The number and size of transformers will be a function of technical requirement and confirmed in the Project's final design.

Underground cabling

Underground cabling would be required throughout the Development Footprint and would be located within the Development Footprint, leading to the onsite substation. The cables would be installed in trenches approximately 900mm to 1000mm deep and the cables may be protected by conduits. A marking tape would be provided to reduce the possibility of accidental damage and ground markers would be provided to identify the cable routes.

Underground cabling on the site would be designed in accordance with Australian and International standards and the cable routes would be designed to minimise ground disturbance.

Copper conductors would be used wherever necessary to electrically bond the metal structures to earth to protect personnel and equipment in the event of lightning strikes and electrical faults.

Weather stations

Weather stations will be installed around the perimeter of the solar farm to monitor solar radiation and other meteorological parameters (see Figure 3-1 and Figure 3-10).

Figure 3-10 Example of weather station at solar farm (source: Campbell Scientific)

3.2.3 Grid connection

3.2.3.1 Substation/switching yards

Two separate substations will be required for the Project, to connect the BESS (exempt from planning approval) and solar farm components of the Project separately to the existing Brinkworth Substation, owned and operated by ElectraNet.

These substations will independently connect the BESS and solar farm to the existing grid. To achieve this, the substations will incorporate step up transformers to step the voltage up to 275 kV, the same voltage as the existing Brinkworth Substation, simplifying the required infrastructure at the point of connection.

The substation for the Project will likely include a 275/33 kV transformer, earthing/auxiliary transformers, outdoor switchgear, control room and switch room, and cable termination structures. Figure 3-11 shows typical elevation drawings of substation infrastructure, see Appendix C for further details.

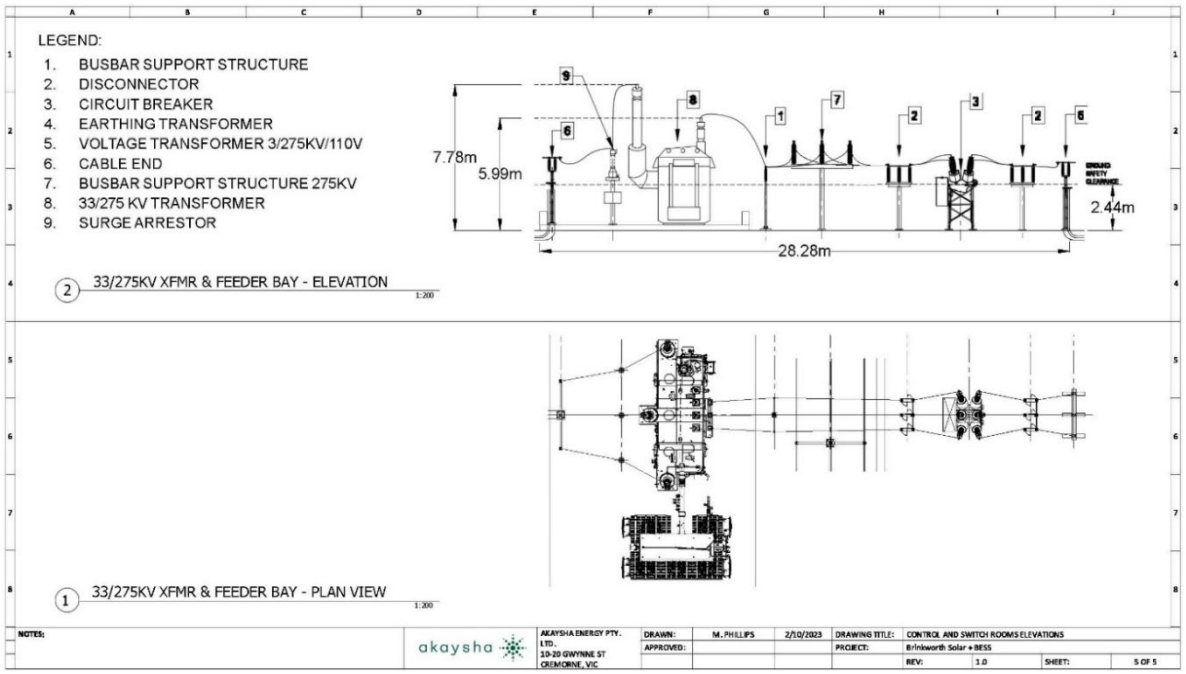


Figure 3-11 Typical elevation drawings of substation infrastructure

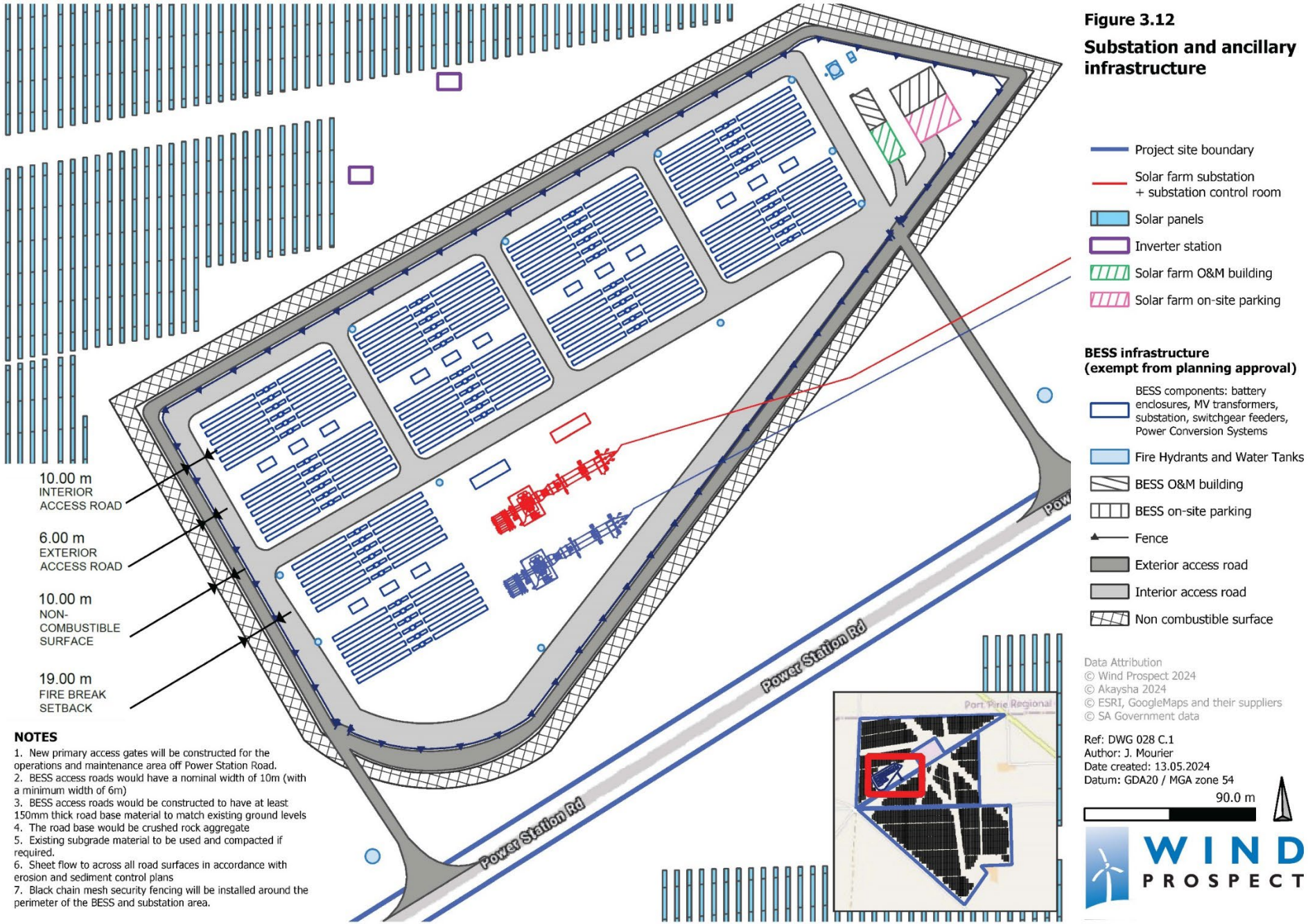
Connection to substation

An overhead transmission line connection between the Project BESS switchyard on the Project Land and the adjacent ElectraNet Brinkworth Substation would be provided as part of the development; however, this would be dependent on the technical advice from ElectraNet given that this connection would pass across several ElectraNet easements.

The connection would be approximately 550 metres long and would be across Project and ElectraNet land only. The connection would include a transmission corridor nominally 50-metres wide. The indicative location of the overhead transmission line connection is shown in Figure 3-12.

If Electranet advise that an overhead transmission line connection is the preferred option, line would be a double circuit configuration i.e., strung on both sides of the towers. The conductors would be above ground and the line would be strung from lattice steel transmission towers, with gantry structures at each end.

Construction of foundations for the new towers would generally involve boring or excavating a hole for each of the four footings of the tower. It is expected that each borehole would be approximately one metre wide and up to 10 metres deep and stabilised with concrete. Alternatively, steel reinforcements would be placed into the hole and backfilled with concrete. Each tower would be craned (in sections) into position onto the footing and secured with holding down bolts. Some structures may require additional strengthening using guy wires. The guy wire would be connected to metal rods which would be embedded in a concrete foundation block (approximately 1m^2) installed below ground.



NOTES

1. New primary access gates will be constructed for the operations and maintenance area off Power Station Road.
2. BESS access roads would have a nominal width of 10m (with a minimum width of 6m)
3. BESS access roads would be constructed to have at least 150mm thick road base material to match existing ground levels
4. The road base would be crushed rock aggregate
5. Existing subgrade material to be used and compacted if required.
6. Sheet flow to across all road surfaces in accordance with erosion and sediment control plans
7. Black chain mesh security fencing will be installed around the perimeter of the BESS and substation area.

Figure 3.12

Substation and ancillary infrastructure

- Project site boundary
- Solar farm substation + substation control room
- Solar panels
- Inverter station
- Solar farm O&M building
- Solar farm on-site parking

BESS infrastructure (exempt from planning approval)

- BESS components: battery enclosures, MV transformers, substation, switchgear feeders, Power Conversion Systems
- Fire Hydrants and Water Tanks
- BESS O&M building
- BESS on-site parking
- Fence
- Exterior access road
- Interior access road
- Non combustible surface

Ref: DWG 028 C.1
Author: J. Mourier
Date created: 13.05.2024
Datum: GDA20 / MGA zone 54

90.0 m

WIND PROSPECT

There is an existing overhead 275kV transmission line that connects the ElectraNet Brinkworth substation. The Project connection would likely connect north of this existing line.

The Project connection would be designed to avoid conflicts with the existing lines where possible and in accordance with Australian Standards and ElectraNet's Design Guidelines.

It is possible that ElectraNet may advise that an underground transmission line connection is the preferred option. This would involve laying an insulated cable within a trench that is backfilled. The specifications of this connections would be designed in accordance with the necessary standards.

The Project substation will be connected to the existing ElectraNet owned Brinkworth Substation via transmission lines. A final decision on the specific routing of the transmission lines will be made during detailed design in consultation with ElectraNet.

3.2.4 Operations and Maintenance compound

The Operations and Maintenance (O&M) area will include several buildings associated with the activities of operational staff operating and maintaining the Project infrastructure (Figure 3-12). These buildings will include an office/ administration facility, a staff building with tearoom and staff amenities, a control room for the operating solar farm and BESS, as well as a maintenance shed and storage for spare parts. The maintenance shed will also include secure, bunded storage for hazardous materials if they are required to be stored onsite. These facilities will be located close to the BESS and substation, with access from Power Station Road. Nominally the design has provided two O&M buildings 20 metres by 10 metres.

Figure 3-13 Example of a typical operations and maintenance building

Carparking for operations and maintenance staff, temporary contractors and visitors will be located within the O&M area, providing access to the O&M buildings.

Separate control rooms for the BESS (exempt from planning approval) and solar farm in demountable-style buildings nominally 21 metres by 4 metres.

Refer to Appendix D for elevation drawings and plans for the O&M area.

3.2.5 Fencing and security

Fencing

Black chain mesh security fencing will be installed around the perimeter of the substation area. Additionally, the same black chain mesh security fencing will be installed and maintained around the perimeter of the solar farm component of the Project. The final fence dimensions will be investigated during the detailed design phase; however, it is anticipated the fence would be black 2.93 metres high chain mesh security fencing.

Figure 3-14 Black mesh fencing is anticipated to be installed around the perimeter of the Project

Lighting

Lighting will be installed where necessary for safety, maintenance, and security purposes. There would be no permanently lit night lighting within the Project boundary.

Within the substation area, lighting would be included in each PCS for night-time maintenance or emergency purposes only. Lighting would be installed around the substation, and O&M facilities to be used in case of night works or an emergency only.

Motion sensor or infrared security lighting (and CCTV cameras) would be installed at sensitive boundary locations and around the substation, O&M facilities, and office areas.

All external operational lighting would be designed to reduce disturbance to neighbouring properties, as such it would be low intensity lighting (except where required for safety or emergency purposes) and would not shine above the horizontal. The external operational lighting would be used only when there are staff on site, as part of night works (where required), site security or during emergency situations including through remote operation to allow improved camera visibility.

External lighting would be installed to comply with Australian/New Zealand Standard AS/NZS 4282:2019 – Control of Obtrusive Effects of Outdoor Lighting, or its latest version.

CCTV

CCTV will be installed at sensitive locations around the Project to monitor for any unauthorised entry.

These locations would include the main access gates at Power Station Road, the control room and transformer/switch yard. A security company would be contracted for monitoring outside of business hours. The CCTV cameras would be solar/battery powered with a wireless communication connection and would be mounted on up to 4.5 m poles complete with sensors or infrared security lighting.

3.2.6 Site access and tracks

The site will be able to be accessed from access gates located around the Project perimeter, providing for efficient and safe ingress and egress from the site. The primary access gates providing access to the Project's Operations and Maintenance area will be located on Power Station Road. The site access to the Operations and Maintenance facility will be open during operational hours only.

Additional primary access gates will be constructed around the solar farm site to provide access for heavy vehicles during construction and operation of the Project (refer to Figure 3-3for indicative locations). These site access points will be constructed to accommodate the largest design vehicles expected to enter and exit the site. Refer to Appendix C for conceptual drawings of the primary access points.

Existing farm gates will also be upgraded to provide emergency access across the sections of land hosting the solar farm. These emergency access gates shall remain locked at all times when not in active use to

prevent unauthorised access. The Project has opted to use of existing farm access gates for emergency access to minimise vegetation clearance in road reserves.

To ensure that emergency vehicles can access the Project site safely, internal access tracks and access gates will be designed in accordance with the requirements of the Planning and Design code, and the Victorian CFA's Design Guidelines and Model Requirements for Renewable Energy Facilities in the absence of a South Australian CFS equivalent (refer to Appendix L for details). Access gates, primary and emergency, have largely been designed based on feedback from CFS to ensure that they are located approximately 2 kilometres apart along public roads to enable emergency services access. 20,000 litre tanks will be sited at entry points to assist firefighting efforts in line with CFS guidance provided to the Project.

Internal access tracks would be established across the Project site to access Project infrastructure, and an internal perimeter access track would be constructed. The internal access tracks would be between 4 m and 6 m wide and be constructed using compacted road base gravel to a depth of 200 mm. It would be constructed in accordance with the AustRoad Guideline requirements, the requirements of the Planning and Design code, and the abovementioned Victorian CFA's Guidelines, and include suitable drainage features to minimise the risk of polluted water leaving the site or entering waterways.

The internal access tracks would be maintained throughout the construction and operation of the Project. Approximately 18 km of formed internal access tracks is anticipated to be constructed during construction of the Project solar farm for ongoing use during operation.

Additional unobstructed vehicle access for light vehicles will be maintained through rows of solar panels for maintenance and cleaning. These minor accessways will not involve any civil works and will not be suitable for heavy vehicle access.

If required, water trucks would be used to suppress dust on the unsealed internal access tracks during construction. Additional stabilising techniques and/or environmentally acceptable dust control would also be applied if required to suppress dust.

3.3 Temporary facilities

During construction temporary facilities will be constructed to provide the construction team with amenities, administration facilities as well as laydown and storage areas for construction materials and equipment.

These facilities will likely include use of the permanent operations and administration buildings, carpark, and laydown area as this will reduce the need for the development of temporary facilities.

The specific design of the temporary construction facilities will be determined by the construction contractors.

Temporary facilities would be located within the Development Footprint during the construction phase only and would include:

- material laydown areas
- temporary construction site offices
- temporary parking for construction worker's transportation. When the construction work is completed, a small car park would be retained for maintenance staff and occasional visitors
- temporary staff amenities.

Laydown requirements are limited as most bulk equipment deliveries would be unloaded into place rather than into designated laydown areas. Some small laydowns would be required for cable drums and other auxiliary equipment, to be wholly contained within the Development Footprint.

The staff amenities would be designed to cater for the peak number of construction staff expected to be onsite and would include:

- water tanks
- changing rooms
- lunch rooms
- administrative offices
- covered walkways
- emergency muster point

- generator – if required
- electrical, data and water reticulation
- sanitary modules with water flush systems connected to holding tanks. The tanks would be fitted with high level alarms, and they would be pumped out regularly.

The Project proponent is exploring the need to develop temporary construction accommodation for the construction staff in consultation with council and key Project stakeholders. Permits and approvals for any temporary accommodation deemed necessary would be sought separately to this Development Application.

3.4 Construction

3.4.1 Timeline and staging of works

It is expected that the Project components, the solar PV and BESS, will be constructed in separate stages. The BESS component will be developed first, with the solar PV component not anticipated to begin construction until mid-2026, and dependent on market conditions. Each component of the Project will be implemented in four stages, as described below:

1. Preconstruction works
2. Construction
3. Operation
4. Decommissioning and rehabilitation.

Pending the granting of a development authorisation, the Project is anticipated to begin construction in mid-2026, following detailed engineering, and a Final Investment Decision and the securing of Project finance.

To facilitate the staged development of the Project, an extended period of time in which to commence (2 years) and complete the Project (4 years) is requested by this Development Application. Table 3.2 provides a high-level overview of the Project schedule, and Table 3.3 provides a summary of the anticipated construction schedule.

Table 3.2 Indicative project timeline

Phase	Project component	Approximate commencement	Approximate duration
Planning Exemption	BESS	Q2 2024	N/A
Project Development Authorisation	Solar farm	Q2 2024	6 months
Financial Close	BESS	Q1 2025	N/A
Construction	BESS	Q1 2025	Approximately 12 months
Commissioning	BESS	Q1 2026	3–6 months
Operation	BESS	Q2 2026	Approximately 20 years
Financial Close	Solar farm	2026	N/A
Construction	Solar farm	Q2 2026	Approximately 12 months
Commissioning	Solar farm	Q2 2027	5 months
Operation	Solar farm	2028	Approximately 20 years
Decommissioning	Both	2046 (if Project life not extended)	TBC

Table 3.3 Estimated project construction schedule

Stage	Delivery	Approximate duration
BESS Construction and Infrastructure delivery – about 12 months	Site establishment, BESS access tracks and road upgrades, including installation of environmental controls, earthworks and any drainage requirements, construction of concrete hardstands, and civil works. Summarised as follows: • earth works (cut and fill, grading and compacting) • establishment of BESS access tracks and completion of any road or intersection upgrades • removal of existing fences • cleaning and levelling the ground for buildings and structures • excavating cable trenches.	3 months
	Delivery of BESS infrastructure	3 months
	Installation of BESS infrastructure (containerised units, transformer, switch room, control room and O&M) and electrical works	3–6 months
BESS Testing	BESS testing works	3 months
Solar farm Construction and Infrastructure delivery – about 12 months	Site establishment and access tracks and road upgrades, including installation of environmental controls, earthworks and any drainage requirements, construction of concrete hardstands, and civil works. Summarised as follows: • earth works (cut and fill, grading and compacting) • establishment of internal access tracks and access points • removal of existing fences • cleaning and levelling the ground for buildings and structures • excavating cable trenches.	6 months
	Delivery of solar infrastructure	6 months
	Installation of solar farm infrastructure (driven piers, panel racks, solar tracking motorised units, solar PV panels), inverters and medium voltage transformers, and electrical works.	6 months
Solar farm Testing	Solar farm connection energisation	5 months

3.4.2 Construction hours

During the construction phase, work would be undertaken during the following hours:

- Monday – Friday: 7 am – 6 pm
- Saturday: 8 am – 1 pm.

Certain light construction and assembly activities would be completed outside of standard construction hours, subject to these activities having no amenity impacts on surrounding residences. Example activities include cable termination, system assembly and testing, script testing (on computer), Supervisory Control and Data Acquisition (SCADA) testing. The performance would be monitored through this SCADA system that would report to staff both on- and off-site. The system would be capable of notifying staff of system issues and failures.

Any construction outside of these standard construction hours, if required, would be minimised, and would only be undertaken with prior approval from relevant authorities.

3.4.3 Resource requirements

Earthworks

The earthworks and excavations associated with the internal access tracks, buildings and cabling trenches would require removal of vegetation cover and soil disturbance in some areas. The solar farm will require installation of piers to hold the racks of solar panels. These piers are expected to be driven into the ground, however further testing and advice from the installer will confirm this approach.

Accurate topographic and cadastre surveys would be undertaken as detailed design commences. This would provide accurate cut and fill quantities.

The installation of security fencing would have a small discrete footprint and is unlikely to result in substantial soil disturbance.

Ground cover would be maintained where possible during the pre-construction and construction stages of the Project and would be rehabilitated upon decommissioning.

Construction materials

The main construction materials would include:

- aggregates, road base and concrete
- solar panels
- steel racks and piers
- inverters and transformer units
- fencing materials
- cables, conduits, junction boxes
- steel framing and Colourbond sheeting for permanent buildings
- timber and fixtures for building fit-out.

Utilities and waste management

Water will be either trucked to site during construction or taken from mains water under licence from SA Water. Water carts and sprinklers will be used on site for dust suppression.

If required during construction, a vehicle washdown station could be established on site and all wastewaters would be captured and managed onsite using licensed waste contractors.

Waste generated during construction are expected to be minimal and will be managed locally. Much of the waste, including pallets that transport the solar modules, will be recyclable. A dedicated area for waste will be established and wastes segregated for appropriate management. All wastes will be disposed of in accordance with regulations and licensed transporters will be used when required.

Waste will be collected regularly throughout the construction phase to avoid the stockpiling of waste that could pose a risk of becoming wind-blown litter. Bins used on site will have lids to further reduce the chance of wind-blown litter.

3.4.4 Construction workforce, accommodation, and machinery

The Project will directly employ up to 225 full time equivalent jobs at the height of the construction phase. An estimated additional peak of 391 FTE roles is anticipated to be indirectly generated by the Project during construction.

Across the civil, construction and commissioning phase, a peak of 80 staff are anticipated to be on site at any one time. These personnel will travel to the site by private vehicles and potential minibus services, generating up to 80 vehicle arrivals/departures associated with the site in the peak hour.

The Project is exploring accommodation solutions for the construction workforce for the Project in consultation with the local and neighbouring councils and every effort would be made to hire staff locally. The proponent is aware of a shortage of rental accommodation in the immediate area and so will work with relevant stakeholders to ensure that the construction workforce can be accommodated conveniently to construct the Project, while at the same time not putting undue pressure on local services. Solutions could involve a combination of housing staff in rental accommodation further from the Project site, and

development of a temporary construction accommodation compound for the construction staff at a nearby location.

Plant expected to be used during construction would include:

- crane
- drum roller
- padfoot roller
- wheeled loader
- dump truck
- 30t excavator
- grader
- chain trencher
- water truck
- telehandler forklift.

3.4.5 Management of traffic

Prior to construction commencing, a Traffic Management Plan will be developed in consultation with the Regional Council of Wakefield, Department for Infrastructure and Transport (DIT) and other relevant stakeholders.

Through the traffic impact assessment by ETA, the anticipated traffic number of daily movements for the site is in four phases. A summary of traffic impact assessment is in Table 3.4 (which also includes the BESS component exempt from planning approval).

- **Civil Works:** During the Civil Works stage, heavy vehicle movements at the site will mainly involve transporting machinery and earth. Most movements (95%) will use vehicles up to 19 metres in length, with a small portion (5%) using vehicles up to 26 metres (B-Double). Over Size/Over Mass (OSOM) vehicles are not expected to access the site. Light vehicle movements, involving around 65 on-site staff, are related to staff commuting.
- **Construction Phase:** During the Construction Phase, solar and BESS components can be transported within standard size limits of 19-metre semi-trailers and 26-metre B-Double vehicles. Anticipated vehicle distribution is 60% for 19-metre semi-trailers and 40% for 26-metre B-Double vehicles. Around 80 on-site staff will use light vehicles for commuting. Certain wide equipment like transformers, switch rooms, and control rooms may necessitate OSOM transport, requiring relevant permits and compliance with final dimensions. Approximately 7 OSOM vehicles may be needed, using approved OSOM routes like the August Highway (up to 4.6 metres in width) connecting to the site via Lake View Road and Power Station Road.
- **Commissioning Phase**: During the Commissioning Phase, vehicle movements to/from the site are expected to decrease. Light vehicles, primarily for staff (up to 45 on-site), will be the main mode of transportation. The number of trucks is anticipated to reduce to about one vehicle per day. No OSOM vehicles are expected during this time. Some additional deliveries may be needed for short periods but should not occur daily.
- **Site Operation**: During the Site Operation Phase, the development will operate mostly automatically. There will be up to 20 full-time staff using light vehicles for monitoring and maintenance after construction. Regular truck movements are not expected; they will occur only when needed for maintenance purposes.

Table 3.4 Traffic generation summary

Vehicle type	Vehicle trips per day			
	Civil works	Construction phase	Commissioning phase	Site operation
Light vehicles	130	160	90	40
Truck Movements up to 19 m semi	56	72	4	0
Truck Movements up to 26 m B-Double	4	48	0	0
Total (trips per day)	**190**	**280**	**94**	**40**

The key traffic impacts caused by the Project include:

- during the peak construction phase, the anticipated number of vehicle movements is anticipated to be in the order of 400 vehicles per day. Outside of the peak construction/civil period, the anticipated traffic movements are anticipated to reduce to be in the order of 150 vehicles per day during the operation period of the site
- this forecast daily traffic volumes fall within the typical current practice where unsealed roads can carry up to 500 vehicles per day.

When comparing the additional traffic volume generated by the site during the construction and operational phases against current traffic volumes on the road network, it is not expected the site traffic will impact on the safety or function of the surrounding road network.

Haulage route

The delivery of solar and battery farm components and other facilities will be delivered to the site by heavy vehicles up to 26 metre B-Doubles, with a small number of OSOM vehicles accessing the site. Currently, it is assumed that most solar and battery components are imported from overseas via Port Adelaide. Oversize Vehicles are expected to travel from Outer Harbour (Port of Adelaide) and therefore would require transportation via the approved OSOM road network where possible. The final route and vehicle dimensions will be subject to the relevant requirements and permits.

The proposed OSOM access to the Project site will be via the Augusta Highway to Redhill, then onto Koolunga to access Power Station Road from the northern approach of Koolunga Road. The access route offers the advantages of:

- utilising existing gazetted roads and is sealed until Power Station Road. A swept path assessment demonstrated that vehicles up to a 26 metre B-Double can enter and exit Power Station Road without requiring any changes to the road surface
- an existing return turn lane is provided at Augusta Highway/Ellis Street intersection that is appropriate to accommodate B-Double vehicles
- a level crossing controlled with warning lights allows vehicles to cross the Adelaide – Darwin railway line.

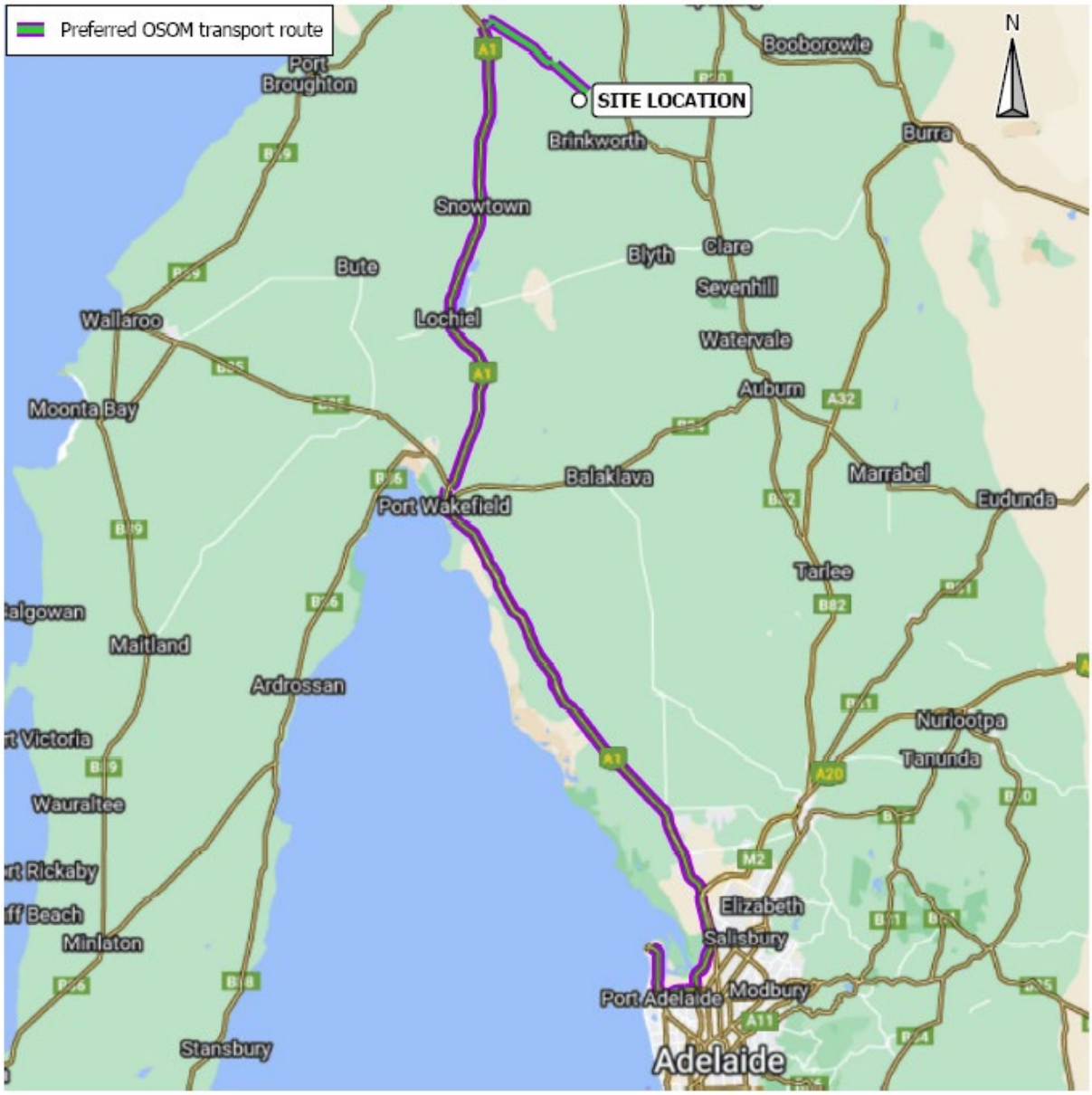


Figure 3-15 **OSOM routes considered for access to the Project site. Route Option 1 is the proposed OSOM route**

3.4.6 Construction Environmental Management Plan

To address any potential identified risks in the assessment of the proposed development, a draft Construction Environmental Management Plan (CEMP) has been prepared to incorporate the necessary environmental controls during construction. The draft CEMP prepared for the Project is contained in Appendix O of this application.

Fire risk management

The Project has engaged Fire Risk Consultants to identify and manage the fire risks associated with the development and operation of the Project infrastructure (refer to Appendix L for details). These risks include the risk of fire generating on site, as well as the risks of external fires impacting the Project site. In addition to the adoption of several fire risk management measures in the Project design, the Project will develop a Fire Risk Management Plan, and Emergency Management Plan to be prepared concurrent with the final CEMP. Emergency Information Books detailing emergency procedures will be located at key locations onsite within marked Emergency Information Containers.

Stormwater management

A Surface water assessment has been undertaken by specialist consultants to identify potential surface water risks which has contributed to the development of the Project design, to avoid areas of 1-in-100-year flooding. The assessment has also provided a number of recommendations to be implemented during Detailed Design and throughout construction and operation. Refer to Chapter 5 for a summary of the assessment and Appendix I for the surface water assessment.

A Flood Management Plan, and a Sediment and Erosion Management Plan will be required to be developed as part of the final Contractor's Environmental Management Plan (CEMP) to address temporary and site-specific risks to surface water during the construction phase.

3.5 Operational phase

During operation of the Brinkworth Solar Farm and BESS, vehicle movements are predicted to be minimal, and not have significant impact on the local road network or traffic. Operational and maintenance activities will require the direct employment of an estimated 10 FTE staff. Small teams of part time specialist staff will be required at various stages throughout the life of the Project to perform various maintenance functions associated with the Project. The size of these teams is not expected to cause any impacts to the road network or to impact on existing road users.

Prior to the commencement of site operations, an Operations Environment Management Plan (OEMP) will be developed to establish the management process and procedures required during operation of the Project.

3.5.1 Activities

Activities undertaken during operation would include:

- infrastructure maintenance
- monitoring the performance of the BESS and solar farm
- inspection of the installation
- routine preventative maintenance
- emergency repair response (24 hours)
- site security response (24 hours)
- vegetation management within the Development Footprint in accordance with the fire management and biodiversity management plans.

3.5.2 Water requirements

Operational water requirements would be minimal. The Project will be connected to mains water for the staff amenities facilities.

A 72,000-litre steel or concrete above ground water tank, for fire protection purposes, would be located adjacent to the skid-based battery modules. Refer to Figure 3.2 for the proposed siting of the water tank.

Additional 20,000 litre tanks for fire protection purposes will be located at each site access gate.

The static water supply would comply with the relevant provisions of AS2419.1 and its specifications would be finalised through further consultation with fire and emergency service authorities.

Water spraying for dust suppression is not anticipated during operations unless triggered by the Project's Operational Environmental Management Plan for the management of dust.

3.5.3 Lighting and CCTV

Under normal circumstances, there would be no night lighting located on site.

External lighting would be provided around the buildings and in the high voltage substation, but they would only be used on the rare occasions that staff are working on the site during the hours of darkness.

CCTV security cameras would be located at the entrance of the operations and maintenance facilities.

3.6 Decommissioning or replacement

The expected life of the proposed Project infrastructure is approximately 20 years, though this may be able to be extended depending on the condition of the equipment at that time.

Towards the end of the Project's operational design life, all equipment will be either replaced with comparable new equipment, or decommissioned. The owner of the Brinkworth solar farm and BESS would assess whether to decommission the Project infrastructure, to extend the life of the infrastructure or to replace it. New approvals would be sought, as required, at the time of replacement.

Where a decision is made to decommission or replace the Project, all Project related infrastructure would be removed from the Project area, and should the Project be decommissioned then the land would be returned for agricultural use.

Prior to the commencement of Project's operation phase, a Decommissioning and Rehabilitation Plan (DRP) will be provided to the relevant authority for approval. The DRP outlines end-of-project decommissioning works, describing the extent of reinstatement and restoration activities upon the removal of the renewable energy infrastructure and associated facilities.

The plan will include, but is not limited to:

- identification of structures to be removed, except where such facilities are to be transferred to the control of the local network operator, and how they will be removed
- measures to reduce impacts of the development on the environment and surrounding land uses; and
- details of how the land will be rehabilitated back to its predevelopment condition, including slope and soil profile.

The proponent is responsible for the decommissioning of the Project. Landowner contracts require the removal of all Project infrastructure at the end of the life of the Project. These contracts form a legally binding obligation that is tied to the land, regardless of whether the parties to the lease change over time.

Chapter 4
Stakeholder engagement

4.1 Engagement approach

Akaysha Energy, supported by Wind Prospect and consultants, are committed to genuine community engagement throughout the planning process. Throughout the Project development there has been commitment to:

- respectful and ongoing engagement with local communities and key stakeholders
- ensuring respectful and timely engagement across a range of mediums and throughout the Project's progression from planning through to operation and decommissioning
- designing and delivering effective stakeholder engagement to ensure community members and other stakeholders are informed, consulted, and given opportunities to be involved and influence project outcomes
- participation in the development process by the community so local knowledge, priorities and expertise could inform the various technical studies.

To this end, Akaysha Energy's commitments align with the aims of the stakeholder communication process outlined in Table 4.1.

Table 4.1 Aims of the stakeholder engagement process

Openness	Awareness	Inclusion
To demonstrate **openness**, we: • proactively provide opportunities to meet with the Project team • meet with neighbours and stakeholders when requested • be open and honest in all communications.	To demonstrate **awareness**, we: • use a range of communication methods such as open days, briefings, and newsletters • target engagement with near neighbours and the wider community for face-to-face discussions to share information.	To demonstrate **inclusion**, we: • seek to understand the full range of local opinions • provide a variety of opportunities to source and discuss information (open days, newsletters, website etc).
Responsiveness	**Transparency and integrity**	**Accountability**
To demonstrate **responsiveness**, we: • acknowledge and respond to all queries and any issues raised • provide updates and feedback on Project design, assessment results and consultation responses.	To demonstrate **transparency and integrity**, we: • request feedback on the Project design, including any issues or concerns and suggested mitigation measures • provide information with enough time for people to review and provide feedback.	To demonstrate **accountability**, we: • provide contact details (freephone, email, postal address) to facilitate contact from the local community • provide information on the potential impacts from the Project that could arise and affect residents.

Guided by community engagement principles, aims, and objectives, Akaysha Energy with the assistance of Wind Prospect have actively engaged with individual landowners associated and in proximity to the site of development, government agencies and council, First Nation groups, the broader community of Brinkworth and Koolunga and surrounding areas, and all proprietary interest stakeholders.

4.2 Stakeholder identification

Early in the development of the Project, a stakeholder consultation database was created, which is a live document that evolves over time. The database includes all stakeholders identified throughout project development, and a record of recipients have been provided with project information. Through consultation with government, local council and various stakeholders, the database has been added by way of recommendations.

Residents within 3 kilometres of the Project site were identified as 'near neighbours' for more focused engagement. All near neighbours have been kept informed and provided with the opportunity to get involved via phone calls, newsletters, and invitations to drop-in sessions meetings.

The 'local community' is defined as people residing within approximately 10 kilometres of the Project. Potential impacts such as those related to the community or amenity are expected to decrease with increasing distance. At this distance, potential impacts are not expected, but have the potential to occur in rare instances. The local community includes the localities of Brinkworth and Koolunga. Through community information sessions, newsletters, and the Project website this community has received information about the Project and the opportunity to provide feedback. Distribution of newsletters to the local community was achieved through letters posted directly to all residents of postcode 5464, which covers Brinkworth and Koolunga, Anama, Bungaree, Condowie, Hart, Marola and Rocheste. Project newsletters were also directly distributed to targeted stakeholders via email. These include community groups and members of parliament.

A Project website was established to provide easy access to project information and allow the community to provide anonymous feedback and contact the Project team for more information. The Project website can be found on the Akaysha Energy website at: https://www.akayshaenergy.com/projects/project-brinkworth. The Project website will be available and updated through throughout the life of the Project.

A summary of project stakeholders is provided in Table 4.2.

Table 4.2 Project stakeholder groups and proposed engagement strategy

Stakeholder group	Description	Engagement strategy
Host landowners	Landowners who are hosting the solar farm and substations infrastructure	Collaborate
Immediate neighbours	Landowners whose properties border the solar farm	Involve and consult
Local community	Residents within 10 km of the Project	Involve and consult
Local councils	Wakefield Regional Council Port Pirie Regional Council	Involve and consult
Traditional Owners/ First nations group	Kaurna Yerta Aboriginal Corporation Ngadjuri Nation Aboriginal Corporation	Involve and consult
Government agencies	Department of Infrastructure and Transport Environmental Protection Agency (EPA) Department for Environment and Water Department for Energy and Mining Department of Premier and Cabinet South Australian Country Fire Service Civil Aviation Safety Association (CASA) SA Water Country Fire Service SA Land Services SA	Involve and consult
State and Commonwealth Governments	South Australian members of Parliament Commonwealth members of Parliament	

Stakeholder group	Description	Engagement strategy
Energy agencies and bodies	ElectraNet Office of the Technical Regulator Australian Energy Market Operator (AEMO) ESCOSA Australian Energy Infrastructure Commissioner	Involve and consult
Community groups	Brinkworth Yacka Management Committee Koolunga Development Association Brinkworth Progress Association Inc SA Country Women's Association Brinkworth Branch Inc Country Fire Service Brinkworth History Group Brinkworth Community Pool Committee Brinkworth Koolunga Cricket club Brinkworth, Spalding and Redhill (BSR) Football and Netball Club	Consult
Local industry and businesses	Regional Development Australia Yorke & Mid North Local businesses that have expressed interest in the Project have been added to a business register	Consult

4.3 Stakeholder engagement methods

4.3.1 Stakeholder Engagement Plan

A Stakeholder Engagement Plan (SEP) was developed for the Project to guide engagement activities for the Project. The SEP outlines the objectives and desired outcomes for stakeholder engagement that will be committed to during all stages of the Project's development.

The SEP details the stakeholder engagement activities and tools that will be drawn upon to achieve the objectives to the Project's SEP. Akaysha Energy, in collaboration with Wind Prospect and consultants, has sought to provide members of the community with a range of ways to communicate with the Project staff. Project information and contact details have been circulated through Project newsletters posted to all residential addresses within the postcodes of Brinkworth and Koolunga, as well as publication in local newspapers and council newsletters.

Stakeholder engagement tools used for the Project include:

- **Project launch**: The Project was publicly launched through a newsletter distributed to the owners of land and residents within the post-codes of Koolunga and Brinkworth (extending approximately 10 km from the Project) combined with phone calls of immediate neighbours. At this point, a website was created for the Project. The launch also coincided with targeted project briefings and letters to key stakeholders.
- **Newsletters**: Newsletters are prepared and distributed to provide quarterly updates as the Project progresses. These newsletters are distributed to the owners of land and residents within the postcode of Koolunga and Brinkworth. All newsletters include contact details for further information as well as the Project website details (see Figure 4-1).
- **Drop-in information sessions(s):** The Project has held two drop-in community information sessions in April and October. Located at accessible venues – the Koolunga Institute and Brinkworth Memorial Hall – drop-in sessions provided an opportunity for members of the local community to drop in at a convenient time to learn about what is being proposed and to provide feedback regarding the Project proposal. Both sessions were advertised in locally distributed newsletters, via social media and on the Project website.

- **Project website**: a Project website was established to provide easy access to information about the Project including contact details (phone and email) to enable further communication with the Project team.
- **Meetings, phone calls and email communication**: Face-to-face meetings have been arranged as appropriate or requested. All communications with stakeholders are recorded with emails filed and summary records of phone calls and meetings created.
- **Stakeholder meetings**: Stakeholder meetings, unlike drop-in centres, focus on those who are directly impacted by the Project. Initially this will include people within 3 km of the Project, the Wakefield Council, and government bodies related to renewable energy projects.
- **Stakeholder engagement database**: A stakeholder engagement database was established that includes all Project stakeholders. This database defines and categorises recipients to enable tailoring of Project information and involvement including recording of all complaints received.

4.4 Stakeholder engagement program

The stakeholder engagement program to support the development phase of the Project has been designed in three phases, broadly consisting of:

- **Phase 1 – Project launch.** In March 2023, the Project launched through meeting with Wakefield Council and government representatives, publication of the Project website, and distribution of the first newsletter drop. The first drop-in session at Koolunga Institute and Brinkworth Memorial Hall was held in May 2023.
- **Phase 2 – Development Application preparation.** From July 2023 to April 2024, the Development Application has been prepared with distribution of a couple of Project newsletters, ability for stakeholders to speak to the Project team through the Project website (email, toll-free telephone) and targeted face-to-face meetings. The second drop-in session at Koolunga Institute and Brinkworth Memorial Hall was held in October 2023.
- **Phase 3 – Development Application assessment.** The final stage would be the period when the Development Application is being assessed by the State Government. While stakeholder engagement activities during this period would be reduced, a Project newsletter and ongoing meetings would be completed as required.

A description of the main engagement tools along with their timing and relevance to stakeholder groups is shown in Table 4.3.

Table 4.3 Application of engagement tools

Engagement tool	Timing	Stakeholder group
Website	Ongoing from Project launch	All
Stakeholder engagement database	Ongoing	All
Project launch	Project launch	Neighbours, community, councils
Newsletters	At Project launch and then roughly quarterly	Community
Meetings, phone calls and email communication	Throughout Project development	Council, government departments and agencies, landowners, Traditional Owners, community
Drop-in information sessions	May 2023 October 2023	Community

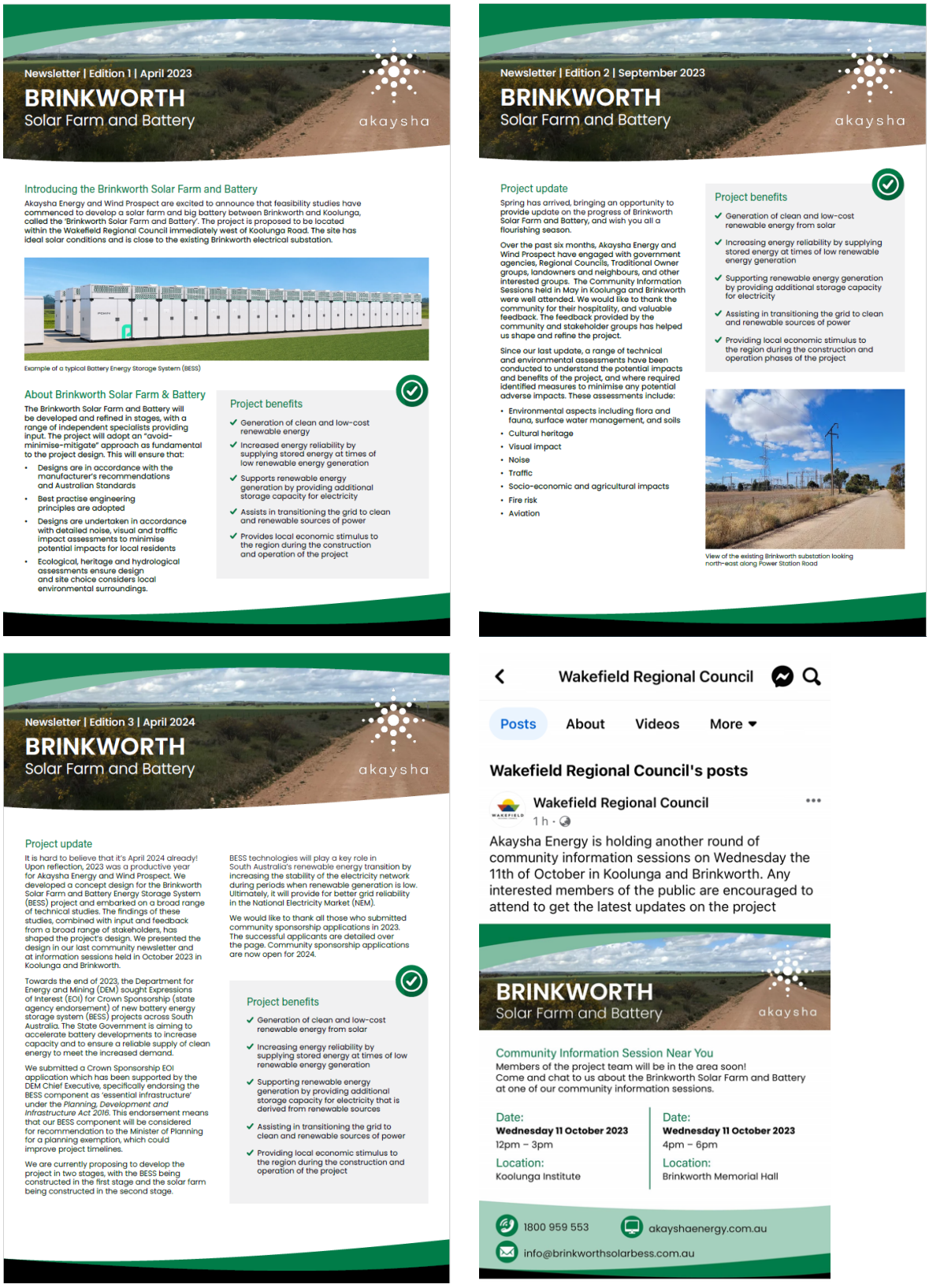


Figure 4-1 Covers of Project newsletters and social media tile

4.5 Government engagement

Akaysha Energy, supported by Wind Prospect and consultants, have actively engaged with relevant stakeholders including all levels of government including state government agencies, councils, and elected members.

The Project team held an introductory meeting with staff from the Department for Energy and Mines, and Planning and Land Use Services (Department for Trade and Investment). This meeting introduced the Project to the departments, discussed project timeframes and the consultation and studies that were being undertaken to inform the Project's design development and Development Application.

On 26 April 2023, the Project team attended the council meeting for the local council, the Regional Council of Wakefield and presented the Project to the elected members. This included an introduction of Akaysha, a description of the Project, and the next steps. Questions from the councillors were also answered. Additionally, due to the Project's proximity to neighbouring councils, consultation with staff and elected members of the Port Pirie Regional Council took place on 12 July 2023, mirroring the meeting with the Wakefield Regional Council.

The Project has sent letters and project newsletters to the following members of Parliament (both State and Federal), informing them of the Project, introducing the proponent of the Project and offering an opportunity for the elected members to discuss the Project further.

Several local members have responded to these letters with a keen interest in following the Project's progression and to see how the Project can work with the community to ensure project benefits are realised and benefit the local community. As the Project develops, these representatives will be kept up to date with project updates through periodic Project newsletters, and opportunities to meet with the Project team.

A letter was also sent to the Australian Energy Infrastructure Commissioner, Andrew Dyer, notifying him of the proposed development and offering him an opportunity to meet to discuss the Project. Further consultation with the Commissioner is anticipated to keep him and his office up to date with the proposed Project.

The Regional Development Australia Yorke and Mid North has also been engaged through a formal briefing held on 12 July 2023.

4.6 Community and stakeholder consultation

On May 8, 2023, Akaysha Energy, in collaboration with Wind Prospect and WSP, successfully conducted the inaugural community information sessions for the Brinkworth Solar Farm and Battery. These sessions were thoughtfully held at accessible venues – the Koolunga Institute and Brinkworth Memorial Hall.

The Community information sessions were drop-in sessions available for any interested person to come in and view information on the Project and discuss the solar farm and battery with members of the Project team. Members of the Project team provided update on the proposed Project site, Project timeline, provided technical information to interested parties, and answered queries.

A second round of community information sessions were held on 11 October in the Koolunga Institute and Brinkworth Memorial Hall. This focussed on discussing the concept design in further detail as well as providing a summary of the technical studies that were completed.

Overall, the sessions were well attended for the local community. For the sessions in May, there were 7 attendees for session in Koolunga and 17 attendees for the session in Brinkworth. For the second round of information sessions in October there were 4 attendees for the session in Koolunga and 12 attendees in Brinkworth.

The sessions had a generally positive atmosphere, and the community were forthcoming with constructive input, feedback, and questions. A feedback form was available to provide written feedback and along with feedback through verbal discussions.

Figure 4-2 Community information session at the Koolunga Institute and Brinkworth Memorial Hall

The key feedback taken from the community information sessions is detailed in Table 4.4.

Table 4.4 Key issues discussed during community information sessions

Key issues	Issues raised and feedback
Traffic impacts	• Traffic studies should take into consideration seasonal changes of traffic patterns (particularly during seeding and harvest) • The capacity of local roads • Responsibility for maintenance and improvements during construction.
Community Sponsorship Fund	• Scope of funding, how much is available per year • Community members expressed their desire to make suggestions for the beneficial use of the sponsorship funds.
Timing of project	• Queries about the stage that the Project is in • When construction was expected to begin, and the duration of construction phase.
Accommodation	• Concern about the current shortage of rental housing in the area • Noting the lack of social infrastructure, hospitality, and retail venues to support temporary workforce in the immediate area • Questions over the Project's plans for construction staff accommodation, suggesting the creation of a mining style camp to be decommissioned after construction.
Local procurement/economic benefits	• Request for workforce to be sourced locally where possible, with local procurement opportunities suggested • Benefits to local area for transport and construction work • Where operational/ maintenance workforce would be based • Qualifications required for operational workforce.
Fire risk	• Fire risks associated with batteries and if there were a bush fire in the area • Maintenance of the land, weed management • Risk mitigation measures required for the site including how surrounding landowners would be notified if there were an incident.
Use of agricultural land	• Questions about what informed the selection of this site • Preference expressed for the use of non-productive land instead of agricultural land.
Visual impacts	• Concern about boundary of panels, government requirements for this • Concern about proximity of site boundary to some residential properties • Request for visual screening/vegetation screening for specific areas.

Key issues	Issues raised and feedback
Noise impacts	• Concern that the battery would generate noise.
Microclimate impacts	• Concern that the large area of panels will create changes to local weather patterns, potentially creating a heat island effect. • Suggestion that not enough research exists to mitigate these concerns
End of project and Decommissioning	• Concern that the decommissioning process will not return land to previous state for agricultural use • Question about possibility of re-permitting the solar farm and battery beyond the 25-year life span.

4.6.1 Traditional Owner groups

On 17 May 2023, a search of the Aboriginal Affairs and Reconciliation's central archives was conducted. The search identified no records of Aboriginal heritage within the Project site area of the Brinkworth Solar Farm and Battery. It is noted that the site is proximate to Country of the Kaurna Yerta, Ngadjuri, and Nukunu Peoples. The Project team has commenced engagement with Traditional Owner groups to further explore and protect the potential heritage value of the Project site.

The contact information for the Kaurna Yerta Aboriginal Corporation and Ngadjuri Nation Aboriginal Corporation was provided by the Department of Aboriginal Affairs and Reconciliation of the South Australian Government and contact for Nukunu Wapma Thura Aboriginal Corporation provided by Regional Development Australia. To commence engagement with Traditional Owner groups, the Project team sent letters and Project newsletters to:

- Ngadjuri Nation Aboriginal Corporation through SA Native Title Services.
- Kaurna Yerta Aboriginal Corporation through SA Native Title Services.

On 10 July 2023, and 4 August 2023, Akaysha Energy, along with Wind Prospect, introduced the Project and sought input and guidance from the Ngadjuri Nation Aboriginal Corporation and Kaurna Yerta Aboriginal Corporation during their respective monthly board meetings. Based on these discussions key commitments that have been made include developing a Cultural Heritage Management Plan with Traditional Owner groups and developing and Aboriginal Participation Plan and for continued engagement as the Project progresses. Project update newsletters have also been provided to each organisation.

4.6.2 Other land interests

Go Exploration Pty Ltd (ABN: 27 651 753 454) and Flinders Prospecting Pty Ltd (ABN: 90 146 899 863) have been identified as having tenements and licences granted under the *Mining Act 1971 (SA)* and the *Petroleum and Geothermal Energy Act 2000 (SA)*. Through Wind Prospect, engagement of both companies has focused on identifying their interest in the land proposed for this Project and navigating a path forward so that the Brinkworth Solar Farm and Battery is not incompatible with any active plans for the proposed land.

Through the Project team's feasibility assessment, it was determined in the South Australia Resources Information Gallery (SARIG) search that the Project site falls partly within an active Exploration License for Mineral and/or Opal Exploration held by Flinders Prospecting Pty Ltd and active Exploration License for Petroleum Exploration Licences/Permits held by Go Exploration Pty Ltd.

The Project team has sent letters and Project newsletters via email to the following management of Flinders Prospecting Pty Ltd and Go Exploration Pty Ltd.

Further discussions with IGO Limited (owners of Flinders Prospecting) were held to gain an understanding of their level of interest in the area and the likelihood for any interaction with their Exploration Tenement (EL 6551). This resulted in IGO providing a letter confirming that IGO is not actively exploring for its target commodities (copper, nickel, cobalt, lithium) within the Project area and that based on an initial desktop review they have no mineral targets within the Project area. However, they also noted that could change in the future and did not constitute approval of the Project nor their rights pursuant to EL6551.

4.7 Response to stakeholder feedback

Through direct response to concerns raised by landowners, neighbours and the community, the design of Brinkworth Solar Farm and Battery has been shaped by a number of variations to the layout and various mitigation measures. Feedback from community, government, and various stakeholders have been sought through direct communications, the Project website, feedback forms available at community information sessions, telephone, post, and email communications. Aligning with community engagement principles, a range of perspectives have been obtained and informed the proposed development of the solar farm and battery.

Although the majority of feedback on the Project was positive, comments received on the Project ranged from supportive through to concerned about various project aspects. The Project team were open to a range of perspectives and respected the views of people attending community information sessions and providing feedback through various channels. The comments received during discussions with people attending the community information session is summarised in Table 4.5. The response column provides measures in place that have resulted from consultation and engagement with the community.

Table 4.5 Key issues discussed during community information sessions and responses

Key issues	Issues raised and feedback	Response
Traffic impacts	• Traffic studies should take into consideration seasonal changes of traffic patterns (particularly during seeding and harvest) • The capacity of local roads • Responsibility for maintenance and improvements during construction.	• A traffic assessment has been undertaken, which considers the impact of traffic during different phases of the Project • Engagement with both the Wakefield and Port Pirie regional councils occurred with respect to the preferred over dimensional road route • Adequate provisions for heavy vehicle movements during Civil Works and Construction Phase have been accounted for. Special considerations are taken for wide equipment transport, requiring relevant permits • The introduction of minibus services might reduce light vehicle trips to the site during Civil Works and will be considered as part of the detailed design phase.
Sponsorship/ funding	• Scope of funding, how much is available per year • Community members expressed their desire to make suggestions for the beneficial use of the sponsorship funds.	• Akaysha Energy have committed $20,000 annually for the BESS and $30,000 annually for the Solar Farm, totalling $50,000 per year (indexed for inflation) for the life of the Project to the sustainable community fund • The Community Benefit Sharing Fund will be available for various community projects and organisations.
Accommodation	• Concern about the current shortage of rental housing in the area • Noting the lack of social infrastructure, hospitality, and retail venues to support temporary workforce in the immediate area • Questions over the Project's plans for construction staff accommodation, suggesting the creation of a mining style camp to be decommissioned after construction.	• The Project is exploring accommodation solutions for the construction workforce for the Project in consultation with the local and neighbouring councils • Akaysha Energy is aware of a shortage of rental accommodation in the immediate area and so will work with relevant stakeholders to ensure that the construction workforce can be accommodated conveniently to construct the Project, while at the same time not putting undue pressure on local services • Solutions could involve a combination of housing staff in rental accommodation further from the Project site, and development of a temporary construction accommodation compound for the construction staff at a nearby location.

Key issues	Issues raised and feedback	Response
Local procurement/ economic benefits	• Request for workforce to be sourced locally where possible, with local procurement opportunities suggested • Benefits to local area for transport and construction work • Where operational/ maintenance workforce would be based • Qualifications required for operational workforce.	• The Project team has conducted engagement with the Regional Development Association and local councils regarding the potential for local procurement of trades • An assessment of workforce availability and potential competition was completed as part of the socio-economic modelling for the Project (Appendix K).
Fire risk	• Fire risks associated with batteries • Maintenance of the land, weed management • Risk mitigation measures required for the site.	• A fire risk assessment has been undertaken, which considers the possible of risks of fire ignition from within the facility and also the risks posed by a bushfire external to the facility (Appendix L) • The Project has adopted best practice design elements to minimise the hazard of fire in accordance with relevant standards and guidelines as outlined in Appendix L • Engaged with the Country Fire Service regarding their recommendations for design elements to minimize fire risk, which were incorporated into the Project design and fire risk assessment (Appendix L).
Use of agricultural land and the scale of the Project	• Questions about what informed the selection of this site • Preference expressed for the use of non-productive land instead of agricultural land.	• Collected site-specific agricultural yields that were included as part of the socio-economic modelling that provides an assessment of lost agricultural production as a consequence of the Project (see Appendix K).
Visual impacts	• Concern about proximity of site boundary to some residential properties • Request for visual screening/vegetation screening on project boundary.	• The Project will alter the character and visual qualities of the existing landscape, the impacts of the Project are anticipated from several locations, but these would be restricted to immediately surrounding the Project (see Appendix F) • Based on consultation with immediate neighbours some setbacks from dwellings were increased, considering the most impacted views • Strategic screening/plantings near dwellings for immediate neighbours is available if requested • A minimal clearance of existing vegetation will be required during construction, and opportunities for screening with native vegetation • Matt non-reflective finishes on the constructed infrastructure has been committed to lessen the visual impacts of the Project.
Noise impacts	• Concern that the battery will produce significant noise.	• Based on the preliminary findings of the noise modelling, several refinements were made to the Project design to further minimise possible noise emissions • Using worst-case modelling scenarios predicted noise at sensitive receptors were predicted to be significantly below regulated limits (see Appendix G).

Key issues	Issues raised and feedback	Response
Microclimate impacts	• Concern that the large area of panels will create changes to local weather patterns, potentially creating a heat island effect • Suggestion that not enough research exists to mitigate these concerns.	• Relevant setbacks of solar PV have been designed in accordance with the Planning and Design Code • Based on the distances to neighbouring cropping areas, the risk was assessed to be low.
Traditional Owners	• Interested to learn more about the project and its location • Heritage values are not limited to those within the government registers • There is an opportunity for employment and training from first nations people.	• Although the likelihood of disturbing unknown aboriginal or European cultural heritage is deemed to be low, the use of appropriate risk management controls for ground disturbance works and the implementation of a site discovery procedure is deemed to be a best practice management procedure and will be included in the Construction Environmental Management Plan • Engagement with Ngadjuri Nation Aboriginal Corporation, and Kaurna Yerta Aboriginal Corporation has commenced and will continue • Based on feedback received, Akaysha have committed to preparing a Cultural Heritage Management Plan in consultation and input from relevant Traditional Owner groups • Based on feedback received, Akaysha have committed to preparing an Aboriginal employment participation plan.

Chapter 5
Project assessment

5.1 Overview

5.1.1 Project assessment approach

The Project assessment approach involved developing an initial design, which enabled the scoping of technical studies to assess the potential impacts of the Project. Findings from these studies, further feasibility investigations and input from stakeholders resulted in the refinement of the Project design. Detailed studies including predictive modelling and impact assessments were then conducted resulting in specific measures to avoid and minimise impacts.

Where there is potential for the Project to give rise to risks of harm, those risks have been minimised so far as reasonably practicable at this stage of the Project, consistent with the *Environment Protection Act 1993*. Commitments and other standard management controls would be implemented to minimise those risks further, as detailed within Chapter 7 Statement of Commitments.

5.1.2 Characterisation of existing conditions and scoping of impact assessments

The character of the existing environment and the social context of the Project site and surrounding areas was established via desktop and field-based investigations, undertaken by subject matter experts (referred to as 'technical specialists'). During the field-based investigations, desktop information was verified, and new information was gathered.

The existing conditions investigations informed the design of the Project and provided a baseline against which the potential impacts of the Project could be assessed. They also allow any residual impacts or positive effects to be predicted, following the implementation of management measures, against the baseline (existing) conditions.

A risk-based approach was adopted during the technical studies, prior to the assessment of likely impacts, so that a greater level of effort could be directed at investigating and managing matters that pose a relatively higher risk of adverse effects.

Scoping impact assessments for the Project involved:

- considering and addressing the relevant statutory guidelines for developments in the South Australian planning and design code as well as other legislation relevant to each technical study
- completing technical investigations of the current environmental, social and heritage conditions
- considering community and other stakeholder information and concerns.

Technical specialist studies identified environmental values, sensitivities and land uses that may have the potential to be impacted by the Project, with a focus on sensitive receptors. These receptors included people, assets, values, or uses that are protected by legislation and policy, are important to the local community (or broader community), and/or are likely to be susceptible to potential impacts resulting from the Project.

The following sections provide an overview of the technical aspects relevant to the development of the Project.

5.2 Landscape and visual

5.2.1 Introduction

A Landscape Character and Visual Impact Assessment (LCVIA) was prepared by Hemisphere Design to assess the potential visual impact the Project. The LCVIA is a qualitative assessment which was undertaken in a manner consistent with the *Guidelines for Landscape and Visual Impact Assessment (Third Edition).* The assessment characterised the site and surrounding area using resources provided by the proponent which included an indicative layout and construction plan. A combined desktop study was then undertaken utilizing aerial photography to establish a Zone of Theoretical Visual Influence (ZTVI) and onsite photography undertaken by Hemisphere Design during a site visit.

5.2.2 Legislative and planning context

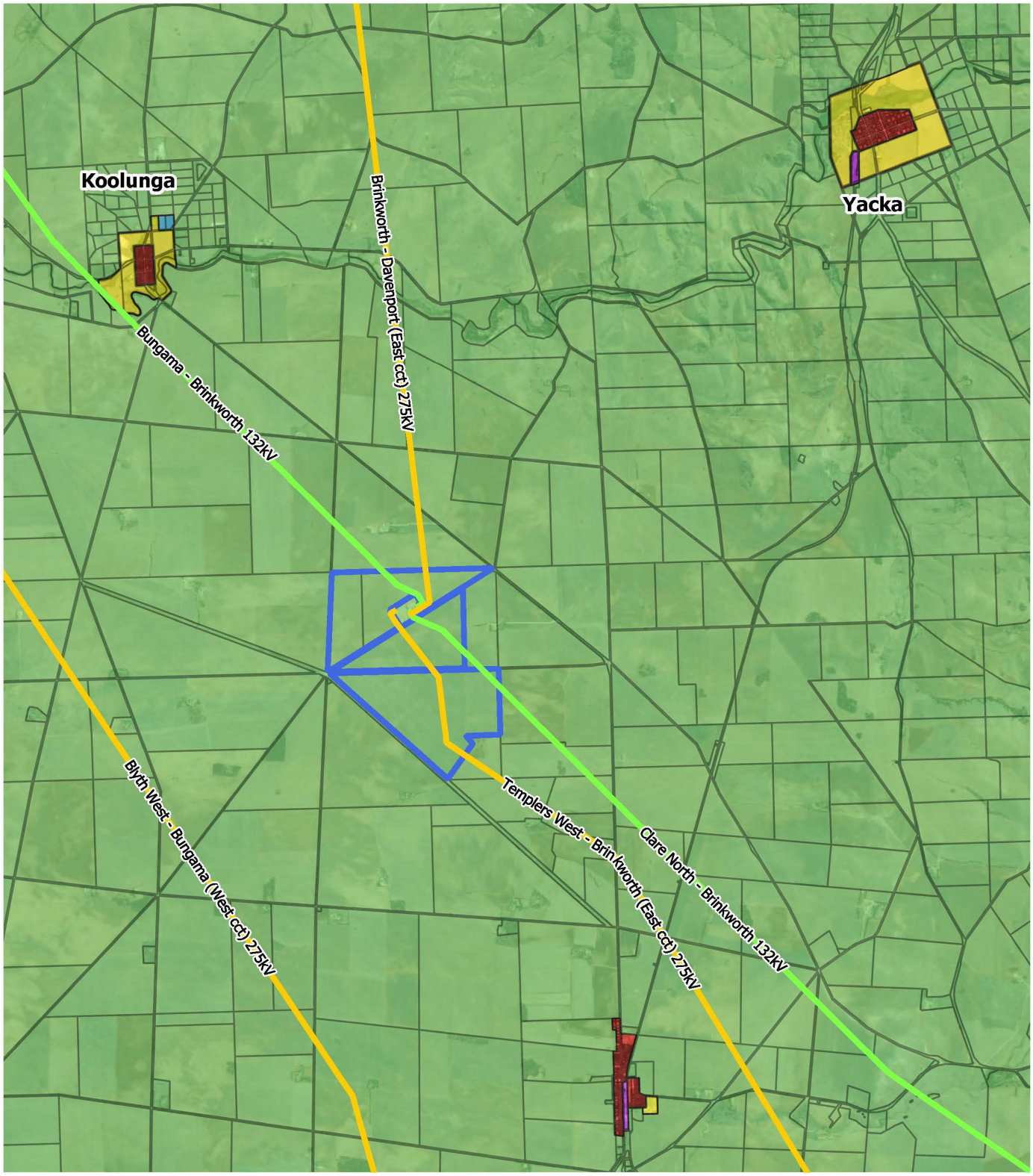
The Planning and Design Code (PDC) comprises planning policy to guide development. The PDC comprises Zones, Overlays and General Development policies. The Project is located within the Rural Zone (see Figure 5.1), with the following applicable Overlays: Dwelling Excision, Hazards (Bushfire General Risk), Hazards (Flooding – Evidence Required), Limited Land Division, Native Vegetation and Water Resources. In addition to the Zones and Overlays, a range of General Development policies apply to the assessment of the development, including those relating to visual amenity and renewable energy facilities.

The PDC contains provisions for the protection of certain landscapes through the Significant Landscape Protection Overlay and the Character Preservation District Overlay. However, the Project site does not fall within nor adjacent to a landscape deemed to be significant or of notable character value.

The PDC refers to desired outcomes (DO), and performance outcomes (PO) pertaining to issues of visual amenity, requiring renewable energy facilities and associated infrastructure to consider the landscape and residential amenity and manage adverse visual impacts at a design and post construction level. The DO for Infrastructure and Renewable Energy Facilities states:

> DO 1: *"Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity".*

Performance outcomes which relate to and address this DO are presented in Table 5.1.



Land use zones - Figure 5.1

Planning and Design (P&D) Zones:

- Community Facilities
- Employment (Bulk Handling)
- Rural
- Rural Living
- Township

- Project site boundary
- Parcels
- 132 kV transmission line
- 275 kV transmission line

Ref: DWG 031 A.3
Author: J. Mourier
Date created: 19.10.2023
Datum: GDA20 / MGA zone 54
2,500 m

WIND PROSPECT

Table 5.1 Performance outcome and deemed-to-satisfy criteria/designated performance feature relevant to visual amenity

General Development Policies – Infrastructure and renewable energy facilities	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
Visual Amenity	
PO 2.1 The visual impact of above-ground infrastructure networks and services (excluding high voltage transmission lines), renewable energy facilities (excluding wind farms), energy storage facilities and ancillary development is minimised from townships, scenic routes, and public roads by: a. utilising features of the natural landscape to obscure views where practicable b. siting development below ridgelines where practicable c. avoiding visually sensitive and significant landscapes d. using materials and finishes with low-reflectivity and colours that complement the surroundings e. using existing vegetation to screen buildings f. incorporating landscaping or landscaped mounding around the perimeter of a site and between adjacent allotments accommodating or zoned to primarily accommodate sensitive receivers.	DTS/DPF 2.1 None are applicable
Electricity Infrastructure and Battery Storage Facilities	
PO 5.1 Electricity infrastructure is located to minimise visual impacts through techniques including: a. siting utilities and services: i. on areas already cleared of native vegetation ii. where there is minimal interference or disturbance to existing native vegetation or biodiversity b. grouping utility buildings and structures with non-residential development, where practicable.	DTS/DPF 5.1 None are applicable
PO 5.3 Battery storage facilities are co-located with substation infrastructure where practicable to minimise the development footprint and reduce environmental impacts.	DTS/DPF 5.3 None are applicable.

<table>
<tr><th colspan="2">General Development Policies – Infrastructure and renewable energy facilities</th></tr>
<tr><th>Performance outcome</th><th>Deemed-to-satisfy criteria/designated performance feature</th></tr>
<tr><td colspan="2">Renewable Energy Facilities (Solar Power)</td></tr>
<tr><td>PO 9.3
Amenity impacts of solar power facilities are minimised through separation from conservation areas and sensitive receivers in other ownership.</td><td>DTS/DPF 9.3
Ground mounted solar power facilities are set back from land boundaries, conservation areas and relevant zones in accordance with the following criteria:
<table>
<tr><th>Generation Capacity</th><th>Approximate size of array</th><th>Setback from adjoining land boundary</th><th>Setback from Conservation Areas</th><th>Setback from Township, Rural Settlement, Rural neighbour-hood and Rural Living Zones[1]</th></tr>
<tr><td>50 MW></td><td>80 ha+</td><td>30 m</td><td>500 m</td><td>2 km</td></tr>
<tr><td>10 MW <50 MW</td><td>16 ha<80 ha</td><td>25 m</td><td>500 m</td><td>1.5 km</td></tr>
<tr><td>5 MW <10 MW</td><td>8 ha to <16 ha</td><td>20 m</td><td>500 m</td><td>1 km</td></tr>
<tr><td>1 MW <5 MW</td><td>1.6 ha to<8 ha</td><td>15 m</td><td>500 m</td><td>500 m</td></tr>
<tr><td>100 kW <1 MW</td><td>0.5 ha<1.6 ha</td><td>10 m</td><td>500 m</td><td>100 m</td></tr>
<tr><td><100 kW</td><td><0.5 ha</td><td>5 m</td><td>500 m</td><td>25 m</td></tr>
</table>
Notes:
1. Does not apply when the site of the proposed ground mounted solar facility is located within one of these zones.</td></tr>
</table>

5.2.3 Methods and assessment

The ZTVI is defined as the geographical area where modifications to the existing landscape resulting from the Project may be potentially discernible or visible. A visibility shadow are areas within the ZTVI which are likely to not be visible due to a combination of ridgelines, depressions or vegetation which are expected to block the views of the development. Due to the open and flat nature of the surrounding landscape of the Project area, a two-kilometre radius from the proposed site was considered appropriate. Twelve publicly accessible viewpoints within the ZTVI were identified and preliminary consideration given to the potential visual impact which may result from the Project. Onsite photography was subsequently taken from the identified viewpoints and five of the twelve viewpoints were deemed to be sensitive receptors due to potential visibility of PV panels or associated BESS infrastructure.

A site visit was undertaken by Hemisphere Design on Monday 12 December 2022. The area of the proposed development is in the Rural Zone and the surrounding landscape of the Project area is predominantly used for agricultural purposes with crops of cereals and pulses dominating the landscape. Windbreak plantations and scattered native trees are also present. It was also noted that existing wind farms along the Barunga Range and existing transmission towers were visible during the visit. The principal paved road in the region relevant to the Project area is Koolunga Road, connecting Brinkworth and Koolunga. The frequency of vehicles travelling on Koolunga Road was deemed to be low, and use of adjoining unpaved roads largely restricted to local residents accessing their properties. The Project would not be visible from the B82 or B80 which are the closest arterial roads and fall outside the 2 km ZTVI. It was also validated during the site visit that approximately 60% of the ZTVI would fall within the visibility shadow.

Four sensitive receptor locations (SRL) were identified during the site visit. SRL1 and SRL2 were both located on Lake View Road, and SRL3 and SRL4 were on Koolunga Road (Figure 5-2). Photomontages were prepared to provide further clarity on the current landscape at each SRL and the potential visual impacts resulting from the proposed development. The overall assessment of landscape and setting at each SRL designated each to be of low scenic quality, and the predicted visual impact ranged from no impact to significant adverse impact.

Photomontages of before and after site development are presented for SRL02 in Figure 5-3 and Figure 5-4 and for SRL03 in Figure 5-5 and Figure 5-6. It is acknowledged that the development will result in changes to the current visual amenity of the site, however impacts are expected to be minor overall and mitigated through appropriate incorporation of the performance outcomes for visual amenity listed in the planning and design code.

The full range of photomontages are presented in the LVCIA report presented in Appendix F.

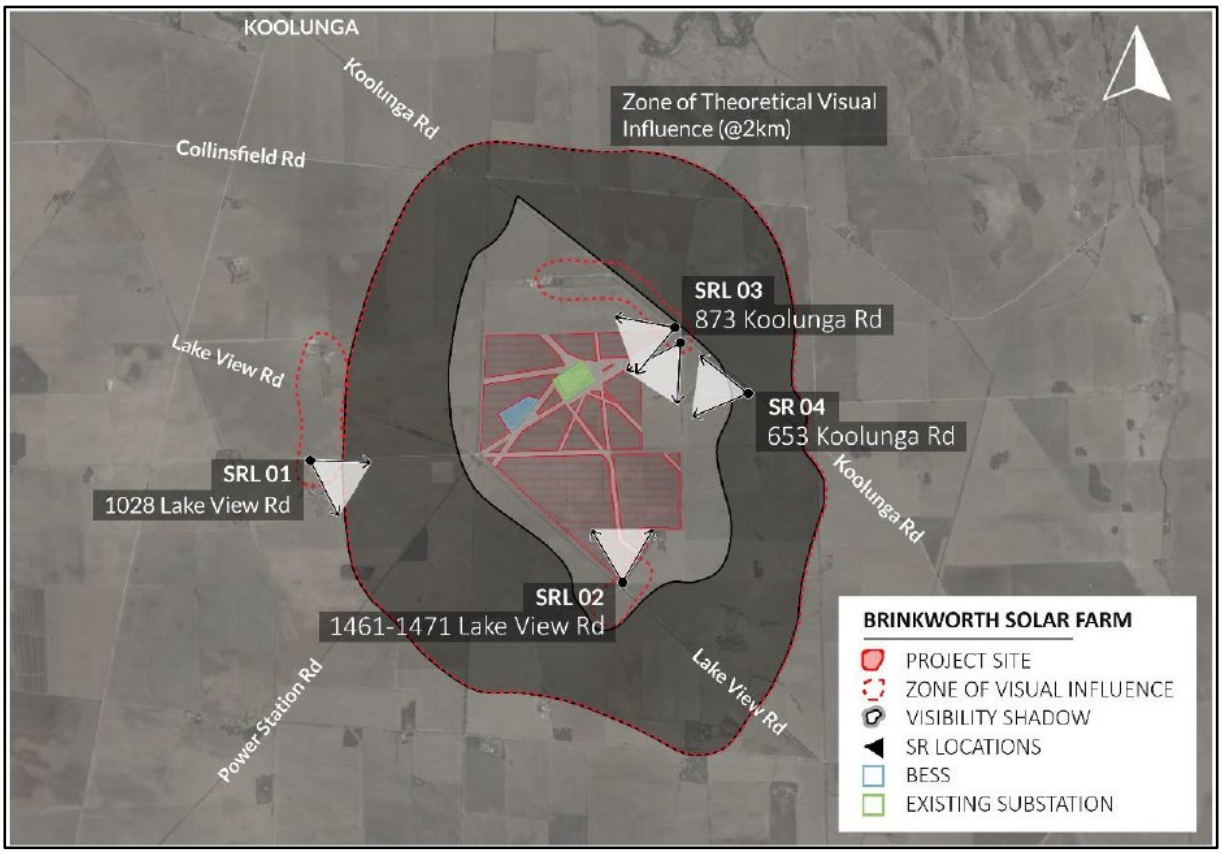


Figure 5-2 **Sensitive receptor locations within the Project area**

Figure 5-3 **Existing view from SRL02 looking north**

Figure 5-4 Photomontage from same location including proposed infrastructure

Figure 5-5 **Existing view from SRL03 looking west**

Figure 5-6 **Photomontage from SRL03 including proposed infrastructure**

5.2.4 Conclusions and recommendations

It is acknowledged that although the Project will alter the character and visual qualities of the existing landscape, the impacts of the Project were predicted overall to be inconsequential to very low considering the following factors.

- Visibility shadow enveloping 60% of the ZTVI, with several dwellings within the ZTVI not expected to be adversely impacted by the Project.
- The Project will not be visible from the nearest township of Brinkworth or Koolunga.
- The visual impacts on identified sensitive receptors will be negligible to moderate.
- The location of the Project, comprising of solar PV panels and supporting infrastructure to existing substation infrastructure are considered complementary infrastructure.
- Avoidance of clearance of existing vegetation during construction, and opportunities for screening with native vegetation and matte non-reflective finishes on the constructed infrastructure will further lessen the impacts of the Project.

The proposed development has taken into account appropriate use of the performance outcomes for visual amenity listed in the planning and design code. It has also considered development specific performance outcomes for renewable energy facilities to minimise all other associated impacts.

5.3 Noise

5.3.1 Introduction

An environmental noise assessment was undertaken by Sonus to support the development of the Project. The assessment considers noise impacts at nearby sensitive receptors from solar farm infrastructure including, medium voltage power station units, tracking motors and a large grid transformer, and the BESS infrastructure includes battery containers, power conversion systems and a large grid transformer. It is noted that the noise assessment includes consideration of the battery, which is exempt from planning approval, and is therefore highly conservative.

5.3.2 Legislative and planning context

The Project is subject to the assessment of provisions in the PDC under the *Planning, Development and Infrastructure Act 2016.* The *Environment Protection (Noise) Policy 2007* (The Policy) was also considered when establishing maximum allowable background noise levels. This policy is based on the *World Health Organisation Guidelines for Community Noise (1999).*

The Policy provides the following target noise levels to be achieved at sensitive receptors in the locality, based on the principally promoted land use:

- an equivalent noise level (L_{eq}) of 57 dB(A) during the day (7:00 am to 10:00 pm)
- an equivalent noise level (L_{eq}) of 50 dB(A) during the night (10:00 pm to 7:00 am).

For a Development Application, the Policy reduces these criteria by 5 dB(A) for non-associated sensitive receivers, becoming:

- an equivalent noise level (L_{eq}) of 52 dB(A) during the day (7:00 am to 10:00 pm)
- an equivalent noise level (L_{eq}) of 45 dB(A) during the night (10:00 pm to 7:00 am).

The nighttime criteria are considered the most critical for continuous noise sources, which can operate any time of the day or night.

The Desired Outcome (DO) of the General Development Policies – Interface Between Land Uses of the PDC, is:

> DO 1: *"Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses."*.

A summary of the PO and designated performance feature (DPF) relevant to the Project are presented below in Table 5.2.

Table 5.2 Performance outcome and deemed-to-satisfy criteria/designated performance feature relevant to activities generating noise or vibration

General Development Policies – Interface between land uses	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
Activities Generating Noise or Vibration	
PO 4.1 Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.1 Noise that affects sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria.

5.3.3 Noise assessment

The assessment has considered noise sources for the components of the development presented in Table 5.3. All sources are assumed to operate simultaneously in accordance with a conservative worst case scenario approach for operation over the night period. The sound power levels for the MV and grid transformers have been determined in accordance with the "standard" level derived from the Australian/New Zealand Standard AS/NZS60067.10:2009 Power transformers Determination of sound levels (IEC60006710, Ed. 1(2001) MOD).

The sound power levels for these items have been derived based on information provided by the manufacturer and spectral data taken from previous similar assessments.

Table 5.3 Noise sources assessed

Solar Farm
4528 tracking motors, one in the middle of each row of solar panels
42 SMA MVPS-4200-S2 inverter units, each with a 5 MVA transformer
One 200 MVA site transformer
BESS
2160 Powin Stack750 battery energy storage units
240 eks WD3s Power Conversion System (PCS) units
120 2.5 MVA transformers
One 400 MVA site transformer

A noise prediction model was developed from these inputs using *SoundPLAN v9.0* noise modelling software and the CONCAWE noise propagation model. A noise contour map presented in Figure 5-7 indicates that no sensitive receivers within the Project area will be subject to nuisance noise in excess of the noise target levels outlined in the Policy.

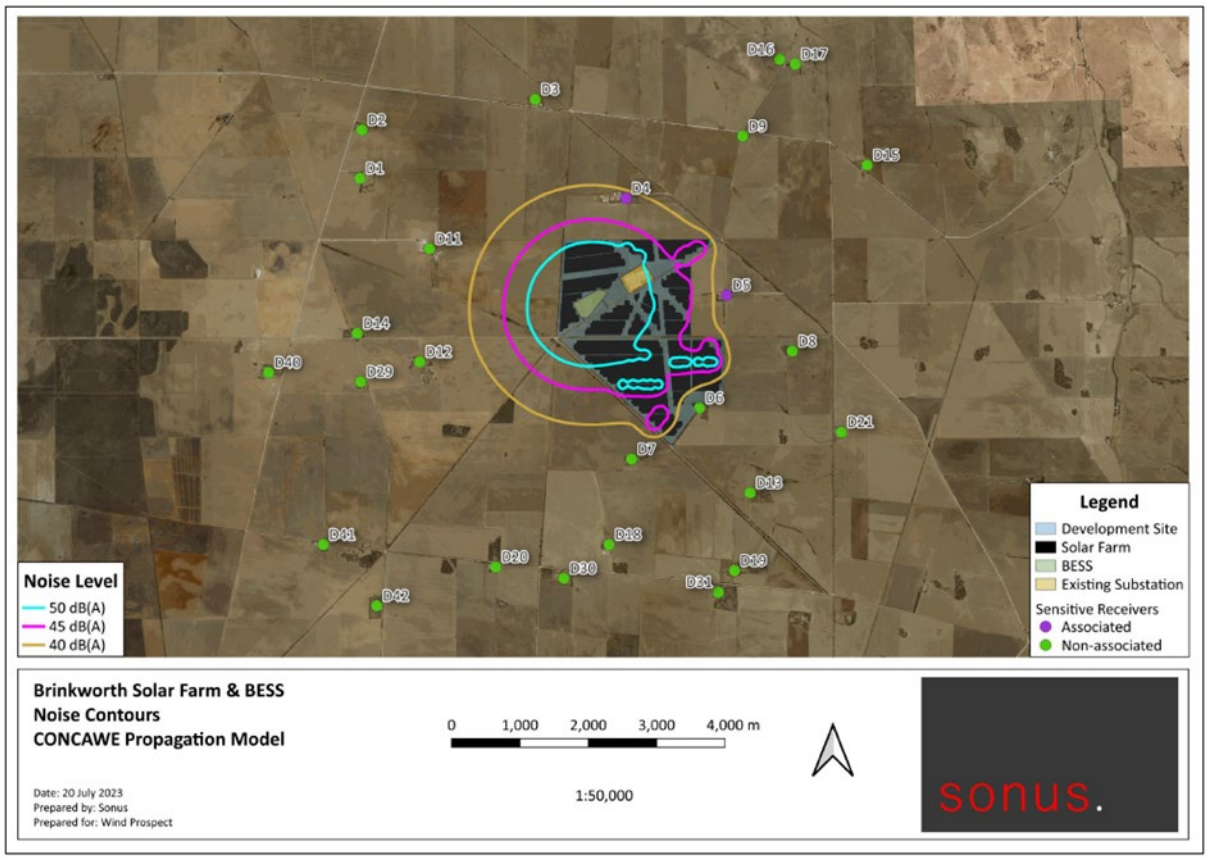


Figure 5-7 Noise propagation model

5.3.4 Conclusion

The results of the environmental noise assessment indicate that the noise criteria of the *Environment Protection (Noise) Policy 2007* would be achieved at all nearby noise sensitive receptors. The upper noise limit for non-involved sensitive receptors is 52 dB during the day, and 45 dB at night. The results of the assessment indicate that all non-involved sensitive receptors will not receive noise from the Project exceeding 40 dB at any time. The Project will therefore *not unreasonably impact the amenity of sensitive receivers*, thereby achieving the relevant provisions of the PDC related to environmental noise.

5.4 Traffic

5.4.1 Introduction

A transport impact assessment was undertaken by Empirical Traffic Advisory (ETA) to support the development of the Project. The key issue with regards to traffic and transport relate to the increase in vehicles using local roads in the surrounding Project area, particularly during construction. These impacts will primarily affect landowners and local residents. It is noted that the assessment includes consideration of the battery, which is exempt from planning approval.

5.4.2 Legislative and planning context

The Desired Outcome (DO) of the PDC General Development Policies – Transport, Access and Parking is:

> DO 1: *"A comprehensive integrated and connected transport system that is safe, sustainable, efficient, convenient and accessible to all users".*

There are a wide range of policies in the PDC related to traffic and access. A summary of the most relevant Performance Outcomes (PO) and designated performance feature (DPF) relevant to the Project, are presented below in Table 5.4.

Table 5.4 Performance outcome and deemed-to-satisfy criteria/designated performance feature relevant to traffic and transport

General Development Policies – Transport, access and parking	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
Movement Systems	
PO 1.1 Development is integrated with the existing transport system and designed to minimise its potential impact on the functional performance of the transport system.	DTS/DPF 1.1 None are applicable.
PO 1.2 Development is designed to discourage commercial and industrial vehicle movements through residential streets and adjacent other sensitive receivers.	DTS/DPF 1.2 None are applicable
PO 1.4 Development is sited and designed so that loading, unloading, and turning of all traffic avoids interrupting the operation of and queuing on public roads and pedestrian paths.	DTS/DPF 1.4 All vehicle manoeuvring occurs onsite.
Sightlines	
PO 2.1 Sightlines at intersections, pedestrian and cycle crossings, and crossovers to allotments for motorists, cyclists and pedestrians are maintained or enhanced to ensure safety for all road users and pedestrians.	DTS/DPF 2.1 None are applicable.
Vehicle Access	
PO 3.1 Safe and convenient access minimises impact or interruption on the operation of public roads.	DTS/DPF 3.1 The access is: a. provided via a lawfully existing or authorised driveway or access point or an access point for which consent has been granted as part of an application for the division of land or b. not located within 6 m of an intersection of 2 or more roads or a pedestrian activated crossing
PO 3.3 Access points are sited and designed to accommodate the type and volume of traffic likely to be generated by the development or land use.	DTS/DPF 3.3 None are applicable.
PO 3.4 Access points are sited and designed to minimise any adverse impacts on neighbouring properties.	DTS/DPF 3.4 None are applicable
PO 3.8 Driveways, access points, access tracks and parking areas are designed and constructed to allow adequate movement and manoeuvrability having regard to the types of vehicles that are reasonably anticipated.	DTS/DPF 3.8 None are applicable.

General Development Policies – Transport, access and parking	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
PO 3.9 Development is designed to ensure vehicle circulation between activity areas occurs within the site without the need to use public roads.	DTS/DPF 3.9 None are applicable.
Access for People with Disabilities	
PO 4.1 Development is sited and designed to provide safe, dignified, and convenient access for people with a disability.	DTS/DPF 4.1 None are applicable.
Vehicle Parking Rates	
PO 5.1 Sufficient on-site vehicle parking and specifically marked accessible car parking places are provided to meet the needs of the development or land use having regard to factors that may support a reduced on-site rate such as: availability of on-street car parking shared use of other parking areas in relation to a mixed-use development, where the hours of operation of commercial activities complement the residential use of the site, the provision of vehicle parking may be shared the adaptive reuse of a State or Local Heritage Place.	Development provides a number of car parking spaces on-site at a rate no less than the amount calculated using one of the following, whichever is relevant: a. Transport, Access and Parking Table 2 – Off-Street Vehicle Parking Requirements in Designated Areas if the development is a class of development listed in Table 2 and the site is in a Designated Area b. Transport, Access and Parking Table 1 – General Off-Street Car Parking Requirements where (a) does not apply c. if located in an area where a lawfully established carparking fund operates, the number of spaces calculated under (a) or (b) less the number of spaces offset by contribution to the fund.
Vehicle Parking Areas	
PO 6.1 Vehicle parking areas are sited and designed to minimise impact on the operation of public roads by avoiding the use of public roads when moving from one part of a parking area to another.	DTS/DPF 6.1 Movement between vehicle parking areas within the site can occur without the need to use a public road.
PO 6.2 Vehicle parking areas are appropriately located, designed and constructed to minimise impacts on adjacent sensitive receivers through measures such as ensuring they are attractively developed and landscaped, screen fenced, and the like.	DTS/DPF 6.2 None are applicable.

5.4.3 Traffic impact, route assessment and site access

The transport impact assessment considered transport implications of the proposed development including the following:

- existing traffic and parking conditions surrounding the site
- site inspection of the subject site and surrounds
- parking demand of the proposed development and in comparison, to the existing demands
- access arrangement for the proposed development; and
- overall transport impacts of the proposed development.

Alterations to traffic volumes resulting from the Project can be broken down into four phases, civil works phase, construction phase, commissioning phase and site operation. The majority the increased traffic volumes will occur during the construction phase, in the order of up to 400 vehicles per day with large components such as transformers, switch rooms and control rooms potentially needing to be transported to site via Over Size/Over Mass (OSOM) routes and vehicles. Outside of the peak periods during the civil and construction phase, traffic movements are anticipated to reduce to in the order of 150 vehicles per day during the operation period of the site. A detailed account of anticipated increases in traffic volumes can be found in the Transport Impact Assessment conducted by ETA, which is provided in Appendix H.

The existing road network relevant to the Project area consists of a range of sealed and unsealed roads, classified as Rural Category 4 and 6, with traffic volume estimates between less than 100 to 300 vehicles per day. Figure 5-8 indicates roads within the sealed road network which are gazetted for use by vehicles up to a 26 metre B-Double and will be required for OSOM loads.

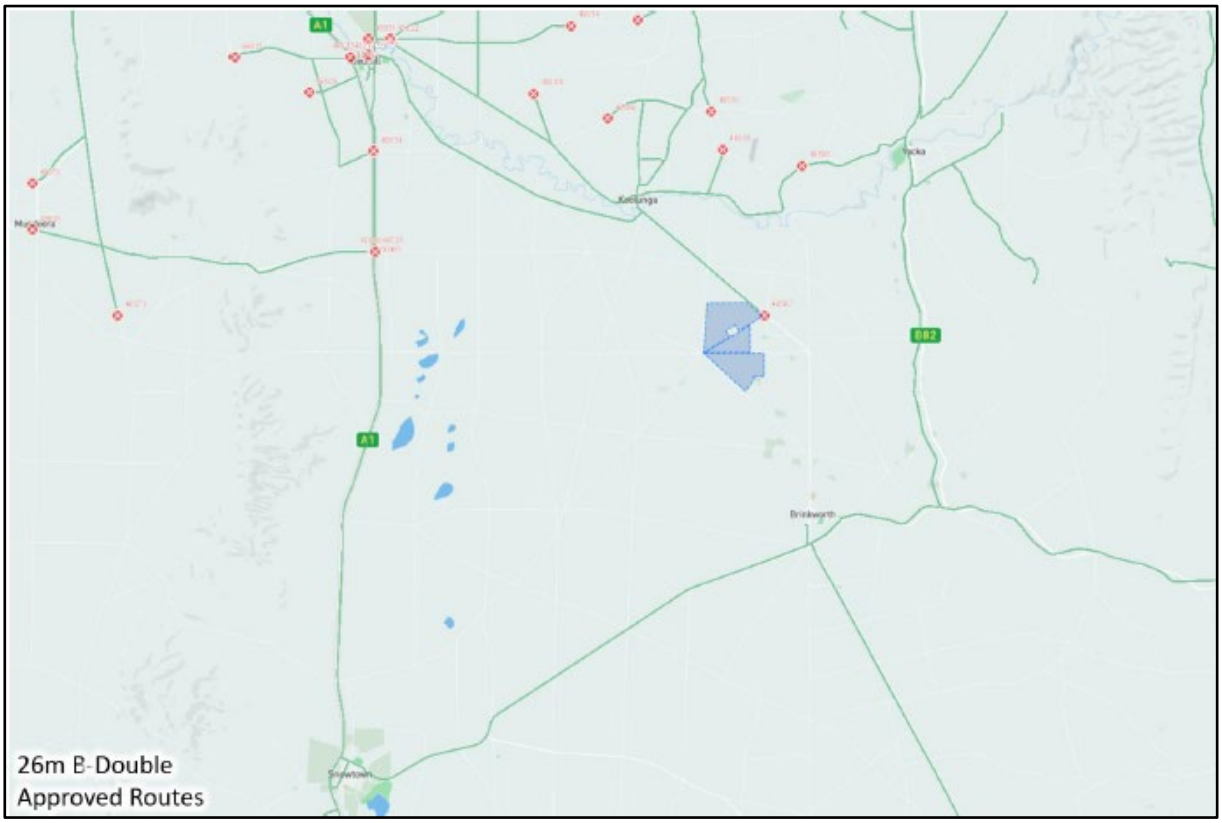


Figure 5-8 26 m B-Double approved roads

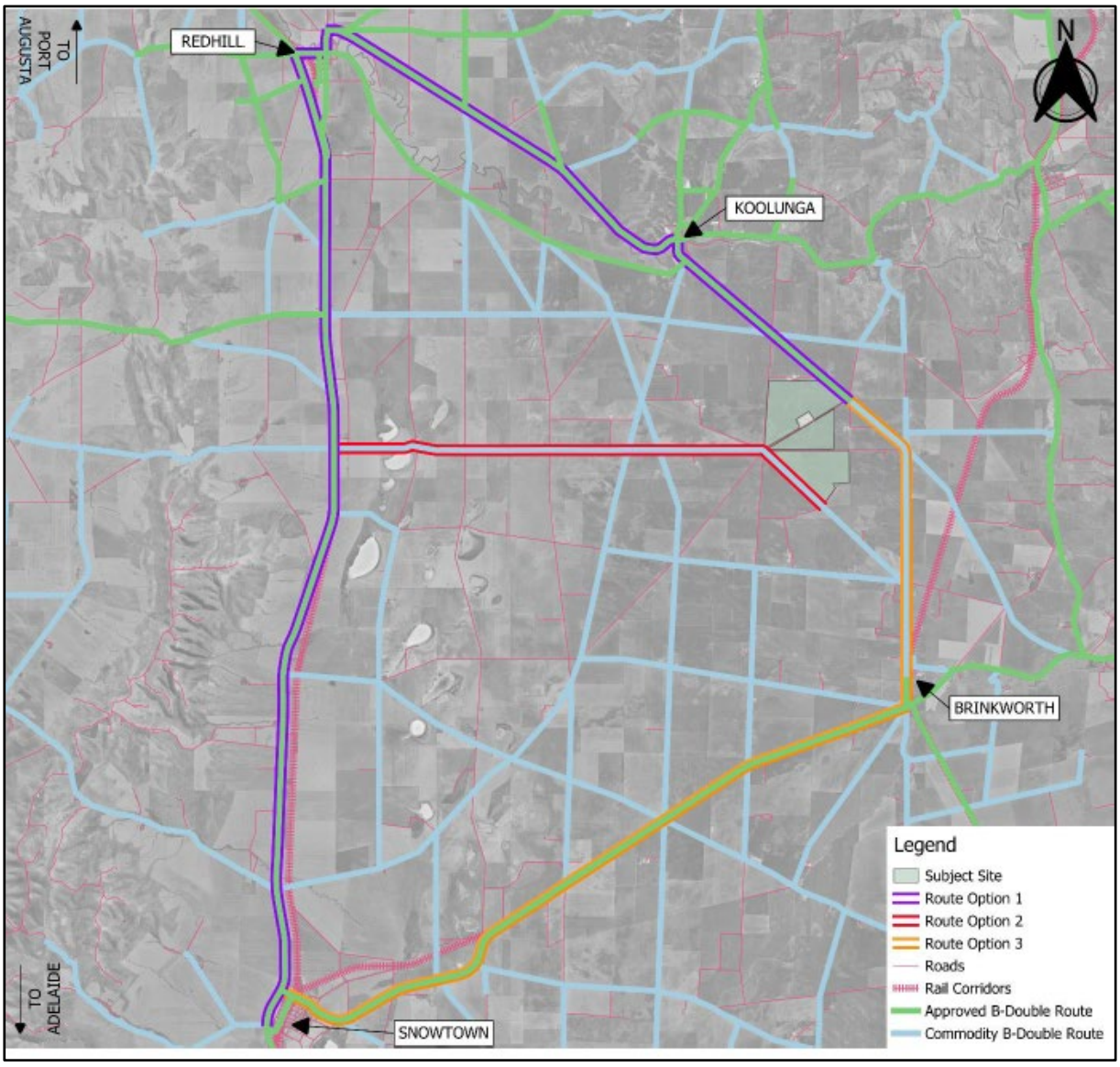


Figure 5-9 Route options for OSOM loads

A route assessment presented in Figure 5-9 was undertaken as part of the study, which identified three potential options for transporting OSOM components from the port at Outer Harbour to the Project Site. Route one (shown in purple) was selected as the preferred option, as it uses gazetted routes and maximises the use of suitably sealed roads where possible.

Access location intersections for the site were selected based on an assessment of areas deemed to have appropriate site distance. Based on the requirements for a heavy vehicle with a design speed of 110 km/h, an intersection would require a Safe Intersection Site Distance (SISD) of 351 metres. A summary of the recommended access point is presented below in Figure 5-10. Based on these recommendations site primary site access has been defined and described in further detail in Chapter 3.

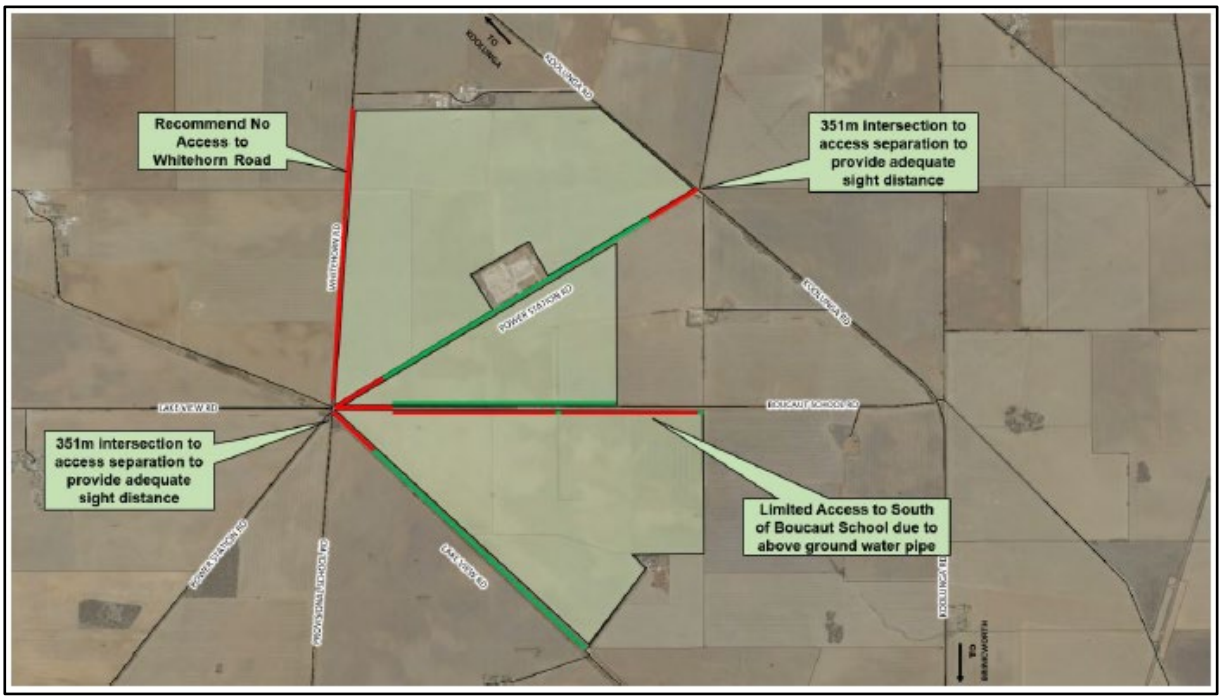


Figure 5-10 Site access points

5.4.4 Conclusions

Based on the projected impacts of the Project on traffic volumes, it is estimated that vehicular movements during peak construction periods will be in the order of 400 vehicles per day. This estimate would not anticipate that the Project will result in any detrimental impacts to the safety or function of the surrounding road network where unsealed roads can carry up to 500 vehicles per day.

It is recommended that Route Option 1 be used for the transportation of OSOM vehicles and components. While the dimensions of the oversize components are not known at this stage, vehicles could utilise existing approvals of the road network to the Augusta Highway to be in the vicinity of the site. The final route and vehicle dimensions will be subject to the relevant requirements and permits.

Alterations to traffic flow and conditions may present on a temporary basis, such as during construction, or permanently, during operation and maintenance of the facility. It is important to ensure the traffic network is accommodated and the performance outcomes presented in Table 5.4 are met for the benefit of other road users, including providing parking for the facility within the site, ensuring adequate sightlines, and vehicle access points not being located within 6m of an intersection.

5.5 Flooding and stormwater

5.5.1 Introduction

A surface water and hydrology assessment of the proposed development site was undertaken by EMM. The assessment examined the existing site conditions, potential impacts stormwater and drainage characteristics and flood risk. Flood modelling was undertaken, and construction and operational phase effects were considered. A range of mitigation measures to reduce these impacts were proposed.

5.5.2 Legislative and planning context

The Project area is within the Hazards (Flooding – Evidence Required) and Water Resources Overlays of PDC. The Desired Outcomes of these Overlays are:

Hazards (Flooding – Evidence Required) Overlay:

> DO 1: *"Development adopts a precautionary approach to mitigate potential impacts on people, property, infrastructure and the environment from potential flood risk through the appropriate siting and design of development".*

Water Resources Overlay:

> DO 1: *"Protection of the quality of surface waters considering adverse water quality impacts associated with projected reductions in rainfall and warmer air temperatures as a result of climate change".*
>
> DO 2: *"Maintain the conveyance function and natural flow paths of watercourses to assist in the management of flood waters and stormwater runoff".*

A Development Assessment Report for the Project was prepared by MasterPlan and this report discusses the application and compliance with the relevant Performance Outcomes (PO) and associated Designated Performance Feature, including those presented below in Table 5.5. This report is presented in its entirety in Appendix E.

Table 5.5 Performance outcome and deemed-to-satisfy criteria/designated performance feature relevant to surface water

Hazards (Flooding – evidence required) overlay	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
Flood resilience	
PO 1.1 Development is sited, designed and constructed to minimise the risk of entry of potential floodwaters where the entry of flood waters is likely to result in undue damage to or compromise ongoing activities within buildings.	DTS/DPF 1.1 Habitable buildings, commercial and industrial buildings, and buildings used for animal keeping incorporate a finished floor level at least 300 mm above: a. the highest point of top of kerb of the primary street or b. the highest point of natural ground level at the primary street boundary where there is no kerb
Water Resources Overlay	
PO 1.1 Watercourses and their beds, banks, wetlands and floodplains (1% AEP flood extent) are not damaged or modified and are retained in their natural state, except where modification is required for essential access or maintenance purposes.	DTS/DPF 1.1 None are applicable.
PO 1.2 Development avoids interfering with the existing hydrology or water regime of swamps and wetlands other than to improve the existing conditions to enhance environmental values.	DTS/DPF 1.2 None are applicable.

5.5.3 Site assessment and flood risk

An initial desktop assessment of the Project area was undertaken by EMM to characterise key features prior to site visit mobilisation. The initial works included: determining current and surrounding land use, topography and slope of the Project area, geological features including soil and aquifer type and characteristics, rainfall and evaporation data, natural and artificial surface water flows in the region, and identify major transport links.

Figure 5-11 presented below provides an overview of the Project area and key surface features. A site visit was undertaken by EMM on 28 March 2023, which confirmed no watercourses were present in the Project area. Soils testing indicated the soils across the Project area are not dispersive.

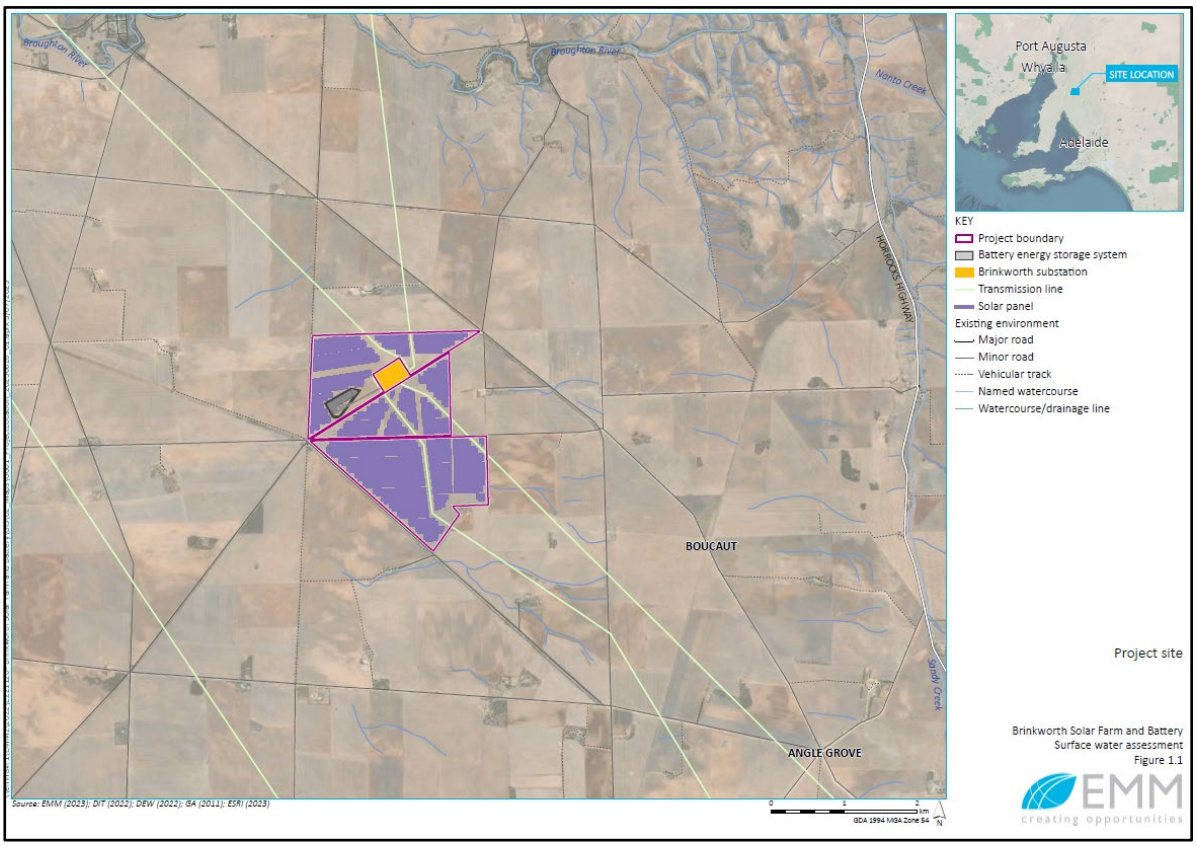


Figure 5-11 Project area and key site features

The Broughton River is an ephemeral river and is the closest surface water feature to the Project area. It is located 4 km to the north of the site. Drainage of the site is west to south-west. Two potential sources of flooding were identified, flooding from the Broughton River and flooding from incidental rainfall. A hydraulic model using the TUFLOW 2D software was used to assess drainage and flooding in the region. A ‘design flood' of the Broughton River was used for assessment purposes, which is 1% the annual exceedance probability (AEP). The results of the flood modelling show that the 1% AEP Broughton River flow will not reach the elevation of the Project area, therefore it is not considered to be at risk of flooding from the Broughton River.

The Project is located at the northeastern corner of a sub catchment area. The gentle southwestern slope of the Project area means surface runoff will flow in a south-westerly direction toward the larger catchment area with limited overland flow accumulating within the Project area during incidental flooding from high intensity rainfall. The results of the flood modelling conducted for direct rainfall flooding indicate that overland flows are likely to occur as sheet flows across the Project area between 100–300 mm in depth forming broad channels conforming to surface depressions in paddocks and linear drainage features as shown in Figure 5-12. These broad channels represent a low hazard (H1) with minimal impacts to people, property, infrastructure, and environment as represented in Figure 5-13.

The location of the proposed BESS has also considered the flood modelling undertaken. Its current location to the southwest of the Brinkworth substation has avoided an area identified during the modelling as being within hazard zone H2 and a potential existing channel for surface water flows. This has reduced the location of the BESS from hazard category from H2 to H1.

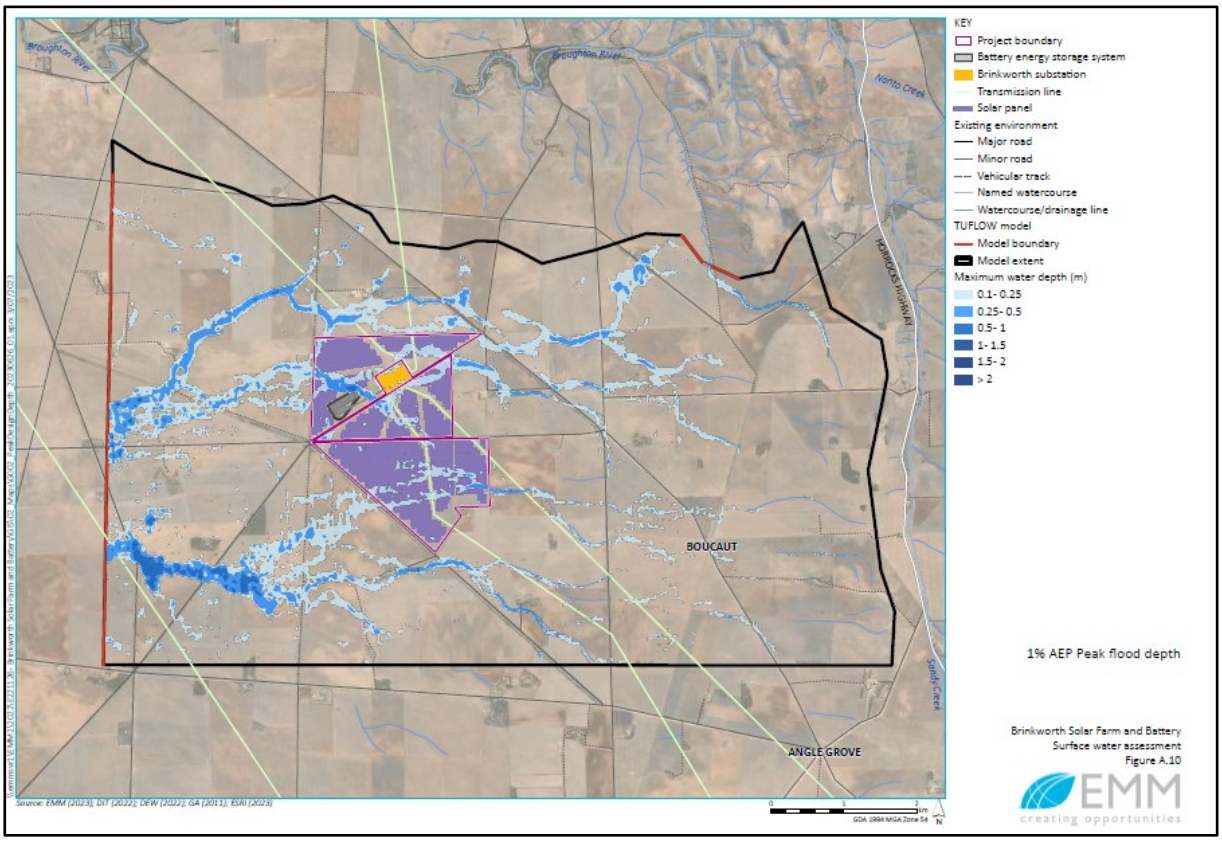


Figure 5-12 Maximum 1% AEP peak flood depth

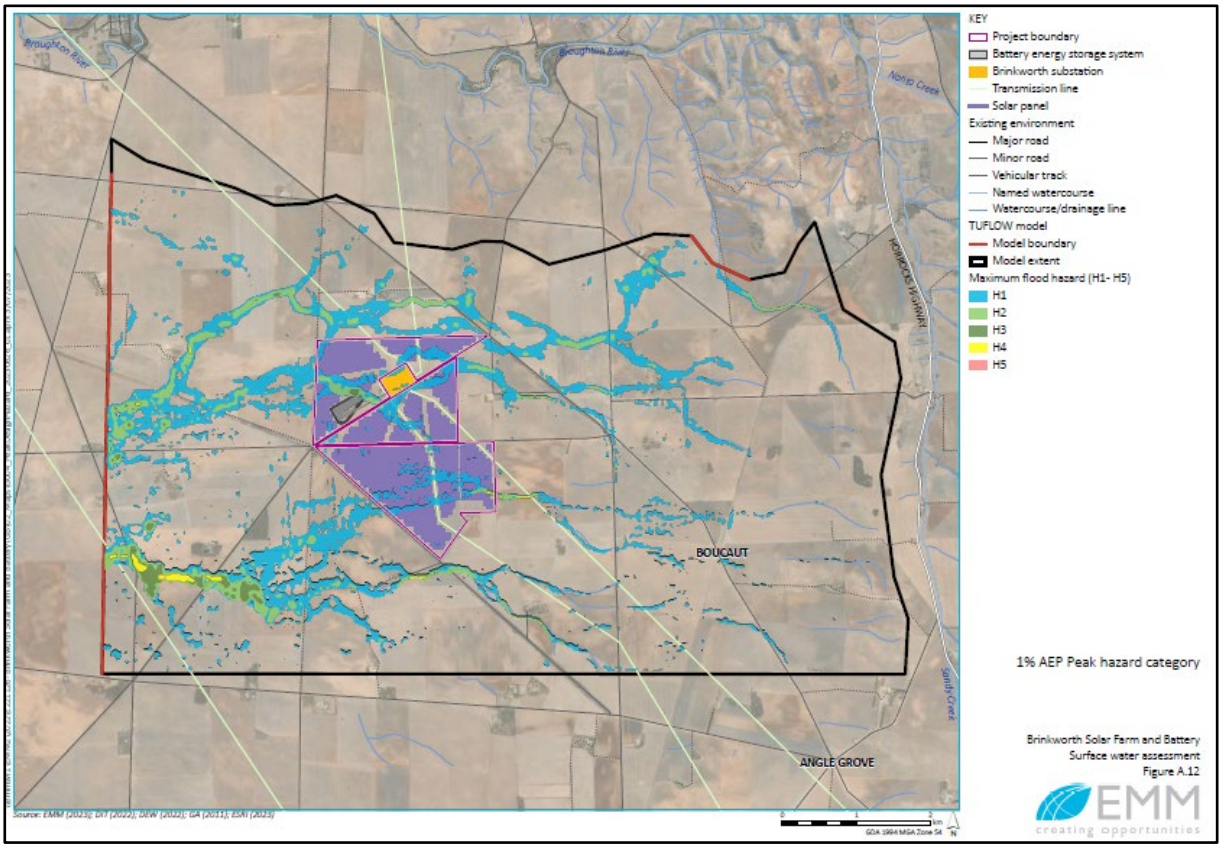


Figure 5-13 Maximum 1% AEP peak hazard category

5.5.4 Construction

It is acknowledged that alterations to existing hydrological features will occur during construction of the Project. The Project is not likely to impact groundwater during construction, operation and decommissioning due to a limited amount of subsurface disturbance anticipated. To address and mitigate some of the identified impacts during the construction phase, a Soil Erosion and Drainage Management Plan (SEDMP) will be developed as part of the overall Construction Environmental Management Plan (CEMP). In addition to the SEDMP a number of Project design and management features will address and mitigate flood risk, this will include locating sensitive infrastructure above the modelled 1% AEP flood levels, placing temporary works, plant, materials and facilities in areas which consider overland flow paths, and the development of a flood management plan which describes site management protocols in the event of flood events during construction and operation.

Water demand during construction will be small and largely restricted to potable water supply for construction staff and site visitor amenity, concrete mixing for construction of pads, vehicle, and equipment washdown, and fire and dust suppression.

5.5.5 Operation

The proposed BESS pad has been relocated from its initial proposed location in order to minimise interaction with known overland flow paths during flooding. Changes to flow regimes resulting from increased runoff rates from PV modules and proposed new impervious surfaces are considered negligible.

Water requirements during operation will largely be limited to fire suppression systems required for the BESS. This would constitute a 70 kL primary tank and additional 20kL tanks at other access points for fire control purposes. BESS fire suppression systems would be bunded to prevent firewater from entering the environment. Firewater contaminated as a result of usage would be directed into a sump. All wastewater generated during operation or released as a result of fire will be collected and transported offsite for disposal at a suitably licenced facility.

5.5.6 Conclusions

The assessment and recommendations contained in the Surface Water Assessment report adequately addresses the intent of the Hazards (Flooding – Evidence Required) Overlay policies. This has been achieved by sitting all necessary infrastructure above the maximum 1% AEP peak flood depth and positioning all other critical infrastructure such as the BESS in lower hazard category areas. Further, the report indicates that the development would not impact water courses, as sought by the Water Resource Overlay policies. Detailed design will address all other relevant performance outcomes relating to sitting and design of infrastructure.

5.6 Flora and fauna

5.6.1 Introduction

EBS Ecology was engaged to conduct an ecological assessment to determine potential flora and fauna values within the Project area and assess potential impacts to these as a result of the Project. The aim of the assessment was to characterise the existing ecology of the Project area and surrounds, assess the extent of the ecological impacts of the development and propose any necessary mitigation measures.

5.6.2 Legislative and planning context

The PDC applies a Native Vegetation Overlay to the Project area. The Desired Outcomes (DO) of the Native Vegetation Overlay states:

Native Vegetation Overlay:

> DO 1: *"Areas of native vegetation are protected, retained and restored in order to sustain biodiversity, threatened species and vegetation communities, fauna habitat, ecosystem services, carbon storage and amenity values".*

Table 5.6 provides an overview of the Performance Outcomes (PO) and Designated Performance Feature for environment protection in areas affected by the native vegetation overlay.

Table 5.6 Performance outcome and deemed-to-satisfy criteria/Designated performance feature relevant to the native vegetation overlay

Native vegetation overlay	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
Environment Protection	
PO 1.1 Development avoids, or where it cannot be practically avoided, minimises the clearance of native vegetation taking into account the siting of buildings, access points, bushfire protection measures and building maintenance.	DTS/DPF 1.1 An application is accompanied by: a. a declaration stating that the proposal will not, or would not, involve clearance of native vegetation under the Native Vegetation Act 1991, including any clearance that may occur: i. in connection with a relevant access point and/or driveway ii. within 10 m of a building (other than a residential building or tourist accommodation) iii. within 20 m of a dwelling or addition to an existing dwelling for fire prevention and control iv. within 50 m of residential or tourist accommodation in connection with a requirement under a relevant overlay to establish an asset protection zone in a bushfire prone area or b. a report prepared in accordance with Regulation 18(2)(a) of the Native Vegetation Regulations 2017 that establishes that the clearance is categorised as 'Level 1 clearance'.
PO 1.2 Native vegetation clearance in association with development avoids the following: a. significant wildlife habitat and movement corridors b. rare, vulnerable or endangered plants species c. native vegetation that is significant because it is located in an area which has been extensively cleared d. native vegetation that is growing in, or in association with, a wetland environment.	DTS/DPF 1.2 None are applicable.

5.6.3 Assessment methods

A desktop fauna assessment was undertaken to determine whether any potential threatened species or Threatened Ecological Communities (TECs) (both Commonwealth and State listed) occur within the Project area. This was achieved by conducting a search of several online databases, including an additional 5 km Project area buffer.

The flora assessment was undertaken by NVC accredited consultant on 10 November 2022 in accordance with the Bushland Assessment Method (BAM) (NVC, 2020a). The BAM is derived from the Nature Conservation Society of South Australia's Bushland Condition Monitoring Methodology (Croft *et al.* 2007). The BAM was used to assess areas of native vegetation requiring clearance and calculate the Significant Environmental Benefit (SEB) requirements. Conservation Significance Scores are calculated from direct observations of flora and direct and historical observations of fauna species of conservation significance. All fauna identified during desktop online database searches including Protected Matters Search Tool (PMST) and Biological Databases of South Australia (BDBSA) within 5km of the Project area are recorded on the BAM scoresheets. A NatureMaps Search was carried out on 10/05/2023 to check for newly listed threatened species records.

5.6.4 Results

It was noted that the land surrounding the Project area has been extensively cleared and modified from its original native state, with remnant vegetation largely being restricted to road reserves. The land comprising the Project area is currently being used primarily for cropping and sheep grazing. The results of the assessment characterised the Project area as having the following features and attributes:

- the landform was flat with loamy clay soil and was partially saturated in areas at the time of the field survey due to recent rainfall
- the majority of the Project area was under crop of cereals and pulses
- no watercourses were present within the Project area
- much of the overstorey vegetation surveyed was of planted roadside Australian native trees and shrubs which are not indigenous to the area
- shrubs had regenerated along the roadsides since the 2018 survey and some areas that were previously mapped as grassland were included in the shrubland community.

Figure 5-14 provides an overview of the Project area and vegetation which was identified and mapped during field surveys by EBS ecology.

A PMST report was generated on May 10, 2023, to identify nationally threatened flora and fauna, migratory fauna and TECs under the EPBC Act to known to occur within the Project area. Aquatic species and waterbirds were not included in the report as no wetlands are present within the Project area. The results of the PMST are summarised below.

The PMST search identified two Critically Endangered TECs that may occur within the Project area:

- Peppermint Box (*Eucalyptus odorata*) Grassy Woodlands of South-eastern Australia; and
- Iron-grass Natural Temperate Grassland of South Australia.

During subsequent field surveys of the Project area conducted by EBS Ecology, neither of these communities were identified within the Project area.

One threatened flora species was recorded in the Project area during field surveys by EBS Ecology in 2018: The state Vulnerable Bottled Fissure-plant (*Maireana excavate)* was recorded in roadside vegetation that is not proposed to be impacted. Three other threatened flora species were returned in the BDBSA and PMST search, however none were identified as to be likely to occur within the Project area.

One threatened fauna species: The State Rare Elegant Parrot (*Neophema elegans elegans*) was observed in the Project area during the 2018 field survey. A further three threatened species were identified in the PMST search as likely or possible to occur within the Project area.

The NatureMaps search carried out in May 2023 did not identify any newly listed fauna species. No new fauna species listed as “known’ were on the updated PMST search.

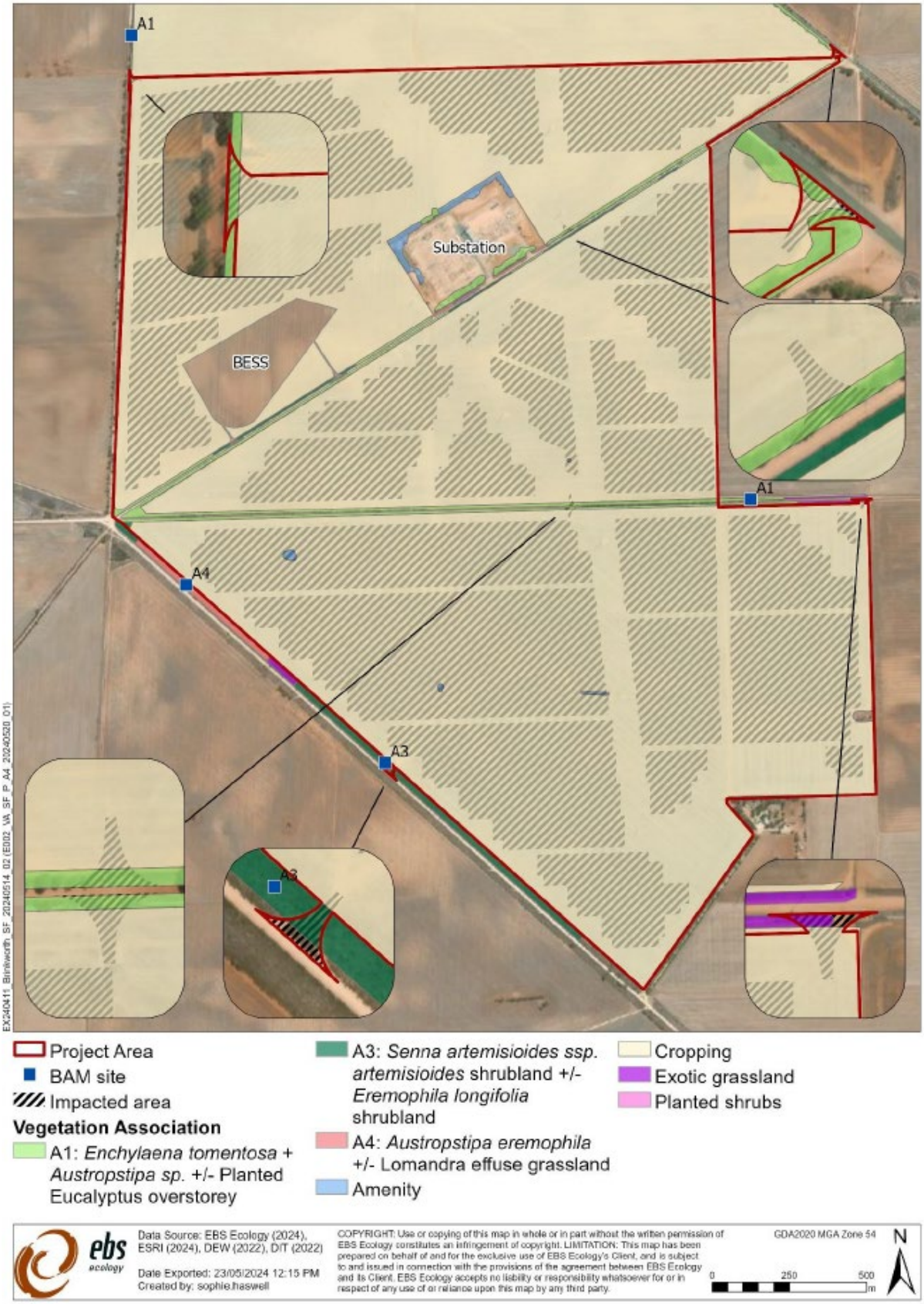


Figure 5-14 Ecological values within the Project area

It was deemed that an Environment Protection and Biodiversity Conservation (EPBC) Act referral was not required. There were no known TECs identified within the Project area during field surveys. The assessment of risk to threatened fauna species concluded there would be as negligible impacts as clearance native vegetation and fauna habitat was avoided. As such, it was concluded that impacts to Matters of National Environmental Significance were unlikely to occur.

5.6.5 Avoidance, mitigation and conclusion

The Project has taken a number of design steps to minimise impacts to ecological communities within the Project area. The Project has avoided native vegetation in the first instance by selecting a site on land which has been highly modified for agricultural use and possesses little remnant native vegetation. Clearance of native vegetation was largely avoided by site design measures such as using existing access points/gates. Complete rehabilitation of the site is not an option due to the existing use of the site and the nature of the proposed development, however there may be opportunities for native ground cover to regenerate within the solar PV area, which will be investigated. In order to offset the impacts of the proposed vegetation clearance required for the Project, an offset will be paid into the SEB fund.

The development has attempted to minimise all impacts to native vegetation as far as reasonably practicable in accordance with the Environment Protection PO 1.1 in the Native Vegetation Overlay. As a result of design changes all native trees present within the Project area would be retained. An area of vegetation 0.17 ha in size is proposed to be cleared during construction of the Project. A risk assessment and clearance summary were undertaken to calculate the total biodiversity score and total SEB points required to determine the offset payment to be paid into the SEB fund.

Other potential indirect impacts to native vegetation as a result of the construction of the Project such as dust generation smothering native vegetation would be managed through the Draft Construction Environment Management Plan in Appendix O.

5.7 Heritage

5.7.1 Introduction

A cultural heritage assessment was completed by EBS Heritage to identify significant historic cultural heritage values which may be present within the Project area. The assessment included undertaking a desktop assessment of potential Aboriginal and European heritage, examining legislative requirements which may be applicable should any objects of heritage significance be uncovered within the Project area, develop a detailed risk assessment defining areas of high, moderate, and low risk based on the results of the background research, and final conclusions and recommendations.

5.7.2 Legislative and planning context

The PDC incorporates policy to protect areas of cultural sensitivity, including the DO of the General Development Policies – Infrastructure and Renewal Energy Facilities, as stated below:

> DO 1: *"Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity."*

Table 5.7 provides an overview of the relevant Performance Outcome (PO) for Renewable Energy Facilities located in areas of potential cultural value.

Table 5.7 Performance outcome and deemed-to-satisfy criteria/designated performance feature relevant to the cultural values

Performance outcome	Deemed-to-satisfy criteria/designated performance feature
Renewable Energy Facilities (Solar Power)	
PO 9.1 Ground mounted solar power facilities generating 5 MW or more are not located on land requiring the clearance of areas of intact native vegetation or on land of high environmental, scenic or cultural value.	DTS/DPF 9.1 None are applicable.

There are no State or Local Heritage Places within the site of the development. The nearest places of heritage significance identified on the South Australian Property and Planning Atlas (SAPPA) are located within the township of Brinkworth. The proposed development does not alter the setting of those identified local heritage places within Brinkworth.

5.7.3 Desktop assessment

The desktop assessment methodology involved undertaking a range of database searches and archival research to gain an understanding of Aboriginal and European history in the region. The following findings were established at the completion of the desktop assessment.

There are currently no native title claims or determinations for the land on which the proposed project is to be located. Claims by Nukuna, Ngadjuri Nation, Narungga Nation and Kaurna Peoples are present to the north, east, west, and south of the Project area respectively. There is no Indigenous Land Use Agreement (ILUA) currently for the Project area.

An archival search of the Register of Aboriginal Sites and Objects was conducted on 27 October 2022 to gain an understanding of how the land has previously been used by Aboriginal people and identify any Aboriginal sites or objects within or close to the Project area. The results of the search indicated that no records for Aboriginal sites were present within 1,000 metres of the Project area, however a less targeted search of the central archive was undertaken in 2018 which returned one registered site (site number: 65304084) approximately 11 kilometres from the Project. The South Australian Museum Database returned several entries for the area surrounding Brinkworth indicating that Aboriginal people used the waterways to the north of the Project area to travel from the hilly regions near Spalding in the northeast to the seas terminating in the Spencer Gulf.

5.7.4 Risk assessment and conclusions

Based on their desktop assessment EBS heritage concluded that the likelihood of disturbance of Aboriginal sites has been deemed to be low, thus the development of a cultural heritage management plan or the application for a permit under the *Aboriginal Heritage Act 1988* – Section 21, 23 or 29(1)(b) was deemed to be unnecessary at this stage. A predictive risk assessment was developed where unknown Aboriginal sites and objects may be found and highlight landforms which may be associated with such finds.

Akaysha Energy has engaged with Traditional Owners and is committed to the development of a Cultural Heritage Management Plan (CHMP) as a best practice management approach.

If Aboriginal sites or objects of significance are disturbed during project works, additional heritage conditions may be required to ensure compliance with the *Aboriginal Heritage Act 1988*. If other historical sites or objects of significance are disturbed during project works a permit may be required to ensure compliance with the *Heritage Places Act 1993*, however as the surface and substrate soils of the Project area are likely to be fill or disturbed soils the likelihood of disturbing unknown heritage sites or objects is considered negligible.

Although the likelihood of disturbing unknown Aboriginal or European cultural heritage is deemed to be low, the commitment to consultation with traditional owners and the development of an appropriate cultural heritage management plan with the use of appropriate risk management controls for ground disturbance works, and the implementation of a site discovery procedure is deemed to be a best practice management procedure and will be included in the Statement of Commitments (Chapter 6).

5.8 Socio-economic

5.8.1 Introduction

A socio-economic assessment was undertaken by BDO to support the development of the Project and is presented in its entirety in Appendix K. The assessment considered the baseline socio-economic conditions of the Project Study Area[1], and assessed the potential economic benefits and impacts of the Project to the region throughout its lifecycle. It is noted that the socio-economic assessment includes development of the BESS, which is exempt from planning approval and not subject to this application. Nonetheless the assessment remains valid when considering the Project in its entirety.

5.8.2 Legislative and planning context

The PDC comprises policies for guiding development within the Rural Zone. There are two desired outcomes (DO1 and DO2) for land use within the Rural Zone which are relevant to the Project.

> DO 1: *"A zone supporting the economic prosperity of South Australia primarily through the production, processing, storage and distribution of primary produce, forestry and the generation of energy from renewable sources".*
>
> DO 2: *"A zone supporting diversification of existing businesses that promote value-adding such as industry, storage and warehousing activities, the sale and consumption of primary produce, tourist development and accommodation".*

In addition to the policies contained within the Rural Zone, the General Development Policies for the development of Infrastructure and Renewable Energy Facilities states the desired outcome:

> DO 1: *"Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity".*

Renewable energy facilities are an anticipated land use within the Rural Zone. The proposed solar farm and BESS will assist in providing sustainable, reliable, and affordable energy, which directly aligns with the strategic plan of the State Government and thereby addresses the desire for development to add to the economic prosperity of the State.

Table 5.8 provides an overview of the Performance Outcomes relevant to land use and socio-economic considerations for the Project within the Rural Zone.

Table 5.8 Performance outcome and deemed-to-satisfy criteria/designated performance feature relevant to socio-economic considerations

Rural Zone	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
Land Use and Intensity	
PO 1.1 The productive value of rural land for a range of primary production activities and associated value adding, processing, warehousing and distribution is supported, protected and maintained.	DTS/DPF 1.1 Development comprises one or more of the following: a. Advertisement … r. Renewable energy facility…

[1] Comprising Wakefield Regional Council, Northern Areas Council, Port Pirie Regional Council and Clare and Gilbert Valleys Council.

Rural Zone	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
Renewable Energy Facilities	
PO 7.1 Renewable energy facilities are located as close as practicable to existing transmission infrastructure to facilitate connections and minimise environmental impacts as a result of extending transmission infrastructure.	DTS/DPF 7.1 None are applicable.
PO 9.1 Renewable energy facilities and ancillary development minimises significant fragmentation or displacement of existing primary production.	DTS/DPF 9.1 None are applicable.
PO 9.2 Small-scale, ground-mounted solar power facilities support rural production or value-adding industries.	DTS/DPF 9.2 None are applicable.
General Development Policies – Infrastructure and Renewable Energy Facilities	
Renewable Energy Facilities (Solar Power)	
PO 9.1 Ground mounted solar power facilities generating 5 MW or more are not located on land requiring the clearance of areas of intact native vegetation or on land of high environmental, scenic or cultural value	DTS/DPF 9.1 None are applicable.

5.8.3 Baseline assessment

The baseline conditions assessment of the Project Study Area indicate that the population is older, less diverse, and has fewer people earning a high income, and has lower levels of educational attainment than the South Australian average. The population grew at a rate of approximately 1.7% over a 10-year period between 2011 and 2021. Which is less than the South Australian average of 5%.

The agricultural sector is the largest contributor to the gross regional product (GRP) and the second largest employing sector in The Region[2]. The unemployment rate for South Australia in 2021 was 5.4%. The unemployment rates within the various LGAs in the region varied from 5.4% – 7.1%.

Table 5.9 provides an overview of information used to calculate the potential agricultural impact of the Project. A weighted average of the output per ha (estimated at $1,372 per ha) using this data was applied to the area expected to be removed for the Project (478 ha) which resulted in an estimated annual net loss of $0.7 million in agricultural output.

[2] Defined as the Yorke and Mid North SA government region (comprising Yorke Peninsula, Copper Coast, Barunga West, Wakefield, Clare and Gilbert Valleys, Goyder, Port Pirie, Northern Areas, Mount Remarkable, Orroroo/Carrieton and Peterborough LGAs).

Table 5.9 Baseline agricultural information, Mid North South Australia

Commodity	Area (ha)	% area	Volume (t)	t/ha	$/t	$/ha
Wheat	248,200	58%	1,090,000	4.4	$330	$1,449
Durum	5,000	1%	21,500	4.3	$428	$1,840
Barley	94,700	22%	405,000	4.3	$280	$1,197
Oats	4,400	1%	16,750	3.8	$285	$1,083
Triticale	1,700	0%	6,750	4.0	$264	$1,048
Peas	13,900	3%	30,500	2.2	$451	$990
Lupins	1,800	0%	3,250	1.8	$396	$715
Beans	12,900	3%	39,000	3.0	$540	$1,633
Chickpeas	2,300	1%	4,000	1.7	$726	$1,263
Lentils	17,100	4%	41,000	2.4	$650	$1,558
Vetch	4,200	1%	5,000	1.2	$590	$702
Canola	25,400	6%	56,000	2.2	$622	$1,371

5.8.4 Economic impact of the Project

The Project is expected to involve a capital investment of $822 million over the construction period, between 2024 and 2027. Of this $420 million was directly attributed to the solar farm component and the subject of this application. The jobs directly associated with the construction and operation of the Project is expected to be a peak workforce demand of 180 FTE on-site personnel during the construction phase, and 10 FTE personnel employed during the operational phase.

The resulting regional economic stimulation of the Project and other ancillary industries is approximately $54.3 million in GRP, the creation of 411 full time equivalent (FTE) jobs and $33.5 million of household income during this phase. The impact on a state level is estimated at an additional $114.4 million in gross state product (GSP), creation of 852 FTE jobs and $72.3 million of household income.

Port Pirie represents the highest level of unemployment in The Region with 7.1% unemployment. It is expected that the majority of the construction workforce (40%) will originate from this locality and represents a boost to the local economy and employment in the region. The remaining workforce are expected to originate from Adelaide (30%), Clare (10%), and the remaining 20% from elsewhere in the region.

The Project is expected to operate for at least 20 years. During the operational phase the regional level economic impacts is expected to be an additional $2.1 million in GRP, 15 FTE jobs, and $1.9 million of household income. State level economic impacts are estimated at an additional $4.9 million in GSP, 19 FTE jobs, and $1.9 million of household income.

In addition to the aforementioned direct and indirect economic impacts of the Project, Akaysha Energy have committed to a Community Sponsorship Fund, which provides a total of $50,000 annually (indexed for inflation with $30,000 attributed to the solar component of the Project and $20,000 attributed to the BESS) which will support various community projects and organisations.

It is acknowledged that the Project will result in the loss of agricultural production due to its location on cleared land used for cropping cereals and pulses, and occasional grazing. The total area no longer available for cropping activities is estimated to be 478 ha. It is, however, considered that the proposed development is appropriately sited, due to its adjacent position to the existing Brinkworth substation. The direct impact of this loss of agricultural land over the life of the Project is estimated to be a reduction of $0.5 million in GPR, 2 FTE jobs, and $0.2 million in household income annually at a regional level. At a state level a reduction of $0.6 million in GSP, 3 FTE jobs, and $0.2 million in household income annually is expected.

5.8.5 Conclusions

When considering the socio-economic impacts of the Project, a range of regional, state, and national factors were taken into account. The Planning and Design Code of South Australia seeks to support economic prosperity of areas within the Rural Zone, by supporting both existing businesses and the diversification of industries deemed to be compatible with the Rural Zone, which includes generation of energy from renewable sources, as per PO 1.1 listed in Table 5.8. Additionally, the Project is ideally located being positioned adjacent to the existing Brinkworth substation as per PO 7.1 listed in Table 5.8.

The Project will have a net positive economic benefit at a regional and state level. The government of South Australia has a goal of achieving 100% net renewables by 2030. The federal target is 82% by 2030. The Project will contribute to these targets by producing an estimated 209 MW of renewable energy from the solar component, and 300 MW/1200 MWh from the BESS. This is enough to power 55,000 South Australian houses and will offset 272,400 tonnes of CO_2 annually.

5.9 Fire

5.9.1 Introduction

A fire risk management plan and fire safety study was undertaken by Fire Risk Consultants to support the development application of the Project (see Appendix L). The report was prepared following an assessment of the site, analysis of supplied information relating to the site layout and design and the fire safety systems and testing reports for the proposed battery. The report considered key risks during the initial construction phase as well as the operational phase risk and presents management measures accordingly.

The South Australian Country Fire Service (CFS) does not have specific design guidelines in place for renewable energy facilities, therefore the report was prepared in accordance with the Victorian Country Fire Authority Guidelines – *Design Guidelines and Model Requirements – Renewable Energy Facilities 2022* (CFA Guidelines). This approach was recommended by the CFS. A meeting was held between the CFS and Fire Risk Consultants to discuss the specifics of the Project design and any further inclusions or exclusions from the guidelines. The report also conforms to NSW Planning's *Hazardous Industry Planning Advisory Paper 2: Fire safety Study Guidelines (2011).*

5.9.2 Legislative and planning context

The PDC applies the Hazards (Bushfire – General Risk) Overlay to the Project area. There are two Desired Outcomes (DO1 and DO2) for land use affected by this overlay which are relevant to the Project.

> DO 1: *"Development, including land division responds to the general level of bushfire risk by siting and designing buildings in a manner that mitigates the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change."*
>
> DO 2: *"To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger."*

Table 5.10 provides an overview of the Performance Outcomes relevant to development on land affected by the Hazards (Bushfire – General Risk) Overlay.

Table 5.10 Performance outcome and deemed-to-satisfy criteria/designated performance feature relevant to hazards (bushfire – general risk)

Hazards (Bushfire – General Risk) overlay	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
Siting	
PO 1.1 Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.	DTS/DPF 1.1 None are applicable.
Built Form	
PO 2.1 Buildings and structures are designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of transportable buildings and buildings on stilts.	DTS/DPF 2.1 None are applicable.
PO 2.2 Extensions to buildings, outbuildings and other ancillary structures are sited and constructed using materials to minimise the threat of fire spread to residential and tourist accommodation (including boarding houses, hostels, dormitory style accommodation, student accommodation and Workers' accommodation) in the event of bushfire.	DTS/DPF 2.2 Outbuildings and other ancillary structures are sited no closer than 6m from the habitable building.
Vehicle Access – Roads, Driveways and Fire Tracks	
PO 5.1 Roads are designed and constructed to facilitate the safe and effective: a. access, operation and evacuation of fire-fighting vehicles and emergency personnel b. evacuation of residents, occupants and visitors.	DTS/DPF 5.1 Roads: a. are constructed with a formed, all-weather surface b. have a gradient of not more than 16 degrees (1-in-3.5) at any point along the road c. have a cross fall of not more than 6 degrees (1-in-9.5) at any point along the road d. have a minimum formed road width of 6 m e. provide overhead clearance of not less than 4 m between the road surface and overhanging branches or other obstructions including buildings and/or structures (Figure 1) f. allow fire-fighting services (personnel and vehicles) to travel in a continuous forward movement around road curves by constructing the curves with a minimum external radius of 12.5 m (Figure 2) g. incorporating cul-de-sac endings or dead end roads do not exceed 200 m in length and the end of the road has either: i. a turning area with a minimum formed surface radius of 12.5 m (Figure 3) or ii. a 'T' or 'Y' shaped turning area with a minimum formed surface length of 11 m and minimum internal radii of 9.5 m (Figure 4) h. incorporate solid, all-weather crossings over any watercourse that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes.

Hazards (Bushfire – General Risk) overlay	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
PO 5.2 Access to habitable buildings is designed and constructed to facilitate the safe and effective: a. access, operation and evacuation of firefighting vehicles and emergency personnel b. evacuation of residents, occupants and visitors	Access is in accordance with (a) or (b): a. a clear and unobstructed vehicle or pedestrian pathway of not greater than 60 metres in length is available between the most distant part of the habitable building and the nearest part of a formed public access road b. driveways: i. do not exceed 600 m in length ii. are constructed with a formed, all-weather surface iii. are connected to a formed, all-weather public road with the transition area between the road and driveway having a gradient of not more than 7 degrees (1-in-8) iv. have a gradient of not more than 16 degrees (1- in-3.5) at any point along the driveway v. have a cross fall of not more than 6 degrees (1- in-9.5) at any point along the driveway vi. have a minimum formed width of 3 m (4 m where the gradient of the driveway is steeper than 12 degrees (1-in-4.5)) plus 0.5 metres clearance either side of the driveway from overhanging branches or other obstructions, including buildings and/or structures (Figure 1) vii. incorporate passing bays with a minimum width of 6 m and length of 17 m every 200 m (Figure 5) viii. provide overhead clearance of not less than 4.0 m between the driveway surface and overhanging branches or other obstructions, including buildings and/or structures (Figure 1) ix. allow fire-fighting services (personnel and vehicles) to travel in a continuous forward movement around driveway curves by constructing the curves with a minimum external radius of 12.5 m (Figure 2) x. allow fire-fighting vehicles to safely enter and exit an allotment in a forward direction by using a 'U' shaped drive through design or by incorporating at the end of the driveway either: A a loop road around the building B a turning area with a minimum radius of C 12.5 m (Figure 3) D a 'T' or 'Y' shaped turning area with a minimum formed length of 11 m and minimum internal radii of 9.5 m (Figure 4) xi. incorporate solid, all-weather crossings over any watercourse that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes.
PO 5.3 Development does not rely on fire tracks as means of evacuation or access for fire-fighting purposes unless there are no safe alternatives available.	DTS/DPF 5.3 None are applicable.

5.9.3 Bushfire risk assessment and management plan

Bushfires are a major hazard within the Yorke and Mid North Zone of South Australia. An analysis of the Project area and bushfire history in the region indicate that grassfires are the primary fire risk for the Project area, however other major fires have also occurred in the region, as shown in Figure 5-15. According to data provided by the South Australian Government there have been no recorded impacts from bushfire to the site of the Project.

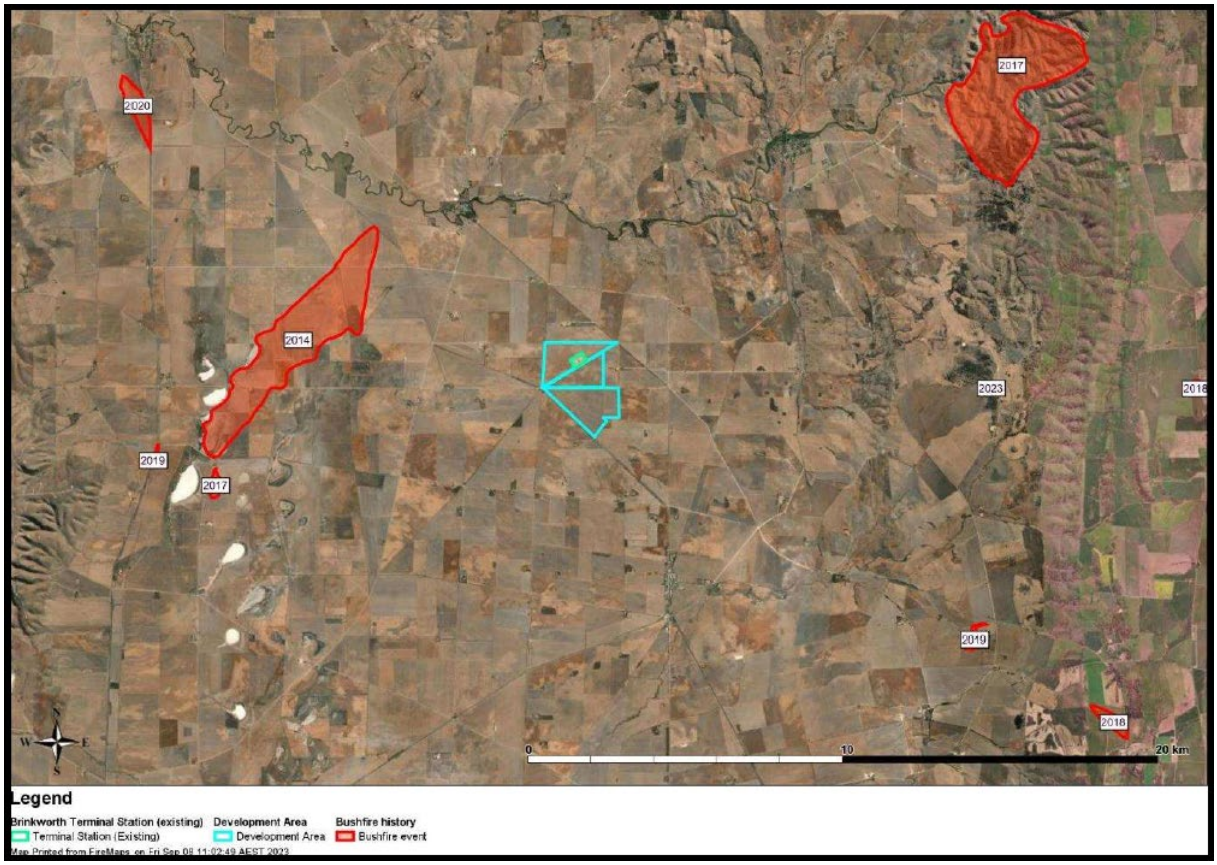


Figure 5-15 Bushfire history

The Fire Management Plan is detailed in the Fire Risk Analysis report and is provided in Appendix L. The requirements for the provision and maintenance of fire management treatments are summarised below:

- access to the site to include full perimeter access including appropriate widths and load limits
- perimeter fire breaks that ensures a sterile area for a distance of at least 10 metres
- static water supplies at the BESS and all access gates
- fire detection system provided within the battery units
- fire management plan
- emergency management plan
- emergency information books located within emergency information containers.

5.9.4 Conclusion

The overall assessment of fire risk for the Project is considered to be low to medium. Bushfire will remain a major hazard in the region, however compliance with the CFA guidelines and design inclusions and site maintenance consistent with the performance outcomes of the Hazards (Bushfire – General Risk) Overlay will reduce risk of fire events causing severe damage to the facility and nearby properties.

5.10 Aviation and glare

5.10.1 Introduction and planning context

An Aeronautical Impact Assessment and Glare and Glint Analysis for the Brinkworth Solar farm was undertaken by Chiron Aviation Consultants to assess potential impacts to aviation which may result from the development of the Project. The PDC General Development Policies – Infrastructure and Renewable Energy Facilities seeks to ensure that renewable energy facilities do not adversely impact on air transport, airfields, and landing strips.

Additional performance outcomes relevant to visual amenity have also been considered as part of this assessment as it relates to nuisance glare which may result from the Project.

A summary of the Performance Outcomes (PO) relevant to the Project are presented below in Table 5.11.

Table 5.11 Performance outcome and deemed-to-satisfy criteria/designated performance feature relevant to aviation and glare

General Development Policies – Infrastructure and renewable energy facilities	
Performance outcome	**Deemed-to-satisfy criteria/designated performance feature**
Hazard management	
PO 4.1 Infrastructure and renewable energy facilities and ancillary development located and operated to not adversely impact maritime or air transport safety, including the operation of ports, airfields and landing strips.	DTS/DPF 4.1 None are applicable.
Visual Amenity	
PO 2.1 The visual impact of above-ground infrastructure networks and services (excluding high voltage transmission lines), renewable energy facilities (excluding wind farms), energy storage facilities and ancillary development is minimised from townships, scenic routes and public roads by: a. utilising features of the natural landscape to obscure views where practicable b. siting development below ridgelines where practicable c. avoiding visually sensitive and significant landscapes d. using materials and finishes with low-reflectivity and colours that complement the surroundings e. using existing vegetation to screen buildings f. incorporating landscaping or landscaped mounding around the perimeter of a site and between adjacent allotments accommodating or zoned to primarily accommodate sensitive receivers.	DTS/DPF 2.1 None are applicable
General Development Policies – Interface Between Land Uses	
Solar Reflectivity/Glare	
PO 7.1 Development is designed and comprised of materials and finishes that do not unreasonably cause a distraction to adjacent road users and pedestrian areas or unreasonably cause heat loading and micro-climatic impacts on adjacent buildings and land uses as a result of reflective solar glare.	DTS/DPF 7.1 None are applicable.

The impact assessment and analysis sought to examine the impacts to aviation in the region by cataloguing all certified and uncertified aerodromes within 15 kilometres of the Project.

The glare and glint analysis utilized the Forge Solar tool which incorporates the *Sandia National Laboratories Solar Glare Hazard Analysis Tool* (SGHAT) which is accepted as compliant with the Australian Civil Aviation Safety Authority (CASA) requirements.

5.10.2 Impact assessment and analysis

Aerodromes fall into three categories, military or joint (combined military and civilian), certified and uncertified, also known as aeroplane landing areas (ALA). Military, joint, and certified aerodromes are listed in the Aeronautical Information Publication (AIP) and are subject to a Notice to Airman service which requires mandatory reporting to keep aerodrome and airway information current and available to the aviation industry worldwide. Uncertified aerodromes are not required to be listed in the AIP, although many are, and information is published in the AIP EnRoute Supplement Australia (ERSA). The AIP designated airspace handbook (DAH) lists *Aircraft Landing Areas (ALA) without an ERSA entry – verified.* This listing of ALA indicates that Airservices Australia have a registered responsible person providing verified information about the ALA.

A review of the aforementioned available resources indicated that no certified or known uncertified aerodromes were present with 15 kilometres of the Project area. The closest aerodromes include a certified aerodrome at Port Pirie (55 kilometres northwest), and three uncertified aerodromes at Clare Valley (19.5 kilometres southeast), Hoyleton (43.8 kilometres south), Baklava (48.6 kilometres south) and Jamestown (52.9 kilometres northeast). The locations of these aerodromes are presented in Figure 5-16.

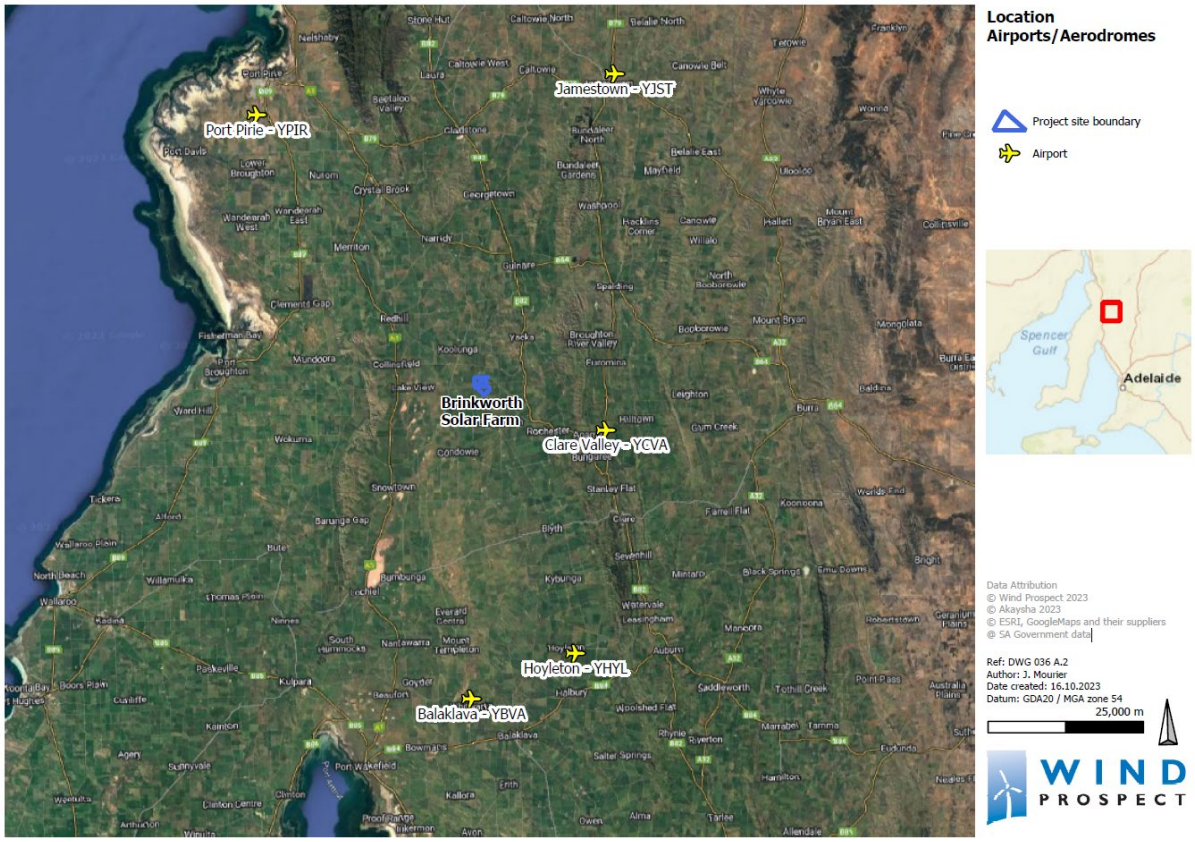


Figure 5-16 Certified aerodromes in the Project area vicinity

The airspace above the Project area is class G airspace from ground level to 8500 ft, which is non-controlled airspace and aircraft may operate in accordance with either instrument flight rules (IFR) and/or visual flight rules (VFR). Aircraft may also operate without Air Traffic Control (ATC) clearance in class G airspace. The minimum safe altitude for VFR over unpopulated areas is 500 ft above ground level (AGL).

Overflying aircraft are required to maintain a minimum safe altitude of 500 ft. Glare and glint is not considered to be a safety hazard for aircraft at this altitude. Aircraft conducting authorised low flying activities will be aware of the solar farm through pre-flight planning and dynamic risk assessment and will fly accordingly.

As noted in the landscape character and visual impact assessment (Appendix F) the purpose of PV panels is to absorb and not emit sunlight and as such glare 'overspill' will be negligible. Glint can often be emitted from newly installed PV panel infrastructure where the hot dipped galvanised finish of supporting steel frames is left untreated. Hemisphere Design concluded that glint is not an issue of relevance given the site's relatively remote location, the set back of PV panels from and presence of screen planting along the adjacent Koolunga Road.

5.10.3 Conclusions and recommendations

The results of the aeronautical impact assessment and glint analysis yielded the following conclusions for the impacts of the proposed development. Due to the nature of the development – a solar farm and BESS with no tall structures exceeding 40 metres, aerodromes within 15 kilometres of the Project were considered, with no certified or known uncertified aerodromes were present within this radius. The minimum safe altitude for aircraft flying in the vicinity of the Project area is 500 feet AGL, and as such any aircraft flying overhead will not be affected by glint or glare. The Project will therefore not be a hazard to aircraft safety on the basis of proximity to nearby aerodromes, tall structures penetrating minimum airspace or glint or glare. The Project conforms to PO 4.1 – Hazard Management, PO 2.1 – Visual Amenity, and PO 7.1 – Solar Reflectivity/Glare listed in Table 5.11.

Chapter 6
Conclusion

The Brinkworth Solar Farm project aligns directly with the Government of South Australia's strategic plan to provide sustainable, reliable, and affordable energy. By incorporating utility-scale renewable energy production and energy storage, the Project aims to enhance the stability and reliability of the state's electricity network. The Project has been endorsed by Department of Energy and Mining as ‘essential infrastructure’.

The Project has been developed as commercially viable. Akaysha is supported by BlackRock, one of the world's largest investors, providing development and construction capital funding. With BlackRock's backing, Akaysha has expertise in the energy market, access to finance and investment, and the capability to develop and deliver the Project successfully.

At a national level, the Project will contribute to Australia’s economic health through reduced reliance on non-renewable resources. The solar farm is estimated to generate approximately 454 GWh of renewable electricity every year for export, enough to power 55,000 homes.

In addition to the renewable electricity generation from the solar component, the installation of a large BESS, with four hours of storage, will enable the energy generated from the solar panels during the day to supply the South Australian grid with renewable electricity well into the evening. The Project will assist South Australia to provide reliable, competitive, and clean power into the future.

The Project is located within cleared land, primarily used for intensive agricultural purposes. The Project has been strategically placed within cropping paddocks to avoid disturbance to native vegetation and fauna habitat.

The Project site selection is based on favourable attributes, such as abundant solar resources and strategic proximity to the existing Brinkworth electrical substation, part of the robust ElectraNet 275kV transmission system. The Project has been sited to ensure an appropriate distance to nearby residences, it has flat topography, and excellent road access, all of which further enhances its suitability.

The landscape and visual assessment undertaken from sensitive key receptors found that visual impacts will be limited to areas immediately surrounding the Project and there will be no noticeable visual impact on the wider landscape beyond a 2-kilometre radius. Impacts to four homes surrounding the Project were predicted to range from no-change to moderate. Mitigation measures including native vegetation screening and matte non-reflective finishes for the buildings are in Project design to reduce the impact.

The design of the Project minimises potential noise at the closest sensitive receptors (homes). Predicative noise modelling has shown that even under the worst-case operating scenario, noise emissions will be significantly below statutory noise limits and therefore compliant.

An assessment of flora and fauna established that native vegetation and habitat for native fauna in the Project area is mostly located in road reserves. There will be no threatened flora and fauna species impacted, however, there may be up to 0.17 ha of native vegetation removal.

The flooding and storm water assessment concluded that the site and development is not subject to flooding and would not impact watercourses or run-off. Potential issues related to storm water management during construction and operation are considered minor and can be managed through mitigation measures in the Construction Environmental Management Plan.

The construction phase will result in increased traffic to and from the sight including the movement of oversized over mass vehicles. The traffic study assessed option of access for delivery of project components, preferencing the option following gazetted B-double routes and maximising use of suitably sealed roads. Based on predicted traffic volumes and considerations of the existing road network, the assessment concluded that the Project is unlikely to have negative impacts on safety or function of surrounding roads.

No hazard to aircraft safety and no tall structures or glint/glare risk was identified in the aviation assessment.

The fire risk study concluded that risks related to bushfire are low. The Project has adopted relevant guidelines to ensure the safe operation of the solar farm. These include making sure relevant fire breaks are incorporated into the design, there are safe access points, and sufficient water storage is provided.

An assessment of Aboriginal and non-Aboriginal heritage was undertaken for the development area involving reviewing database and archival research to gain an understanding of the Aboriginal and European history of the region. While there were no heritage sites recorded, discussion with Traditional Owners is ongoing to understand site history and any sensitive areas and further engagement will be conducted to develop and Cultural Heritage Management Plan.

Akaysha Energy have received general support for the Project, although negative opinions have been expressed during the public consultation process undertaken. Amendments to Project design have directly resulted from the consultation process.

The Project is expected to bring substantial economic benefits not only to the local community but also to the broader South Australian and domestic economy. The Project will provide for a range of direct and flow-on economic benefits, particularly during the construction phase of the Project. This includes income to local service providers, employment to a large temporary workforce during construction and 15 FTE jobs during 20-year operation phase, improvements to local workforce, improvements to local infrastructure, and benefits related to financial agreements of the landowners within the Project.

In a broader sustainability sense and with concern of the wider ‘public interest’, the Project can be implemented with minimal environmental impacts to the Project area and its location and sustainable energy development is consistent with the planning policy for the area. Through producing renewable energy from the solar component and providing significant renewable energy storage from the BESS, the Brinkworth Solar Farm and Battery will contribute Federal and South Australian renewable energy targets and assist in addressing global concerns about climate change and inter-generational and social equity through reducing consumption of finite resources in energy generation.

Whilst there are some effects to the region as a result of the Project, these are limited and will be managed through the Construction and Operational Management Plans. Overall, it is considered that any adverse impact will be minor and will be outweighed by the positive long-term environmental, social, and economic benefits of the Project.

Chapter 7
Statement of commitments

7.1 Overview

The statement of commitments outlines the overall management of the Project during planning, construction, operation, and decommissioning. Akaysha Energy is committed to working with stakeholders to ensure compliance with all commitments put forth in the development application.

The commitments will undergo review following development authorisation to include further matters, as required, to address planning conditions which may be included as part of the authorisation. It is anticipated that periodic reviews will be scheduled to track progress and ensure compliance with all agreed commitments and permit conditions.

7.2 General administrative commitments

Issue	Commitment	Timing
Scope of development	Akaysha Energy will carry out the development of the Project in accordance with the requirements of the development authorisation.	Ongoing
Minimising harm to the environment	Akaysha Energy will take all steps reasonably practicable to prevent and minimise harm to the environment which may result from the construction, operation, maintenance and decommissioning of the development.	Ongoing
Statutory requirements	Copies of all necessary approvals, licences and permits will be held at the Site Office. Environmental Management Plans will include measures to manage compliance with all relevant environmental obligations and the conditions of all necessary approvals, licenses and permits.	Ongoing
Decommissioning	Akaysha Energy will prepare a draft decommissioning and rehabilitation plan to outline the end-of-project decommissioning works, describing the extent of reinstatement and restoration activities upon the removal of the renewable energy infrastructure and associated facilities. This plan shall be submitted to the planning authority prior to the commencement of commercial operations.	Prior to commissioning
	At the end of its economic life, all equipment will either be replaced with comparable new equipment, or the solar farm and battery will be decommissioned.	Upon decommissioning
	Akaysha Energy will prepare a final decommissioning and rehabilitation plan and submit it to the relevant planning authority for approval prior to decommissioning commencing. This plan will include relevant technical reports that are required to inform the decommissioning process and minimise environmental harm and impact on the amenity of the community within the locality or as maybe affected.	Prior to decommissioning
	Decommissioning of the development will involve dismantling or removal of all equipment, and site rehabilitation. Access tracks may be retained depending on the landowners' wishes.	During decommissioning

7.3 Community consultation

Issue	Commitment	Timing
Notice of construction activities	Akaysha Energy will ensure that the local community and businesses are advised of construction activities that could cause disruption prior to those activities occurring. Communication methods will be detailed within the final Construction Environmental Management Plan (CEMP). Information will include: • details of traffic distributions and controls • work approved to be undertaken outside standard construction hours; and • procedures for managing the continued farming operation of neighbouring land especially regarding movement of agricultural equipment.	Prior to disruptive works
Periodic project updates on project website	Akaysha Energy will maintain a project website until construction ends. The website will indicate the date of the latest update and expected frequency of updates. The website will contain: • periodic updates of work progress, consultation activities, and planned work schedules when significant changes in noise or traffic impacts are expected • a description of the relevant approvals authorities and their areas of responsibility • project reports and plans that are publicly available for download • contact names and phone numbers of relevant communications staff.	Ongoing until construction is complete
Construction noise communication requirements	Prior to the commencement of construction neighbours to the solar farm and battery site will be informed of the construction works, the nature and duration of components of the construction phase, the potential impacts and contact details for registering complaints or enquires. The aim of consultation will be to ensure adequate community awareness and notice of expected construction noise. Consultation will include: • regular community information newsletters providing details of the construction plan and duration • a site notice board in a community location(s) providing copies of the newsletters, updated construction programme details, contact details of the project team members, and an ability to register for email updates of the newsletter • a feedback mechanism for the community to submit questions to the construction team and for the construction team to respond • regular updates on the construction activities to local authorities to assist in complaint management if necessary; and contact details of the project manager and/or site 'environmental representative'.	Prior to construction commencing and as required
Complaints management	Prior to construction commencing, Akaysha Energy will ensure the following is available: • a postal and email address to which written complaints can be sent; and • a telephone contact line. Akaysha Energy will keep record of a Complaints Register for a period of at least four years after the complaint was made. This will include: • the date and time of the complaint • whether the complaint was via mail, email, telephone or in person • any personal details provided (if any) or a note if no details were provided • the nature of the complaint • any action(s) taken by Akaysha Energy in relation to the complaint, including follow-up; and • if no action was taken in relation to the complaint, the reason(s) why. The Complaints Register will be made available for inspection upon request of the planning authority or other relevant government agency.	Prior to construction commencing

7.4 Design

Issue	Commitment	Timing
Project Layout	Akaysha Energy will prepare and submit a final project layout, solar panels, specification to the Minister prior to commencement of construction. The chosen reference solar panel model and number to be installed may differ from those described in the development application documents (up to 367,360 JA Solar 'JAM72D40 570/GB' panels rated at 570 watts), dependant on the final design conditions. Adjustment will consider relevant sensitivities of the location.	Prior to construction commencing
	Akaysha Energy will require the design of facilities and services buildings to incorporate the collection of roof drainage.	Prior to construction commencing
	Wastewater systems will be designed in accordance with Council requirements. Approvals and licenses will be obtained prior to installation.	Prior to construction commencing
	Akaysha Energy will require a Flood Management Plan, and a Sediment and Erosion Management Plan to be developed as part of the final Contractor's Environmental Management Plan (CEMP) to address temporary and site-specific risks to surface water during the construction phase.	During the construction phase
Visual impact measures	Measures to mitigate the visual impact of the Project will include: • screening with vegetation • matt non-reflective finishes on the constructed infrastructure; and • areas of existing native vegetation will be preserved as far as possible.	During construction

7.5 Aviation and glare

Issue	Commitment	Timing
Glare	Akaysha Energy will seek to minimise the impacts of glare on aviation and amenity by using low sheen and non-reflective finishes.	Ongoing

7.6 Traffic

Issue	Commitment	Timing
Infrastructure Deed	Akaysha Energy will enter into an Infrastructure Deed if/as required with the Northern Areas Council in relation to the management of local roads proposed to be utilised during construction of the Project.	Prior to construction
Mass transport options	Akaysha Energy will investigate the potential with the chosen construction contractors to use minibuses for movement of staff/contractors, to reduce traffic during construction. The number of light vehicles travelling to/from the site may be reduced with the introduction of minibus services, which could reduce the number of light vehicle trips to the site (in the order of 25-50%).	During construction
Traffic Management Plan	Akaysha Energy will prepare a detailed Traffic Management Plan once development authorisation is obtained. This Traffic Management Plan will incorporate: • pre-construction assessments of road pavements and infrastructure along access route to assess the required upgrading or likely rehabilitation • further consultation with stakeholders and community • details of noise and dust mitigation.	Prior to construction
Decommissioning	Akaysha Energy will prepare a Traffic Management Plan for the decommissioning of the development.	Prior to decommissioning

7.7 Flora and fauna

Issue	Commitment	Timing
Project layout	Akaysha will have a suitably qualified and experienced environmental consultant undertake an Environment Protection and Biodiversity Conservation Act 1999 (EPBC) self-assessment report for the Project.	Prior to construction commencing
	Akaysha Energy will seek approval for the clearance of native vegetation as required by the *Native Vegetation Act 1991* and will pay directly into the SEB offset fund.	Prior to construction commencing
	In the final design, construction and operation of the Project, Akaysha Energy will avoid removal of all scattered native trees present within the Project Area.	Ongoing
Management Plans	Akaysha Energy will develop a Construction Environmental Management Plan (CEMP) which incorporates best practice environmental management measures including: • cleaning of vehicles and equipment to ensure they are free of plant material and soil, to reduce the dispersal of exotic flora species into, out of, and within the Project area • control of declared and environmental weeds found within the site • minimise the construction footprint e.g., along access roads • staff training to ensure they are aware of the threatened flora and fauna species and ecological communities present and potentially present; and the potential and actual impacts of construction, operation, and maintenance of the proposed project infrastructure on flora and fauna species and habitats • a Weed/Pathogen Management Plan will be developed to ensure noxious species are not introduced or spread further within or off-site.	Prior to construction

7.8 Noise

Issue	Commitment	Timing
Construction noise and vibration requirements	All construction activities will be managed and occur in accordance with the Noise and Vibration Management Plan, which would be developed and endorsed (if/as required) by the responsible authority prior to the commencement of construction. Construction activities to be undertaken must be compliant with requirements of Environment Protection (Commercial and Industrial Noise) Policy 2023.	Construction
Operational noise requirements	Akaysha Energy will ensure that the requirements of the *Environment Protection (Commercial and Industrial Noise) Policy 2023* are meet for sensitive noise receptors.	Ongoing

7.9 Socio-economic

Issue	Commitment	Timing
Community fund	Akaysha Energy has committed to establishing a community benefits fund which will provide a total of $50,000 annually ($30,000 for the solar farm and $20,000 for the BESS) which will support a variety of community projects and organisations.	The fund will be allocated annually and indexed for inflation commencing the first financial year post construction
Workforce accommodation strategy	Before development starts, a Workforce Accommodation Strategy would be developed and implemented for the construction phase in consultation with the Wakefield and Port Pirie regional councils.	Prior to construction
Local business and labour prioritisation	A business register will be established for the Project. Companies can register their interest in providing a range of goods and services. Priority will be given to local companies and businesses where possible.	Prior to construction

7.10 Fire

Issue	Commitment	Timing
Bushfire and emergency management	An Emergency Management Plan will be prepared concurrent with the final CEMP and will include: • a bushfire management plan that is established prior to commencement of construction • exact locations of the dedicated water tank at site • SOP's established for management of fire risk • the emergency contact number (readily available online and is always attended by trained staff) • key emergency contacts list and emergency contact protocols are available to the CFS, allowing for clear and timely communications to and from the CFS • site mapping with locations of water supply, access information, routes, gates and locks • implementing and testing bushfire response plans • providing appropriate emergency response training and equipment to all staff and contractors • during the construction phase, the developer should provide periodical updates to the CFS as the Project is progressively built.	Prior to construction and ongoing
Project design	In consultation with CFS, Akaysha Energy will identify the appropriate size and location of static water points onsite.	Prior to construction
	Akaysha Energy will install agreed static water storage tanks (as appropriate) in the form of above ground water tanks constructed of concrete or steel.	During construction
	Emergency vehicle access gates will be provided every 2 kilometres on boundary roads.	During construction
	Fire breaks of at least 10 metres will be established and maintained around control rooms, electricity compounds and substations.	Ongoing

7.11 Surface water

Issue	Commitment	Timing
Erosion and sediment control	Akaysha Energy will implement erosion and sediment control measures and site rehabilitation and revegetation in accordance with best practice comprising *Water Affecting Activities Best Practice Operating Procedure* and use standard construction site management practices to comply with the Government of South Australia, Department of Transport and Infrastructure, Master Specification PC-ENV2 – Environment Protection Requirements.	Construction and ongoing
Flood risk management	Akaysha Energy will develop and implement site management and protocols in the event of flood events that could impact construction sites or access.	Pre-construction and during construction

7.12 Aboriginal cultural heritage

Issue	Commitment	Timing
Aboriginal Heritage	Construction will be undertaken in accordance with the South Australian Aboriginal Heritage Act (1988), which establishes site reporting requirements during construction so that the works does not "damage, disturb or interfere" with an item, object of site of Aboriginal Heritage.	During construction
	Akaysha Energy will ensure staff undertaking construction are appropriately inducted to be aware of the risks and have a general understanding of how to identify Aboriginal cultural materials.	Prior to construction commencing and during construction
	Akaysha Energy has engaged with traditional owners and is committed to the development of a cultural heritage management plan as a best practice management approach.	Ongoing
	An Aboriginal Participation Plan will be developed in collaboration with traditional owner groups in the region.	Ongoing

Chapter 8
References

ABS (2021) *Koolunga: 2021 Census All persons QuickStats* Accessed 5 October 2023 <https://www.abs.gov.au/census/find-census-data/quickstats/2021/SAL40709>.

AEMO (2022) *2022 Integrated System* Accessed 1 October 2023 <https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en>.

Akaysha (2023) *Brinkworth BESS & Solar Farm* Accessed 5 October 2023 <https://www.akayshaenergy.com/projects/project-brinkworth>.

Austroads (2023) *Austroads Guidelines* Accessed 5 October 2023 <https://austroads.com.au/about-austroads/austroads-guides>.

CFA (2023) *Renewable Energy Fire Safety: CFA's Design Guidelines and Model Requirements for Renewable Energy Facilities v4 (2023)* Accessed 5 October 2023 <https://www.cfa.vic.gov.au/plan-prepare/building-planning-regulations/renewable-energy-fire-safety>.

DCCEEW (2022) *Australia submits new emissions target to UNFCCC* Accessed 5 October 2023 < https://www.dcceew.gov.au/about/news/australia-submits-new-emissions-target-to-unfccc>.

EBS (2023) *Brinkworth Solar Farm and Battery Project – Cultural Heritage Desktop Assessment*. EBS Heritage.

ElectraNet (2013) *Land use guidelines for electricity transmission corridors* Accessed 5 October 2023 < https://www.electranet.com.au/resources/factsheet-land-planning-guide/>.

ElectraNet (2023a) *Transmission Annual Planning Report Update* Accessed 5 October 2023 <https://www.electranet.com.au/wp-content/uploads/2023-TAPR-Update.pdf>.

ElectraNet (2023b) *Mid North SA Renewable Energy Zone: Preparatory Activities – Final Report*. Accessed 1 October 2023 <https://www.electranet.com.au/wp-content/uploads/Preparatory-activities-Mid-North-SA-REZ.pdf>.

ENF (2023) *Deep Blue 4.0X JAM72D40 555-580/GB* Accessed 5 October 2023. < https://www.enfsolar.com/pv/panel-datasheet/crystalline/56654>.

Government of South Australia (2023). *Leading the green economy* Accessed 5 October 2023 <https://www.energymining.sa.gov.au/industry/modern-energy/leading-the-green-economy>.

NSW Treasury (2022) *AUS Input-Output Employment Multipliers* Accessed 5 October 2023 < https://www.treasury.nsw.gov.au/sites/default/files/2022-03/aus-io-model-28022022.xlsx>.

Powin (2023) *Stake 750 Centipede Platform* Accessed 5 October 2023 <https://powin.com/wp-content/uploads/2023/05/Powin-Centipede-Product-Line.pdf>.

SMA (2023) *Medium Voltage Power Station 4000 / 4200 / 4400* Accessed 5 October 2023 < https://www.sma-australia.com.au/products/system-solutions-packages/medium-voltage-power-station-4000-4200-4400>.

Wakefield Regional Council (2023) *Wakefield 2023 Our Community Plan* Accessed 5 October 2023 <https://www.wrc.sa.gov.au/__data/assets/pdf_file/0032/805388/WRC-Community-Plan-W2030.pdf>.

akaysha

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Appendix A
Certificates of Titles

Product	Register Search Plus (CT 5864/896)
Date/Time	18/10/2023 11:04AM
Customer Reference	BRW
Order ID	20231018003287

REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

Certificate of Title - Volume 5864 Folio 896

Parent Title(s) CT 3592/68

Creating Dealing(s) CONVERTED TITLE

Title Issued 18/01/2002 **Edition** 3 **Edition Issued** 22/10/2009

Estate Type

FEE SIMPLE

Registered Proprietor

EULUNGA PTY. LTD. (ACN: 135 777 392)
OF PO BOX 12 BRINKWORTH SA 5464

Description of Land

ALLOTMENT 96 FILED PLAN 199935
IN THE AREAS NAMED BRINKWORTH AND KOOLUNGA
HUNDREDS OF BOUCAUT AND KOOLUNGA

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A AND C TO DISTRIBUTION LESSOR CORPORATION (SUBJECT TO LEASE 8890000) (T 1878875 AND T 2878770 RESPECTIVELY)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A. B AND C TO TRANSMISSION LESSOR CORPORATION (SUBJECT TO LEASE 9061500) AND ELECTRANET PTY. LTD. (T 1878875 T 2258076 AND T 2878770 RESPECTIVELY)

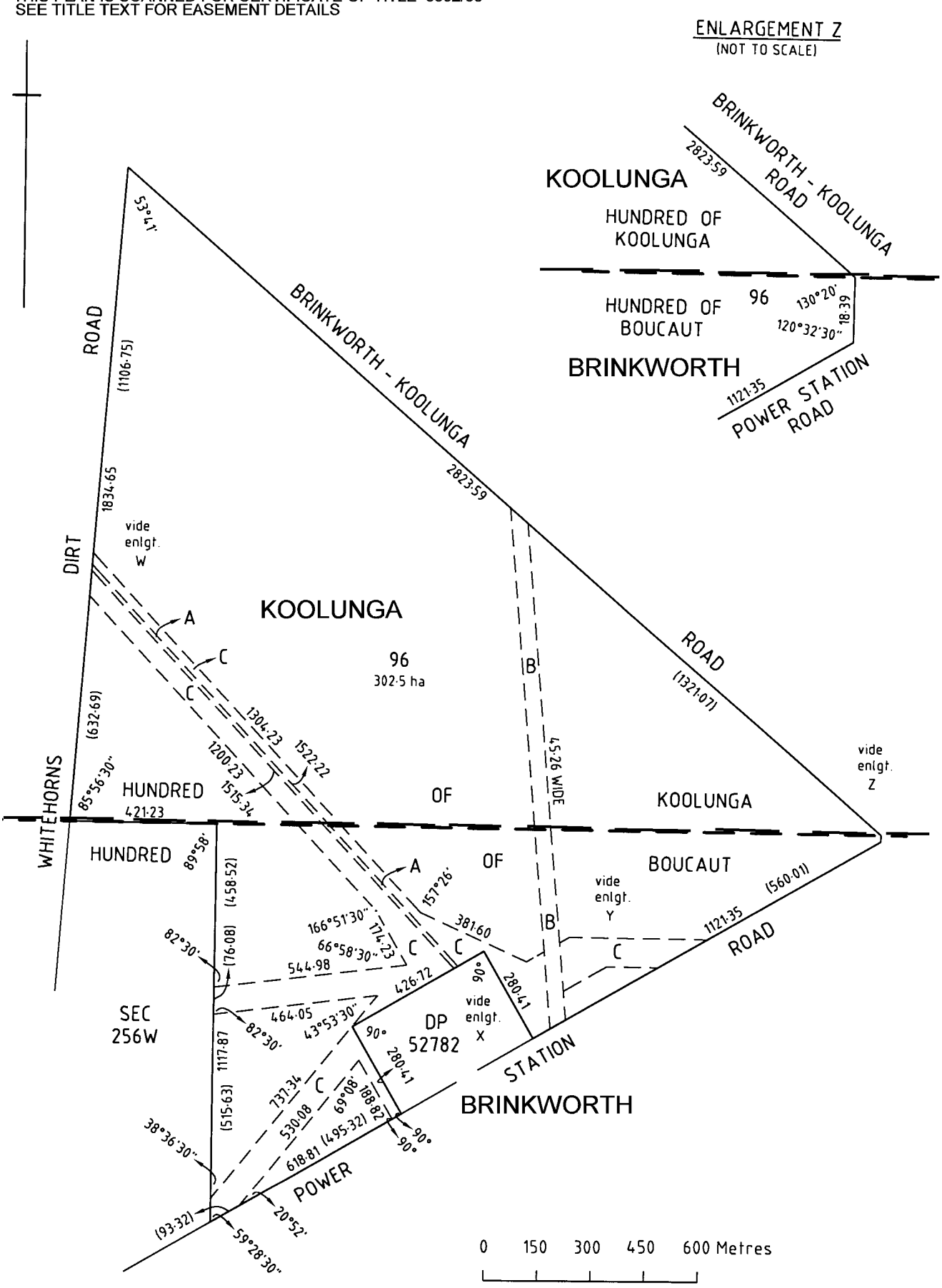
Schedule of Dealings

Dealing Number	Description
11270247	MORTGAGE TO AUSTRALIA & NEW ZEALAND BANKING GROUP LTD.
13418627	CAVEAT BY BRINKWORTH SOLAR FARM PTY. LTD. (ACN: 630 724 579)

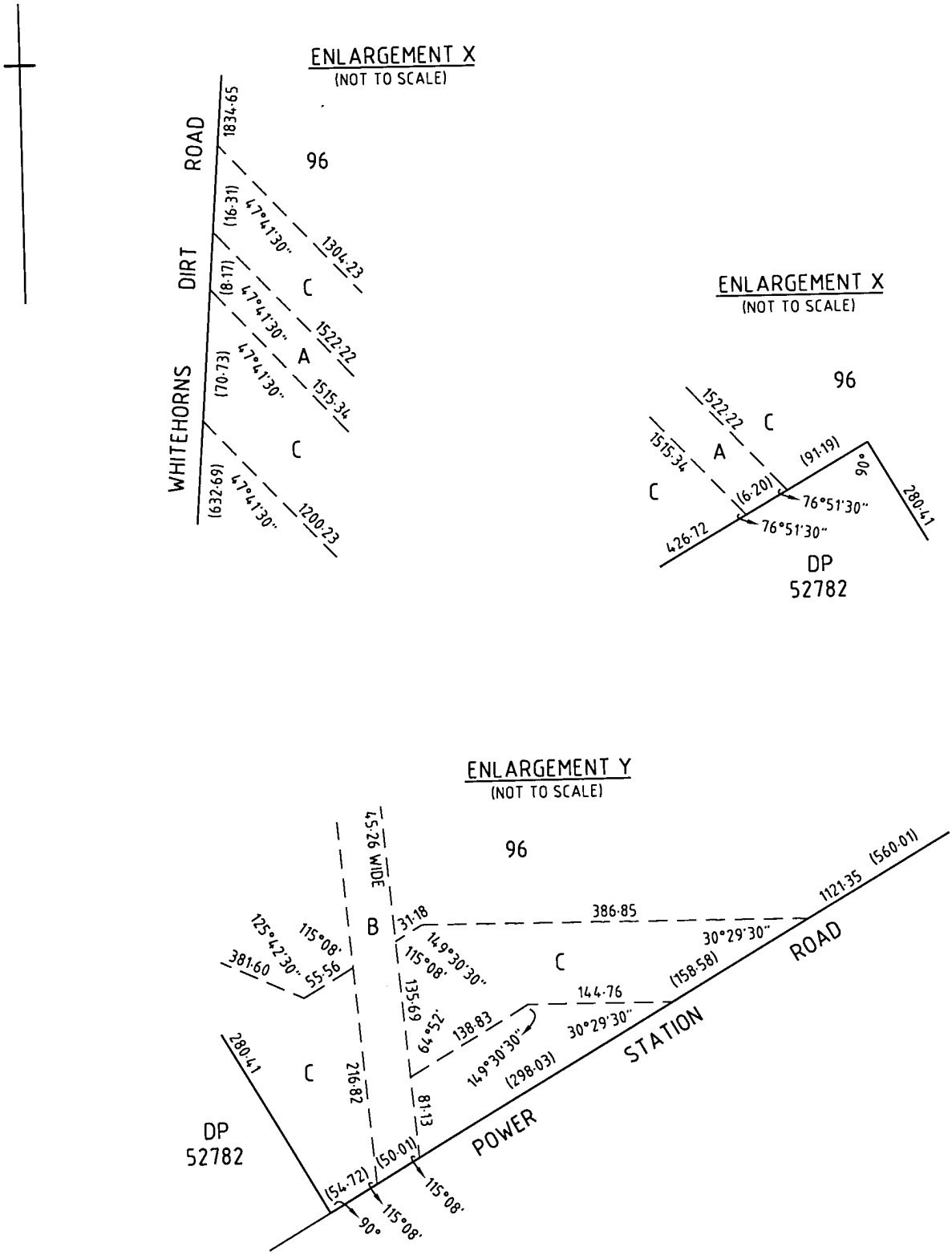
Notations

Dealings Affecting Title	NIL
Priority Notices	NIL
Notations on Plan	NIL
Registrar-General's Notes	NIL
Administrative Interests	NIL

THIS PLAN IS SCANNED FOR CERTIFICATE OF TITLE 3592/68
SEE TITLE TEXT FOR EASEMENT DETAILS



NOTE: SUBJECT TO ALL LAWFULLY EXISTING PLANS OF DIVISION



Product	Register Search Plus (CT 5559/453)
Date/Time	18/10/2023 11:01AM
Customer Reference	BRW
Order ID	20231018003230

REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

Certificate of Title - Volume 5559 Folio 453

Parent Title(s)	CT 3592/67				
Creating Dealing(s)	CONVERTED TITLE				
Title Issued	30/07/1998	**Edition**	3	**Edition Issued**	16/12/2010

Estate Type

FEE SIMPLE

Registered Proprietor

EULUNGA PTY. LTD. (ACN: 135 777 392)
OF C/- JEFFREY A GILL PTY LTD 167 MAIN NORTH ROAD CLARE SA 5453

Description of Land

SECTION 256W
HUNDRED OF BOUCAUT
IN THE AREA NAMED BRINKWORTH

Easements

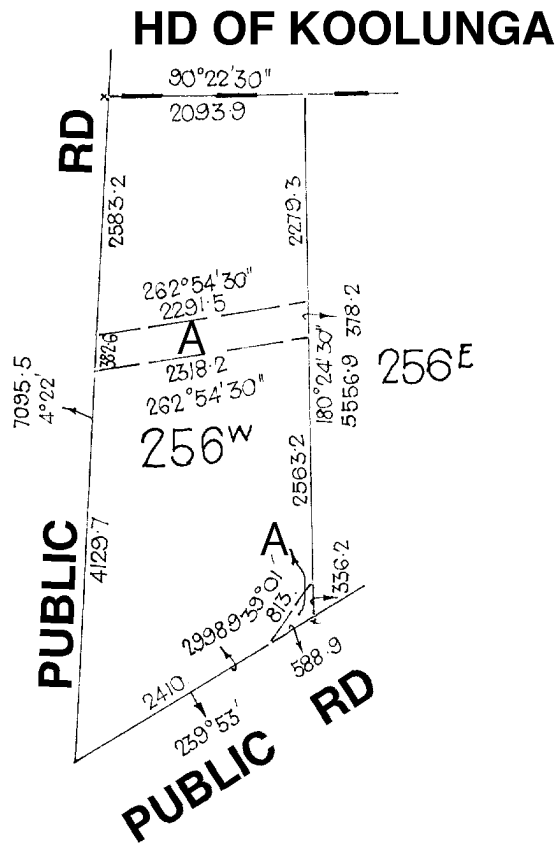
SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO THE ETSA CORPORATION (T 2878770)

Schedule of Dealings

Dealing Number	Description
11494303	MORTGAGE TO AUSTRALIA & NEW ZEALAND BANKING GROUP LTD.
13418627	CAVEAT BY BRINKWORTH SOLAR FARM PTY. LTD. (ACN: 630 724 579)

Notations

Dealings Affecting Title	NIL
Priority Notices	NIL
Notations on Plan	NIL
Registrar-General's Notes	NIL
Administrative Interests	NIL



DISTANCES ARE IN LINKS FOR METRIC CONVERSION

1 LINK = 0·201168 METRES

1 CHAIN = 100 LINKS

Product	Register Search Plus (CT 5588/666)
Date/Time	18/10/2023 11:06AM
Customer Reference	BRW
Order ID	20231018003339

REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

Certificate of Title - Volume 5588 Folio 666

Parent Title(s) CT 3588/148

Creating Dealing(s) CONVERTED TITLE

Title Issued 26/10/1998 **Edition** 3 **Edition Issued** 19/11/2021

Estate Type

FEE SIMPLE

Registered Proprietor

WAYNE ANDREW WECKERT
OF PO BOX 5 BRINKWORTH SA 5464
1 / 2 SHARE

SHARON ANN WECKERT
OF PO BOX 5 BRINKWORTH SA 5464
1 / 2 SHARE

Description of Land

SECTIONS 257 AND 259
HUNDRED OF BOUCAUT
IN THE AREA NAMED BRINKWORTH

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO THE ETSA CORPORATION (T 1877485)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED B TO THE ETSA CORPORATION (T 2258069)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED C TO THE ETSA CORPORATION (T 2923111)

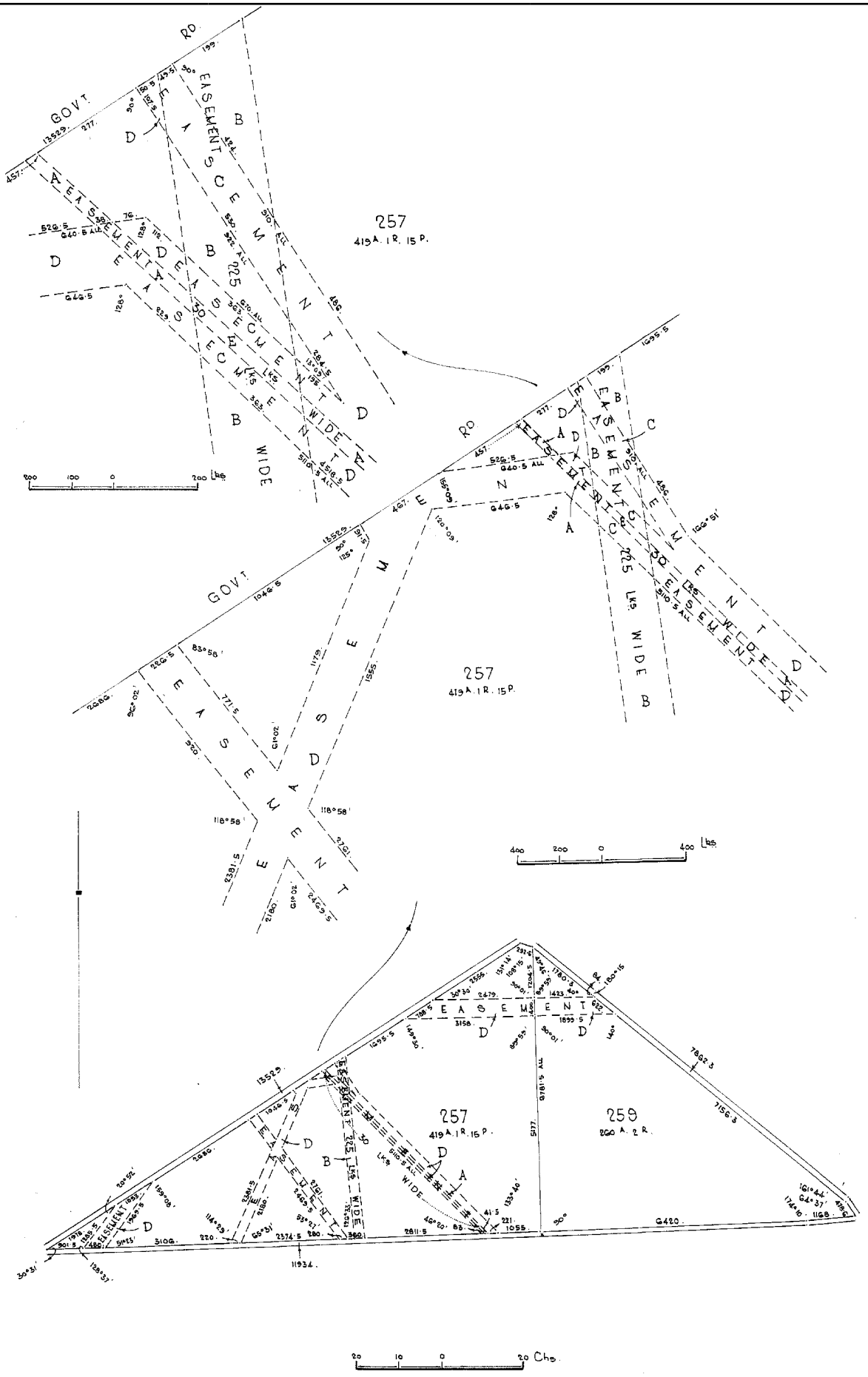
Schedule of Dealings

Dealing Number	Description
13418626	CAVEAT BY BRINKWORTH SOLAR FARM PTY. LTD. (ACN: 630 724 579)
13651918	MORTGAGE TO NATIONAL AUSTRALIA BANK LTD. (ACN: 004 044 937)

Notations

Dealings Affecting Title	NIL
Priority Notices	NIL
Notations on Plan	NIL
Registrar-General's Notes	NIL
Administrative Interests	NIL

Product	Register Search Plus (CT 5588/666)
Date/Time	18/10/2023 11:06AM
Customer Reference	BRW
Order ID	20231018003339



Product	Register Search Plus (CT 6169/612)
Date/Time	18/10/2023 11:08AM
Customer Reference	BRW
Order ID	20231018003365

REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

Certificate of Title - Volume 6169 Folio 612

Parent Title(s) CT 6106/213

Creating Dealing(s) TG 12465165

Title Issued 16/02/2016 **Edition** 3 **Edition Issued** 19/11/2021

Estate Type

FEE SIMPLE

Registered Proprietor

WAYNE ANDREW WECKERT
SHARON ANN WECKERT
OF PO BOX 5 BRINKWORTH SA 5464
WITH NO SURVIVORSHIP

Description of Land

ALLOTMENT 102 DEPOSITED PLAN 27337
IN THE AREA NAMED BRINKWORTH
HUNDRED OF BOUCAUT

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A ON F250770 TO DISTRIBUTION LESSOR CORPORATION (SUBJECT TO LEASE 8890000) (T 1877489)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A ON F250770 TO TRANSMISSION LESSOR CORPORATION OF 1 UNDIVIDED 2ND PART (SUBJECT TO LEASE 9061500) AND ELECTRANET PTY. LTD. OF 1 UNDIVIDED 2ND PART (T 1877489)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED B ON F250770 TO TRANSMISSION LESSOR CORPORATION OF 1 UNDIVIDED 2ND PART (SUBJECT TO LEASE 9061500) AND ELECTRANET PTY. LTD. OF 1 UNDIVIDED 2ND PART (T 2302334)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED C ON F250770 TO TRANSMISSION LESSOR CORPORATION OF 1 UNDIVIDED 2ND PART (SUBJECT TO LEASE 9061500) AND ELECTRANET PTY. LTD. OF 1 UNDIVIDED 2ND PART (T 3056913)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED D ON F250770 FOR WATER SUPPLY PURPOSES (TG 12465165)

Schedule of Dealings

Dealing Number	Description
13418626	CAVEAT BY BRINKWORTH SOLAR FARM PTY. LTD. (ACN: 630 724 579)
13651907	MORTGAGE TO NATIONAL AUSTRALIA BANK LTD. (ACN: 004 044 937)

Notations

Dealings Affecting Title NIL

Priority Notices NIL

Notations on Plan NIL

Registrar-General's Notes	NIL
Administrative Interests	NIL

Appendix B
Technical Regulator Certificate

Government of South Australia
Department for Energy and Mining

Ref: 2023D049285

Energy and Technical Regulation

Office of the Technical Regulator

Level 8, 11 Waymouth Street
Adelaide SA 5000

GPO Box 320
Adelaide SA 5001

Telephone: 08 8226 5500
Facsimile: 08 8226 5866

www.sa.gov.au/otr

14 June 2023

Paul Curnow
Director Strategy and General Counsel
Akaysha Energy
10 - 12 Gwynne Street
Cremorne VIC 3121

Dear Mr Curnow,

RE: Brinkworth Solar Farm and BESS Project

The development of the Brinkworth Solar Farm and BESS Project has been assessed by the Office of the Technical Regulator (OTR) under section 122 of the *Planning, Development and Infrastructure Act 2016.*

The *Planning, Development and Infrastructure (General) Regulations 2017* prescribe if the proposed development is for the purposes of the provision of electricity generating plant with a generating capacity of more than 5 MW that is to be connected to the State's power system – a certificate from the Technical Regulator is required, certifying that the proposed development complies with the requirements of the Technical Regulator in relation to the security and stability of the State's power system.

In making a decision on your application, our office has taken the following information into account:

- Your letters dated 25th May 2023

After assessing the information provided, I advise that approval is granted for the project on the condition that 84.5MW of fast frequency response is provided by the 300MW/1200MWh BESS.

It should be noted that should the proponent subsequently decide not to construct the BESS as outlined in the Development Application (DA) and agreed to in this certificate, the proponent is advised that they must apply for a variation to the DA. Any such variation will require the proponent to obtain a new certificate from the OTR. If a certificate is not obtained, formal referral to the OTR will be required during the DA assessment process. Any formal referral may be subject to referral fees applicable at the time.

Should you have any questions regarding this matter, please do not hesitate to call Mark Burns on (08) 8429 2707.

Yours sincerely

Rob Faunt
TECHNICAL REGULATOR

Appendix C

Crown Sponsorship Letter

Government of South Australia

Department for Energy and Mining

Our Ref: DEMC23/00993

Michael Sale
Regional Development Manager
Wind Prospect Pty Ltd
Suite 10, 19 – 35 Gertrude St
FITZROY VICTORIA 3065

Via email: michael.sale@windprospect.com.au

Cc: mary.lavelle@sa.gov.au

Dear Mr Sale

CROWN SPONSORSHIP FOR AKAYSHA ENERGY'S BRINKWORTH SOLAR FARM AND BATTERY PROJECT

Thank you for the correspondence dated 16 June 2023 requesting Crown sponsorship under section 131 of the *Planning, Development and Infrastructure Act 2016* to assist with Akaysha Energy's proposed Brinkworth Solar Farm and Battery Project (the project).

The project has been considered by the Department for Energy and Mining (DEM) with input from the Department for Infrastructure and Transport, the Department for Environment and Water, and the Environment Protection Authority. In principle, the project is supported, recognising the possible environmental and community issues that will need to be addressed through the development assessment process.

On balance, the development of Akaysha Energy's proposed project has the potential to benefit South Australia and can be considered essential infrastructure.

Accordingly, I, as Chief Executive of DEM, will support the development and specifically endorse a development application to assess the project, comprising 300MW battery with 4 hours of storage, 209MW of solar panels and ancillary equipment at Brinkworth, as a development of 'essential infrastructure' under section 131(2)(c) of the *Planning, Development and Infrastructure Act 2016*.

It is the responsibility of Akaysha to prepare all documentation as required by the relevant Act. This includes all costs in the preparation, lodgement and assessment of the development application and any other subsequent action in relation to this application.

A development application must be submitted to DEM's Growth and Low Carbon Division (glc@sa.gov.au) who will lodge it with the State

Chief Executive
Address Level 12, 11 Waymouth Street, Adelaide 5000 | GPO Box 320 Adelaide SA 5001 | DX452
Tel (+61) 08 8429 3216 | Email DEM.OCE@sa.gov.au | www.energymining.sa.gov.au | ABN 83 768 683 934

SOUTH AUSTRALIA

Government of South Australia
Department for Energy and Mining

Commission Assessment Panel (SCAP). These lodgement documents can be provided in electronic form or made available via download link. Any development fee levied by SCAP is the responsibility of Akaysha Energy.

It is also a requirement that you contact Ms Mary Lavelle, Industry Analyst – Clean Energy Infrastructure, on 08 8429 3515 or via email at mary.lavelle@sa.gov.au prior to the lodgement of the development application to ensure all relevant statutory requirements are met.

DEM makes no representations and gives no warranties in relation to the outcome of the development application or time that it takes to secure a planning outcome. It is the responsibility of Akaysha Energy to obtain all other statutory approvals, licences, connection agreements and permits from relevant authorities; manage community expectations; and to fund the project. The South Australian Government makes no commitment to purchase any product or service related to the project.

If the development application has not been received electronically, by mail or in person by the SCAP within 12 months from the date of this letter, my support for this Crown sponsorship under section 131(2)(c) of the *Planning, Development and Infrastructure Act 2016* will lapse.

Yours sincerely

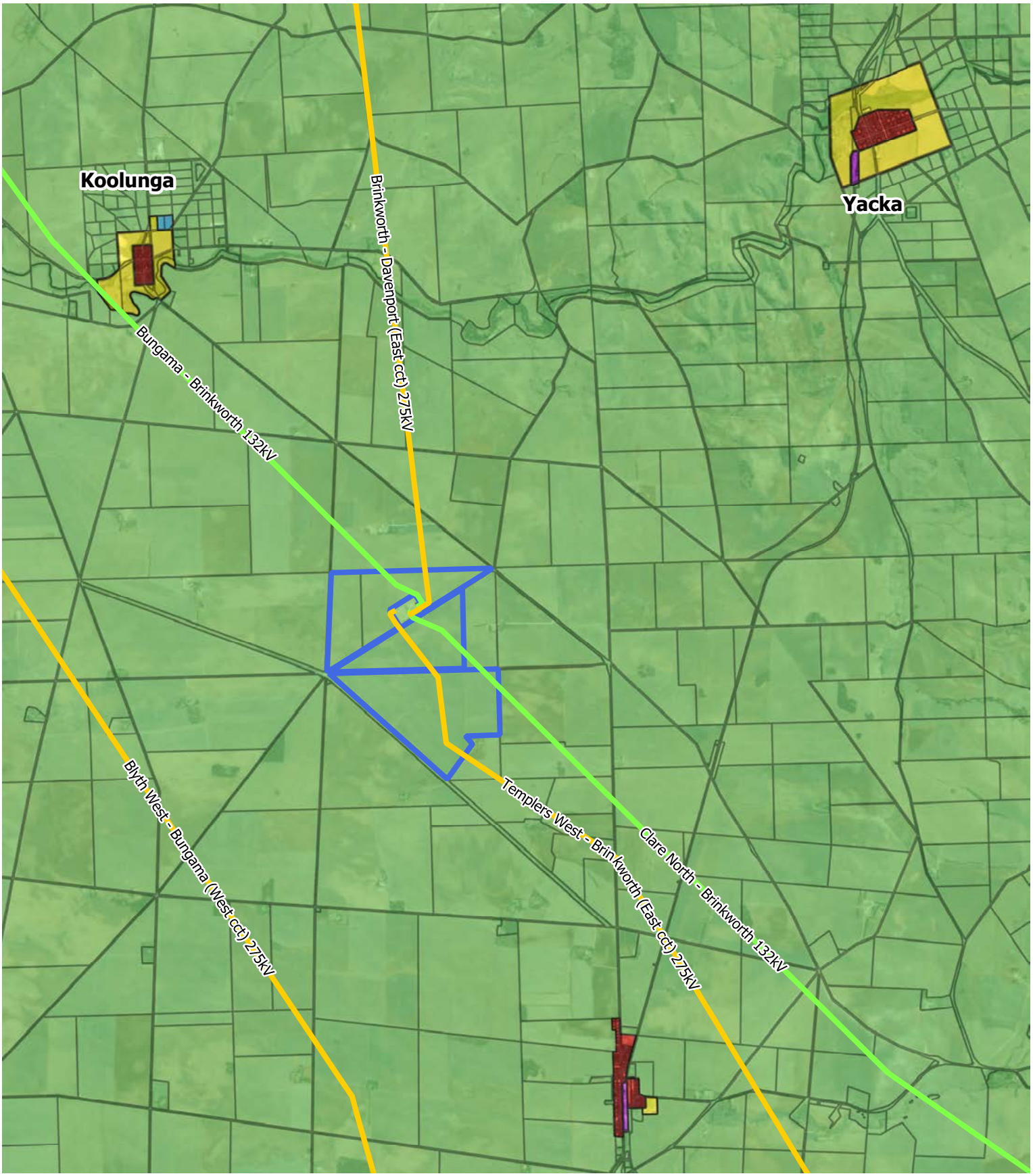
Paul Heithersay PSM
CHIEF EXECUTIVE

7 / 9 / 2023

Chief Executive
Address Level 12, 11 Waymouth Street, Adelaide 5000 | GPO Box 320 Adelaide SA 5001 | DX452
Tel (+61) 08 8429 3216 | Email DEM.OCE@sa.gov.au | www.energymining.sa.gov.au | ABN 83 768 683 934

SOUTH AUSTRALIA

Appendix D
Proposed Plans



Land Use Zones

Planning and Design (P&D) Zones:

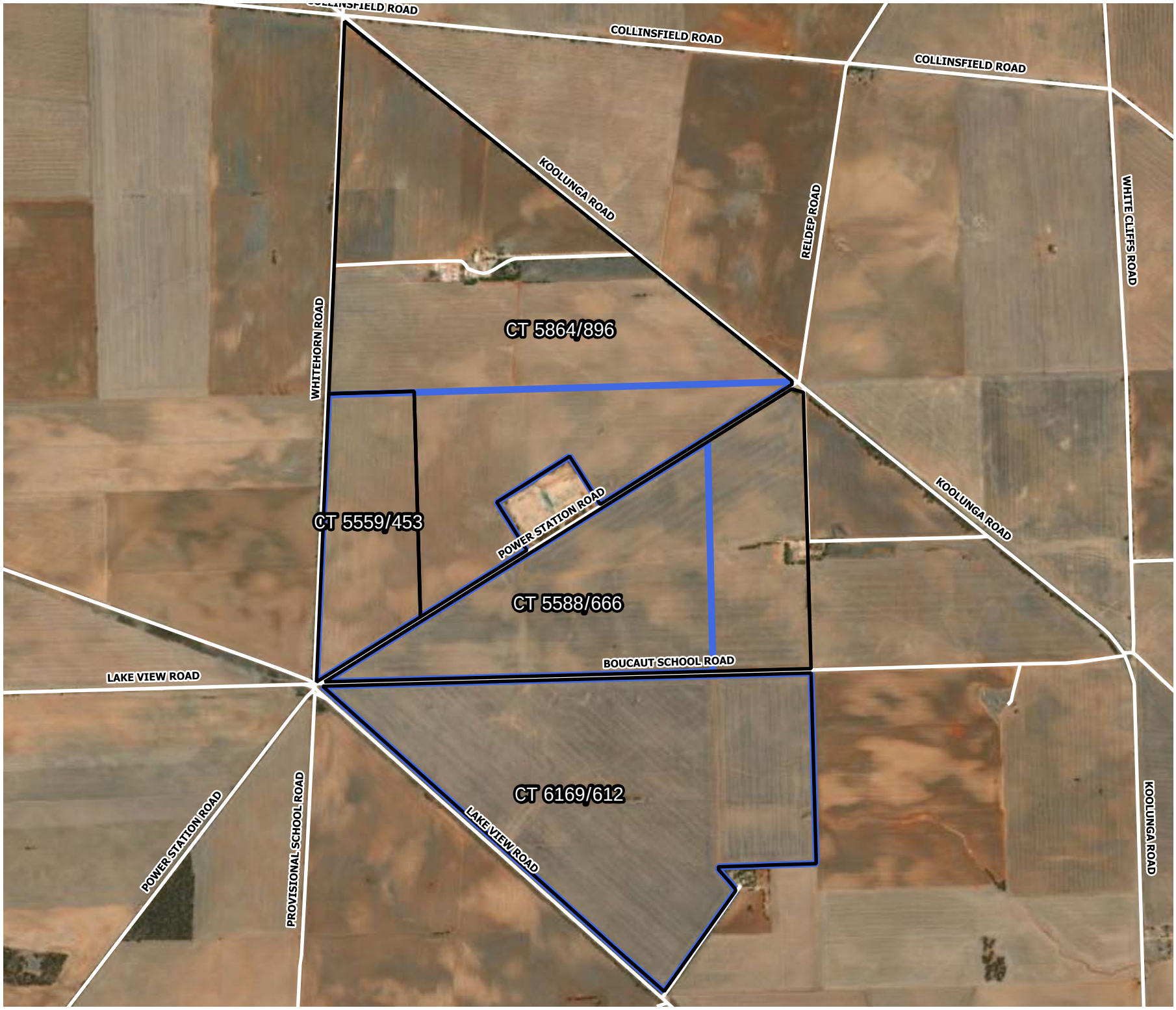
- Community Facilities
- Employment (Bulk Handling)
- Rural
- Rural Living
- Township

- Project site boundary
- Parcels
- 132 kV transmission line
- 275 kV transmission line

Ref: DWG 031 A.2
Author: J. Mourier
Date created: 4.10.2023
Datum: GDA20 / MGA zone 54

2,500 m

WIND PROSPECT

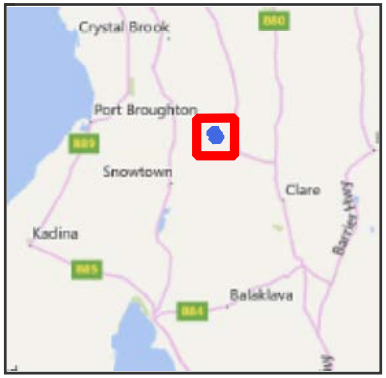


Subject land

Subject land

Parcels

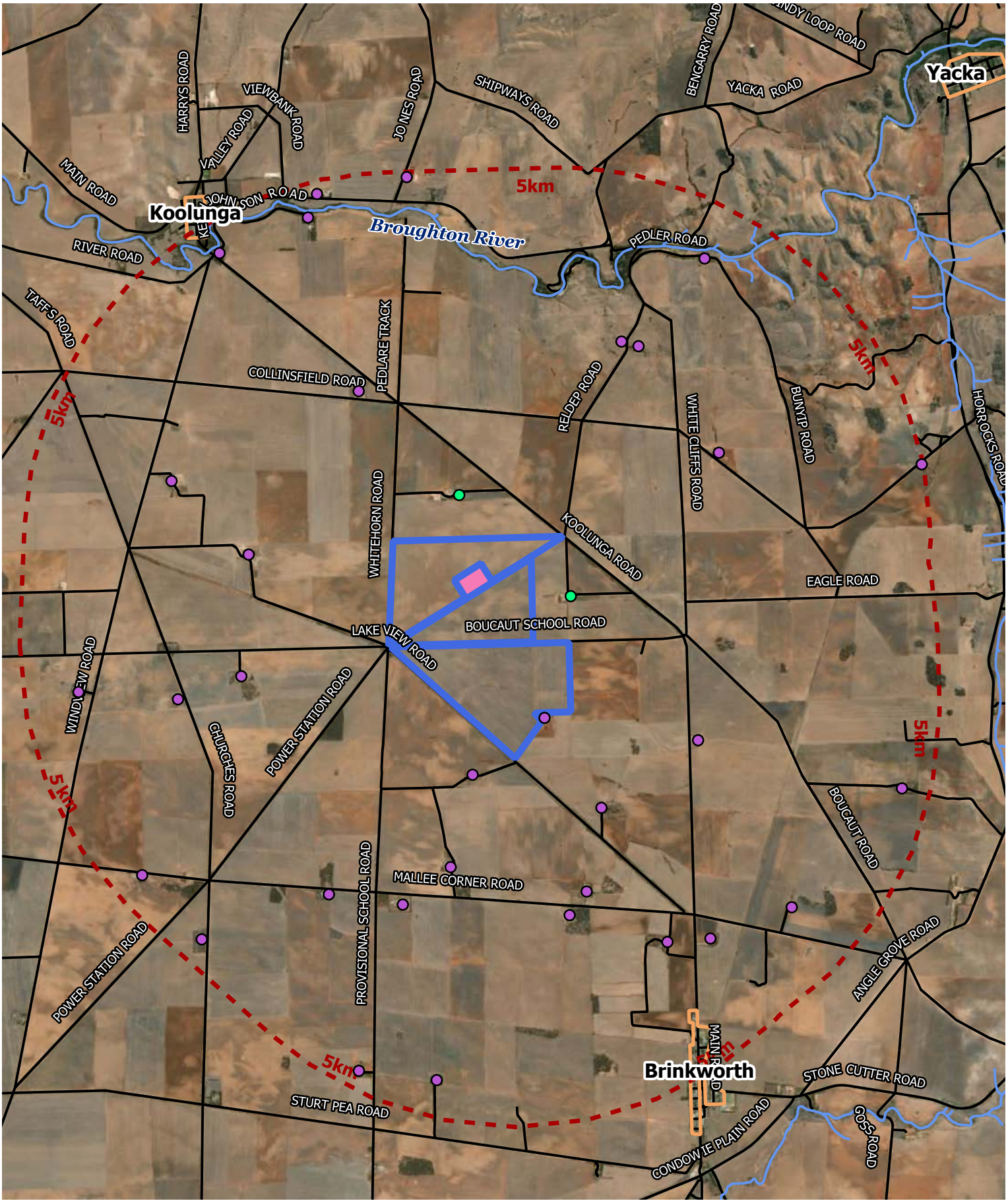
Road



Ref: DWG 038 A.1
Author: J. Mourier
Date created: 9.10.2023
Datum: GDA20 / MGA zone 54

850 m

WIND PROSPECT



Sensitive receptors

- Project site boundary
- Township zone
- Existing Brinkworth substation
- Watercourse
- Road
- 5 km from project

Sensitive receivers:

- Involved landowner dwelling
- Neighbouring dwelling

Ref: DWG 030 A.5
Author: J. Mourier
Date created: 19.10.2023
Datum: GDA20 / MGA zone 54

2,500 m

WIND PROSPECT

Project overview

- Project site boundary
- Fence
- Existing Brinkworth substation
- BESS infrastructure (exempt from planning approval)
- Solar farm substation and connection
- Solar panels
- Inverter station
- Weather station
- Water tank
- Primary access
- Emergency access

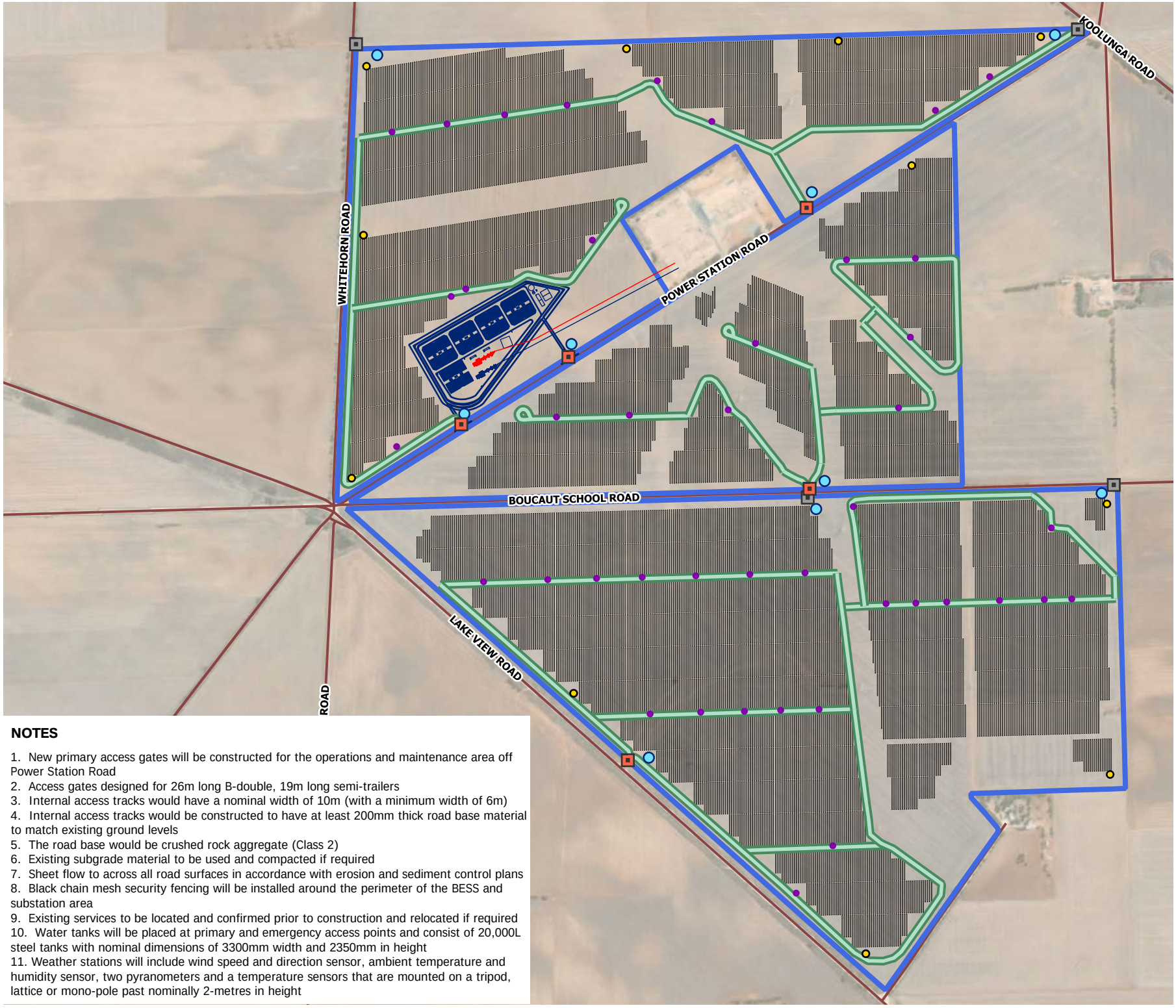
Transmission Lines Electranet

- 132 kV
- 275 kV

Ref: DWG 027 B.5
Author: J. Mourier
Date created: 02.05.2024
Datum: GDA20 / MGA zone 54

600 m

WIND PROSPECT



Solar farm overview and vehicle access

- Project site boundary
- Public road
- Fence
- Primary access
- Emergency access
- Water tank
- Weather station
- Inverter station
- Internal access track
- Solar panels
- Solar farm substation and connection
- BESS infrastructure (exempt from planning approval)

NOTES

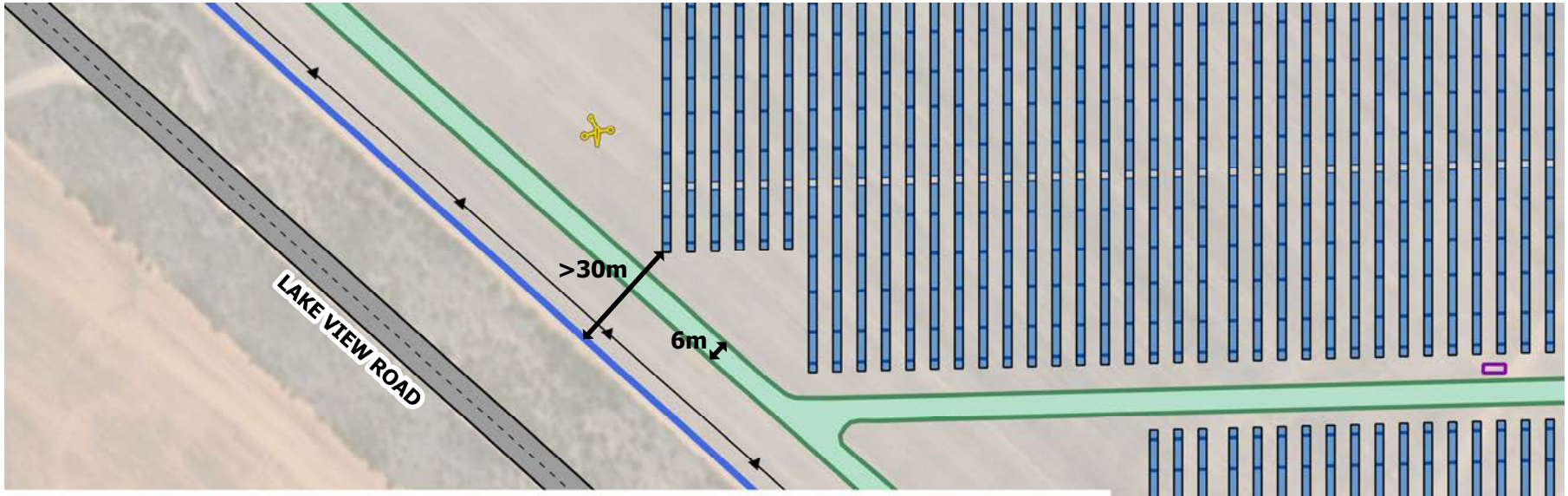
1. New primary access gates will be constructed for the operations and maintenance area off Power Station Road
2. Access gates designed for 26m long B-double, 19m long semi-trailers
3. Internal access tracks would have a nominal width of 10m (with a minimum width of 6m)
4. Internal access tracks would be constructed to have at least 200mm thick road base material to match existing ground levels
5. The road base would be crushed rock aggregate (Class 2)
6. Existing subgrade material to be used and compacted if required
7. Sheet flow to across all road surfaces in accordance with erosion and sediment control plans
8. Black chain mesh security fencing will be installed around the perimeter of the BESS and substation area
9. Existing services to be located and confirmed prior to construction and relocated if required
10. Water tanks will be placed at primary and emergency access points and consist of 20,000L steel tanks with nominal dimensions of 3300mm width and 2350mm in height
11. Weather stations will include wind speed and direction sensor, ambient temperature and humidity sensor, two pyranometers and a temperature sensors that are mounted on a tripod, lattice or mono-pole past nominally 2-metres in height

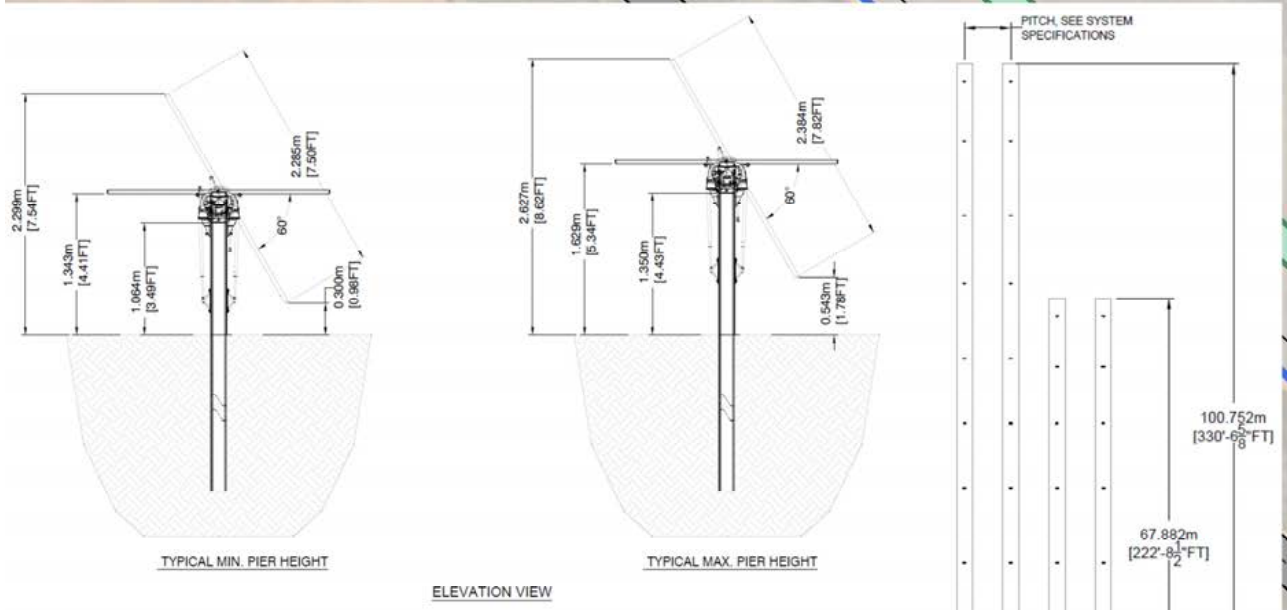
Ref: DWG 039 A.7
Author: J. Mourier
Date created: 02.05.2024
Datum: GDA20 / MGA zone 54

600 m

WIND PROSPECT

Solar farm typical plan





NOTES

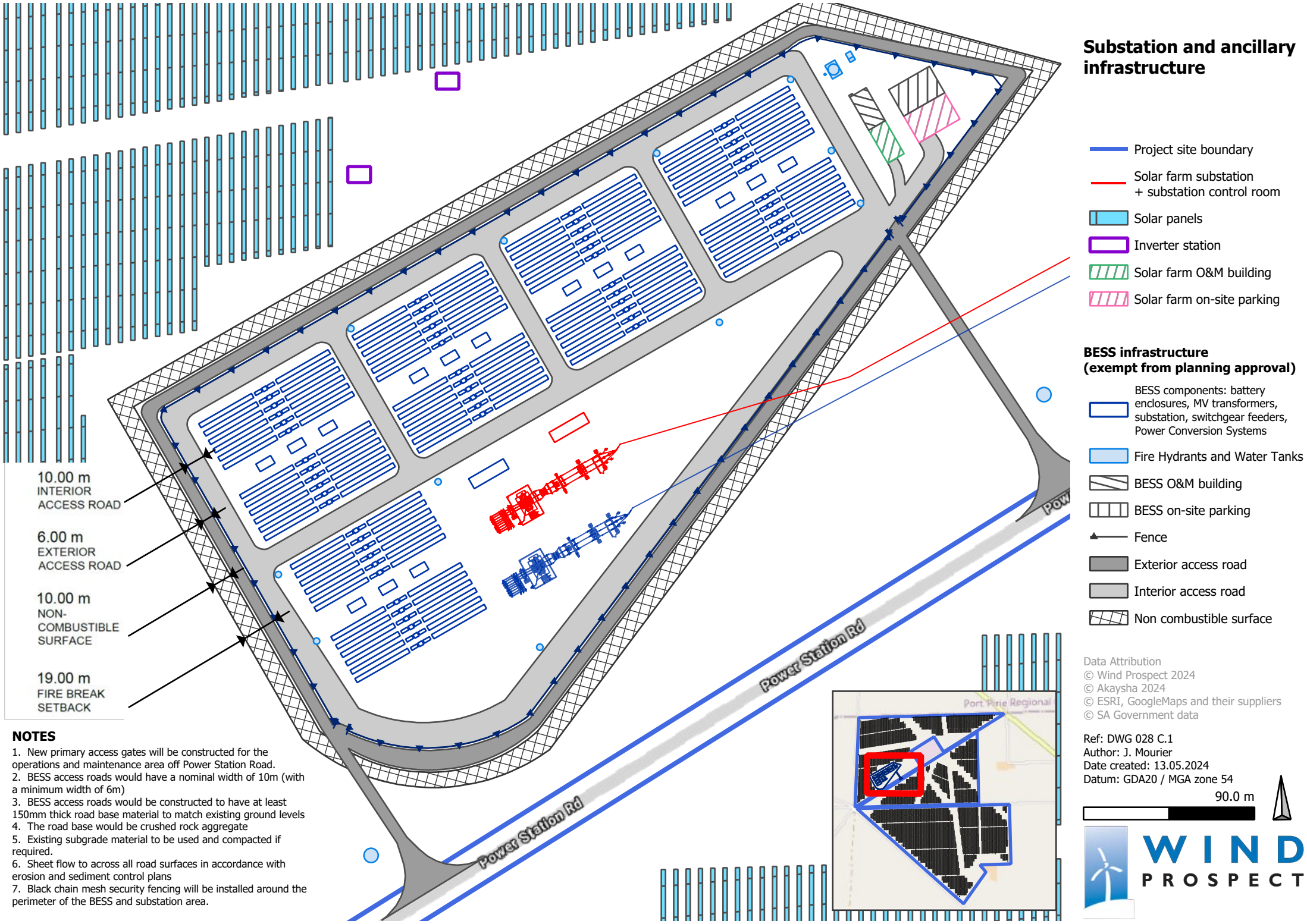
1. Solar PV module capacity 570W
2. 28 solar modules per string on 13,120 strings
3. Trackers to have a maximum pier height of 1.5m
4. Compaction of the solar field driven post foundation shall be in conformance with the geotechnical report recommendations.
5. Internal access tracks would be constructed to have at least 200mm thick road base material to match existing ground levels
6. The road base would be crushed rock aggregate (Class 2)
7. 11 weather stations to include wind speed and direction sensor, ambient temperature and humidity sensor, two pyranometers and a temperature sensors that are mounted on a tripod, lattice or mono-pole past nominally 2-metres in height
8. Water tanks will be placed at primary and emergency access points and consist of 20,000L steel tanks with nominal dimensions of 3300mm width and 2350mm in height
9. Setback distances are greater than 30m from the closest point of solar panels to the property boundary

- Project site boundary
- Public road
- Access gate
- Inverter station
- Weather station
- Internal road
- Solar panels
- Water tank
- Fence

Ref: DWG 042 A.4
Author: J. Mourier
Date created: 19.10.2023
Datum: GDA20 / MGA zone 54

60.0 m

WIND PROSPECT



Substation and ancillary infrastructure

- Project site boundary
- Solar farm substation + substation control room
- Solar panels
- Inverter station
- Solar farm O&M building
- Solar farm on-site parking

BESS infrastructure (exempt from planning approval)

- BESS components: battery enclosures, MV transformers, substation, switchgear feeders, Power Conversion Systems
- Fire Hydrants and Water Tanks
- BESS O&M building
- BESS on-site parking
- Fence
- Exterior access road
- Interior access road
- Non combustible surface

NOTES

1. New primary access gates will be constructed for the operations and maintenance area off Power Station Road.
2. BESS access roads would have a nominal width of 10m (with a minimum width of 6m)
3. BESS access roads would be constructed to have at least 150mm thick road base material to match existing ground levels
4. The road base would be crushed rock aggregate
5. Existing subgrade material to be used and compacted if required.
6. Sheet flow to across all road surfaces in accordance with erosion and sediment control plans
7. Black chain mesh security fencing will be installed around the perimeter of the BESS and substation area.

Ref: DWG 028 C.1
Author: J. Mourier
Date created: 13.05.2024
Datum: GDA20 / MGA zone 54

90.0 m

WIND PROSPECT

6.2.2 External dimensions and weights

With oil spill containment

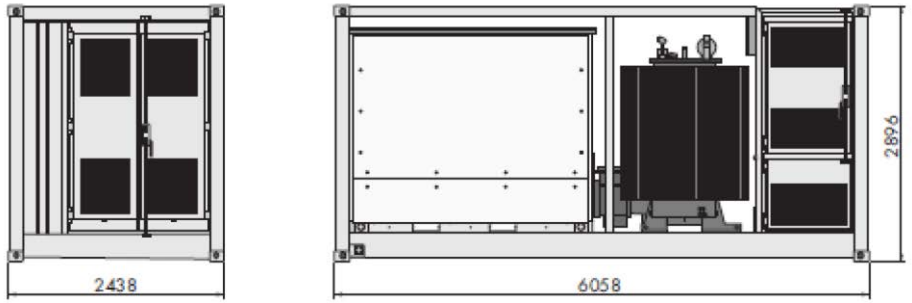


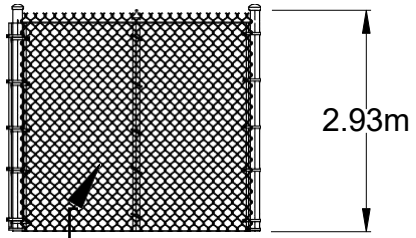
Figure 33: Dimensions of the MV Power Station(Dimensions in mm)

Width	Height	Depth	Weight
6058 mm	2896 mm	2438 mm	< 18 t

1 ES5

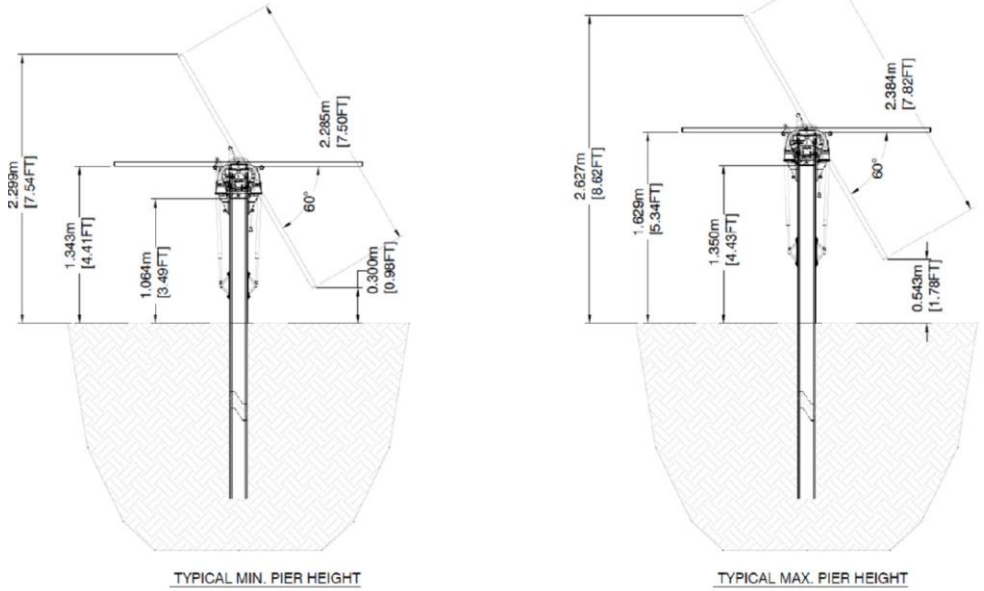
1 MV POWER STATION

1:100



4 HIGH SECURITY FENCE

1:100



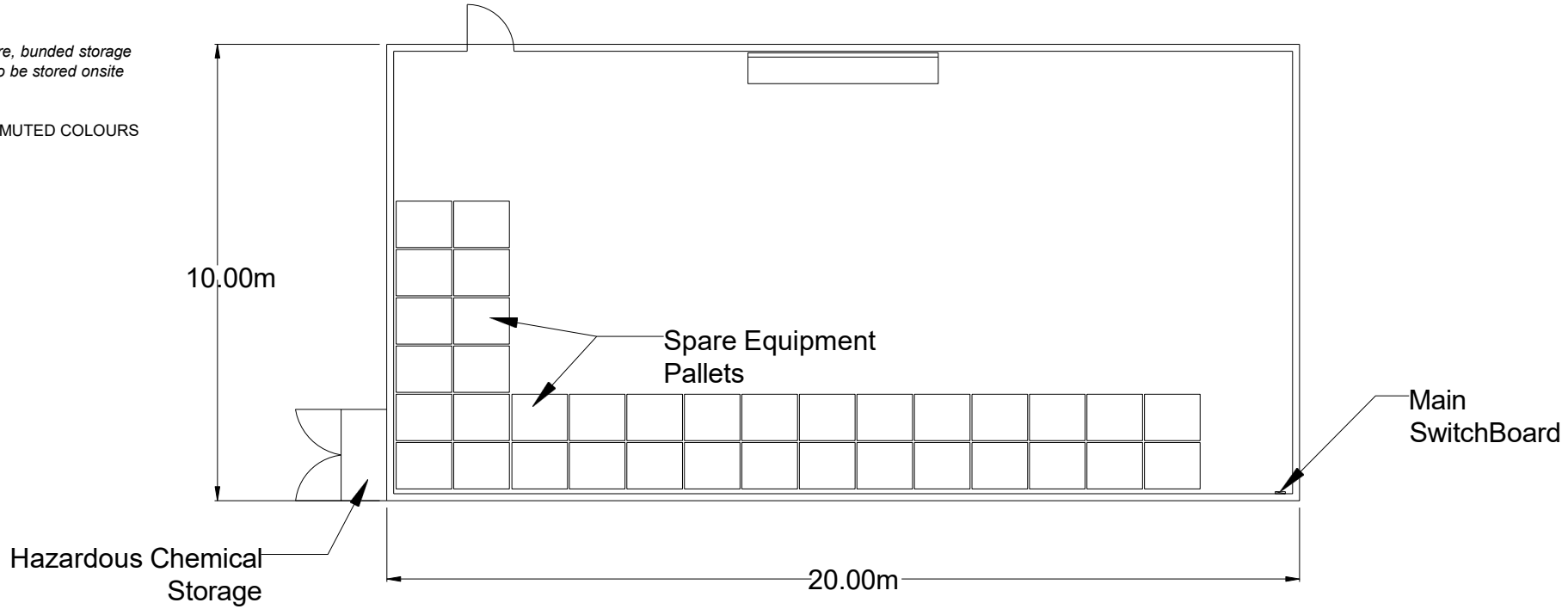
ELEVATION VIEW

3 SOLAR PANEL

NOTES:	AKAYSHA ENERGY PTY. LTD. 10-20 GWYNNE ST CREMORNE, VIC	DRAWN:	M. PHILLIPS	2/10/2023	DRAWING TITLE:	OTHER EQUIPMENT ELEVATIONS AND DETAILS	
		APPROVED:			PROJECT:	Brinkworth Solar + BESS	
					REV: 1.0	SHEET:	3 OF 5

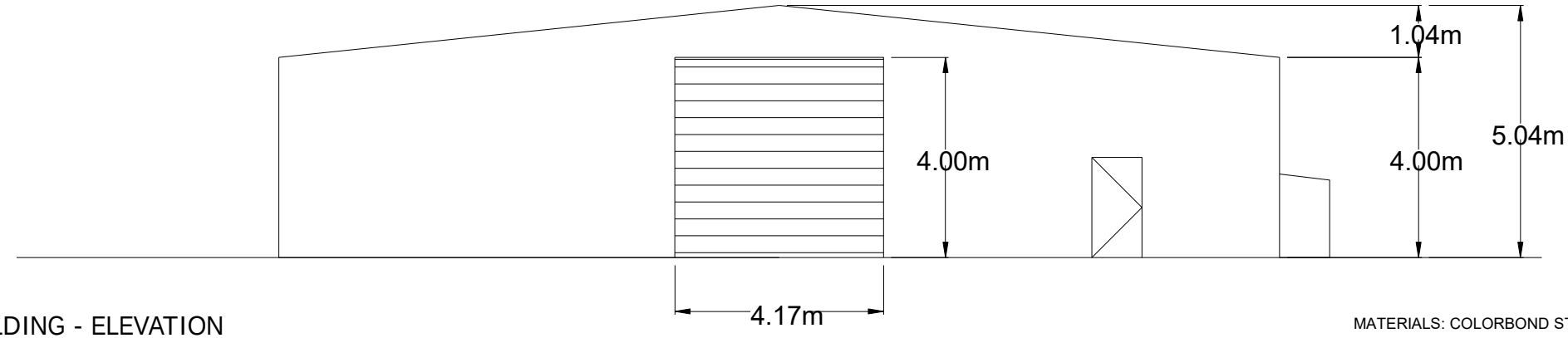
The maintenance shed will also include secure, bunded storage for hazardous materials if they are required to be stored onsite

MATERIALS: COLORBOND STEEL
COLOUR: EUCALYPT GREEN OR SIMLAR MUTED COLOURS



2 O&M BUILDING - PLAN VIEW

1:100



1 O&M BUILDING - ELEVATION

1:100

MATERIALS: COLORBOND STEEL
COLOUR: EUCALYPT GREEN OR SIMLAR MUTED COLOURS

NOTES:

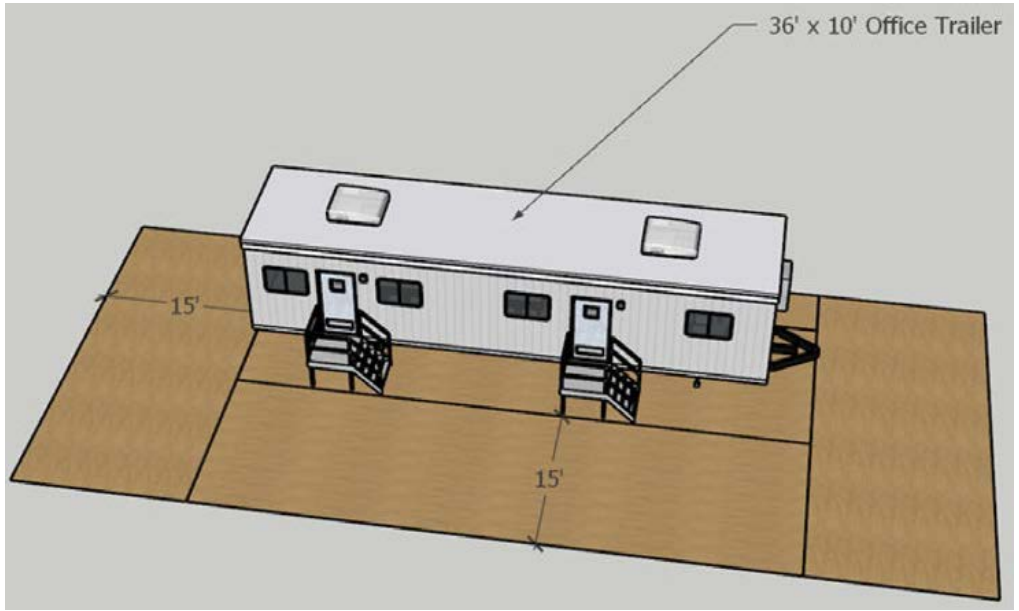
akaysha

AKAYSHA ENERGY PTY. LTD.
10-20 GWYNNE ST
CREMORNE, VIC

DRAWN:	M. PHILLIPS	2/10/2023	DRAWING TITLE:	O&M BUILDING PLAN AND ELEVATION	
APPROVED:			PROJECT:	Brinkworth Solar + BESS	
			REV:	1.0	SHEET: 4 OF 5

The maintenance shed will also include secure, bunded storage for hazardous materials if they are required to be stored onsite

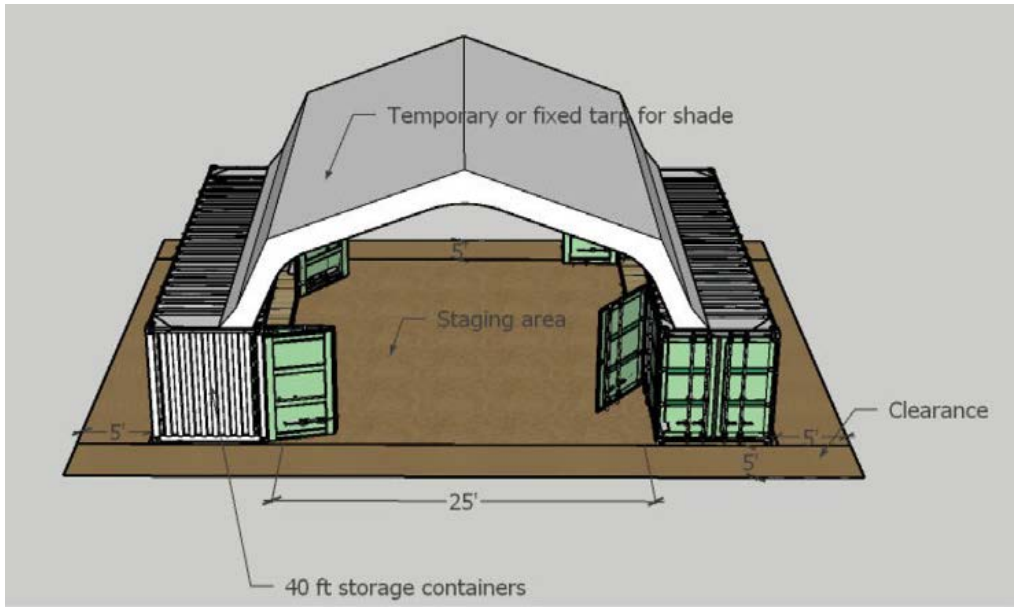
MATERIALS: COLORBOND STEEL
COLOUR: EUCALYPT GREEN OR SIMLAR MUTED COLOURS



2 ON-SITE MAINTENANCE INFRASTRUCTURE CONCEPT

The maintenance shed will also include secure, bunded storage for hazardous materials if they are required to be stored onsite

MATERIALS: STEEL
COLOUR: EUCALYPT GREEN OR SIMLAR MUTED COLOURS



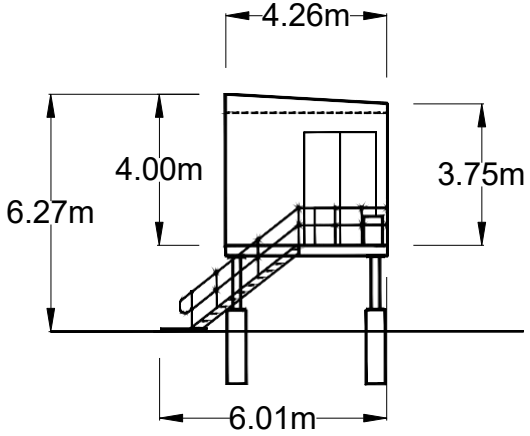
1 STORAGE CONTAINER AND STAGING AREA CONCEPT

NOTES:

akaysha

AKAYSHA ENERGY PTY. LTD.
10-20 GWYNNE ST
CREMORNE, VIC

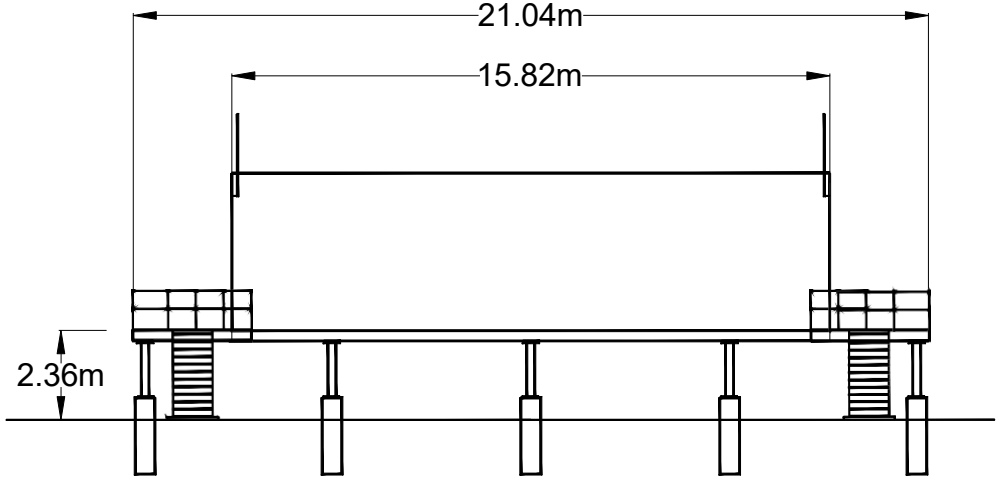
DRAWN:	M. PHILLIPS	2/10/2023	DRAWING TITLE:	O&M BUILDING PLAN AND ELEVATION	
APPROVED:			PROJECT:	Brinkworth Solar + BESS	
			REV:	1.0	SHEET: 4 OF 5



4 CONTROL ROOM - SIDE VIEW

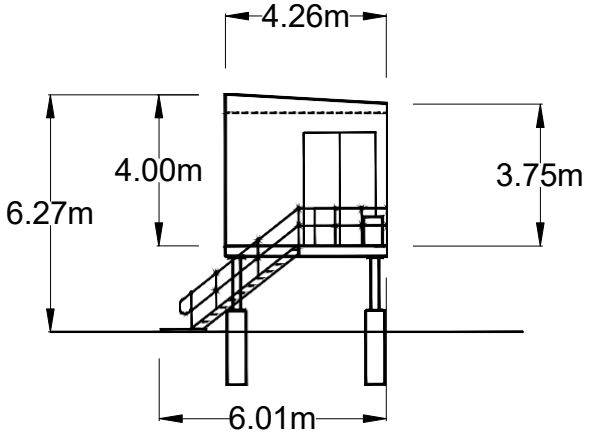
1:200

Demountable style office building with natural colour tones of Eucalypt Green or similar muted colours.



3 CONTROL ROOM - FRONT VIEW

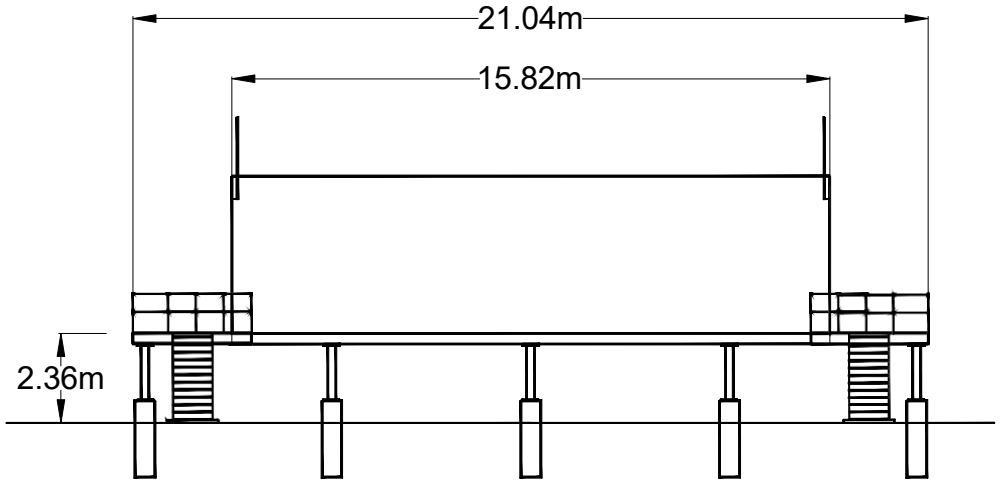
1:200



2 33KV SWITCH ROOM - SIDE VIEW

1:200

Demountable style office building with natural colour tones of Eucalypt Green or similar muted colours.



1 33KV SWITCH ROOM - FRONT VIEW

1:200

NOTES:

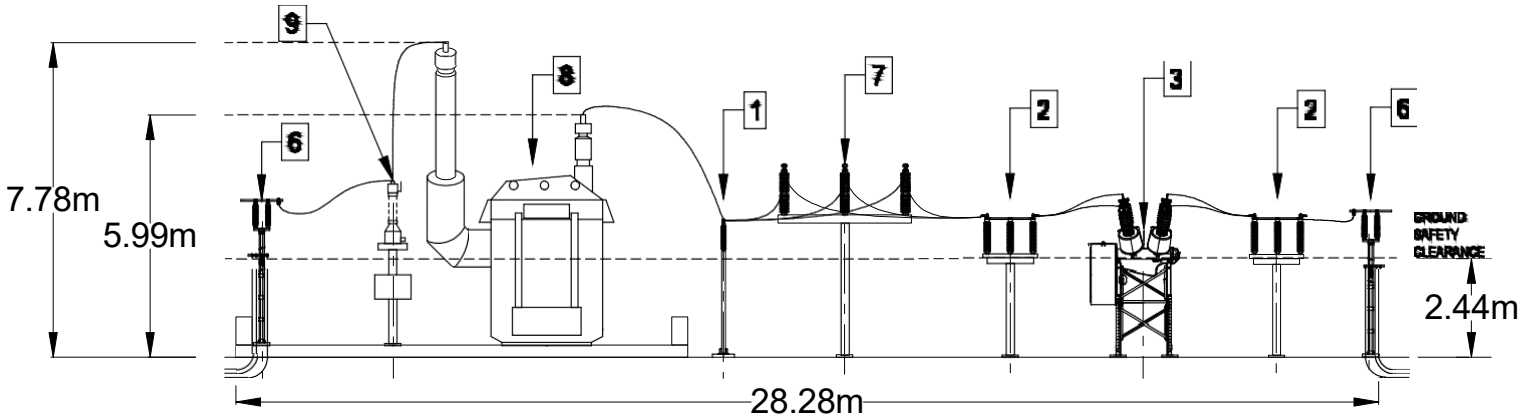
akaysha

AKAYSHA ENERGY PTY. LTD.
10-20 GWYNNE ST
CREMORNE, VIC

DRAWN:	M. PHILLIPS	2/10/2023	DRAWING TITLE:	CONTROL AND SWITCH ROOMS ELEVATIONS	
APPROVED:			PROJECT:	Brinkworth Solar + BESS	
			REV:	1.0	SHEET: 5 OF 5

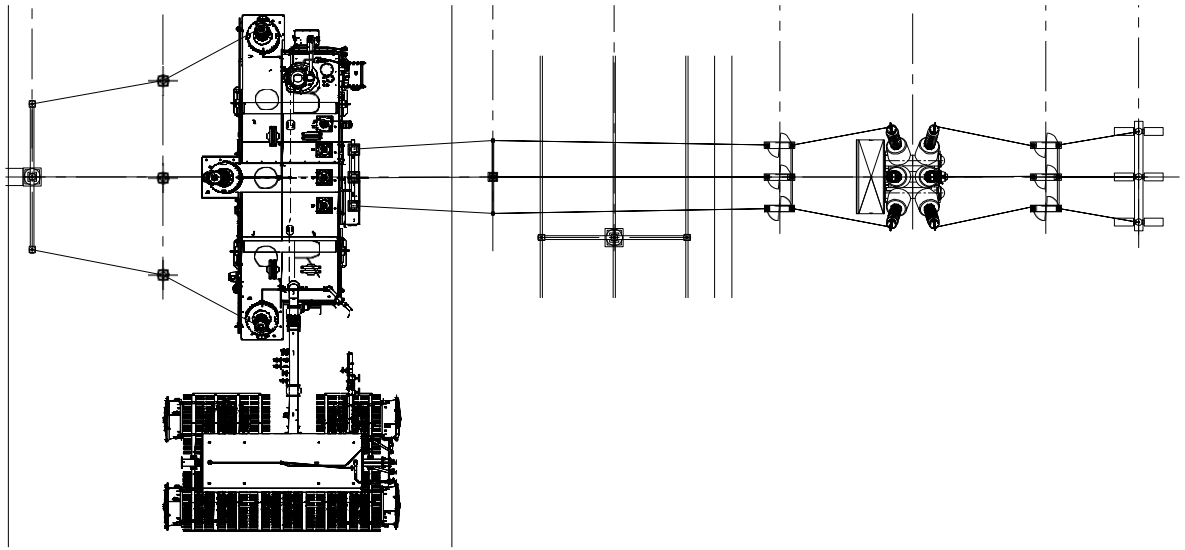
LEGEND:

1. BUSBAR SUPPORT STRUCTURE
2. DISCONNECTOR
3. CIRCUIT BREAKER
4. EARTHING TRANSFORMER
5. VOLTAGE TRANSFORMER 3/220KV/110V
6. CABLE END
7. BUSBAR SUPPORT STRUCTURE 220KV
8. 33/220 KV TRANSFORMER
9. SURGE ARRESTOR



2 33/220KV XFMR & FEEDER BAY - ELEVATION

1:200



1 33/220KV XFMR & FEEDER BAY - PLAN VIEW

1:200

NOTES:

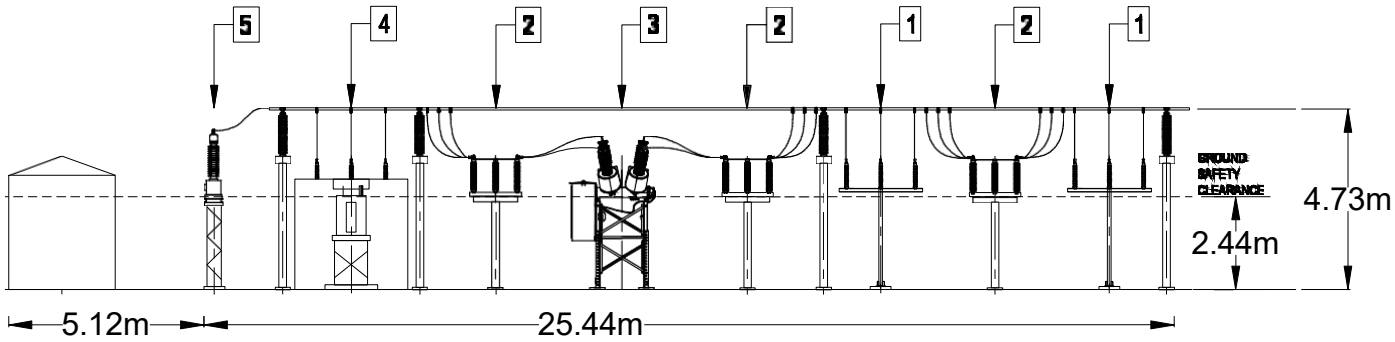
akaysha

AKAYSHA ENERGY PTY. LTD.
10-20 GWYNNE ST
CREMORNE, VIC

DRAWN:	M. PHILLIPS	2/10/2023	DRAWING TITLE:	CONTROL AND SWITCH ROOMS ELEVATIONS	
APPROVED:			PROJECT:	Brinkworth Solar + BESS	
			REV:	1.0	SHEET: 5 OF 5

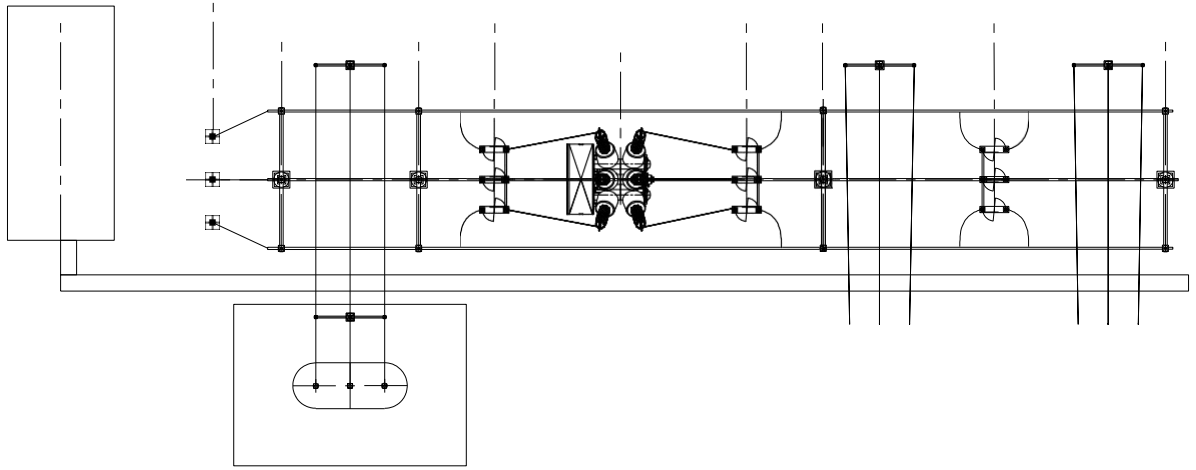
LEGEND:

1. BUSBAR SUPPORT STRUCTURE
2. DISCONNECTOR
3. CIRCUIT BREAKER
4. EARTHING TRANSFORMER
5. VOLTAGE TRANSFORMER 3/220KV/110V
6. BUSBAR SUPPORT STRUCTURE 220KV



2 33KV BUSBAR BAY - ELEVATION

1:200



1 33KV BUSBAR BAY - PLAN VIEW

1:200

NOTES:

akaysha

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10-20 GWYNNE ST
CREMORNE, VIC

DRAWN:	M. PHILLIPS	2/10/2023	DRAWING TITLE:	CONTROL AND SWITCH ROOMS ELEVATIONS	
APPROVED:			PROJECT:	Brinkworth Solar + BESS	
			REV:	1.0	SHEET: 5 OF 5

Appendix E
Development Assessment Report

Development Assessment Report

Proposed Solar Farm
For Akaysha Energy Pty Ltd

Lot 256W Power Station Road and
Lot 102 Lakeview Road, Brinkworth
653 and 873 Koolunga Road,
Koolunga

May 2024

Development Assessment Report

Proposed Solar Farm
For Akaysha Energy Pty Ltd

Lot 256W Power Station Road and
Lot 102 Lakeview Road, Brinkworth
653 and 873 Koolunga Road,
Koolunga

May 2024

Version	Date	Prepared	Review
51011REP01	07 Aug 2023	Julie Jansen	Michael Sale, Wind Prospect
51011REP01b	27 Sept 2023	Julie Jansen	Michael Sale, Wind Prospect
51011REP01c	10 Oct 2023	Julie Jansen	Michael Sale, Wind Prospect
51011REP01d	23 Oct 2023	Julie Jansen	
51011REP02	02 Apr 2024	Julie Jansen	Michael Sale, Wind Prospect
51011REP02a	05 Apr 2024	Julie Jansen	Michael Sale, Wind Prospect
51011REP02b Final	28 May 2024	Julie Jansen	

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Contents

Executive Summary

Akaysha Energy Pty Ltd (Akaysha) proposed to develop a renewable energy facility comprising 209MW solar farm and 300MW battery with 4 hours of storage, in the mid-north of South Australia. The Brinkworth Solar Farm and Battery Energy Storage System (BESS) Project (the Project) is proposed to be located adjacent to the existing Brinkworth substation, approximately 7.0 kilometres north of the town of Brinkworth, 4.0 kilometres south-east of Koolunga, and around 145 kilometres north of Adelaide. The Project site is approximately 474 hectares of freehold land currently being used largely for cropping.

The Brinkworth Solar Farm and BESS Project is proposed to be developed in two stages, with the BESS component of the Project being developed as the first stage and the solar farm as the second stage. The BESS will be developed as exempt from approval, pursuant to Schedule 13, Clause 2(3) of the *Planning, Development and Infrastructure (General) Regulations 2017* (PDI Regulations). This development application is for the 209MW solar farm and associated infrastructure, structures, equipment, and ancillary work. An extended period of time in which to commence (2 years) and complete the project (4 years) is requested as part of the development application, to facilitate the solar farm being constructed subsequent to the BESS.

Located on freehold land, the Project is located in the Wakefield Regional Council. The site of the proposed development is located within the Rural Zone, in which renewable energy facilities are expressly envisaged. An assessment of the merits of the proposed development has been undertaken against the relevant provisions of the Planning and Design Code (version 2024.9 dated 23 May 2024). It is considered that the proposed development is not significantly at variance with the Planning and Design Code. The proposed renewable energy project (solar farm) adequately and appropriately addresses potential impacts, particularly those associated with noise, visual amenity, protection of flora and fauna, interface between land uses, European and Aboriginal heritage, bushfire and traffic movements in a manner sought by the relevant policies of the Planning and Design Code.

On balance, the proposal is a suitable form of development within the Rural Zone and appropriately addresses potential impacts and thereby warrants the granting of Development Authorisation.

A summary of the project is contained in **Table 1**.

Table 1 Project Overview

Project Overview	
Applicant	Brinkworth Solar Farm Pty Ltd (ACN 630 724 579) (a member of the Akaysha Energy group)
Proposed Development	Renewable energy facility comprising 209MW Solar Farm, substation and associated infrastructure.
Property Location	Lot 256W Power Station Road, Brinkworth – Section 256W, H230400, Hundred of Boucaut in Certificate of Title Volume 5559 Folio 453 873 Koolunga Road, Koolunga – Allotment 96 F199935, Hundred of Boucaut in Certificate of Title Volume 5864 Folio 896

Project Overview	
	653 Koolunga Road, Brinkworth – Section 257, H230400, Hundred of Boucaut in Certificate of Title Volume 5588 Folio 666 Lot 102 Lakeview Road, Brinkworth – Allotment 102, D27337, Hundred of Boucaut in Certificate of Title Volume 6169 Folio 612
Valuation Numbers	Valuation No: 3004551006 3501313113 3004552009 3004556608
Landowners	Eulunga Pty Ltd W & S Weckert
Land Type	Freehold
Local Government Area	Wakefield Regional Council
Subject Land	474 hectares (approximately and including BESS)
Zoning	Rural Zone, Planning and Design Code (version 2024.9 dated 23 May 2024)
Land Use	Cropping and Grazing
Estimated Capital Expenditure	Approximately $420 million

1 Introduction

MasterPlan SA Pty Ltd was engaged by Wind Prospect on behalf of Akaysha Energy to undertake an assessment of the proposed renewable energy facility, incorporating solar farm and BESS, against the provisions of the Planning and Design Code (the Code).

After the initial assessment of the development against the Code, amendments were made to the *Planning, Development and Infrastructure (General) Regulations 2017* on 4 April 2024, which now exempts the BESS (as an identified and gazetted site) from requiring development authorisation. A revised assessment of the proposed development has been undertaken of the proposed solar farm.

It is noted that the energy from the solar farm will be stored in the BESS, and provides the required inertia from the Project.

We conclude that the proposal for the 290MW solar farm satisfies the relevant provisions of the Planning and Design Code and provide herein our assessment report.

1.1 Document Review

In preparing this report, all relevant investigations have been undertaken including:

- review of relevant legislation, including the Planning, Development and Infrastructure Act, 2016; and Planning, Development and Infrastructure (General) Regulations 2017;
- Government Gazette dated 4 April 2024 incorporating the "*identification of site determined by the Minister for the purpose of Clause 2(3) of Schedule 13 – Battery Storage Facility*" as exempt from approval.
- review of the provisions of the Planning and Design Code (version 2024.6 dated 4 April 2024);
- a site and locality inspection;
- the plans of the development (including those relating to the BESS, albeit exempt development), including those listed below have been reviewed:

  Wind Prospect Plans:
  - Figure 3.1: Project Overview - Plan Ref: DWG 0.27
  - Figure 1.2: Sensitive Receptors – Plan Ref: DWG 030
  - Figure 3.5: BESS Site Layout – Plan Ref: DWG 028
  - Figure 3.7: Solar Farm Overview and Vehicle Access – Plan Ref: DWG 039
  - Figure 3.8: Solar Farm Typical Plan – Plan Ref: DWG 042
  - Figure 3.9: Solar Farm Separation Distances to Closest Neighbouring Dwelling – Plan Ref: DWG 043
  - Figure 5.1: Land Use Zones – Plan Ref: DWG 031

Akaysha Plans:

- Battery Storage Elevation Rev 1.0 – Sheets 1 and 2.
- Other Equipment Elevations and Details Rev 1.0 – Sheets 3 and 4.
- O&M Plan and Elevation Rev 1.0 – Sheet 4.
- Control and Switch Rooms Elevations Rev 1.0 – Sheet 5 (3 pages).

- The following technical reports have been reviewed:
  - Environmental Noise Assessment by Sonus (Ref S7575C1 dated June 2023).
  - Aeronautical Impact Assessment by Chiron Aviation Consultants dated 5 October 2023.
  - Socioeconomic Impact Assessment by BDO EconSearch (Ref ES2238 dated 14 July 2023).
  - Surface Water Assessment by EMM (Ref E221126 R1 dated July 2023).
  - Geotechnical Desktop Review by WSP (Ref PP200909-WSP-ADL-GEO-MEM-001 Rev0_Brinkworth Desktop Study dated 27 April 2023).
  - Native Vegetation Clearance Data Report by EBS Ecology (Ref EX240411 dated 23 May 2024).
  - Traffic Impact Assessment by Empirical Traffic Advisory (Ref 1000038 dated 17 October 2023).
  - Landscape Character and Visual Impact Assessment by Hemisphere Design (dated 3 October 2023).
  - Fire Risk Management Plan and Fire Safety Study (v2.1 – 4 October 2023) by Fire Risk Consultants.

It is noted that several of the technical reports were prepared for a staged BESS and solar PV development, prior to the BESS being exempt from development authorisation. The assessment of the solar PV development in the technical reports remains valid, as does the proposed operational and construction management plans that would be incorporated for the solar PV and also the BESS.

1.2 Crown Development

At the time that Crown sponsorship was sought from the Department for Energy and Mining (DEM) the development incorporated both the 300MW battery and 209MW of solar panels and ancillary equipment. The Project (as described in the Crown sponsorship application) was deemed to be 'essential infrastructure' as defined by the *Planning, Development and Infrastructure Act 2016*, as it involves infrastructure, equipment, structures, works and other facilities used in or in connection with—the generation of electricity or other forms of energy; and the distribution or supply of electricity, gas or other forms of energy.

Endorsement of the Project as essential infrastructure has been received from the Department for Energy and Mining (by letter dated 7 September 2023).

On 23 October 2023, the Department for Energy and Mining invited Akaysha Energy to provide an Expressions of Interest (EOI) for the BESS component of the proposal to be considered as an exempt form of development, as the State Government was seeking to accelerate grid-scale battery developments to increase South Australia's dispatchable capacity. Given Akaysha Energy was intending to construct the BESS as the first stage of the proposed Brinkworth development, an EOI to participate in the exemption pathway was lodged with DEM on 3rd November 2023. The EOI application was subsequently supported by the DEM Chief Executive on 12 February 2024, endorsing the BESS component as 'essential infrastructure' under the *Planning, Development and Infrastructure Act 2016*. We understand that the project must now be formally gazetted as exempt under the PDI Act. We have not been provided with a timeframe for this to occur.

The EOI application was subsequently supported by the DEM Chief Executive on 12 February 2024, endorsing the BESS component as 'essential infrastructure' under the *Planning, Development and Infrastructure Act 2016* and recommending the BESS component of the development be assessed as exempt development pursuant to a subsequent change to the *Planning, Development and Infrastructure (General) Regulations 2017* (PDI Regulations).

Given the BESS is now exempt from development approval, the solar component of the Project is proposed to continue to be processed as a 'crown development'.

1.3 Office of the Technical Regulator

In accordance with the requirements of Schedule 6 of the *Planning, Development and Infrastructure (General) Regulations 2017*, a certificate from the Office of the Technical Regulator must be obtained and accompany a development application for electricity generation exceeding 5MW that is connected to the State's electricity system.

The BESS (although exempt from development approval) will have the capability to meet the Office of the Technical Regulator (OTR) technical requirements by providing Fast Frequency Response (FFR). The BESS will provide 84.5MW of FFR to support the South Australian network which will meet the requirements of the OTR.

A Certificate of Compliance has been obtained from the Office of the Technical Regulator for the Project (dated 14 June 2023).

1.4 Time in Which to Commence and Complete the Development

Akaysha is seeking a period of two (2) years in which to substantially commence the development from the operative date with substantial completion to be extended to four (4) years from the operative date of the development authorisation.

2 Description of the Proposed Development

The Brinkworth Solar Farm and Battery Project consists of a utility-scale solar farm with a capacity of

up to 209MW, a Battery Energy Storage System able to provide 300MW of power for four (4) hours (300MW/1200MWh, now exempt from development authorisation) along with the auxiliary equipment required to connect the Project to the existing grid. This development application is for the solar farm and ancillary infrastructure.

Located on land adjacent the existing Brinkworth Substation, the development is proposed to connect to this substation and the National Electricity Market (NEM).

The solar farm is estimated to generate approximately 454 GWh of renewable electricity every year for export, enough to power 55,000 homes. The BESS with four hours of storage, will enable the energy generated from the solar panels during the day to supply the grid with renewable electricity well into the evening.

The BESS (Stage 1 as exempt from development authorisation) is proposed to be developed as the first stage of the overall Brinkworth Solar Farm and Battery Project, in or about 2025, and the Solar Farm (Stage 2 and this development application) to be commenced in or about 2026.

The solar farm and BESS will be connected separately to the Brinkworth substation. This provides flexibility with the timing of installation and operation of the BESS (as now exempt from development authorisation) as the first element of the overall development and the solar farm to be developed subsequently.

Elements of the solar farm development as proposed in this development application include:

- Solar Photo Voltaic (PV) modules incorporating:
  - single axis tracking racks that are orientated north-south;
  - the racks vary in length depending on location and are between 67 and 101 metres;
  - approximately 367,360 panels;
  - overall height will depend on the ground level, but at maximum tilt, the height is approximately 4.5 metres with the lower edge of each PV module up to 1.2 metres from the ground (in a horizontal position) and no less than 0.3 metres (maximum tilt); and
  - footings and racking for solar modules either driven piles, screw pile or concrete. Preliminary geotechnical investigations indicate driven post foundations are the most likely to be used.
- Power Conversion Systems (Inverters):
  - approximately 70 inverters for the solar farm;
  - typically inverters are prefabricated in shipping containers and contain step up transformers.
- One electrical substation including:
  - step up transformers (stepping up the voltage to 275kV); and
  - connection to ElectraNet owned Brinkworth Substation via transmission lines.

- Associated underground cables connecting groups of solar panels to inverter stations and underground and/or overhead transmission lines from inverter stations to the Project's switching substation;
- Operations and Maintenance area including:
  - control room and site office being a transportable building of approximately 11 metres by 3.0 metres;
  - operations and maintenance building - approximately 20 metres by 10 metres with overall height of 5.04 metres;
  - Storage container and staging area 13.6 metres by 12 metres;
  - Buildings to be constructed of Colorbond steel in Eucalypt Green (or similar); and
  - car parking sufficient for employees and contractors during operation.
- Access tracks/driveways:
  - site access for the operations and maintenance area will be constructed from Power Station Road; and
  - internal access tracks will be constructed within the site to a width of 6 metres of gravelled surface.
- stormwater management as per stormwater management report;
- Security fencing and CCTV:
  - black mesh fencing around each element of the project to an anticipated height of 2.93 metres; and
  - CCCTV - Motion sensor or infrared security lighting (and CCTV cameras) would be installed at sensitive boundary locations and around the substation, battery storage facility, O&M facilities, and office areas.
- Lighting:
  - Lighting will be installed where necessary for safety, maintenance, and security purposes. There would be no permanently lit night lighting within the Project boundary.
  - Lighting would be installed around the substation, battery storage facility and O&M facilities to be used in case of night works or an emergency only.

These elements are shown on the plans prepared by Wind Prospect and Akaysha and attached to the development application.

3 Site and Locality Description

3.1 Site

Located on land adjacent the existing Brinkworth substation, the site of the development is described as:

- Lot 256W Power Station Road, Brinkworth - Section 256W, H230400, Hundred of Boucaut in Certificate of Title Volume 5559 Folio 453;
- 873 Koolunga Road, Koolunga – Allotment 96 F199935, Hundred of Boucaut in Certificate of Title Volume 5864 Folio 896;
- 653 Koolunga Road, Brinkworth – Section 257, H230400, Hundred of Boucaut in Certificate of Title Volume 5588 Folio 666; and
- Lot 102 Lakeview Road, Brinkworth – Allotment 102, D27337, Hundred of Boucaut in Certificate of Title Volume 6169 Folio 612.

Overall the site of the development is approximately 474 hectares, with frontage to Power Station Road, Koolunga Road, Whitehorn Road and Lake View Road.

The site of the development is principally cropped paddocks with scattered areas of trees, mainly in the form of fence line/windbreak planting with some occasional clusters of native vegetation, as illustrated in the photographs below.

Figure 1. View of subject land from Power Station Road, looking in an easterly direction.

Figure 2. View of subject land from Power Station Road, looking in a south-easterly direction with existing overhead powerlines evident.

Figure 3. View of subject land from Power Station Road, looking in a northerly direction with Brinkworth substation evident.

Figure 4. View of Brinkworth substation from Power Station Road.

Figure 5. View of the Brinkworth substation and Snowtown Wind Farm in the background.

3.2 Locality

The townships of Koolunga and Brinkworth are located to the north and south of the project area respectively and within 5.0 kilometres. Within this 5.0-kilometre radius is also scattered rural dwellings and associated outbuildings typical of the rural landscape.

Located within the Mid North Region of South Australia, the area comprises several north-south ridgelines, resulting in parallel ridges and wide valleys. The project is located within a valley which is characterised by open agricultural landscape with cultivated paddocks and open fields utilised for grazing. The nearest watercourse is the Broughton River, which is located to the north adjacent Koolunga township.

The Brinkworth substation and overhead powerlines are a significant element within the locality. On the ridgelines to the west is the Snowtown wind farm.

A detailed description of the locality is contained in the visual assessment prepared by Hemisphere Design, including a description of the landscape and setting from various viewpoints, which are referenced **below**:

> *Sensitive Receptor Locality 01 – 1028 (and Carlew) Lake View Road*
>
> *A landscape of low scenic quality.*
>
> *The locality is defined by the extensive vista across a 180-degree panorama over a foreground of planar cropping fields where clusters of native trees and shrubs and the occasional farmstead building and agricultural shed 'silhouette' the expansive skyline. It is a summer landscape of stark and confronting colours, with vegetative threads of olive and grey green complementing the darkened shadowed appearance of the horizon.*
>
> *The visually ad-hoc arrangement of electricity substation infrastructure and the extensive presence of transmission towers with a catenary of overhead cables are notable features where the transmission towers punctuate the skyline.*
>
> *Within this planar landscape the eye of the observer is drawn along the visual axis defined by Lake View Road and the stark grey pipeline to the distant hills face. A monumentally underwhelming panorama of limited visual merit.*
>
> *Sensitive Receptor Locality 02 – Adjacent 1461 and 1471 Lake View Road*
>
> *A landscape of low scenic quality*
>
> *A foreground of rich ochre-coloured cropped fields bounded by roadside tree and shrub planting and the occasional collection of trees and smaller shrubs which define field and property boundaries. The panorama is dominated by electricity transmission towers juxtaposed against the skyline and the outline of the existing taller substation gantry infrastructure.*

A planar landscape where the eye of the observer traces over the open landscape in anticipation of some injection of visual interest only to conclude the search somewhat unrewardingly at the distant horizon.

Sensitive Receptor Locality 03 - Northern entrance to 653 Koolunga Road and intersection of Koolunga Road with Power Station Road

A landscape of Low scenic quality

A foreground of rich ochre-coloured cropped fields bounded by roadside tree and shrub planting and the occasional collection of trees and smaller shrubs which define field and property boundaries. The panorama is dominated by a midground comprising of electricity transmission towers and the outline of the existing taller substation gantry infrastructure juxtaposed against the skyline. Distant views of the hills face where the appearance of crest and folds are accentuated by the moving cloud 'shadow play' offer some visual interest in an otherwise uninspiring vista.

Sensitive Receptor 04 - At the southern entrance to No. 653 Koolunga Road

A landscape of low scenic quality

Fore and mid - ground views reveal a landscape of cropped fields bounded by roadside tree and shrub planting and the occasional collection of trees and shrubs which define field and property boundaries. The dark green-grey ribbons of native vegetation that traverse the view in a left right direction contrast with and stand prominent against the enveloping summer expanse of yellow and ochre hues.

The panorama is dominated by views of the mid ground existing substation and transmission towers juxtaposed against the skyline and puncturing the horizon. Within the expansive 180-degree panorama the contiguous folds and creases of the distant hills face offer a welcome visual distraction) the skyline offers limited interest.in an otherwise underwhelming visual landscape.

In a planar landscape where the eye of the observer traces over the undulating landscape searching for visual stimulation the scatted copses of mature eucalypts 'silhouetting' the skyline offers limited interest.

4 Planning Assessment

4.1 Renewable Energy Facility

Part 7 – Land Use Definition Table of the Planning and Design Code defines a renewable energy facility as follows:

> *Renewable energy facility: Means land and/or water used to generate electricity from a renewable source such as wind, solar, tidal, hydropower, biomass and/or geothermal.*
>
> *This use may also include:*
>
> *(a) any associated facility for the storage and/or transmission of the generated electricity;*
>
> *(b) any building or structure used in connection with the generation of electricity.*

The table specifically includes a solar power facility as a land useto be included in the meaning of a renewable energy facility.

4.2 Essential Infrastructure

In accordance with the definition of "essential infrastructure" in Section 3(1) of the *Planning, Development and Infrastructure Act 2016* Akaysha are providing electricity infrastructure, as identified in part (a).

> *essential infrastructure means—*
>
> *(a) infrastructure, equipment, structures, works and other facilities used in or in connection with –*
>
> *(i) the generation of electricity or other forms of energy; or*
>
> *(ii) the distribution or supply of electricity, gas or other forms of energy; and ...*

Electricity proposed to be generated by the solar farm (and stored in the BESS) will be distributed to the national grid. The South Australian Department for Energy and Mining (state agency) has endorsed the proposed development for the purposes of Section 131.

The development application is lodged with the State Commission Assessment Panel (SCAP). SCAP will process the development application and prepare a report to the Minister for Planning for a decision to approve or refuse the proposed development.

In determining the application, an assessment of the application against the relevant provisions of the Planning and Design Code (version2024.9 dated 23 May 2024) will be undertaken by SCAP.

It is noted that a renewable energy facility is not listed as an accepted, deemed-to-satisfy, or restricted form of development within the Rural Zone, but rather would be a Code Assessed – Performance Assessed form of development in accordance with the Planning and Design Code.

4.3 Office of the Technical Regulator

The *Planning, Development and Infrastructure (General) Regulations 2017* prescribe if the proposed development is for the purposes of the provision of electricity generating plant with a generating capacity of more than 5MW that is to be connected to the State's power system, a certificate from the Technical Regulator is required, certifying that the proposed development complies with the requirements of the Technical Regulator in relation to the security and stability of the State's power system.

The Office of the Technical Regulator (OTR) has been assessed the development pursuant to Section 122 of the *Planning, Development and Infrastructure Act 2016* and granted approval for the project on the condition that 84.5MW of fast frequency response is provided by the 300MW/1200MWh BESS.

4.4 Public Notification

In accordance with Section 131 (13) of the *Planning, Development and Infrastructure Act 2016*, as the proposed construction work will exceed $10,000,000.00, the State Commission Assessment Panel must make a public advertisement inviting interested persons to make written submissions on the proposal.

4.5 Time to Commence and Complete Development

Due to long lead times for detailed design, tendering for supply of component infrastructure, transmission connection modelling, and delivery and construction, our clients are seeking an extension of time in which to commence and complete the development.

The period prescribed to commence or complete a development approved under Section 131 of the PDI Act, may be extended by the Minister either when the relevant approval is given or at a later time (Regulation 108(3)).

Requests for extensions of time in which to commence and complete developments are reasonably common for large infrastructure developments which have numerous and complex issues to resolve. Our client is seeking a period of 2 years in which to substantially commence the development from the operative date, with substantial completion to be extended to 4 years from the operative date of the approval.

4.6 Referrals

In accordance with Section 131 (6) of the PDI Act, the Commission must give notice to the Council. In the case of this development application, a referral will be forwarded to the Wakefield Regional Council. The Council will be provided with a 4-week period in which to provide a report to the Commission.

The Planning and Design Code specifies various forms of development which require referral in the relevant Overlays and in Part 9 – Referrals. The subject land is located within the following Overlays:

- Dwelling Excision;
- Hazards (Bushfire - General);
- Hazards (Flooding - Evidence Required);
- Limited Land Division;
- Native Vegetation; and
- Water Resources.

Except for the Native Vegetation Overlay, there are no referral requirements for any of the other abovementioned applicable Overlays.

A referral to the Native Vegetation Council is required for clearance of vegetation categorised as Level 3 or Level 4 clearance. An assessment undertaken by EBS Ecology (Brinkworth Solar Farm and Battery Project Data Report – 23 June 2024) identifies the 0.17 hectares (ha) of *Senna artemisioides ssp. artemisioides* shrubland +/- *Eremophila longifolia* shrubland, and *Enchylaena tomentosa* (Ruby Saltbush) Low Open Shrubland +/- *Atriplex stipitata* (Bitter Saltbush) +/- *Lycium australe* (Australian Boxthorn) +/- *Maireana aphylla* (Cotton-bush) +/- *Senna artemisioides ssp. X artemisioides* (Desert Senna) +/- Planted Eucalypt Overstorey, to be cleared for the development to be low quality, Level 3 clearance category. On this basis the development requires a referral to the Native Vegetation Council.

Part 9 – Referrals of the Planning and Design Code establishes additional referrals. Part 9.1 outlines referrals required to the Environment Protection Authority (EPA) for various forms of energy generation. Referral to the EPA is required for energy generation that is:

Development involving an electricity generating plant (other than a battery storage facility or pumped hydroelectricity production works) using any other energy source (excluding fuel burning and solar photovoltaic) with a capacity to generate or store 30 megawatts (MW) or more.

By reference to the above, a referral is not required to the EPA for electricity generation from a solar photovoltaic source.

5 Planning and Design Code Assessment

The Planning and Design Code (version2024.9 dated 23 May 2024) identifies the site of the development within:

Zone	Rural Zone
Overlays	Dwelling Excision Hazards (Bushfire – General Risk) Hazards (Flooding - Evidence Required) Limited Land Division Native Vegetation Water Resources
General Development Policies	All policies as relevant to the assessment

The following assessment of the proposed development is undertaken with reference to the policies contained in Rural Zone and Overlays identified above, along with the most relevant provisions of the General Development Policies of the Planning and Design Code (the Code) for assessment of a renewable energy facility (Solar PV and associated infrastructure). The following assessment concentrates on land use, built form and scale, interface between land uses, vehicle access and stormwater management, as these are considered to be the most relevant to the assessment of the proposed development.

5.1 Overlays

Prior to assessing the proposed development against the most relevant provisions of the Rural Zone and General Development Policies, the following comments are provided in relation to the Overlays applicable to the site of the development.

5.1.1 Dwelling Excision

There are no dwellings within the site of the development. Subsequently, the development does not require or propose the creation of an allotment for an existing habitable dwelling. No further assessment of the policies of the Dwelling Excision Overlay and required.

5.1.2 Hazards (Bushfire – General Risk)

A detailed assessment of fire risk has been undertaken by Fire Risk Consultants and is detailed in the Fire Risk Management Plan and Fire Safety Study (v2.1 – 4 October 2023). The proposed development has been discussed with the SA Country Fire Service (CFS), who have advised that in lieu of a specific South Australian standard or guideline for assessment of fire risk for renewable energy projects, the utilisation of the Victorian Country Fire Authority Guidelines – Design Guidelines and Model Requirements – Renewable Energy Facilities 2022 (CFS Guidelines) is appropriate. In addition to the CFA Guidelines, Fire Risk Consultants undertook an assessment of the proposal against the Hazards (Bushfire – General Risk) Overlay policies.

The proposal incorporates the following design features to mitigate the threat of bushfire:

- Perimeter fire break around the boundaries of site.
- Vehicle access from Power Station Road and other boundary roads if/as required.
- Internal access roads of 6 metres in width within the perimeter fire breaks
- Suitable turn around areas for emergency vehicles.
- Dedicated water tanks at the entrances to the development.
- Construction of infrastructure such as inverters, substation and operations and maintenance area on a hard stand surface.
- Setbacks between solar fields to provide for emergency vehicle access.
- Control of ground cover vegetation during high fire danger periods.

These features are illustrated on the plans included with the development application and will be reinforced in the draft construction environmental management plan (and associated operational management plans) for the development. In this regard the proposal adequately and suitably addresses the intent of the Hazards (Bushfire – General Risk) Overlay policies.

Hazards (Bushfire – General Risk) Overlay	
Desired Outcome	
DO1 Development, including land division responds to the general level of bushfire risk by siting and designing buildings in a manner that mitigates the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.	
DO2 To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.	
Performance Outcome	**Deemed-to-Satisfy Criteria / Designated Performance Feature**
Siting	
PO 1.1 Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.	DTS/DPF 1.1 None are applicable.
Built Form	
PO 2.1 Buildings and structures are designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of transportable buildings and buildings on stilts.	DTS/DPF 2.1 None are applicable.

Hazards (Bushfire – General Risk) Overlay	
Vehicle Access – Roads, Driveways and Fire Tracks	
PO 5.1 Roads are designed and constructed to facilitate the safe and effective: a) access, operation and evacuation of fire-fighting vehicles and emergency personnel b) evacuation of residents, occupants and visitors.	DTS/DPF 5.1 Roads: a) are constructed with a formed, all-weather surface b) have a gradient of not more than 16 degrees (1-in-3.5) at any point along the road c) have a cross fall of not more than 6 degrees (1-in-9.5) at any point along the road d) have a minimum formed road width of 6m e) provide overhead clearance of not less than 4m between the road surface and overhanging branches or other obstructions including buildings and/or structures (Figure 1) f) allow fire-fighting services (personnel and vehicles) to travel in a continuous forward movement around road curves by constructing the curves with a minimum external radius of 12.5m (Figure 2) g) incorporating cul-de-sac endings or dead end roads do not exceed 200m in length and the end of the road has either: (i) a turning area with a minimum formed surface radius of 12.5m (Figure 3) or (ii) a 'T' or 'Y' shaped turning area with a minimum formed surface length of 11m and minimum internal radii of 9.5m (Figure 4) h) incorporate solid, all-weather crossings over any watercourse that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes.

5.1.3 Hazards (Flooding – Evidence Required) & Water Resources

Detailed consideration has been given to the surface water in the locality and stormwater management from the development. The Surface Water Assessment report prepared by EMM, which accompanies the development application states the following in the Executive Summary:

Existing flooding characteristics for the site and surrounds have been established by flood modelling (Appendix A). The site is not considered to be at risk of flooding from the 1% annual exceedance probability (AEP) Broughton River flow, and development of the site will not interact with Broughton River flooding. The solar farm and BESS is not expected to interact with storm runoff; runoff would flow around panel footings and continue to flow downstream via the current drainage pathways, and the BESS is located outside of overland flow paths. The solar farm installation would not change the overall catchment permeability, and infiltration of rainfall into the soil and underlying aquifers would still occur…

Overall, potential surface water impacts during construction and operation are considered minor and can be adequately managed through the implementation of the mitigation measures outlined in Section 6 and included in the contractor's environmental management plan (CEMP) (draft provided with the development application).

The assessment and recommendations contained in the Surface Water Assessment report adequately addresses the intent of the Hazards (Flooding – Evidence Required) Overlay policies and indicates that the site and development is not subject to potential flooding. Further, the report indicates that the development would not impact water courses, as sought by the Water Resource Overlay policies.

Hazards (Flooding – Evidence Required) Overlay	
Desired Outcome	
DO 1 Development adopts a precautionary approach to mitigate potential impacts on people, property, infrastructure and the environment from potential flood risk through the appropriate siting and design of development.	
Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Flood Resilience	
PO 1.1 Development is sited, designed and constructed to minimise the risk of entry of potential floodwaters where the entry of flood waters is likely to result in undue damage to or compromise ongoing activities within buildings.	DTS/DPF 1.1 Habitable buildings, commercial and industrial buildings, and buildings used for animal keeping incorporate a finished floor level at least 300mm above: a) the highest point of top of kerb of the primary street or b) the highest point of natural ground level at the primary street boundary where there is no kerb

Water Resources Overlay
Desired Outcome
DO 1 Protection of the quality of surface waters considering adverse water quality impacts associated with projected reductions in rainfall and warmer air temperatures as a result of climate change.

Water Resources Overlay	
DO2 Maintain the conveyance function and natural flow paths of watercourses to assist in the management of flood waters and stormwater runoff.	
Performance Outcome	**Deemed-to-Satisfy Criteria / Designated Performance Feature**
Water Catchment	
PO 1.1 Watercourses and their beds, banks, wetlands and floodplains (1% AEP flood extent) are not damaged or modified and are retained in their natural state, except where modification is required for essential access or maintenance purposes.	DTS/DPF 1.1 None are applicable.
PO 1.2 Development avoids interfering with the existing hydrology or water regime of swamps and wetlands other than to improve the existing conditions to enhance environmental values.	DTS/DPF 1.2 None are applicable.

5.1.4 Limited Land Division

The intent of the Limited Land Division Overlay policy is to limit the fragmentation of primary production land through land division. The development does not involve the division of land and hence there is no further assessment of the policies of this Overlay.

5.1.5 Native Vegetation

An assessment undertaken by EBS Ecology (Brinkworth Solar Farm and Battery Project Data Report – 23 May 2024) identifies the 0.017 hectares (ha) of *Senna artemisioides ssp. artemisioides* shrubland +/- *Eremophila longifolia* and *Enchylaena tomentosa* (Ruby Saltbush) Low Open Shrubland +/- *Atriplex stipitata* (Bitter Saltbush) +/- *Lycium australe* (Australian Boxthorn) +/- *Maireana aphylla* (Cotton-bush) +/- S*enna artemisioides ssp. X artemisioides* (Desert Senna) +/- Planted Eucalypt Overstorey , to be cleared to facilitate suitable site access from Power Station Road to the BESS. The vegetation to be cleared is assessed by EBS of low quality and a Level 3 clearance category.

In assessing the impact of the development on native vegetation, EBS note that the siting of the infrastructure solar PV and associated infrastructure is within existing cleared (cropping) land.

Based on the limited impact of the development of the solar PV and associated infrastructure on native vegetation, which is limited to two of the proposed vehicle access points, it is considered that the proposal adequately addresses the policy intent of the Native Vegetation Overlay.

Native Vegetation Overlay	
Desired Outcome	
DO 1 Areas of native vegetation are protected, retained and restored in order to sustain biodiversity, threatened species and vegetation communities, fauna habitat, ecosystem services, carbon storage and amenity values.	
Performance Outcome	**Deemed-to-Satisfy Criteria / Designated Performance Feature**
Environmental Protection	
PO 1.1 Development avoids, or where it cannot be practically avoided, minimises the clearance of native vegetation taking into account the siting of buildings, access points, bushfire protection measures and building maintenance.	DTS/DPF 1.1 An application is accompanied by: (a) a declaration stating that the proposal will not, or would not, involve clearance of native vegetation under the Native Vegetation Act 1991, including any clearance that may occur: (i) in connection with a relevant access point and / or driveway (ii) within 10m of a building (other than a residential building or tourist accommodation) (iii) within 20m of a dwelling or addition to an existing dwelling for fire prevention and control (iv) within 50m of residential or tourist accommodation in connection with a requirement under a relevant overlay to establish an asset protection zone in a bushfire prone area or (a) a report prepared in accordance with Regulation 18(2)(a) of the Native Vegetation Regulations 2017 that establishes that the clearance is categorised as 'Level 1 clearance'.
PO 1.2 Native vegetation clearance in association with development avoids the following: a) significant wildlife habitat and movement corridors b) rare, vulnerable or endangered plants species c) native vegetation that is significant because it is located in an area which has been extensively cleared d) native vegetation that is growing in, or in association with, a wetland environment.	DTS/DPF 1.2 None are applicable.

5.2 Land Use

Renewable energy facilities are a form of development that the Desired Outcome (DO) of the Rural Zone envisages to support the economic prosperity of South Australia, as stated in DO1.

Rural Zone	
Desired Outcome	
DO 1 A zone supporting the economic prosperity of South Australia primarily through the production, processing, storage and distribution of primary produce, forestry and the generation of energy from renewable sources.	
DO2 A zone supporting diversification of existing businesses that promote value-adding such as industry, storage and warehousing activities, the sale and consumption of primary produce, tourist development and accommodation.	
Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Land Use and Intensity	
PO 1.1 The productive value of rural land for a range of primary production activities and associated value adding, processing, warehousing and distribution is supported, protected and maintained.	DTS/DPF 1.1 Development comprises one or more of the following: (a) Advertisement ... (r) Renewable energy facility...
Renewable Energy Facilities	
PO 9.1 Renewable energy facilities and ancillary development minimises significant fragmentation or displacement of existing primary production.	DTS/DPF 9.1 None are applicable.
PO 9.2 Small-scale, ground-mounted solar power facilities support rural production or value-adding industries.	DTS/DPF 9.2 None are applicable.

Performance Outcome (PO) 1.1 of the Rural Zone anticipates a range of primary production and value adding activities on rural land. Designated Performance Feature (DPF) 1.1 identifies renewable energy facilities as a land use that is envisaged to satisfy PO 1.1.

The Rural Zone contains specific policies relating to renewable energy facilities. Performance Outcome 9.1 seeks to ensure that renewable energy facilities do not fragment or displace existing primary production. The proposed development utilises approximately 474 hectares of land. Whilst the development would preclude this land from being utilised for primary production purposes, it is appropriately sited adjacent to the existing Brinkworth substation to efficiently generate and store electricity in a manner consistent with the Desired Outcome of the Rural Zone. Furthermore, the Project will not preclude ongoing rural land uses continuing on adjacent land or in the locality.

In addition to the policies contained in the Rural Zone, the General Development Policies – Infrastructure and Renewal Energy Facilities incorporate specific policies to guide siting and design of renewable energy facilities. In relation to Desired Outcome 1 of the Infrastructure and Renewable Energy Facilities policies, the proposed development provides an efficient renewable energy facility that will assist in providing electricity to the national grid in a manner that assists with the stability of the South Australian electricity network.

Infrastructure and Renewable Energy Facilities	
Desired Outcome	
DO 1 Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity.	
Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
General	
PO 1.1 Development is located and designed to minimise hazard or nuisance to adjacent development and land uses.	DTS/DPF 1.1 None are applicable.
Renewable Energy Facilities	
PO 7.1 Renewable energy facilities are located as close as practicable to existing transmission infrastructure to facilitate connections and minimise environmental impacts as a result of extending transmission infrastructure.	DTS/DPF 7.1 None are applicable.
Renewable Energy Facilities (Solar Power)	
PO 9.1 Ground mounted solar power facilities generating 5MW or more are not located on land requiring the clearance of areas of intact native vegetation or on land of high environmental, scenic or cultural value	DTS/DPF 9.1 None are applicable.

Renewable energy facilities are an anticipated land use within the Rural Zone. The proposed solar farm will assist in sustainable, reliable, and affordable energy, which directly aligns with the strategic plan of the State Government and thereby addresses the desire for development to add to the economic prosperity of the State.

Incorporating utility-scale energy storage and renewable energy production, the development aims to enhance the stability and reliability of the State's electricity network, effectively serving as a crucial component of public infrastructure. Furthermore, the project plays a significant role in achieving South Australia's carbon reduction goals, including a reduction of over 50% below 2005 levels by 2030 and reaching net-zero emissions by 2050. Additionally, the project supports the South Australian Government's initiative to rapidly transition to renewable energy generation, reducing global greenhouse gas emissions. The overall development incorporating the BESS and solar PV enables the storage of energy from intermittent renewable sources, which can be discharged during peak demand periods, contributing to network stabilisation, and ensuring an affordable and reliable electricity network for South Australia's growing economy.

For all of the above stated reasons, the development is an appropriate land use within the Rural Zone.

5.3 Design, Siting and Visual Amenity

Inclusion of a solar PVand associated infrastructure in a rural environment will result in some visual impacts. To accord with the policies of the Rural Zone and General Development Policies – Infrastructure and Renewable Energy Facilities, quoted below, the development minimises the visual impacts as follows:

- located immediately adjacent to the Brinkworth substation;
- location adjacent to public roads that provide suitable vehicle access;
- separation from the nearest townships of Brinkworth and Koolunga by approximately
- 5.0 kilometres, so not adversely impact on the residential amenity of people resident in those towns;
- the development is not sited on a ridgeline or elevated area;
- located on cropped agricultural land with the maintenance of vegetation along fence lines and scattered patches to provide visual relief when viewed from public roads and dwellings in the locality;
- with the exception of 0.17 hectares of native vegetation required to be cleared to facilitate vehicle access, the solar PV and ancillary infrastructure does not require the removal of any further native vegetation;
- buildings are to be sited on areas with a slope of less than 10 per cent and thereby minimising the need for excavation;
- the solar panels incorporate anti-reflective coatings;
- the materials and finishes of buildings and infrastructure will be low-reflectivity as far as practicable. Colours of buildings will be colours that complement the surrounding rural landscape (eg. Eucalypt Green or similar muted colours);
- the solar arrays are able to follow the contours of the land and the construction is proposed to be pole driven, which in combination minimises the amount of excavation and alteration to the landform; and
- vehicle access for the development will be constructed of all-weather materials and have a similar appearance to many of the surrounding public road.

In addition to the above design and siting features, the development seeks to minimise impact on the nearest adjoining non-involved dwellings by satisfying the guideline setbacks for ground mounted solar power facilities, established in DTS/DPF 9.3 of the General Development Policies – Infrastructure and Renewable Energy:

- setback a minimum of 30 metres from the boundary of adjoining land;
- setback approximately 5.0 kilometres from the Township Zones of Brinkworth and Koolunga, which is in excess of the guiding 2.0 kilometres;
- is not within 2.0 kilometres of any rural living, settlement or neighbourhood zones; and
- is not within 500 metres of any conservation area.

Rural Zone	
Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Siting and Design	
PO 2.1 Development is provided with suitable vehicle access.	DTS/DPF 2.1 Development is serviced by an all-weather trafficable public road.
PO 2.2 Buildings are generally located on flat land to minimise cut and fill and the associated visual impacts.	DTS/DPF 2.2 Buildings: a) are located on sites with a slope not greater than 10% (1-in-10) b) do not result in excavation and/or filling of land greater than 1.5m from natural ground level.

Infrastructure and Renewable Energy Facilities	
Desired Outcome	
DO 1 Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity.	
Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Visual Amenity	
PO 2.1 The visual impact of above-ground infrastructure networks and services (excluding high voltage transmission lines), renewable energy facilities (excluding wind farms), energy storage facilities and ancillary development is minimised from townships, scenic routes and public roads by: a) utilising features of the natural landscape to obscure views where practicable b) siting development below ridgelines where practicable c) avoiding visually sensitive and significant landscapes d) using materials and finishes with low-reflectivity and colours that complement the surroundings e) using existing vegetation to screen buildings f) incorporating landscaping or landscaped mounding around the perimeter of a site and between adjacent allotments accommodating or zoned to primarily accommodate sensitive receivers.	DTS/DPF 2.1 None are applicable.

<table>
<tr><th colspan="2">Infrastructure and Renewable Energy Facilities</th></tr>
<tr><td>PO 2.2
Pumping stations, battery storage facilities, maintenance sheds and other ancillary structures incorporate vegetation buffers to reduce adverse visual impacts on adjacent land.</td><td>DTS/DPF 2.2
None are applicable.</td></tr>
<tr><td>PO 2.3
Surfaces exposed by earthworks associated with the installation of storage facilities, pipework, penstock, substations and other ancillary plant are reinstated and revegetated to reduce adverse visual impacts on adjacent land.</td><td>DTS/DPF 2.3
None are applicable.</td></tr>
<tr><td colspan="2">Electricity Infrastructure and Battery Storage Facilities</td></tr>
<tr><td>PO 5.1
Electricity infrastructure is located to minimise visual impacts through techniques including:
(a) siting utilities and services:
(i) on areas already cleared of native vegetation
(ii) where there is minimal interference or disturbance to existing native vegetation or biodiversity
(b) grouping utility buildings and structures with non-residential development, where practicable.</td><td>DTS/DPF 5.1
None are applicable.</td></tr>
<tr><td>PO 5.3
Battery storage facilities are co-located with substation infrastructure where practicable to minimise the development footprint and reduce environmental impacts.</td><td>DTS/DPF 5.3
None are applicable.</td></tr>
<tr><td colspan="2">Renewable Energy Facilities (Solar Power)</td></tr>
<tr><td>PO 9.3
Amenity impacts of solar power facilities are minimised through separation from conservation areas and sensitive receivers in other ownership.</td><td>DTS/DPF 9.3
Ground mounted solar power facilities are set back from land boundaries, conservation areas and relevant zones in accordance with the following criteria:
<table>
<tr><th>Generation Capacity</th><th>Approximate size of array</th><th>Setback from adjoining land boundary</th><th>Setback from Conservation Areas</th><th>Setback from Township, Rural Settlement, Rural neighbour-hood and Rural Living Zones[1]</th></tr>
<tr><td>50MW></td><td>80ha+</td><td>30m</td><td>500m</td><td>2km</td></tr>
<tr><td>10MW< 50MW</td><td>16ha<80ha</td><td>25m</td><td>500m</td><td>1.5km</td></tr>
<tr><td>5MW<10MW</td><td>8ha to <16ha</td><td>20m</td><td>500m</td><td>1km</td></tr>
</table></td></tr>
</table>

Infrastructure and Renewable Energy Facilities					
	1MW<5MW	1.6ha to<8ha	15m	500m	500m
	100kW<1MW	0.5ha<1.6ha	10m	500m	100m
	<100kW	<0.5ha	5m	500m	25m
	Notes: 1. Does not apply when the site of the proposed ground mounted solar facility is located within one of these zones.				

The siting of the project adjacent the existing Brinkworth substation, separated from townships and scenic routes, on cropped land which does not contain native vegetation, minimises the amount of visual change in the rural landscape. In addition to this assessment of the planning policy, the Landscape Character and Visual Impact Assessment (LCVIA) Report by Hemisphere Design considers visual change in the landscape in detail. The LCVIA report concludes (Section 7) that:

> *The development of The Project will alter the character and visual qualities of the locality and wider contextual landscape. Whilst the likely visual impact will be largely inconsequential, the following considerations will assist in minimising likely visual impacts to address potential community concerns which may arise:*
>
> – *Eucalypt Green or similar muted colours are used in the finishing of the BESS which may be partially visible within the locality;*
> – *the use of bright galvanised steel finish is avoided/minimised in finishing exposed metal work for the construction of the PV panels supporting framework;*
> – *where required, quick growing low maintenance native species are used in screen planting;*
> – *new boundary security will be open mesh style fencing with evergreen screen planting running parallel to the fence line.*
>
> *Based on this LCVIA, and noting that the existing locality and landscape is characterised as being of low scenic quality, the visual impact that is likely to be experienced by The Project is considered to range between:*
>
> – *Substantial to slight adverse impact at one Sensitive Receptor Locality (SRL 03)*
> – *Moderate adverse impact at one Sensitive Receptor Locality (SRL 02)*
> – *No change to slight adverse impact at one Sensitive Receptor (SR 04)*
> – *No change at one Sensitive Receptor Locality (SRL 01)*
>
> *Outside the ZTVI, The Project will have no discernible impact on the wider landscape.*
>
> *Accordingly, it is the author's opinion that, in an expansive landscape where taller features capture the eye of the observer the proposed the Brinkworth Solar Farm will not have an adverse visual impact nor will it adversely affect the visual amenity of the locality and wider contextual landscape.*

Based on the assessments above, it is considered that the proposed development adequately and appropriately addresses the relevant policies of the Planning and Design Code that relate to the visual impact of renewable energy facilities (solar and ancillary infrastructure).

5.4 Hazard Minimisation

Policies of the General Development – Infrastructure and Renewable Energy Facilities seek to ensure that renewable energy facilities do not adversely impact on air transport, airfields and landing strips. An Aeronautical Impact Assessment has been undertaken by Chiron Aviation Consultants, which does not identify any certified or uncertified aerodromes within 15 kilometres of the site of the development and concludes that there is no hazard to aviation safety.

General Development Policies – Infrastructure and Renewable Energy Facilities	
Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Hazard Management	
PO 4.1 Infrastructure and renewable energy facilities and ancillary development located and operated to not adversely impact maritime or air transport safety, including the operation of ports, airfields and landing strips.	DTS/DPF 4.1 None are applicable.
PO 4.2 Facilities for energy generation, power storage and transmission are separated as far as practicable from dwellings, tourist accommodation and frequently visited public places (such as viewing platforms / lookouts) to reduce risks to public safety from fire or equipment malfunction.	DTS/DPF 4.2 None are applicable.
PO 4.3 Bushfire hazard risk is minimised for renewable energy facilities by providing appropriate access tracks, safety equipment and water tanks and establishing cleared areas around substations, battery storage and operations compounds.	DTS/DPF 4.3 None are applicable.

A fire assessment has been undertaken by Fire Risk Consultants and concludes that the proposed solar farm (and BESS, now exempt) has a low to medium risk rating. “This low risk is driven by the compliance with the CFA Guidelines and the assessment against the Planning and Design Code – Hazards (Bushfire – General Risk) Overlay during the design phase of the Project. The systems and procedures that are being implemented during design, construction, commissioning and operation will ensure that any risk is managed to an acceptable level.” (Section 6 – Conclusion – Fire Risk Consultant report). Based on the technical assessment undertaken it is considered the proposed development adequately and appropriately addresses the relevant Planning and Design Code policy relating to bushfire hazard.

5.5 Interface Between Land Uses

The Desired Outcome of the General Development Policies – Interface between Land Uses seeks to protect neighbouring properties from the adverse effects of development. The appropriateness of the land use within the Rural Zone has previously been discussed and determined that the renewable energy facility is an appropriate form of development.

The potential impacts on adjoining land uses from the development of the renewable energy facility, are identified as visual (previously discussed), glint/glare, noise, and air quality (particularly during construction) and these are reflected in the policies quoted below.

The nearest sensitive land uses are the non-involved dwellings to the south-east and south of the subject land. Figure 3.9 (Plan DWG 043 in the application documents) illustrates that the nearest infrastructure (solar panels) to the non-associated dwelling to the southeast of the site is approximately 245 metres from the dwelling.

It is acknowledged that there may be some short-term impact on the amenity of owners and occupiers of land during the construction phase of the Project. Post construction and during the operational phase of the solar farm (and BESS), the facility will operate 24 hours per day, seven days per week, when conditions are conducive to the generation of electricity and the battery energy storage facility will be utilised to provide electricity to the grid as required and in accordance with its service/license conditions.

5.5.1 Glint and Glare

Based on the fact that the solar panels absorb and not emit sunlight the potential for glare will be negligible. The existing planting along Koolunga Road, the site's remote location and setback of solar panels from adjacent roads would sufficiently minimise potential for glint by road users and the nearest sensitive receivers. The development does not impact on aviation safety and appropriately mitigates the moderate potential of glint and glare on a limited number of non-involved dwellings.

5.5.2 Noise

An assessment of the potential noise from infrastructure within the renewable energy facility has been undertaken by Sonus in the Environmental Noise Assessment which accompanies the development application. The assessment considers the noise impacts at nearby sensitive receivers from Solar Farm infrastructure comprising medium voltage power station units, tracking motors, and a large grid transformer, power conversion systems, and a large grid transformer. This acoustic assessment includes the BESS infrastructure comprising battery containers, albeit that the BESS is now exempt from development authorisation. The noise levels at sensitive receivers were predicted based on the noise model and the assessment indicated that the noise criteria of the Environment Protection (Noise) Policy 2007 can be achieved at all nearby noise sensitive receivers. Based on the assessment, the development is predicted to not unreasonably impact the amenity of sensitive receivers, thereby achieving the relevant provisions of the Planning and Design Code related to environmental noise.

General Development Policies – Interface Between Land Uses	
Desired Outcome	
DO1 Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses.	
Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
General Land Use Compatibility	
PO 1.2 Development adjacent to a site containing a sensitive receiver (or lawfully approved sensitive receiver) or zone primarily intended to accommodate sensitive receivers is designed to minimise adverse impacts.	DTS/DPF 1.2 None are applicable.
Activities Generating Noise or Vibration	
PO 4.1 Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.1 Noise that affects sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria.
Air Quality	
PO 5.1 Development with the potential to emit harmful or nuisance-generating air pollution incorporates air pollution control measures to prevent harm to human health or unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers) within the locality and zones primarily intended to accommodate sensitive receivers.	DTS/DPF 5.1 None are applicable.
Light Spill	
PO 6.1 External lighting is positioned and designed to not cause unreasonable light spill impact on adjacent sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 6.1 None are applicable.
PO 6.2 External lighting is not hazardous to motorists and cyclists.	PO 6.2 External lighting is not hazardous to motorists and cyclists.
Solar Reflectivity/Glare	
PO 7.1 Development is designed and comprised of materials and finishes that do not unreasonably cause a distraction to adjacent road users and pedestrian areas or unreasonably cause heat loading and micro-climatic impacts on adjacent buildings and land uses as a result of reflective solar glare.	DTS/DPF 7.1 None are applicable.
Electrical Interference	
PO 8.1	DTS/DPF 8.1 The building or structure:

General Development Policies – Interface Between Land Uses	
Development in rural and remote areas does not unreasonably diminish or result in the loss of existing communication services due to electrical interference.	(a) is no greater than 10m in height, measured from existing ground level or (b) is not within a line of sight between a fixed transmitter and fixed receiver (antenna) other than where an alternative service is available via a different fixed transmitter or cable.

5.5.3 Air Quality

The potential impacts on air quality are generally those associated with the construction phase of the project, particularly movement of vehicles and earthworks required in constructing access tracks, trenching and preparing each solar array for installation, which is likely to create a risk of causing a dust nuisance. Minimisation of dust during the construction phase is addressed in the draft Construction Environmental Management Plan, which accompanies the development application, and the need to undertake the development pursuant to the developers' duty of care under the *Environment Protection Act 1993*, and relevant EPA policies and guidelines.

In addition, a Construction Traffic Management Plan will be prepared prior to construction to identify the route for vehicles and any specific mitigation required, i.e. management of potential fugitive material during transportation, operation of equipment to control exhaust emissions and a procedure for complaints.

Mitigation methods identified to date include identification of routes to avoid or minimise traffic through townships and, wherever possible residential land uses; all vehicles and equipment will be operated and maintained to comply with regulatory standards for exhaust emissions; construction site roads watered down; pavement materials and aggregates sprayed with water before transporting and covering any loads of dust generating or odorous materials entering or leaving site. These practices are satisfactory in meeting the intent of the policies of the Planning and Design Code in relation to minimising nuisance in relation to air quality.

5.5.4 Light Spill

Lighting within the development will include lighting of compounds and buildings and for emergency maintenance purposes. There is no permanent perimeter lighting. The development is unlikely to create light spill that would adversely impact occupants of dwellings in the locality.

5.5.5 Electrical Interference

The Interface Between Land Uses policies seek to ensure that development does not detrimentally affect the amenity of the locality through electrical interference. It is understood that electro-magnetic interference (EMI) is typically taken to mean radiofrequency (RF) emissions emanating from PV systems impacting nearby radio receivers, but can also include interference with communication devices and navigational aids.

The aviation assessment undertaken as part of the technical assessments for the application indicates that no interference is anticipated with navigational aids. Furthermore, we are advised that: "*in the United States the Federal Aviation Admiration (FAA) has concluded that EMI from PV installations is low risk. PV systems equipment such as step-up transformers and electrical cables are not sources of electromagnetic interference because of their low-frequency (60 Hz) of operation and PV panels themselves do not emit EMI. The only component of a PV array that may be capable of emitting EMI is the inverter. Inverters, however, produce extremely low frequency EMI similar to electrical appliances and at a distance of 150 feet from the inverters the EM field is at or below background levels. Also inverter enclosure grounding, filtering, and circuit layout further reduce EM radiation* ".

5.6 Traffic and Access

As outlined in the relevant provisions of the Planning and Design Code (some of which are quoted below), there are various policies in relation to traffic and access, including the provision of safe and efficient movement from public road. The key issue with regard to traffic and transport relate to the additional vehicles accessing the proposed site during its construction, and to a considerably lesser degree during operation. It is acknowledged that the proposed construction period will have an effect on the daily use of local roads with increased traffic and noise.

A detailed Traffic Impact Assessment has been undertaken by Empirical Traffic Advisory (ETA) and is included in the development application documents. This assessment report gives particular consideration to the potential route of travel for over size and over mass components of the development during construction, along with a traffic and safety assessment of the proposed development. The conclusions of the ETA report summarise the findings as:

Route Assessment and Site Access

1. *It is recommended that 26 metre B-Double vehicles access the site via Redhill and Koolunga Road, utilising the existing gazetted network and utilising the existing right turn facility on the Augusta Highway.*

2. *Oversize Vehicles are expected to travel from Outer Harbour and therefore would require transportation via the approved OSM road network where possible. While the dimensions of the oversize components are not known at this stage, vehicles could utilise existing approvals of the road network to the Augusta Highway to be in the vicinity of the site. The final route and vehicle dimensions will be subject to the relevant requirements and permits.*

3. *The locations of the proposed site access and egress points are considered appropriate, with good sight distance available in accordance with relevant design standards and guidelines.*

4. *The access points will be constructed to accommodate the largest design vehicles expected to enter and exit the site.*

Traffic Impact

5. *During the peak construction phase, the anticipated number of vehicle movements is anticipated to be in the order of 400 vehicles per day. Outside of the peak construction/civil period, the anticipated traffic movements are anticipated to reduce the in the order of 150 vehicles per day during the operation period of the site.*

6. *This forecast daily traffic volumes fall within the typical current practice where unsealed roads can carry up to 500 vehicles per day.*

7. *When comparing the additional traffic volume generated by the site during the construction and operational phases against current traffic volumes on the road network, it is not expected the site traffic will impact on the safety or function of the surrounding road network.*

Based on the technical assessment undertaken by ETA, it is considered the proposed development suitably addresses the policies of the Planning and Design Code in relation to traffic and access in the following manner:

- safe and efficient movement of all vehicles anticipated to utilise the site (during construction and operation) can be accommodated within the existing road network;
- the recommended access routes for delivery of infrastructure via B-Double or OSM vehicles seek to utilise roads and intersections that minimise impact on the transport system;
- options have been examined to minimise traffic movements through townships, however during construction the preferred route would travel through the township of Koolunga. A Traffic Management Plan would be prepared to suitably manage the impacts during the construction period, which is anticipated to be approximately 4-6 months;
- vehicle access to the site during the construction period and ongoing operation of the renewable energy facility are suitable for the vehicle movements anticipated and have suitable sightlines, so that local traffic would not be adversely impacted;
- all construction traffic can suitably manoeuvre within the site; and

- suitable areas can be made available for parking of staff during construction and for ongoing operation on the site.

General Development Policies – Transport, Access and Parking	
Desired Outcome	
DO 1 A comprehensive, integrated and connected transport system that is safe, sustainable, efficient, convenient and accessible to all users.	
Performance Outcome	Deemed-to-Satisfy Criteria / Designated Performance Feature
Movement Systems	
PO 1.1 Development is integrated with the existing transport system and designed to minimise its potential impact on the functional performance of the transport system.	DTS/DPF 1.1 None are applicable.
PO 1.2 Development is designed to discourage commercial and industrial vehicle movements through residential streets and adjacent other sensitive receivers.	DTS/DPF 1.2 None are applicable
PO 1.4 Development is sited and designed so that loading, unloading and turning of all traffic avoids interrupting the operation of and queuing on public roads and pedestrian paths.	DTS/DPF 1.4 All vehicle manoeuvring occurs onsite.
Sightlines	
PO 2.1 Sightlines at intersections, pedestrian and cycle crossings, and crossovers to allotments for motorists, cyclists and pedestrians are maintained or enhanced to ensure safety for all road users and pedestrians.	DTS/DPF 2.1 None are applicable.
Vehicle Access	
PO 3.1 Safe and convenient access minimises impact or interruption on the operation of public roads.	DTS/DPF 3.1 The access is: (a) provided via a lawfully existing or authorised driveway or access point or an access point for which consent has been granted as part of an application for the division of land or (b) not located within 6m of an intersection of 2 or more roads or a pedestrian activated crossing.
PO 3.3 Access points are sited and designed to accommodate the type and volume of traffic likely to be generated by the development or land use.	DTS/DPF 3.3 None are applicable.
PO 3.4	DTS/DPF 3.4

General Development Policies – Transport, Access and Parking	
Access points are sited and designed to minimise any adverse impacts on neighbouring properties.	None are applicable
PO 3.8 Driveways, access points, access tracks and parking areas are designed and constructed to allow adequate movement and manoeuvrability having regard to the types of vehicles that are reasonably anticipated.	DTS/DPF 3.8 None are applicable.
PO 3.9 Development is designed to ensure vehicle circulation between activity areas occurs within the site without the need to use public roads.	DTS/DPF 3.9 None are applicable.
Access for People with Disabilities	
PO 4.1 Development is sited and designed to provide safe, dignified and convenient access for people with a disability.	DTS/DPF 4.1 None are applicable.
Vehicle Parking Rates	
PO 5.1 Sufficient on-site vehicle parking and specifically marked accessible car parking places are provided to meet the needs of the development or land use having regard to factors that may support a reduced on-site rate such as: (a) availability of on-street car parking (b) shared use of other parking areas (c) in relation to a mixed-use development, where the hours of operation of commercial activities complement the residential use of the site, the provision of vehicle parking may be shared (d) the adaptive reuse of a State or Local Heritage Place.	DTS/DPF 5.1 Development provides a number of car parking spaces on-site at a rate no less than the amount calculated using one of the following, whichever is relevant: (a) Transport, Access and Parking Table 2 - Off-Street Vehicle Parking Requirements in Designated Areas if the development is a class of development listed in Table 2 and the site is in a Designated Area (b) Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements where (a) does not apply (c) if located in an area where a lawfully established carparking fund operates, the number of spaces calculated under (a) or (b) less the number of spaces offset by contribution to the fund.
Vehicle Parking Areas	
PO 6.1 Vehicle parking areas are sited and designed to minimise impact on the operation of public roads by avoiding the use of public roads when moving from one part of a parking area to another.	DTS/DPF 6.1 Movement between vehicle parking areas within the site can occur without the need to use a public road.
PO 6.2 Vehicle parking areas are appropriately located, designed and constructed to minimise impacts on adjacent sensitive receivers through measures such as ensuring they are attractively developed and landscaped, screen fenced, and the like.	DTS/DPF 6.2 None are applicable.

5.7 Cultural Heritage

Planning and Design Code policies - Infrastructure and Renewal Energy Facilities seek to protect areas of cultural sensitivity, as stated in Desired Outcome 1 and PO 9.1.

There are no State or Local Heritage Places within the site of the development. The nearest places of heritage significance identified on the South Australian Property and Planning Atlas (SAPPA) are located within the township of Brinkworth. The proposed development does not alter the setting of those identified local heritage places within Brinkworth.

A cultural heritage desktop assessment of the site has been undertaken by EBS Heritage and they note that there are no Aboriginal places of national significance protected under the *Environment, Protection and Biodiversity Conservation Act 1999*, record on the Australian Heritage Database. There are no Aboriginal sites, objects, cultural and/or spiritual histories protected under the *Aboriginal Heritage Act 1988*, recorded in the Central Archive maintained by the Attorney General's Department – Aboriginal Affairs and Reconciliation. The conclusion of the desktop heritage assessment is that the risk of disturbing unknown Aboriginal sites is low. Our client is aware of their responsibilities to ensure compliance with the *Aboriginal Heritage Act 1988* should Aboriginal sites or objects of significance be disturbed during project works.

Development of the project is not considered to adversely impact places of local or State heritage significance, or those of Aboriginal cultural significance, as sought by the policies of the Planning and Design Code.

Infrastructure and Renewable Energy Facilities	
Desired Outcome	
DO 1 Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity.	
Performance Outcome	**Deemed-to-Satisfy Criteria / Designated Performance Feature**
Renewable Energy Facilities (Solar Power)	
PO 9.1 Ground mounted solar power facilities generating 5MW or more are not located on land requiring the clearance of areas of intact native vegetation or on land of high environmental, scenic or cultural value.	DTS/DPF 9.1 None are applicable.

6 Conclusion

The appropriateness of the renewable energy facility has been assessed against the relevant provisions of the Planning and Design Code, including those quoted above. Considering the intent of the policy, it is considered that the site of the development is appropriate for a renewable energy facility and has substantial planning merit, including:

- the development is of significant benefit via the generation of sustainable and stable electricity;
- the development will benefit the state by providing storage of renewable energy for distribution into the national electricity grid at peak periods;
- renewable energy facilities are an envisaged land use within the Rural Zone;
- the site of the development is not located within a designated area of landscape character;
- the development is unlikely to adversely affect safety of water or air transport;
- the development incorporates suitable and adequate separation from townships and boundaries, including those of non-involved dwellings or other sensitive receivers;
- the development will be designed to be compliant with EPA noise criteria for sensitive receivers;
- suitable access can be provided in a safe and efficient manner for the construction period and operation of the renewable energy facility;
- the development does not impact on cultural heritage; and
- the development can be designed to suitably manage potential impacts such as traffic movements, dust, noise and vibration during the construction phase, as outlined in the draft Construction Management Plan which accompanies the application.

A balanced assessment of the relevant policies concludes that the proposed renewable energy facility is a suitable form of development within the Rural Zone of the Planning and Design Code and warrants the granting of development authorisation.

Julie Jansen FPIA
BA, BA(Hons), GDURP


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Appendix F

Landscape Character and Visual Impact Assessment

LANDSCAPE ARCHITECTURE
URBAN DESIGN
CULTURAL PLANNING
ADVISORY SERVICES

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10th April 2024

State Commission Assessment Panel
Planning and Land Use Services
Level 10, 83 Pirie Street
Adelaide
SA 5001

To whom it may concern:

Re: Brinkworth Solar Farm and BESS Project

This letter should be read in conjunction with the Landscape Character and Visual Impact Assessment (3 Oct 2023) for the Brinkworth Solar Farm and BESS Project, which assessed both the landscape character of the site and the visual impacts of the project. The assessment considered both the solar PV and the battery energy storage facility (BESS) of the Brinkworth project.

Since preparing this report, and prior to the development application being submitted, the Planning, Development and Infrastructure (General) Regulations 2017 (PDI Regulations) have been varied, which has made battery storage facilities in designated locations, including the subject land where the BESS is proposed, exempt from planning approval. Further, we understand that our client now wishes to proceed with the development of the BESS as Stage 1 of the project (as development exempt from approval) and subsequently Stage 2 being the solar farm (the subject of this development application).

The assessment undertaken in our report remains valid, irrespective of the amended application and approval processes, and noting that our client is not seeking approval for the BESS or supporting infrastructure

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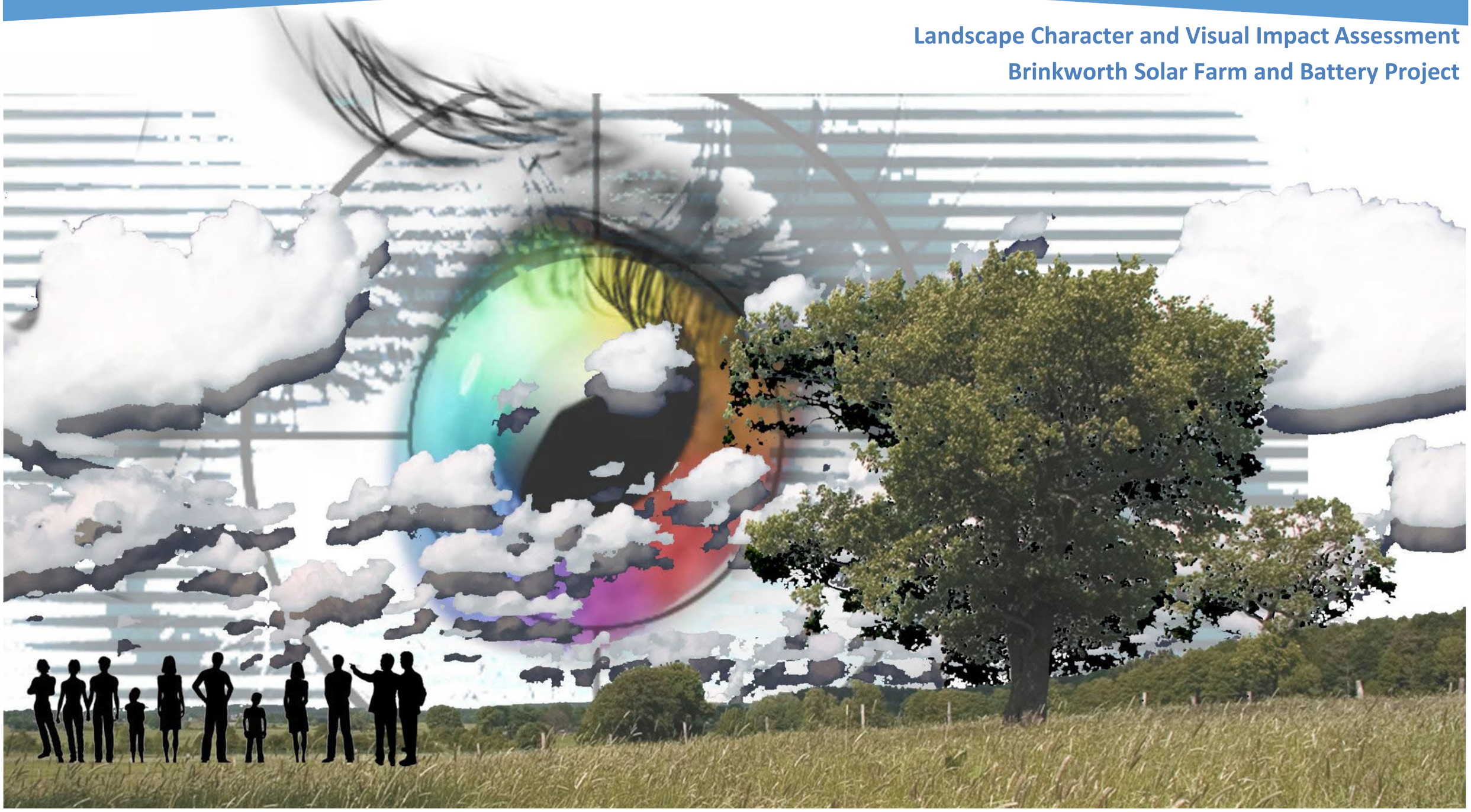
Yours sincerely

STUART HESELTINE
Principal
Hemisphere Design (Aust) Pty Ltd

Landscape Character and Visual Impact Assessment
Brinkworth Solar Farm and Battery Project



Hemisphere Design (Aust) Pty Ltd

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About the author

Stuart Heseltine, Registered Landscape Architect, Principal, Hemisphere Design (Aust) Pty Ltd

Stuart is acknowledged as a leading practitioner in the area of landscape character and visual impact assessment. In considering each visual impact assessment exercise Stuart undertakes a qualitative landscape character assessment consistent with best practice as prescribed by the Guidelines for Landscape and Visual Impact Assessment (third edition), the Landscape Institute (UK) and Institute of Environmental Management and Assessment (NSW) 2013.

Stuart has successfully applied this methodology to major projects across South Australia, the Northern Territory, New South Wales and Victoria. With relevance to this project Stuart has prepared assessments for the Adelaide, Kangaroo Island and Port Lincoln Desalination Plants (SA), the Lincoln Gap (Stage 3) and Barn Hill Windfarm Developments (SA), the Chaff Mill (SA), Tailem Bend (SA) Stage Two, Frasers Solar Farm (Glengarry North, Victoria), Mid Murray and Berri Solar Farm developments (SA), the Clements Gap BESS (SA), Tyabb BESS (Mornington Peninsula, Victoria) and the Torrens Island Gas Power Station Expansion (SA).

Stuart provides regular advice on the likely visual impact of numerous infrastructure developments undertaken by SA Water and visual assessment exercises pertaining to Development Applications lodged in numerous Adelaide metropolitan and regional council areas.

Stuart's particular expertise in undertaking visual assessments is highly sought after for the provision of expert evidence for the Environment, Resources and Development Court (SA).

Note: This document is prepared to be printed and read in A3 format

Disclaimer: Stuart Heseltine, Principal Hemisphere Design is the sole author of this report; all changes implemented without the authors consent after the final report has been issued may warrant the intellectual property contained in the report wholly or partially invalid.

Glossary of Terms

BESS	Battery Energy Storage System
CL	Contextual Landscape
HD	Hemisphere Design
Landscape Assessment	An assessment of the elements that collectively make up the landscape, such as landform, vegetation, land-use and cultural influences
LCVIA	Landscape Character and Visual Impact Assessment
Locality	The position or site of something
PDC	Planning and Design Code
Pv	Photovoltaic panel
Sensitive Receptor (SR)	A Viewpoint or Viewpoint Locality where the observer is more susceptible to the visual impact of the development
Sensitive Receptor Locality (SRL)	An area where there are a number of collocated sensitive receptors
Viewpoint (VP)	A position providing a view of the proposed development from where an assessment is made to consider landscape character and the likely potential of visual impacts which may result as a consequence of the development
Viewpoint Locality (VPL)	An area where there are a number of collocated viewpoints
Visibility shadow	Areas within the likely ZTVI where it is predicted that the proposed development will not be visible because there are a combination of ridgelines and depressions, specific blocks of vegetation and built form between the viewer and the proposed site that potentially blocks all views
Visual Exposure	A measure of the degree to which an observer at a location can see or potentially see the area to be affected by the proposed development. The visual exposure is subjectively classified as either none, low, moderate or high
Zone of Theoretical Visual Influence (ZTVI)	The Zone of Theoretical Visual Influence (ZTVI) is the defined area within which modification to the contextual landscape as a result of the proposed development could be discernible to the naked eye. A nominated radius (e.g., 2 km, 5 km, etc) from the centre of the proposed site is adopted as the likely furthest extent of the likely ZTVI.

Document Control and Distribution Copies

Issue Number	Date Issued	Author	Approved By	Date Approved	Revision Type	Issued to
#01	06.02.2023	Stuart Heseltine	Stuart Heseltine	06.02.2023	N/A	Michael Sale Wind Prospect
#02	23.05.2023	Stuart Heseltine	Stuart Heseltine	23.05.2023	Final	Michael Sale Wind Prospect
#03	03.10.2023	Stuart Heseltine	Stuart Heseltine	03.10.2023	Clarifications	Michael Sale Wind Prospect

Executive summary

This Landscape Character and Visual Impact Assessment (LCVIA) has been prepared as one of a number of studies to support a Development Application prepared by Wind Prospect Pty Ltd on behalf of Akaysha Energy for the development of a Solar Farm, Battery Energy Storage System (BESS) and associated infrastructure off Power Station Road, Brinkworth, SA. The Project will be installed adjacent to but separate from an existing substation facility.

Based on this LCVIA, and noting that the existing locality and landscape is characterised as being of **low scenic quality**, the visual impact that is likely to be experienced within a 2 km radius Zone of Theoretical Visual Influence (ZTVI) by the introduction of the Brinkworth Solar Farm is considered to range from

- **Slight** to **substantial adverse impact** at one Sensitive Receptor Locality (SRL 03). It is acknowledged that the owner and occupier of a property within SRL 03, Number 873 Koolunga Road, is supportive of and a participant in the development and therefore unlikely to have any concerns pertaining to visual impact and loss of visual amenity;
- **Moderate adverse impact** at one Sensitive Receptor Locality (SRL 02);
- **No change** to **slight adverse impact** at one Sensitive Receptor (SR 04);
- **No change** at one Sensitive Receptor Locality (SRL 01).

Outside the ZTVI The Project will have **no discernible impact** on the wider landscape.

As with all renewable energy developments the introduction of new infrastructure elements will potentially alter the character and visual qualities of the locality and wider contextual landscape. Whilst the likely visual impact will be largely inconsequential, the following considerations will assist in minimising likely visual impacts to address potential community concerns which may arise:

- Eucalypt Green or similar muted colours are used in the finishing of the BESS and Operation and Maintenance infrastructure which may be partially visible within the locality;
- the use of bright galvanised steel finish is avoided/minimised in finishing exposed metal work for the construction of the Pv panels supporting framework;
- quick growing low maintenance native species are used in screen planting where required;
- new boundary security will be open mesh style fencing with evergreen screen planting running parallel to the fence line.

It is the author's opinion that in an expansive landscape where taller features capture the eye of the observer the proposed Brinkworth Solar Farm will not have an adverse visual impact nor will it adversely affect the visual amenity of the locality and wider contextual landscape.

1. Introduction

This Landscape Character and Visual Impact Assessment (LCVIA) has been prepared as part of a Development Application being prepared by Wind Prospect Pty Ltd who are supporting Akaysha Energy the developers and operators of the Brinkworth Solar Farm and Battery Project, herein referred to as The Project.

This LCVIA provides an analysis of:

- The existing landscape character and visual amenity of the contextual landscape and locality where existing infrastructure features, for example 275Kv transmission towers, which have a notable visual presence are accepted and are integral features of the contextual landscape;
- The sensitivity of the landscape to change; and
- The likely degree of visual impact as a result of the introduction of The Project and associated infrastructure.

This assessment determines the likely visual impact of The Project where the adjacent existing substation and associated infrastructure and transmission towers and powerlines are prominent and accepted visual features of the existing contextual landscape. It should be noted that assessment of visual impact is highly subjective and the individual consideration of visual impact from any given location or view point may differ from the findings presented in this assessment.

2. Project description

- More than 350,000 photovoltaic panels (Pv) mounted on single-axis tracking structures. The single-axis mounting system allows the panels to track the sun from east to west across the sky over the day. The typical height of the bottom of the solar modules will be 0.5 to 1.0 metres above ground level. The height of modules is expected to be a maximum of 4.5 metres above ground level. The panels will be installed in parallel rows, with potential spacing of up to 9.5 metre between each row.
- A Battery Energy Storage System (BESS) where batteries will be housed as a single array of container like structures approx. – 38.53m by 5.63m and 2.5m in height standing approximately 2.8m above ground level. The BESS will be located some 200m off the western site boundary with Power Station Road and will likely be the first infrastructure component to be installed on the site. Given the proposed setback the BESS will be a fairly inconspicuous addition to the locality and wider contextual landscape.
- An Operations and Maintenance (O & M) building - 24.70m by 10.30m with a pitched roof at 5.04m above ground level. The building will be similar in appearance to a number of large agricultural buildings dotted around the wider contextual landscape.
- An elevated control room with a notional footprint of - 12.00m by 5.00m and 3.75m in height standing approximately 6.27m above ground level.
- Powerline monopoles approximately 21.34m tall, black 2.93m high chain mesh security fencing and water tank 4.17m in diameter by approximately 4.00m above ground level.
- 11 weather stations of up to 10m in height positioned around the site.

2.1 LCVIA considerations

The following inputs have been considered in the preparation of this assessment:

- Project overview, location drawings and indicative layout/construction plans of the site provided by Wind Prospect (Appendix A).
- Aerial photography of the site and wider locality.
- On site photography undertaken by Hemisphere Design.

2.2 LCVIA assumptions

The assessment was undertaken based on the following assumptions:

- That glare or glint will not be an issue to be addressed as part of this study; the purpose of Pv panels is to absorb and not emit sunlight and as such glare ‘overspill’ will be negligible. Glint can often be omitted from newly installed Pv panel infrastructure where the hot dipped galvanised finish of supporting steel frames is left untreated. However, it is the author’s opinion that glint is not an issue of relevance given the site’s relatively remote location, the set back of PV panels from and presence of screen planting along the adjacent Koolunga Road.

3. Summary of Methodology

The methodology employed for the LCVIA involves consideration of best practice guidelines in qualitatively considering the landscape character and the likely visual impact of a proposal. Relevant statutory policies and/or guidelines are also considered and assessed as part of the LCVIA process.

The degree of likely visual impact that will arise from The Project was determined based on a preliminary desktop study which determined the Zone of Theoretical Visual Influence (ZTVI) as a two-kilometre radius from the centre of the site. Within the ZTVI Viewpoints, being publicly accessible locations, were identified to enable a remote ‘Google Earth’ character assessment of the contextual landscape and locality to be prepared.

The assessment of aerial imagery identified twelve Viewpoints both within and immediately outside the ZTVI which were used to reaffirm the findings of the character assessment on-site. One Sensitive Receptor (SR) and three Sensitive Receptor Localities (SRLs) each containing two Viewpoints, were identified as locations where views of the more visually prominent infrastructure elements of The Project are likely to be obtained.

A qualitative assessment of the likely visual impact of The Project from the identified SR/SRLs and subsequent degree of likely visual impact was determined through on-site investigations and is presented in Section 5.

The assessment is supported by photomontage imagery and Photo – negative ‘x - ray images’ are appended for reference which depict the presence of proposed infrastructure in each photomontage without in-situ and contextual rendering.

Typical examples of infrastructure elements

Image 1: Example of Battery Energy Storage System BESS

Image 2: Example of operations and maintenance building and control room and onsite water tanks, of notional size

Image 3: Example of an array Pv solar panels

4. Landscape Character Assessment

4.1 Evaluation of the existing landscape character

A qualitative landscape character assessment has been undertaken in a rigorous manner consistent with best practice, as prescribed by the *Guidelines for Landscape and Visual Impact Assessment (Third Edition)*.[1]

A desktop study was undertaken using Google Earth aerial photography, and Google Earth 'street view' to identify a ZTVI.

The ZTVI is the defined geographical area within which modification to the contextual landscape as a result of The Project could be potentially discernible or visible. Given the open nature of the contextual landscape a two-kilometre radius from the proposed site was considered an appropriate ZTVI for this assessment (refer to HD Figure 1: Contextual Landscape).

Within the ZTVI and immediately adjacent the ZTVI, twelve publicly accessible Viewpoints were identified from which the landscape character of the locality was determined and preliminary consideration given to the potential visual impacts which may result because of The Project.

Viewpoints VP 01, VP 02, VP 03 and VP 04 and Viewpoint VP 05 which were subsequently identified as Sensitive Receptor Localities and a Sensitive Receptor are shown in HD Figure 1: Contextual Landscape.

Within the ZTVI a 'visibility shadow' was determined to illustrate areas within the ZTVI where it is predicted that The Project will not be visible because of a combination of the presence of mature trees over subtly undulating landform falling in a south – north direction between the viewer and The Project that potentially blocks all views (refer to HD Figure 1: Contextual Landscape).

The extensive footprint of the visibility shadow, identified as approximately 60% of the ZTVI was validated through the on-site assessment.

Subsequent on-site photography was taken from Viewpoints that were identified as Sensitive Receptors and other general locations to substantiate and corroborate the initial findings of the desktop study with regards to the definition of both the ZTVI and 'visibility shadow' and also to underpin the visual impact assessment.

4.2 Site visit and photography

A site visit was undertaken on Monday 12th December 2022 by staff of Hemisphere Design.

The weather was overcast with later clearing skies. Photographs were taken at the identified Viewpoints and other locations typical of the general contextual landscape to support and reaffirm the landscape character assessment and underpin the visual impact assessment.

Photographs have been taken using a 35mm Single Lens Reflex (SLR) camera with an approximate lens setting of 43mm.

4.3 Landscape assessment

Landscape assessment for this LCVIA, in contrast to visual assessment, considered the fabric, character and quality of the locality and contextual landscape.

The landscape fabric consists of the elements that make up the landscape, such as landform, land-use and cultural influences. The way these elements fit together in terms of proportion, pattern, scale, etc., gives rise to a particular landscape character. Changes to the fabric and character of a particular landscape may affect the perceived value of that landscape, giving rise to changes in its scenic quality.

The landscape character assessment encompassed both the wider contextual landscape and the locality, within which The Project is located.

This landscape characterisation process was used to establish a 'baseline' upon which judgments about the potential effects of the proposed development can be made. The following guiding definitions have been applied to determine the character assessments:

High scenic quality: Areas and localities which exhibit an exceptionally strong positive character with valued features which combine to give an experience of unity, richness and harmony. Within this definition 'exceptional' could apply where an area is also deemed to be worthy of a legislative designation, e.g., a National Park.

Moderate scenic quality: Areas which exhibit a strong positive character with valued features with evidence of a visually acceptable level of alteration/degradation/erosion resulting in a location of more mixed character.

Low scenic quality: Areas with a generally positive character with fewer valued features with evidence of a visually acceptable level of alteration/degradation/erosion resulting in a location of more mixed character.

No scenic quality: Areas with a little or no positive character with few or no valued features with evidence of a visually unacceptable level of alteration/degradation/erosion resulting in a highly modified location of little character.

Further, the landscape characterisation process defines the landscape 'sensitivity to change' for both the wider contextual landscape and the locality. The following definitions have been applied to determine the landscape's sensitivity to change:

[1] Landscape Institute and Institute of Environmental Management and Assessment. Guidelines for landscape and visual impact assessment (3rd ed.). (2013). Routledge. https://doi.org/10.4324/9780203436295 8.

- High
- Medium
- Low
- Negligible

A landscape that displays a high ‘sensitivity to change’ would not be able to absorb a development of this nature without irreparable consequences and impacts on the inherent character and visual amenity.

The South Australian Planning and Design Code contains provision for the protection of certain landscapes through the Significant Landscape Protection Overlay and the Character Preservation District Overlay. However, The Project site does not fall within nor adjacent to a landscape deemed to be significant or of notable character value.

4.4 Landscape character of the contextual landscape and locality

The landscape can be described as a monumental planar landscape typifying the quintessential qualities of the South Australian Mid North Region. A gateway and one of the many starting points for travellers commencing the much anticipated South Australian ‘outback journey’; a journey where the contextual landscape offers an invite to enter and be immersed in an overwhelming panorama where the eye traces the horizon in search of ‘incident’ and ‘expression’.

This is a landscape where agricultural production dominates drawing the eye of the observer over expansive open fields of wheat and barley to the distant enveloping hills of the Barunga Ranges to the west and the northern part of the Mount Lofty Ranges to the east. In this highly modified landscape of agricultural production large tracts of open fields are bounded by contiguous threads of screen and windbreak planting and intermittent copses of native evergreen trees and shrubs. It is a landscape where the visual impact of human ‘adaptation’ is secondary to the visually engaging form of the distant enveloping ranges.

The monumentality of the landscape is one which readily absorbs large prominent visual elements as evidenced by the notable but not incongruous presence of the existing wind farms along the Barunga Range some 35km to the west. However, the procession of 275Kv transmission towers which uniformly march across the locality and contextual landscape are somewhat obtrusive.

Scale within this expansive contextual landscape is shaped ‘kinetically’ much like the view experienced when looking through a kaleidoscope where rotating shapes and forms distort in size and appearance as the angle and disposition of the view changes. Vertical elements appear much smaller than in reality, whereas more prostrate forms are concealed within a subtle interplay between gentle crests and falls and the patchwork of field and boundary plantings. For example, the ‘dendritic’ arrangement, scale and proportioning of the distant Wind Turbine Generators are notable and accepted visual features which silhouette the expansive horizon providing cues narrating the travellers’ journey. Within the township of Brinkworth vertical forms comprising of the water tower and grain silo and the procession into the distance of 275Kv transmission towers and power lines associated with the existing substation capture and draw the eye of the observer, dominating the immediate vista.

In a planar landscape of open fields and scattered copses of native trees fast moving cloud shadows create patterns of muted darker tones overlaying and creating a blanket like appearance over fields, not too

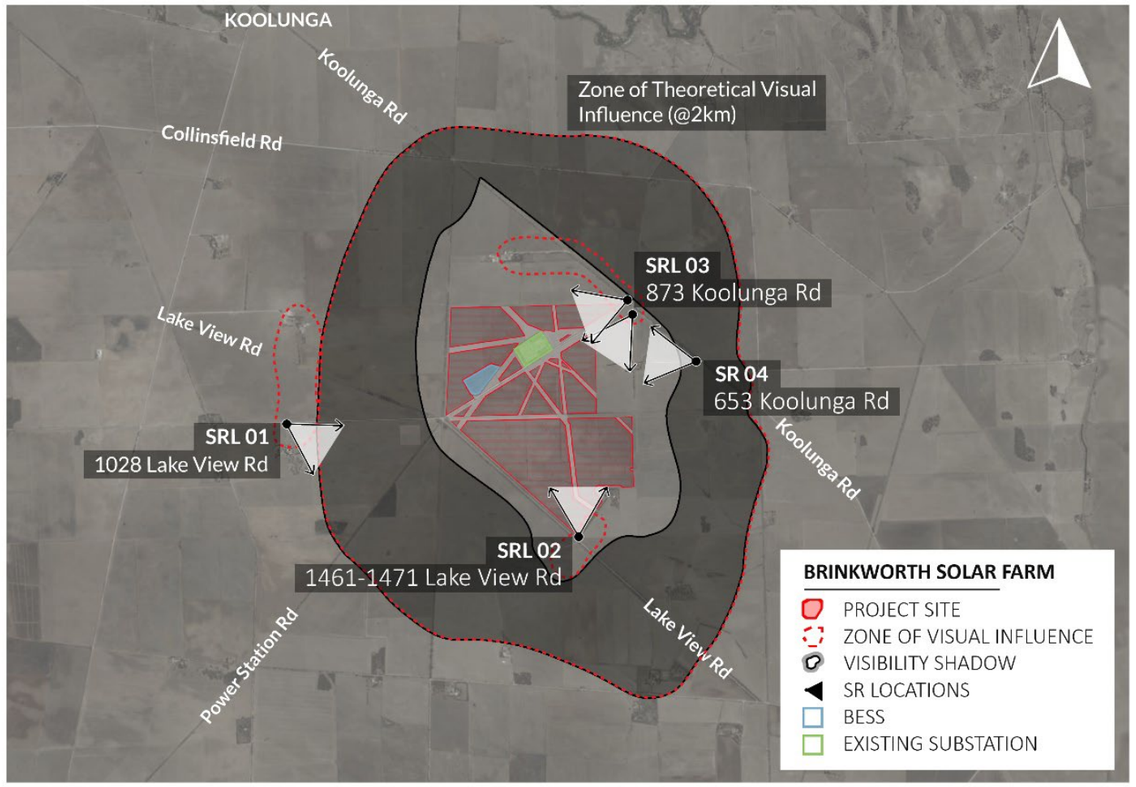


Figure 1: Contextual Landscape

dissimilar to the likely view of a distant solar farm. Within a wider contextual landscape where large shrubs and small trees of dark grey green hues create a sense of partial enclosure and visual punctuation, the site locality is visually incidental.

The more immediate locality within which The Project is located can be loosely defined as the area bounded by Koolunga Road to the east where it interacts with Collinsfield Road to the north, the pastural fields to the west falling either side of Lake View Road and the area to the south bounded by Mallee Corner Road. The landscape of the locality is typical of the wider contextual landscape of cropped fields over undulating land and scattered copses of native plantings. The existing substation is an obvious feature from occasional elevated viewpoints to the south where an absence of screen planting between the observer and the facility exposes the array of gantries, frames, pylons and overhead wires.

Koolunga Road is the principal bituminised road in the locality accommodating local traffic movements between the township of Brinkworth and Koolunga to the north and Blyth and Snowtown further afield.

Observations during the site visit in December 2022 would suggest that:

- the frequency of vehicular movement on Koolunga Road would be deemed to be low and as such locations along the road would not be considered as sensitive receptors where the infrequent traveler would be moving through at speeds of up to 80kph;

- vehicular movement along the network of secondary non bituminised roads within the locality would be local journeys undertaken by locals and residents only who are accessing their property.
- The Project is not visible from either the B82 or B80, the main arterial roads which fall outside the ZTVI traversing the wider contextual landscape.

It is my opinion that the landscape character is one of a **low to moderate scenic quality** and has **a low sensitivity** to change.

Image 4: Photograph showing view northwest along Koolunga Road at Mallee Corner Road intersection

5. Likely visual impact assessment

Determining the likely visual impact of a development proposal in most regional locations presents obvious challenges where properties are often located some distance off major roads on private land away from publicly accessible locations. Where access is not sought to enter private land to obtain a view(s) that will best represent a potential visual impact, assumptions have to be drawn from views obtained from public locations that best typify the view and consequent visual impact that would likely be received from within the curtilage of the dwelling located on such 'remote' properties.

The Project has presented such assessment challenges; however, it is the author's opinion this LCVIA assessment is an accurate and fair presentation of the potential likely impacts given these obvious constraints.

Of the twelve viewpoints identified in the desktop study and assessed on site the LCVIA evaluation has, as implied in the PDC considered the likely visual impacts on townships, scenic routes and public roads and determined that:

- One Viewpoint, VP 01 is considered to be a Sensitive Receptor Locality (SRL 01) where No. 1208 Lake View Road and 'Carclew' are likely to receive broadly similar views of The Project to the east.
- One Viewpoint, VP 02 adjacent the entrances to both 1461 and 1471 Lake View Road is considered to be a Sensitive Receptor Locality (SRL 02) where views of The Project located to the northwest are likely to be received.
- Viewpoints VP 03 at the intersection of Koolunga Road with Power Station Road and VP 04, at the northern entrance to no 653 Koolunga Road, are considered to be a Sensitive Receptor Locality (SRL 03).

  The view west and northwest from the intersection of Koolunga Road with Power Station Road presents views that would be a reasonable representation of the likely views received of The Project by No. 873 Koolunga Road located to the immediate north. It is the author's understanding that the owner and occupier of Number 873 Koolunga Road is supportive of and a participant in The Project and therefore unlikely to have any concerns pertaining to visual impact and change to visual amenity.

- One Viewpoint, VP 05, at the south entrance to Number 653 Koolunga Road is considered to be a Sensitive Receptor (SR 04). It also represents likely views of The Project that will be intermittently received along Koolunga Road by travellers.

These Sensitive Receptor and Sensitive Receptor Localities are illustrated on HD Illustration 1: Contextual Landscape (Figure 1).

The remaining Viewpoints considered, including views from within both Brinkworth and Koolunga, either fall within The Project 'visibility shadow' or outside the ZTVI where the presence and likely visual impact of The Project will be largely indiscernible.

The following factors were considered when assessing the likely visual impact of the visual features of The Project on the Sensitive Receptors and Sensitive Receptor Localities:

- The visual qualities of the view and the duration and angle of the view in relation to the main activity of the viewer;
- The distance of the viewpoint from visible infrastructure;
- The extent of the area over which the changes would be visible and the scale of the change in the view (loss or addition of features, changes in composition, proportion of view affected);
- The degree of contrast in form, scale, mass, line, height, colour and texture introduced into the view by The Project where the existing 132 Kv and 275 Kv transmission towers and array of gantries and frames within the existing substation site buildings are incongruous;
- The duration and nature of the effect (temporary, permanent, intermittent), which is particularly relevant in this appraisal where the majority of viewers are travellers journeying through the landscape along one main road at speed of up to 80kph; and
- The numbers and types of viewers affected, which in this assessment is likely to be small and limited to the local population and the occasional traveller journeying through to a distant destination.

5.1 Likely visual impact during construction phase

During the construction phase temporary changes to visual amenity will occur. These changes will be due mainly, but not limited to the presence of construction equipment, earthworks activities and an overall increase in the number of people and large vehicles at each site and at roadside locations.

Given the inability to predict the timing, programming and duration of construction until a contractor has been appointed and commences work on site and the degree of temporary change in the visual environment that will likely occur but which cannot thus be determined, the visual impact during construction phase is not considered in detail in this assessment.

5.2 Likely visual impact at the identified Sensitive Receptors

The likely impacts at SRL 01, SRL 02, SRL 03 and SR 04 are described in Tables 1 to 4, using the following definitions:

Substantial adverse impact	where the visible elements of The Project would cause a significant deterioration in the existing view
Moderate adverse impact	where the visible elements of The Project would cause a noticeable deterioration in the existing view
Slight adverse impact	where the visible elements of The Project would cause a barely perceptible deterioration in the existing view
Slight beneficial impact	where the visible elements of The Project would cause a barely perceptible improvement in the existing view
Moderate beneficial impact	where the visible elements of The Project would cause a noticeable improvement in the existing view
Substantial beneficial impact	where the visible elements of The Project would cause a significant improvement in the existing view
No change	No discernible deterioration or improvement in the existing view as a consequence of The Project

5.3 Mitigation considerations

The use of vegetative screening is not considered necessary given the low level of visual impact expected and low frequency of travellers through the locality passing along Koolunga Road. However, if vegetative screening is considered desirable (from a community relations perspective) then the use of quick growing native tree and shrub species to supplement existing plantings along the eastern boundary of the site fronting Koolunga Road would be appropriate. The establishment of a vegetative screen along this boundary will, after a few growing seasons, likely ameliorate all visual impacts on glimpsed views afforded from Koolunga Road.

Consideration should be given to selecting materials and finishes for the BESS that complement the local built form vernacular, for example Eucalypt Green coloured tin sheeting facades and rooves.

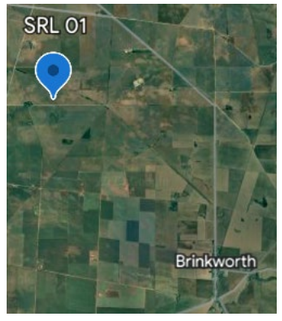
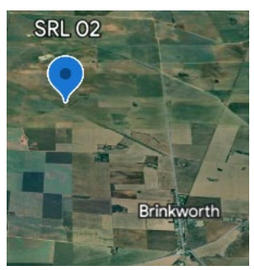
Table 1 – Sensitive Receptor Locality 01 (SRL 01)	
 *Image 5: 1028 Lake View Road looking east* 	
Location	Number 1028 and ‘Carclew’, Lake View Road.
View directions	Panoramic north – east – south.
Landscape and setting	A landscape of **low scenic quality**. The locality is defined by the extensive vista across a 180-degree panorama over a foreground of planar cropping fields where clusters of native trees and shrubs and the occasional farmstead building and agricultural shed ‘silhouette’ the expansive skyline. It is a summer landscape of stark and confronting colours, with vegetative threads of olive and grey green complementing the darkened shadowed appearance of the horizon. The visually ad-hoc arrangement of electricity substation infrastructure and the extensive presence of transmission towers with a catenary of overhead cables are notable features where the transmission towers punctuate the skyline. Within this planar landscape the eye of the observer is drawn along the visual axis defined by Lake View Road and the stark grey pipeline to the distant hills face. A monumentally underwhelming panorama of limited visual merit.

Table 1 – Sensitive Receptor Locality 01 (SRL 01)	
Distance from Project Site(s)	Approximately 2km to the western boundary.
Visual exposure at receptor	The degree of visual exposure is moderate to high, however existing mature plantings on the eastern boundary of the proposed site will afford glimpsed views only of the Pv panels installed along the site western boundary.
Predicted visual impact	**No change.** From this vantage point the panels will be indiscernible from the bands of native vegetation that cross the vista at right angles. The full array of Pv panels will sit below the horizon without penetrating the skyline. Glare and reflection from site infrastructure is not considered to be a visual impact. Refer to Image 6 – Photomontage illustration for Sensitive Receptor Locality 01 (SRL 01).
Mitigation	Not recommended.

Image 6: Photomontage for Sensitive Receptor Locality 01 (SRL 01), looking east

Table 2 – Sensitive Receptor Locality 02 (SRL 02)

Image 7: No. 1461 Lake View Road, view north – north-west



Location	Adjacent to the entrances of No. 1461 and 1471 Lake View Road
View Direction	North – northwest
Landscape and setting	A landscape of low scenic quality

Table 2 – Sensitive Receptor Locality 02 (SRL 02)	
	A foreground of rich ochre-coloured cropped fields bounded by roadside tree and shrub planting and the occasional collection of trees and smaller shrubs which define field and property boundaries. The panorama is dominated by electricity transmission towers juxtaposed against the skyline and the outline of the existing taller substation gantry infrastructure. A planar landscape where the eye of the observer traces over the open landscape in anticipation of some injection of visual interest only to conclude the search somewhat unrewardingly at the distant horizon.
Distance from Project Site	At/adjacent the entrance to both properties of Lake View Road and within 200m – 500 m of the southwestern array of panels
Visual exposure at receptor	Moderate to high where the array of Pv panels along the southwestern boundary are prominent. At this Sensitive Receptor Locality, boundary fencing is likely to appear more obvious and obtrusive than at other Sensitive Receptors. Whilst prominent, the panels are less incongruous than the imposing transmission towers which run at continuous intervals drawing the eye of the observer North to the hills face and horizon. The panels sit below the horizon retaining views towards the hills, in the mid ground threaded ribbons of mature roadside plantings foil and soften the stark, abrupt edges of the linear array of the Pv panels. This visual receptor locality impacts on two residential properties only, the frequency of traffic passing along Lake View Road is likely to be low and mainly comprise of infrequent movements of property owners and residents accessing their properties.
Predicted visual impact	**Moderate adverse impact** where the initial rows of Pv panels will be highly prominent; however, the depth of Pv panels will be visually concealed over a flat planar landscape where the distant views to the hills face horizon remains unaffected. Glare and/or reflection from site infrastructure are not considered to cause a likely visual impact. Refer to Image 8 – Photomontage illustration for Sensitive Receptor Locality 02 (SRL 02).
Mitigation	Whilst considered unnecessary, where required supplementary roadside planting of quick growing and native screen plantings will assist in mitigating the likely visual impacts.

Image 8: Photomontage for Sensitive Receptor Locality 02 (SRL 02), looking north – northwest

Table 3 – Sensitive Receptor Locality 03 (SRL 03)

Image 9: Northern entrance to No. 653 Koolunga Road (off Koolunga Road adjacent Power Station Road), view - west and southwest

Image 10: Intersection of Power Station Road and Koolunga Road looking west across land south of No. 873 Koolunga Road

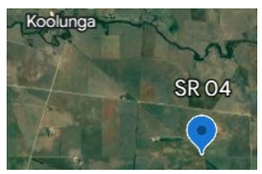
Table 3 – Sensitive Receptor Locality 03 (SRL 03)	
Location	Northern entrance to 653 Koolunga Road and intersection of Koolunga Road with Power Station Road
View directions	Views that would be a reasonable representation of: • the likely views received by No. 873 Koolunga Road located to the immediate northwest where the property (No. 873 Koolunga Road) would receive views of The Project to the immediate south • glimpsed views off Koolunga Road where a portion of the eastern site boundary is immediately adjacent Koolunga Road
Landscape and setting	A landscape of **Low scenic quality** A foreground of rich ochre-coloured cropped fields bounded by roadside tree and shrub planting and the occasional collection of trees and smaller shrubs which define field and property boundaries. The panorama is dominated by a midground comprising of electricity transmission towers and the outline of the existing taller substation gantry infrastructure juxtaposed against the skyline. Distant views of the hills face where the appearance of crest and folds are accentuated by the moving cloud 'shadow play' offer some visual interest in an otherwise uninspiring vista
Distance from Project Site(s)	Approximately 10m – 20m from the southern property boundary of No. 873 Koolunga Road
Visual exposure at receptor	The degree of visual exposure is **moderate** where: • the northern boundary of The Project extends to within close proximity of the southern boundary and residential dwelling of No. 873 • glanced intermittent views of the initial rows of Pv panels will be obtained by motorists travelling along Koolunga Road at speeds of no less than 80Kph
Predicted visual impact	The likely visual impact will be: • **significant adverse impact** when viewed from No. 873 Koolunga Road • A fleeting and **slight adverse impact** from Koolunga Road/Power Station Road intersection adjacent the eastern boundary Refer to Images 11 and 12 – Photomontage illustration for Sensitive Receptor Locality 03 (SRL 03)
Mitigation	Within an expansive panorama the introduction of vegetative screening is deemed unnecessary; however, where desired the use of supplementary native small trees and large evergreen shrubs will assist in ameliorating all likely visual impacts from Koolunga Road.

Image 11: Photomontage for Sensitive Receptor Locality 03 (SRL 03), looking west and south-west

Image 12: Photomontage for Sensitive Receptor Locality 03 (SRL 03), looking west

Table 4 – Sensitive Receptor 04 (SR 04)

Image 13: Southern entrance to No. 653 Koolunga Road



Location	At the southern entrance to No. 653 Koolunga Road
View directions	View west - southwest
Landscape and setting	A landscape of **low scenic quality** Fore and mid - ground views reveal a landscape of cropped fields bounded by roadside tree and shrub planting and the occasional collection of trees and shrubs which define field and property boundaries. The dark green-grey ribbons of native vegetation that traverse the view in a left right direction contrast with and stand prominent against the enveloping summer expanse of yellow and ochre hues. The panorama is dominated by views of the mid ground existing substation and transmission towers juxtaposed against the skyline and puncturing the horizon. Within the expansive 180-degree panorama the contiguous folds and creases of the distant hills face offer a welcome visual distraction in an otherwise underwhelming visual landscape.

Table 4 – Sensitive Receptor 04 (SR 04)	
	In a planar landscape where the eye of the observer traces over the undulating landscape searching for visual stimulation the scatted copses of mature eucalypts ‘silhouetting’ the skyline offers limited interest.
Distance from Project Site(s)	Approximately 1.3km to 800m to the eastern site boundary
Visual exposure at receptor	The degree of visual exposure is low. Within a planar landscape where the distant ranges remain the prevailing dominant visual feature the row(s) of panels are set back 500m west of the dwelling of 653 Koolunga Road and a further 800m approximately from Koolunga Road the Pv panels will appear as a thin grey ‘pencil line’, broken by the foreground of intermittent tree planting, The panels will be barely discernible against the horizon and similar in appearance to the linear bands of mid – ground darker vegetation which also traverses the view. The continuous north-south march of incongruous transmission towers and the existing substation infrastructure will continue to dominate the mid ground view across the horizon.
Predicted visual impact	The likely visual impact will be **no change to slight adverse impact** where the Pv panels will be faintly discernible additions to the visual landscape. The view from the entrance to 653 Koolunga Road is indicative of a number of glimpsed views that would likely be received by travellers through intermittent breaks in boundary screen planting along Koolunga Road. Glare and/or reflection are not considered to cause a likely visual impact. Refer to Image 14 – Photomontage illustration for Sensitive Receptor 04 (SR 04)
Mitigation	Within an expansive panorama the introduction of vegetative screening is deemed unnecessary, however where desired the use of infill native small trees and large evergreen shrubs will assist in ameliorating all likely visual impacts from Koolunga Road

Image 14: Photomontage for Sensitive Receptor 04 (SR 04), looking west - southwest

6. Consideration of The Planning and Design Code

The following provisions of the SA Government Planning and Design Code[2], which refer to Desired Outcomes (DO) and Performance Outcomes (PO) are considered relevant where they pertain to issues of visual amenity.

Infrastructure and renewable energy facilities

D0: 1 *(requires the)* Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity.

PO: 2.1 The visual impact of above-ground infrastructure networks and services (excluding high voltage transmission lines), renewable energy facilities (excluding wind farms), energy storage facilities and ancillary development is minimised from townships, scenic routes and public roads by:

a) utilising features of the natural landscape to obscure views where practicable

b) siting development below ridgelines where practicable

c) avoiding visually sensitive and significant landscapes

d) using materials and finishes with low-reflectivity and colours that complement the surroundings

e) using existing vegetation to screen buildings

PO: 2.2 Pumping stations, battery storage facilities, maintenance sheds and other ancillary structures incorporate vegetation buffers to reduce adverse visual impacts on adjacent land.

PO: 2.3 Surfaces exposed by earthworks associated with the installation of storage facilities, pipework, penstock, substations and other ancillary plant is reinstated and revegetated to reduce adverse visual impacts on adjacent land.

PO: 5.1 Electricity infrastructure is located to minimise visual impacts through techniques including:

a) siting utilities and services:

i. on areas already cleared of native vegetation

ii. where there is minimal interference or disturbance to existing native vegetation or biodiversity

b) grouping utility buildings and structures with non-residential development, where practicable

In summary The Project can be considered as 'complementary development.' In a planar landscape of **low** to **moderate** scenic quality where views to the distant hills face are unimpeded by the introduction of The Project the likely visual impact will be inconsequential.

- Has a 'visibility shadow' that envelops 60% of the ZTVI; several dwellings within the ZTVI will not be impacted by The Project.
- Will be visually anonymous from within the township of Brinkworth, locations within the locality and the wider contextual landscape.
- Will have a negligible to moderate visual impact on the identified Sensitive Receptors.
- Is located adjacent the existing substation and as such the Pv panels and BESS will be viewed as a visually complementary infrastructure feature.
- Will require minimal clearance of existing vegetation.
- Will be afforded screening benefits derived from the pockets of mature vegetation along Koolunga Road and within the wider locality. Within the wider contextual landscape the dark appearance of the Pv panels will appear similar to the boundary plantings of grey green native vegetation.
- Will avoid reflective finishes and where practicable incorporate muted colours in cladding finishes for the BESS which will assist in ameliorating the built form into the wider visual narrative.
- Will include the reinstatement of the site and immediate landscape to an acceptable standard on completion of construction works.

In considering the PDC, The Project is not at a variance with the relevant Infrastructure and Renewable Energy Facilities (General) desired and performance outcomes.

The Significant Landscape Protection Overlay Assessment Provisions and the Character Preservation District Overlay Assessment Provisions do not apply to The Project.

The sense of place and place attachment values of either the locality or contextual landscape will not be detrimentally affected by The Project.

[2] Plan SA, Government of South Australia. *Planning and Design Code* Version 2022.21. November 2022.

7. Summary and recommendations

The development of The Project will alter the character and visual qualities of the locality and wider contextual landscape. Whilst the likely visual impact will be largely inconsequential, the following considerations will assist in minimising likely visual impacts to address potential community concerns which may arise:

- Eucalypt Green or similar muted colours are used in the finishing of the BESS which may be partially visible within the locality;
- the use of bright galvanised steel finish is avoided/minimised in finishing exposed metal work for the construction of the Pv panels supporting framework;
- where required, quick growing low maintenance native species are used in screen planting;
- new boundary security will be open mesh style fencing with evergreen screen planting running parallel to the fence line.

Based on this LCVIA, and noting that the existing locality and landscape is characterised as being of **low scenic quality**, the visual impact that is likely to be experienced by The Project is considered to range between:

- **Substantial** to **slight adverse impact** at one Sensitive Receptor Locality (SRL 03)
- **Moderate adverse impact** at one Sensitive Receptor Locality (SRL 02)
- **No change** to **slight adverse impact** at one Sensitive Receptor (SR 04)
- **No change** at one Sensitive Receptor Locality (SRL 01)

Outside the ZTVI, The Project will have **no discernible impact** on the wider landscape.

Accordingly, it is the author's opinion that, in an expansive landscape where taller features capture the eye of the observer the proposed the Brinkworth Solar Farm will not have an adverse visual impact nor will it adversely affect the visual amenity of the locality and wider contextual landscape.

Appendix A – Site Plan (DWG 027 B.1)

LEGEND

- Project Site Boundary
- Existing Brinkworth Substation
- BESS and transmission connections
- Solar Panels
- Inverter Station
- Weather Station

Transmission Lines Electranet

- 132 kV
- 275 kV

SCALE

800 m

SOURCE

Geoscience Australia © Australian Government 2023;
SA map data © State of South Australia 2023;
Imagery © Bing Maps 2023;
© Wind Prospect 2023.

DWG 027 B.1	GDA 2020 (54)
	24 JULY 2023
BRINKWORTH SOLAR FARM PTY LTD	
PROJECT OVERVIEW	
DRAWN BY: J. MOURIER	CHECKED BY: M. SALE

Appendix B – Photo Negative ‘X Ray’ Images

Image 15: X-Ray Image SRL 01

Image 16: X- ray Image SRL 02

Image 17: X- Ray Image SRL 03

Image 18: X- Ray Image SRL 03

Image 19: X-Ray Image SR 04

Appendix G

Environmental Noise Assessment

State Commission Assessment Panel
Planning and Land Use Services
Level 10, 83 Pirie Street
Adelaide SA 5001

S7575C3

Attention: Secretary – State Commission Assessment Panel

8 April 2024

Dear Sir/Madam,

BRINKWORTH SOLAR FARM AND BESS PROJECT
ENVIRONMENTAL NOISE ASSESSMENT

This letter should be read in conjunction with the Environmental Noise Assessment (Sonus Report S7575C2, dated June 2023) (the **Assessment**) for the Brinkworth Solar Farm and BESS Project (the **Project**), which assessed predicted noise from the Project against regulatory criteria. The assessment considered both the Solar PV and the Battery Energy Storage Facility (**BESS**) of the Brinkworth project.

Since preparing the Assessment, and prior to the development application being submitted, the *Planning, Development and Infrastructure (General) Regulations 2017* (**PDI Regulations**) have been varied, which has made battery storage facilities in designated locations, including the subject land where the BESS is proposed, exempt from Planning Approval. Further, it is understood that our client now wishes to proceed with the development of the BESS as Stage 1 of the Project (as development exempt from approval) and subsequently Stage 2 being the solar farm (the subject of this Development Application).

The assessment undertaken in our report remains valid, irrespective of the amended application and approval processes, and noting that our client is not seeking approval for the BESS or supporting infrastructure.

Yours faithfully
Sonus Pty Ltd

Adam Cook
Associate

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acook@sonus.com.au

Brinkworth Solar Farm and Battery

Environmental Noise Assessment

S7575C2

June 2023

sonus.

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www.sonus.com.au

Document Title	: Brinkworth Solar Farm and Battery Environmental Noise Assessment
Client	: Wind Prospect
Document Reference	: S7575C2
Date	: June 2023
Author	: Adam Cook, MAAS

1 INTRODUCTION

An environmental noise assessment (the **Assessment**) has been undertaken for the proposed Brinkworth Solar Farm and Battery project (the **Development**).

The Development is proposed to be constructed adjacent to the existing electrical substation on Power Station Road at Brinkworth, South Australia. The Development comprises the construction of a solar farm (the **Solar Farm**) with 209 MW of generation capacity and a Battery Energy Storage System (**BESS**) with 300 MW / 1200 MWh energy storage capacity.

The Assessment considers the noise impacts at nearby sensitive receivers from Solar Farm infrastructure comprising medium voltage power station units, tracking motors, and a large grid transformer; and the BESS infrastructure comprising battery containers, power conversion systems, and a large grid transformer. The layout of the Solar Farm and BESS is shown in Appendix A.

An overview of the Development and the surrounding area is shown in Figure 1.

The Assessment has been based on the following:

- *PROJECT OVERVIEW* by Wind Prospect for "BRINKWORTH SOLAR FARM PTY LTD", Drawing Number "DWG 027 A.2", dated 14 June 2023
- *BATTERY ENERGY STORAGE SYSTEM (BESS) OVERVIEW* by Wind Prospect "BRINKWORTH SOLAR FARM PTY LTD", Drawing Number "DWG 028 A.1", dated 13 June 2023
- *GENERAL LAYOUT* by PowerSwitch LLC, for Project Name "Brinkworth", Project No. "AKE111", Sheet "ES2", dated 24 March 2023
- *SITE PLAN* by PowerSwitch LLC, for Project Name "Brinkworth", Project No. "AKE111", Sheet "ES1", dated 22 March 2023
- Manufacturer data for the *SMA MVPS-4200-S2* inverter units
- Manufacturer data for the *NEXTracker* solar tracker motors
- Manufacturer data for the *Powin Stack750* battery units
- Manufacturer data for the *eks WD3s* PCS units
- Previous noise measurements and sound power data obtained from similar facilities for the grid transformers.

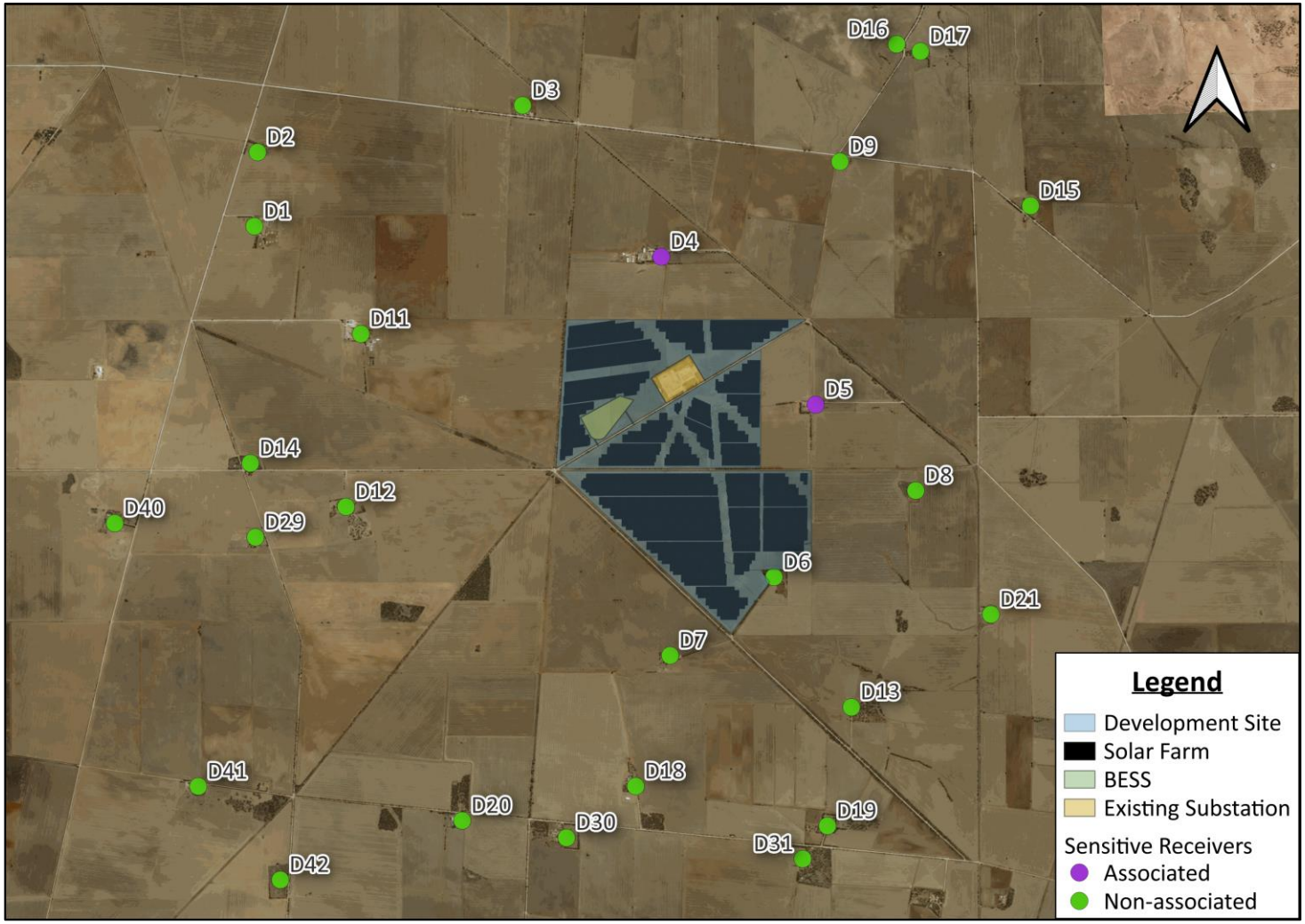


Figure 1: Overview of the Development and surrounding area

2 CRITERIA

2.1 Planning and Design Code

The Development is located within the Wakefield Regional Council area and is subject to the provisions of the South Australian *Planning and Design Code* (the **Code**) under the *Planning, Development and Infrastructure Act 2016*.

The Development and all sensitive receivers in the locality are within the *Rural* zone of the Code. The closest non-associated sensitive receiver is located adjacent to the southeastern section of the Development. Additional non-associated sensitive receivers surround the Development, but at greater separation distances. The Code has been reviewed and the provisions considered relevant to the Assessment are provided in Appendix B.

Performance Outcome 4.1 (**PO4.1**) of the Interface between Land Uses section of the Code requires noise from developments to *not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers)*. The Deemed-to-Satisfy / Designated Performance Feature provision for PO4.1 references the *Environment Protection (Noise) Policy 2007* (the **Policy**).

2.2 Environment Protection (Noise) Policy 2007

The Policy provides objective criteria to assess the environmental noise emissions from a proposed development. The noise criteria provided by the Policy are based on the *World Health Organisation Guidelines for Community Noise (1999)*[1] (the **WHO Guidelines**), which provide recommended maximum noise levels to prevent annoyance, sleep disturbance and unreasonable interference on the amenity of an area. Therefore, compliance with the Policy is considered to satisfy the WHO Guidelines, and the provisions in the Code related to environmental noise.

The Policy establishes goal noise levels to be achieved at sensitive receivers based on the principally promoted land use of the zones in which the noise source (the Solar Farm and BESS) and sensitive receivers (the residences) are located.

[1] Berglund B, Lindvall T & Schwela DH 1999, *Guidelines for Community Noise*, World Health Organisation (WHO), Geneva, Switzerland.

When considering the principally promoted land uses, the Policy provides the following goal noise levels to be achieved at associated sensitive receivers in the locality:

- An equivalent noise level (L_{eq}) of 57 dB(A) during the day (7:00am to 10:00pm).
- An equivalent noise level (L_{eq}) of 50 dB(A) during the night (10:00pm to 7:00am).

For a Development Application, the Policy reduces these criteria by 5 dB(A) for non-associated sensitive receivers, becoming:

- An equivalent noise level (L_{eq}) of 52 dB(A) during the day (7:00am to 10:00pm).
- An equivalent noise level (L_{eq}) of 45 dB(A) during the night (10:00pm to 7:00am).

The night time criteria are considered the most critical for continuous noise sources, which can operate any time of the day or night.

When measuring or predicting noise levels for comparison with the Policy, adjustments may be made to the average noise levels for each “annoying” characteristic of tonality, impulsiveness, low frequency, and modulation. The characteristic must be dominant in the acoustic environment and therefore the application of any penalties varies depending on the assessment location, time of day, the noise source being assessed, and the measured or predicted noise level. The application of penalties is discussed further in the Assessment section.

3 ASSESSMENT

3.1 Noise Prediction Model

Predictions of noise have been made using *SoundPLAN v9.0* noise modelling software and the CONCAWE[2] noise propagation model. The CONCAWE noise propagation model is widely accepted as an appropriate model for ground-based sources and has the ability to take into account relevant influences, including:

- Sound power levels and locations of noise sources and receivers.
- Separation distances between noise sources and receivers.
- Topography of the area.
- Influence of the ground.
- Air absorption.
- Meteorological conditions.

Meteorological conditions for noise propagation can be described using the CONCAWE noise propagation model and associated weather categories. The CONCAWE system divides meteorological conditions into six separate "weather categories", depending on wind speed, wind direction, time of day and level of cloud cover. Weather Category 1 provides the weather conditions associated with the "lowest" propagation of noise, whilst Weather Category 6 provides "worst-case" (i.e. highest noise level) conditions. Weather Category 4 provides "neutral" conditions for noise propagation (that is, conditions which do not account for the effects of temperature inversion or wind on propagation).

The Assessment provides noise predictions for CONCAWE Weather Category 6 (worst-case) conditions based on the following assumptions:

- Atmospheric conditions at 10°C and 80% relative humidity
- Wind direction from each noise source to each sensitive receiver
- Ground types in accordance with the CONCAWE propagation model. That is, "hard" ground for concrete or water, and all other surface (including grass) considered to be ground with finite acoustic impedance. In this case, the model has assumed hard ground for the BESS facility and soft ground in all other areas.

[2] CONCAWE – The oil companies' international study group for conservation of clean air and water – Europe, 'The propagation of noise from petrochemicals complexes to neighbouring communities', May 1981.

3.2 Noise Sources

The Assessment has considered the following noise sources for the components of the Development:

- Solar Farm
    - 4528 tracking motors, one in the middle of each row of solar panels.
    - 42 *SMA MVPS-4200-S2* inverter units, each with a 5 MVA transformer.
    - One 200 MVA site transformer.
- BESS
    - 2160 *Powin Stack750* battery energy storage units.
    - *240 eks WD3s* Power Coversion System (**PCS**) units.
    - 120 2.5 MVA transformers.
    - One 400 MVA site transformer.

All sources are assumed to operate simultaneously, which is understood to be a conservative worst-case approach for operation over the night period.

The sound power levels for the MV and grid transformers have been determined in accordance with the "standard" level derived from the *Australian/New Zealand Standard AS/NZS60067.10:2009 Power transformers Determination of sound levels (IEC60006710, Ed. 1(2001) MOD*).

The sound power levels for these items have been derived based on information provided by the manufacturer and spectral data taken from previous similar assessments.

Sound power level data associated with the proposed equipment are provided in the following tables.

Table 1: eks WD3s PCS unit sound power levels

Octave Band Centre Frequency (Hz)	Sound Power Level (dB(A))
63	68
125	77
250	84
500	91
1000	92
2000	95
4000	100
Total	**102**

Table 2: Powin Stack750 battery energy storage unit sound power levels

Octave Band Centre Frequency (Hz)	Sound Power Level (dB(A))
63	64
125	69
250	75
500	77
1000	79
2000	79
4000	77
Total	**85**

Table 3: SMA MVPS-4200-S2 inverter sound power levels

One-Third Octave Band Centre Frequency(Hz)	Sound Power Level (dB(A))
25	40
31	48
40	49
50	55
63	61
80	64
100	65
125	74
160	70
200	75
250	78
315	82
400	80
500	78
630	78
800	81
1000	79
1250	79
1600	79
2000	77
2500	81
3150	89
4000	72
5000	72
6300	81
8000	70
10000	67
Total	**93**

Table 4: Solar tracking motor sound power levels

Octave Band Centre Frequency (Hz)	Sound Power Level (dB(A))
63	29
125	34
250	36
500	39
1000	43
2000	46
4000	43
Total	**50**

Table 5: 2.5 MVA medium voltage transformer sound power levels

Octave Band Centre Frequency (Hz)	Sound Power Level (dB(A))
63	51
125	59
250	66
500	69
1000	61
2000	58
4000	51
8000	47
Total	**72**

Table 6: 5 MVA transformer sound power levels

Octave Band Centre Frequency (Hz)	Sound Power Level (dB(A))
63	55
125	63
250	71
500	73
1000	65
2000	62
4000	55
8000	51
Total	**72**

Table 7: 200 MVA site transformed sound power level

Octave Band Centre Frequency (Hz)	Sound Power Level (dB(A))
63	77
125	85
250	93
500	95
1000	88
2000	85
4000	78
8000	73
Total	**98**

Table 8: 400 MVA site transformer sound power level

Octave Band Centre Frequency (Hz)	Sound Power Level (dB(A))
63	82
125	90
250	97
500	100
1000	92
2000	89
4000	82
8000	78
Total	**102**

3.3 Predicted Noise Levels

The noise level at sensitive receivers has been predicted based on the noise model detailed above. The noise level predicted at each sensitive receiver and a comparison with the relevant criterion is shown in Table 9, with a noise contour plot shown in Figure 2.

Table 9: Predicted noise levels (L_{eq})

Sensitive Receiver	Criterion (dB(A))	Prediction (dB(A))
D1	45	27
D2	45	26
D3	45	31
D4	50	41
D5	50	38
D6	45	37
D7	45	36
D8	45	32
D9	45	30
D11	45	35
D12	45	34
D13	45	29
D14	45	29
D15	45	25
D16	45	24
D17	45	24
D18	45	29
D19	45	25
D20	45	26
D21	45	15
D29	45	29
D30	45	27
D31	45	24
D40	45	23
D41	45	<20
D42	45	<20

Although there is the potential for some noise sources to produce tonal noise, the noise at residences will be from many different noise sources. In particular the highest contributing noise sources are the cooling fans, which operate at varying speeds depending on the temperature of the individual equipment items. As the cooling fans will be operating at different speeds tonality is not predicted. Therefore, a 5 dB(A) character penalty for tonality is not warranted.

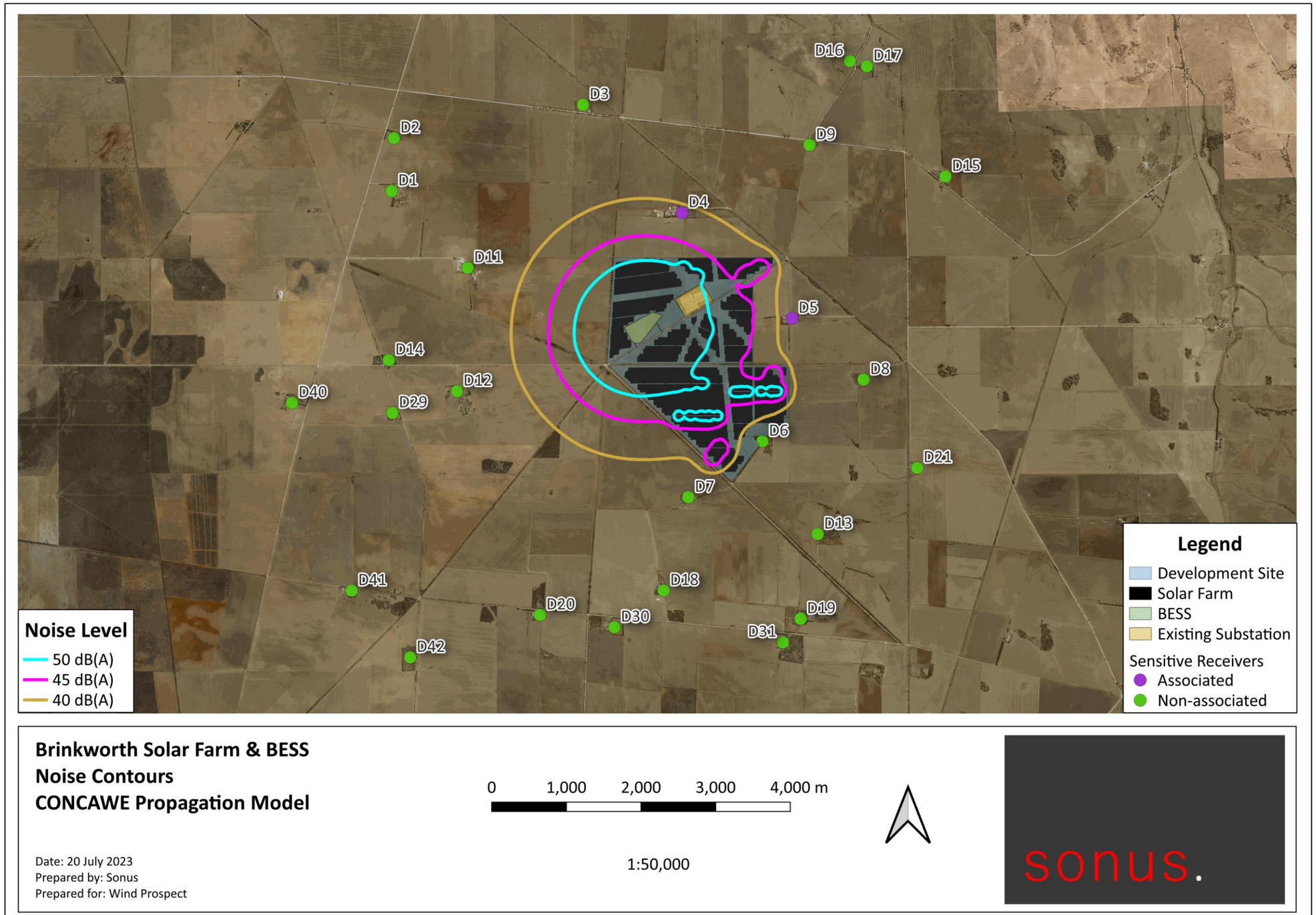


Figure 2: Noise contour plot

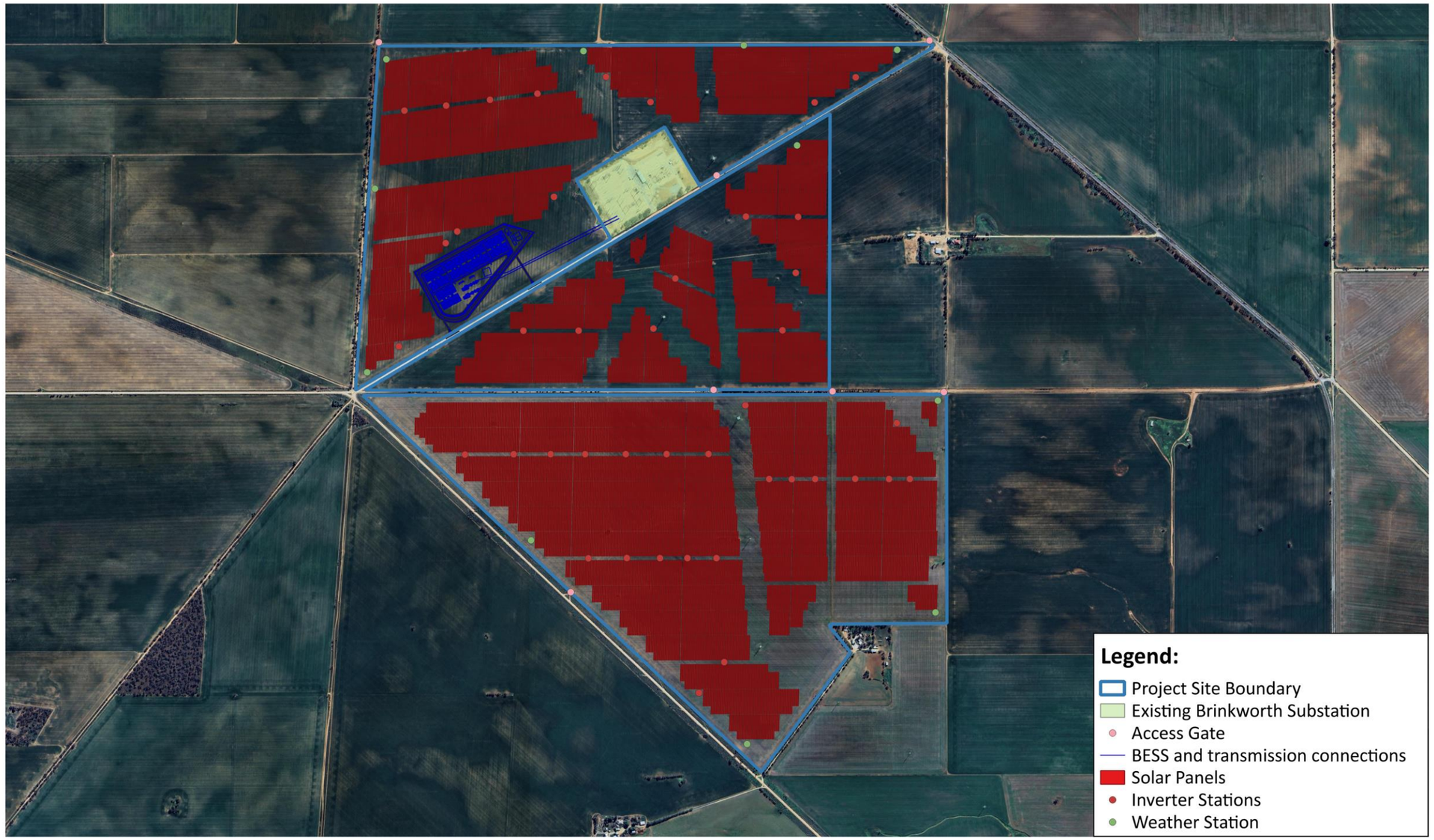
4 CONCLUSION

An environmental noise assessment has been undertaken for the Brinkworth Solar Farm and Battery to be constructed adjacent to the existing electrical substation on Power Station Road at Brinkworth, South Australia.

The predictions made in this Assessment indicate that the noise criteria of the *Environment Protection (Noise) Policy 2007* can be achieved at all nearby noise sensitive receivers.

Based on the Assessment, the Development is predicted to *not unreasonably impact the amenity of sensitive receivers*, thereby achieving the relevant provisions of the *Planning and Design Code* related to environmental noise.

APPENDIX A: SITE LAYOUT



Brinkworth Solar Farm & BESS

Project Overview

Date: 20 July 2023

0 500 1,000 1,500 2,000 m

APPENDIX B: PLANNING AND DESIGN CODE PROVISIONS

Part 4 – General Development Policies – Infrastructure and Renewable Energy Facilities

Desired Outcome	
D01	*Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity.*

Performance Outcome	***Deemed-to-Satisfy Criteria / Designated Performance Feature***
General	
PO 1.1 *Development is located and designed to minimise hazard or nuisance to adjacent development and land uses.*	*DTS/DPF 1.1* *None are applicable.*
Electricity Infrastructure and Battery Storage Facilities	
PO 5.3 *Battery storage facilities are co-located with substation infrastructure where practicable to minimise the development footprint and reduce environmental impacts.*	*DTS/DPF 5.3* *None are applicable.*

Part 4 – General Development Policies – Interface between Land Uses

Desired Outcome	
D01	*Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses.*

Performance Outcome	***Deemed-to-Satisfy Criteria / Designated Performance Feature***
General Land Use Compatibility	
PO 1.2 *Development adjacent to a site containing a sensitive receiver (or lawfully approved sensitive receiver) or zone primarily intended to accommodate sensitive receivers is designed to minimise adverse impacts.*	*DTS/DPF 1.2* *None are applicable.*
Activities Generating Noise or Vibration	
PO 4.1 *Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers).*	*DTS/DPF 4.1* *Noise that affects sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria.*
PO 4.2 *Areas for the on-site manoeuvring of service and delivery vehicles, plant and equipment, outdoor work spaces (and the like) are designed and sited to not unreasonably impact the amenity of adjacent sensitive receivers (or lawfully approved sensitive receivers) and zones primarily intended to accommodate sensitive receivers due to noise and vibration by adopting techniques including:* *(a) locating openings of buildings and associated services away from the interface with the adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers* *(b) when sited outdoors, locating such areas as far as practicable from adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers* *(c) housing plant and equipment within an enclosed structure or acoustic enclosure* *(d) providing a suitable acoustic barrier between the plant and / or equipment and the adjacent sensitive receiver boundary or zone.*	*DTS/DPF 4.2* *None are applicable.*

Appendix H
Traffic Impact Assessment

21 April 2024
#eta1000038

The Secretary
State Commission Assessment Panel
GPO Box 1815
Adelaide SA 5001

BRINKWORTH SOLAR FARM AND BESS PROJECT
DEVELOPMENT APPLICATION AMENDMENT – TRAFFIC REPORT

Dear Sir/Madam,

I refer to the proposed Brinkworth Solar Farm and BESS Project located on Power Station Road in Brinkworth for which Empirical Traffic Advisory prepared a Transport Impact Assessment to accompany a development application dated 17 October 2023 which includes assessment of traffic impacts, and an assessment of the planned route and site access. The assessment considered both the solar PV and the battery energy storage facility (BESS) of the Brinkworth project.

Since preparing this report, and prior to the development application being submitted, the Planning, Development and Infrastructure (General) Regulations 2017 (PDI Regulations) in South Australia have been varied, which has made battery storage facilities in designated locations, including the subject land where the BESS is proposed, exempt from planning approval.

Further, we understand that our client now wishes to proceed with the development of the BESS as Stage 1 of the project (as development exempt from approval) and subsequently Stage 2 being the solar farm (the subject of this development application).

The assessment undertaken in our report remains valid, irrespective of the amended application and approval processes, and noting that our client is not seeking approval for the BESS or supporting infrastructure.

Should further information be required, please contact the undersigned at your convenience.

Yours sincerely

EMPIRICAL TRAFFIC ADVISORY

Paul Morris
Director
M.TransTraff, MAITPM

Empirical Traffic Advisory Pty Ltd | ABN 34 931 371 361 | PO Box 268 Glenside SA 5065 | contact@empiricaltraffic.com.au

Empirical Traffic Advisory

Proposed Solar Farm

Brinkworth, SA

Transport Impact Assessment

#eta1000038

DATE

17 October 2023

Document Information

Project Name	Proposed Solar Farm
Project Location	Brinkworth, SA
Type	Transport Impact Assessment
Version	0
Issue Date	17 October 2023
Client	Brinkworth Solar Farm Pty Ltd
Project Number	1000038
Filename	231017-1000038-brinkworth-traffic-d.docx

Quality Record

Issue	Date	Description	Author	Checked	Approved	Signed
0	17 October 2023	Final Report	PSM	DK	PSM	

Table of Contents

Figures

Tables

1 INTRODUCTION

A development application for is currently being sought for a proposed Solar and Battery Energy Storage development on land located on Power Station Road in Brinkworth. The proposed development consists of a solar photovoltaic (PV) farm, battery energy storage system (BESS) and the associated infrastructure. The proposed development will change the existing farm land use to include solar and energy storage systems located on either side of Power Station Road and Boucaut School Road. Primary site access is proposed from Power Station Road with service access locations along Boucaut School Road and Lake View Road to access the solar arrays.

Empirical Traffic Advisory was commissioned by Brinkworth Solar Farm Pty Ltd to undertake a transport impact assessment of the proposed development.

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

- existing traffic and parking conditions surrounding the site
- site inspection of the subject site and surrounds
- parking demand of the proposed development and its adequacy
- traffic demands of the proposed development
- access arrangements for the proposed development
- overall transport impact of the proposed development.

2 EXISTING CONDITIONS

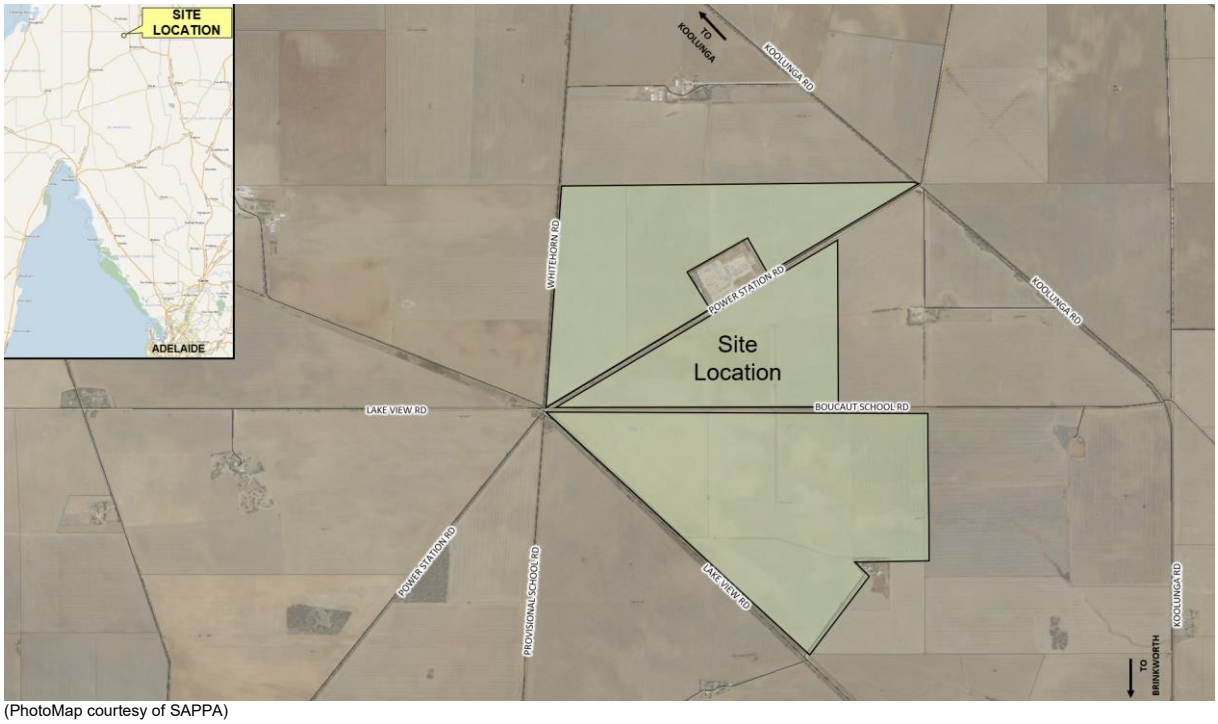
2.1 Subject Site

The subject site is located approximately 7km from the Brinkworth and Koolunga townships, spread across 4 allotments. The proposed development consists of a solar photovoltaic (PV) farm, battery energy storage system (BESS) and the associated infrastructure. The subject site of approximately 500 hectares has road frontages to Koolunga Road, Power Station Road, Boucaut School Road, Lake View Road and Whitehorn Road.

The site is located within a Rural zone and is currently farmland and is located within the Wakefield Regional Council. The surrounding properties are primarily farmland and associated farmhouses and the Brinkworth township.

The location of the subject site and the surrounding environs is shown in Figure 2.1.

Figure 2.1: Subject Site and Environs



(PhotoMap courtesy of SAPPA)

2.2 Road Network

2.2.1 Power Station Road

Power Station Road is a two-way unsealed road configured with an approximate carriageway width of 7 metres with a traffic width of 6.2 metres, set within an approximately 20 metre wide road reserve as shown in Figure 2.2. It is classified as a Rural Category 4 unsealed road (local community access medium use roads, typical 6m sheeted width, graded twice a year) under the care and control of Wakefield Regional Council.

The Power Station Road surface appears to be of a good quality constructed formation and in good condition (at the time of inspection), providing access to the existing substation located mid-block between Koolunga Road and Lake View Drive. Due to the rural and unsealed nature of the road, traffic volumes are estimated to be less than 100 vehicles per day.

Figure 2.2: Power Station Road (looking north-east towards Substation)

Photo taken 3rd December 2022

2.2.2 Boucaut School Road

Boucaut School Road is a two-way unsealed road configured with a varying carriageway width typically in the order of 5 to 6 metres, set within an approximately 18.5 metre wide road reserve as shown in Figure 2.3. It is classified as a Rural Category 6 formed graded road (natural surface, dry weather roads only for access for primary producers to their land, graded once a year) under the care and control of Wakefield Regional Council.

An above-ground large water main is located along the southern side of the carriageway with a three crossing points located at existing gates into the adjacent properties, as shown in Figure 2.4. Boucaut School Road surface is of a lower quality graded formation and in poor condition (at the time of inspection), assumed to be very lightly trafficked based use by the adjacent land owners.

Figure 2.3: Boucaut School Road (looking east)

Photo taken 9th June 2023

Figure 2.4: Boucaut School Road Water Main (looking west)

Photo taken 9th June 2023

2.2.3 Lake View Road

Lake View Road is a two-way unsealed road configured with an approximate carriageway width 9 metres, with a travel width of between 6 and 7.5 metres as shown in Figure 2.5. Lake View Road has varying road reserve widths, ranging from approximately 60 metres between Power Station Road and Mallee Corner Road, to approximately 20 metres to the west of Power Station Road. It is classified as a

Rural Category 4 sheeted road (local community access medium use roads, typical 6m sheeted width, graded twice a year) under the care and control of Wakefield Regional Council.

Lake View Road surface is a good quality formation and in good condition (at the time of inspection), providing a link between Mallee Corner Road and Augusta Highway. Due to the rural and unsealed nature of the road, traffic volumes are estimated to be less than 100 vehicles per day.

Figure 2.5: Lake View Road (looking south-east)

Photo taken 9th June 2023

2.2.4 Koolunga Road

Koolunga Road is a two-way road configured with a single lane in each direction, approximately 7.3 metre wide carriageway set within an approximately 18 metre wide road reserve to the north and 20 metre road reserve to the south of Power Station Road, shown in Figure 2.6.

Koolunga Road has a posted speed limit of 100km/h and traffics volume adjacent the site is estimated to in the order of 300 vehicles per day based on LocationSA data for similar roads in the general area of the site (Rail Corridor Road/Condowie Plain Road).

Figure 2.6: Koolunga Road (looking north-west from Power Station Road)

Photo taken 3rd December 2022

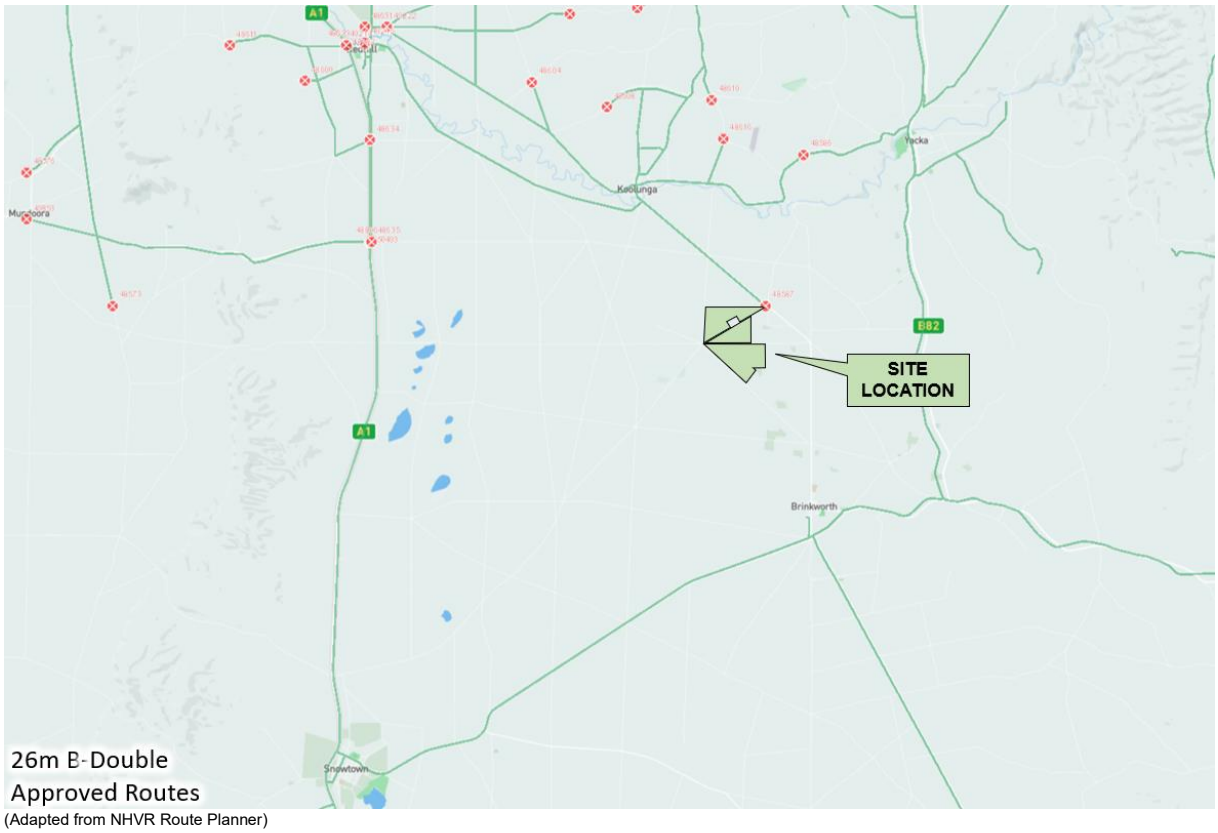
2.2.5 Whitehorn Road

Whitehorn Road is a two-way unsealed road classified as a two wheel drive track on LocationSA. It is configured with a varying carriageway width typically in the order of 3.5 to 4 metres, set within an approximately 20 metre wide road reserve. It is classified as a Rural Category 6 formed graded road (natural surface, dry weather roads only for access for primary producers to their land, graded once a year) under the care and control of Wakefield Regional Council. The road surface has a lower quality formation, assumed to be very lightly trafficked and assumed to only be utilised by the adjacent land owners.

2.3 Restricted Access Vehicles Road Network

The surrounding sealed road network adjacent the subject site is generally gazetted for use by vehicles up to a 26 metre B-Double, as shown in Figure 2.7. The section of Koolunga Road between Power Station Road and Downer Street in the Brinkworth township is not gazetted for 26 metre B-Doubles.

Figure 2.7: 26 metre B-Double Gazetted Routes



(Adapted from NHVR Route Planner)

It is also noted that some of the unsealed roads within the Wakefield Regional Council are approved for 26 metre B-Doubles under the following Commodity Routes requirements

- Grain
- Fertilizer
- Hay & Bulk Stock Feed
- Dairy Milk
- Livestock
- Logging and Timber
- Wine
- Wool
- Fruit & Veg

3 DEVELOPMENT PROPOSAL

The proposed development consists of a solar photovoltaic (PV) farm, battery energy storage system (BESS) and the associated infrastructure. The primary access to the site buildings and on-site parking will be provided via Power Station Road.

A site layout plan is shown in Figure 3.1 below.

Figure 3.1: Proposed Development Layout

Source: Wind Prospect

4 TRAFFIC IMPACT

4.1 Traffic Generation

The anticipated number of daily vehicle movements for the site has been provided by Brinkworth Solar Pty Ltd. The anticipated traffic volumes have been broken down into four phases.

4.1.1 Civil Works

The heavy vehicle movements associated with the Civil Works stage are anticipated to be primarily associated with transport of machinery and transporting material into and out of the site. It is anticipated that the majority of these movements will occur by vehicles up to a 19 metre semi trailer, with a small proportion (in the order of 5%) being undertaken by vehicles up to a 26 metre B-Double. It is not anticipated that any Over Size/Over Mass (OSM) vehicles will access the site during this period.

Light vehicle movement to/from the site will be generally associated staff working on-site (in the order of 65 staff on site). The number of light vehicles travelling to/from the site may be reduced with the introduction of mini bus services, which could reduce the number of light vehicle trips to the site (in the order of 25-50%). For the purposes of this assessment, this potential reduction has not been considered.

The anticipated number of vehicles during the civil works phase is summarised in Table 4.1.

Table 4.1: Civil Works Phase Traffic Generation

Vehicle Type	Vehicles per Day	Vehicle Trips per Day
Light Vehicles	65	130
Truck Movements – up to 19 metre semi	28	56
Truck Movements – up to 26 metre B-Double	2	4
Total	95 vehicles per day	190 vehicle trips per day

4.1.2 Construction Phase

The general solar and battery energy storage components are generally able to be transported within the typical size requirements of 19 metre Semi-trailers and 26 metre B-Double vehicles. It is anticipated that during this phase, it is anticipated that in the order of 60% of trips will occur via vehicles up to a 19 metre Semi-trailer, and 40% undertaken by vehicles up to a 26 metre B-Double. As with the Civil Works stage, light vehicle movement to/from the site will be generally associated staff working on-site (in the order of 80 staff on site).

The anticipated number of vehicles during the civil works phase is summarised in Table 4.2.

Table 4.2: Construction Phase Traffic Generation

Vehicle Type	Vehicles	Vehicle Trips per Day
Light Vehicles	80	160
Truck Movements – up to 19 metre Semi	36	72
Truck Movements – up to 26 metre B-Double	24	48
Total	140 vehicles	280 vehicle trips per day

It is anticipated that components such as transformers, switch rooms and control rooms will be the widest equipment that will be transported to the site. At this stage, the dimension of this equipment is not known. These components may need to be transported to the site via OSM transport methods, and will be subject by the relevant requirements and permits for the final dimensions. It is anticipated that approximately 7 of OSM vehicles may be required. In the vicinity of the subject site, the August Highway is approved for OSM vehicles up to 4.6 metres in width, with potential connection to the site via the existing B-Double network or Lake View Road and Power Station Road (subject to approvals).

4.1.3 Commissioning Phase

During the commissioning phase, the number of vehicle movements to/from the site is anticipated to decrease, with the movements being primarily associated with light vehicles/staff (up to 45 staff on site). The typical number of trucks is anticipated to decrease to approximately one vehicle per day. No OSM vehicles are anticipated to access the site during this period. At certain periods, additional deliveries may be required, but would only be for a short period and not occur on a daily basis.

The anticipated number of vehicles during the civil works phase is summarised in Table 4.3.

Table 4.3: Commissioning Phase Traffic Generation

Vehicle Type	Vehicles	Vehicles Trips per Day
Light Vehicles	45	90
Truck Movements – up to 19 metre semi	2	4
Truck Movements – up to 26 metre B-Double	0	0
Total	47 vehicles	94 vehicle trips per day

4.1.4 Site Operation

The development will be designed to operate automatically for the most part. There would be up to 20 full-time staff using light vehicles only monitoring the operation and maintaining the facility once the construction is complete. There is anticipated to be no regular truck movements to/from the site, only occurring when/if required for maintenance.

The anticipated number of vehicles during the civil works phase is summarised in Table 4.3.

Table 4.4: Site Operation Phase Traffic Generation

Vehicle Type	Vehicles per Day	Vehicle Trips per Day
Light Vehicles	20	40
Truck Movements – up to 19 metre semi	0	0
Truck Movements – up to 26 metre B-Double	0	0
Total	20 vehicles per day	40 trips per day

4.1.5 Summary

Based on the above, a summary of the various phases is outlined in Table 4.5. The peak period for vehicles movements will occur during the Construction Phase, with up to 280 vehicle trips per day occurring, followed by the Civil Works Phase with 190 vehicle trips per day.

Table 4.5: Traffic Generation Summary

Vehicle Type	Vehicle Trips per Day			
	Civil Works	Construction Phase	Commissioning Phase	Site Operation
Light Vehicles	130	160	90	40
Truck Movements up to 19 metre semi	56	72	4	0
Truck Movements up to 26 metre B-Double	4	48	0	0
Total (Trips Per Day)	190	280	94	40

4.2 Traffic Distribution

Traffic generated by the proposed development would be distributed to the surrounding residential and employment areas. Regional hubs of Port Pirie, Crystal Brooke and Clare are assumed to supply the majority of construction and operational staff for the development. The location of the surrounding regional hubs to the subject site is shown in Figure 4.1.

Figure 4.1: Surrounding Regional Hubs

Based on the location of the regional hubs, it is anticipated that vehicles will utilise the main connecting roads such as Koolunga Road, Main Road to access the Crystal Brook and Port Pirie via the Augusta Highway and Koolunga Road, Condowie Plain Road and Horrocks Highway to access Clare.

4.3 Traffic Impact

Traffic generated by staff commuting to and from the site could be expected to fall within the typical peak periods for the road network. Heavy vehicle movements during the Civil Works and Construction phase are assumed to occur outside the 'typical' road network peak time.

The peak hour traffic forecast is based on the anticipated trips generated by the staff travelling to or from the site. Assuming all personnel were to arrive in a one-hour period, the peak hour traffic is estimated to be 160 trips per hour.

As outlined in 2.2, each of the surrounding unsealed roads are anticipated to carry less than 100 vehicles per day, and primarily utilised by land owners in the vicinity.

During the peak construction phase, the proposal could be expected to generate in the order of 280 vehicle movements per day, resulting in less than 400 vehicles per day considering both the existing and construction traffic volumes on the surrounding unsealed road network. This period is anticipated to occur over a 16 week period. Outside of the peak construction/civil period, the anticipated traffic movements are anticipated to reduce to in the order of 40 vehicle movements per day, resulting in no more than 150 vehicles per day considering the existing and construction traffic volumes on the surrounding unsealed road network.

It is noted that the general vicinity of the subject site experiences an increase in heavy vehicle movements associated with seeding and harvest seasons. To minimise interaction between the proposed development peak traffic and the seasonal traffic, it would be beneficial to target the Construction Phase (the highest traffic generation period) to occur outside of these periods.

Based on the above, the forecast daily traffic volumes fall within the typical current practice where unsealed roads can carry up to 500 vehicles per day, and as a result is not expected to impact on the safety or function of the surrounding road network.

5 ROUTE ASSESSMENT

5.1 Restricted Access Vehicles

It is anticipated that a portion of the truck movements heavy vehicle movements to/from the site will occur during the civil work/construction periods for the development, with access by vehicles up to a 26 metre B-Double. It is understood these vehicles will generally be transporting materials from Outer Harbour to the subject site. The existing DIT approved restricted access vehicle routes have been outlined in Figure 2.7, which indicate that the Koolunga Road to/from the north of Power Station Road is gazetted for vehicles up to a 26 metre B-Double. The section of Koolunga Road to the south has no gazettal for restricted access vehicles. Commodity routes for Grain transportation is generally acceptable on the unsealed road network in the vicinity of the site, with the exception of Power Station Road and Boucaut School Road.

The anticipated routes that could be utilised by 26m B-doubles to access the site is outlined in Figure 5.1.

5.1.1 Option 1 – Access via Redhill

Option 1 provides access to the site via the Augusta Highway to Redhill, then onto Koolunga to access Power Station Road from the northern approach of Koolunga Road.

Some advantages of this route option are as follows:

- Route option utilises existing gazetted routes where possible.
- Route option is sealed until Power Station Road.
- An existing right turn lane is provided at the Augusta Highway/Ellis Street intersection that is considered to be appropriate to accommodate B-Double vehicles.
- Proposed route requires vehicles to cross the Adelaide – Darwin railway line as vehicles enter Redhill on Ellis Street West. The level crossing is controlled with warning lights.

Some disadvantages of this route option are as follows:

- Route option requires large vehicles to travel through Redhill and Koolunga townships
- Route option is the longest distance out of the three options.

Power Station Road is not currently gazetted under general or commodity routes, and vehicles would be required to undertake a right turn in and a left turn out to access the gazetted network. A swept path assessment, shown in Figure 5.2 and Figure 5.3 demonstrates that vehicles up to a 26 metre B-Double can enter and exit Power Station Road without requiring any changes to the road surface.

Figure 5.1: Anticipated Routes - 26 metre B-Double

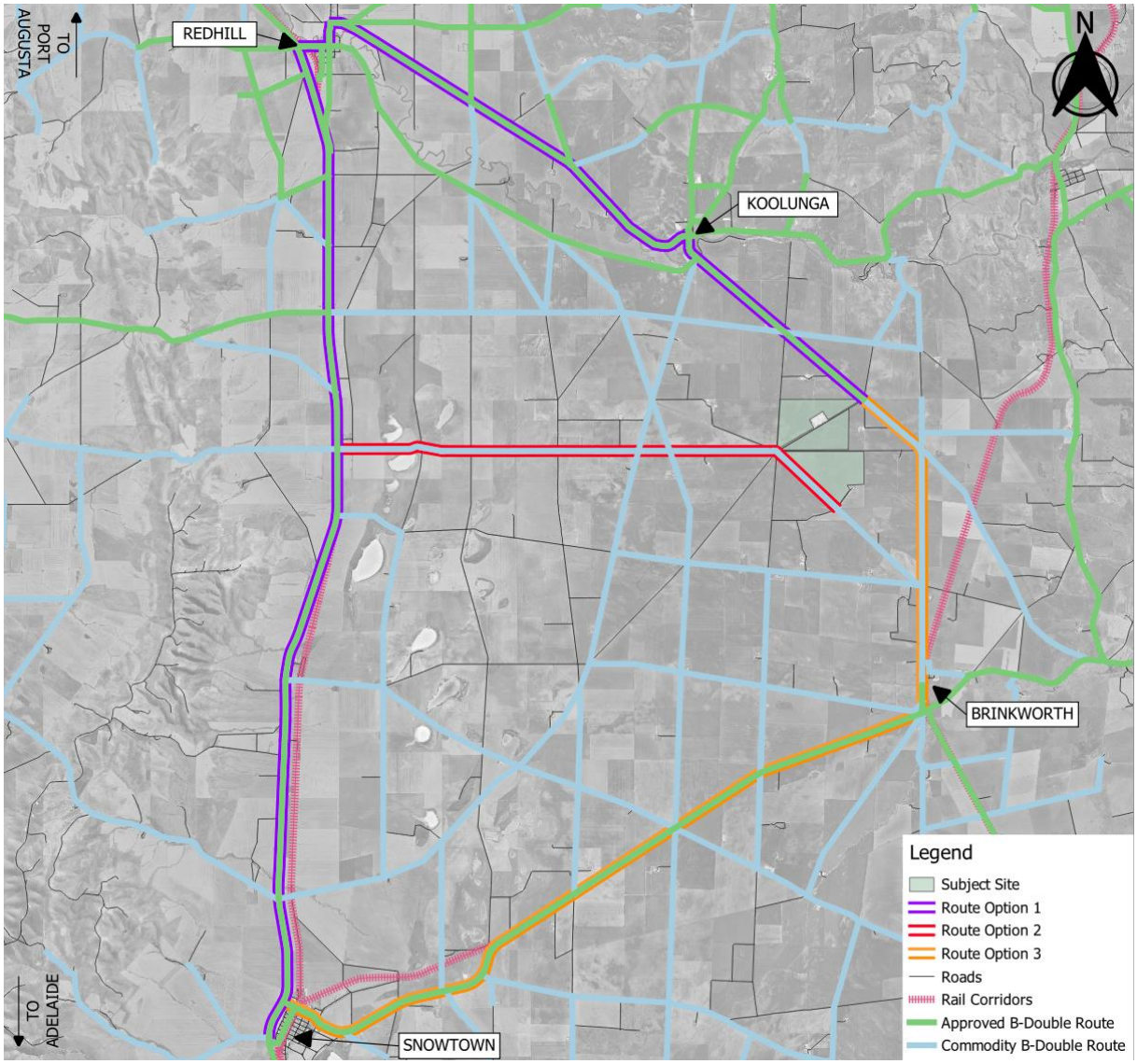


Figure 5.2: 26 metre B-Double Koolunga Rd/Power Station Rd Right Turn Entry

Figure 5.3: 26 metre B-Double Koolunga Rd/Power Station Rd Left Turn Exit

While it is noted that the swept paths require the entire width of Power Station Road to undertake the manoeuvre, the forecast vehicle movements on Power Station Road is not anticipated to result in two vehicles turning at the intersection. In the unlikely event that two vehicles were to be at the intersection, the entering vehicle could utilise the large open area to the south of the stobie pole to undertake the turning manoeuvre, as shown in Figure 5.4.

Figure 5.4: 26 metre B-Double Koolunga Rd/Power Station Rd Right Turn Entry Alternative

5.1.2 Option 2 – Access via Lake View

Option 2 provides a connection from Augusta Highway at Lake View, utilising the unsealed Lake View Road to connect to Power Station Road.

Some advantages of this route option are as follows:

- Route option provides the shortest distance to the site.
- Route minimises movements through townships.

Some disadvantages of this route option are as follows:

- Access into Lake View Road occurs at the end of overtaking lanes (currently under construction) which is not anticipated to provide a dedicated right turn lane.
- Proposed route requires vehicles to cross the Adelaide – Darwin railway line as vehicles enter Lake View Road. The level crossing is uncontrolled, with no warning lights provided.
- Lake View Road is unsealed, and may require additional maintenance as a result of vehicle movements to/from the site.
- Lake View Road is a Commodity B-Double route, and would require a permit to access the site.

Lake View Road is currently gazetted under commodity routes for 26m B-Double access. As deliveries will not occur under the commodity requirements, a swept path assessment has been undertaken at the Augusta Highway intersection. As shown in Figure 5.5 and Figure 5.6, vehicles up to a 26 metre B-Double can enter and exit Lake View Road and remain clear of the railway line, without requiring any changes to the road surface.

Figure 5.5: 26 metre B-Double Augusta Hwy/Lake View Rd Right Turn Entry

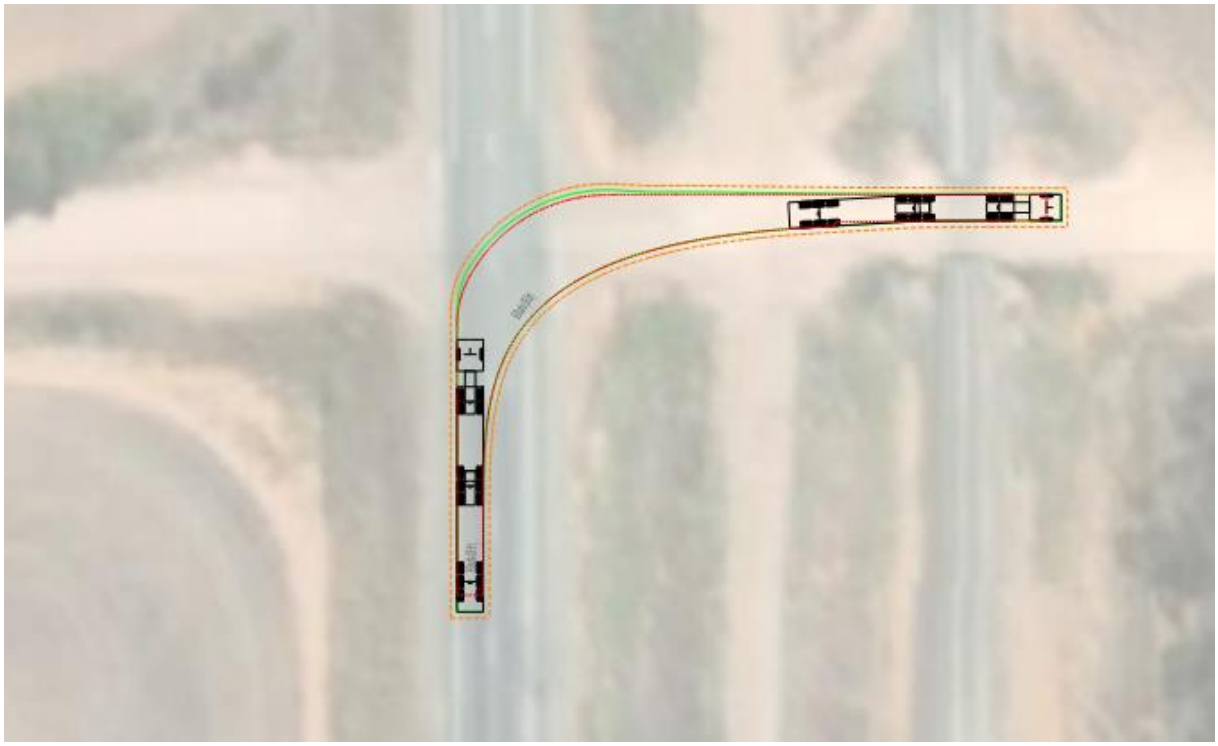
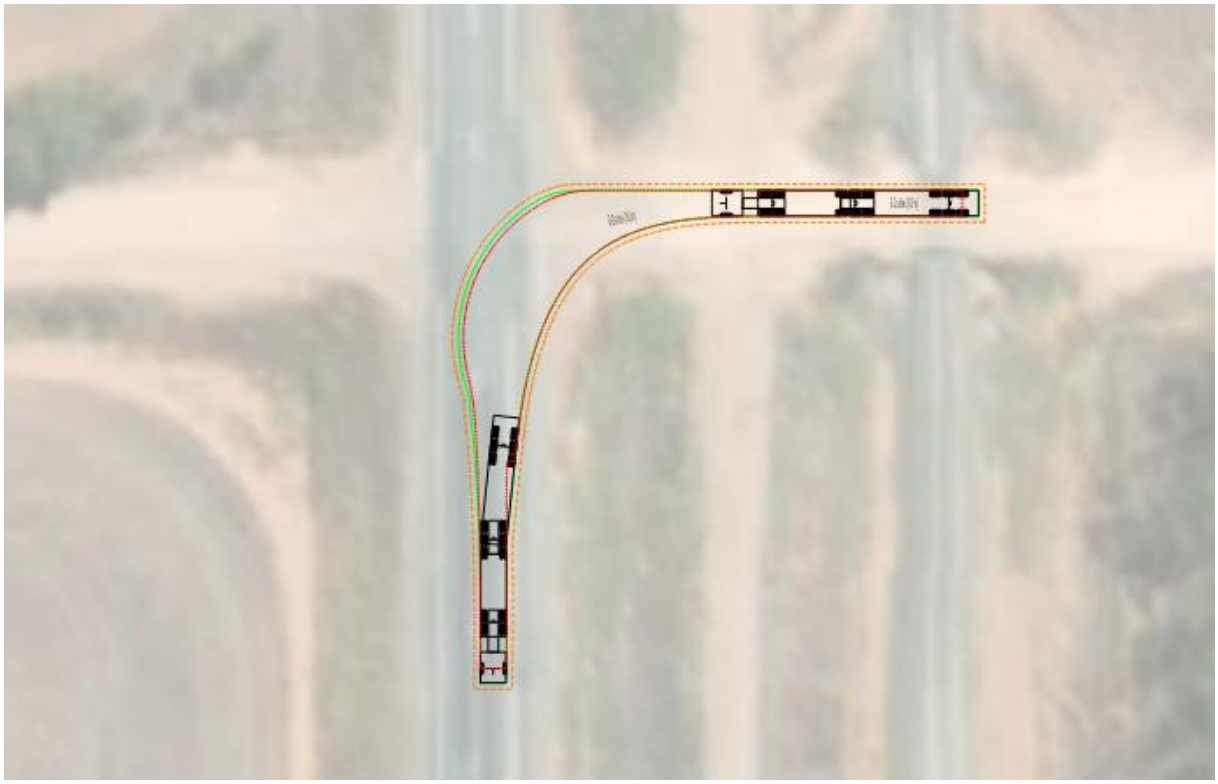


Figure 5.6: 26 metre B-Double Augusta Hwy/Lake View Rd Left Turn Exit



While it is noted that the swept paths require the entire width of Lake View Road to undertake the manoeuvre, the number of vehicle movements at this location is not anticipated to result in two vehicles turning at the intersection simultaneously.

5.1.3 Option 3 – Access via Brinkworth

Option 3 provides a connection from Augusta Highway at Snowtown, connection to Brinkworth, then onto Koolunga to access Power Station Road from the southern approach of Koolunga Road.

Some advantages of this route option are as follows:

- Route option is sealed until Power Station Road.
- Route option provides the shortest sealed distance to the site.
- An existing right turn lane is provided at the Augusta Highway/North Terrace intersection that is considered to be appropriate to accommodate B-Double vehicles.
- Proposed route requires vehicles to cross the Adelaide – Darwin railway line as vehicles enter Snowtown on North Terrace. The level crossing is controlled with warning lights.

Some disadvantages of this route option are as follows:

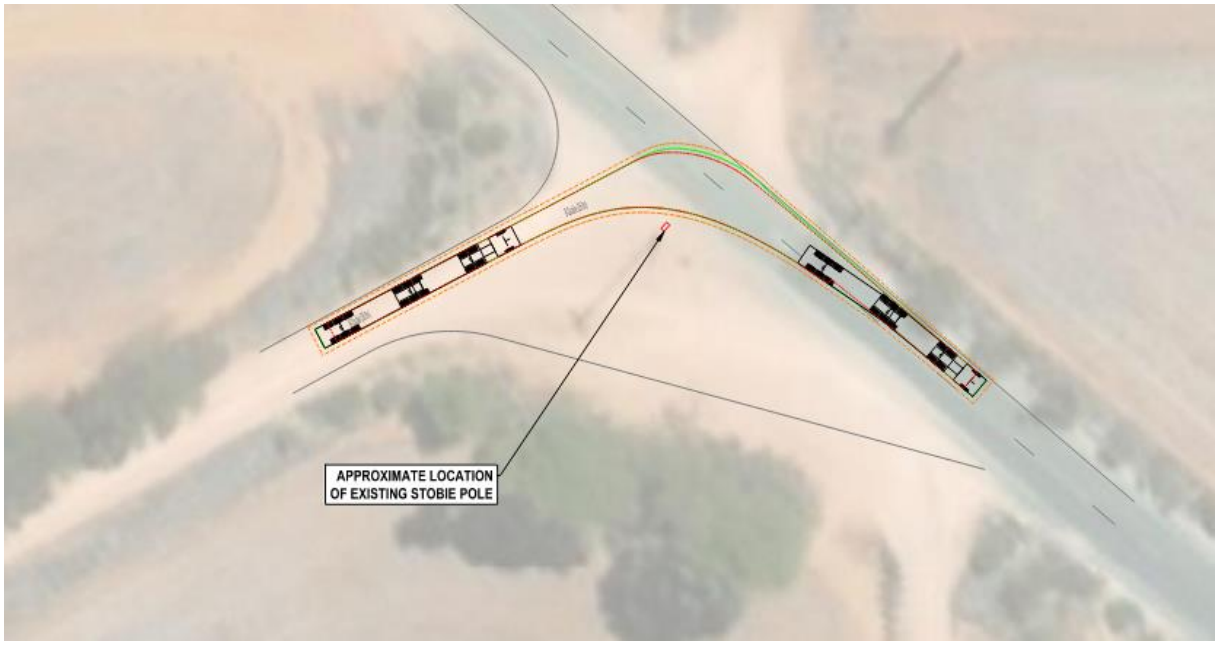
- Route option requires large vehicles to travel through Snowtown and Brinkworth townships
- Access through Brinkworth and along Koolunga Road are currently Commodity B-Double routes and would require a permit to access the site.

Vehicles would be required to undertake a left turn in and a right turn out of Power Station Road, which is not currently gazetted under general or commodity routes. A swept path assessment, shown in Figure

5.7 and Figure 5.8 indicates that vehicles up to a 26 metre B-Double can enter and exit Power Station Road without requiring any changes to the road surface.

Figure 5.7: 26 metre B-Double Koolunga Rd/Power Station Road Left Turn Entry

Figure 5.8: 26 metre B-Double Koolunga Rd/Power Station Road Right Turn Exit

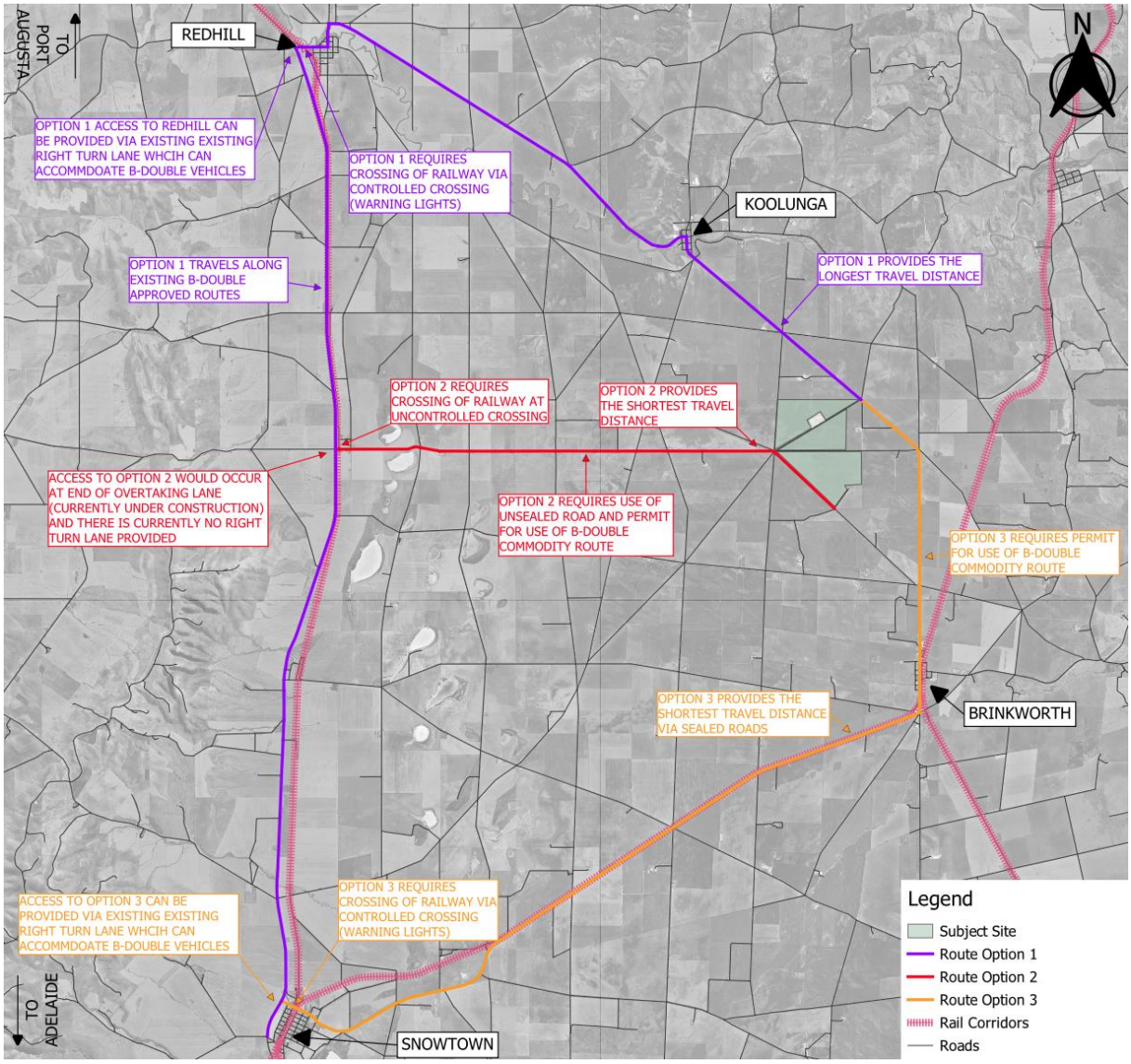


While it is noted that the swept paths require the entire width of Power Station Road to undertake the manoeuvre, the forecast vehicle movements on Power Station Road is not anticipated to result in two vehicles turning at the intersection.

5.2 Access Summary

A summary of the route assessment is summarised in Figure 5.9. Based on the above, it is recommended that Option 1 be adopted for access to and from the site.

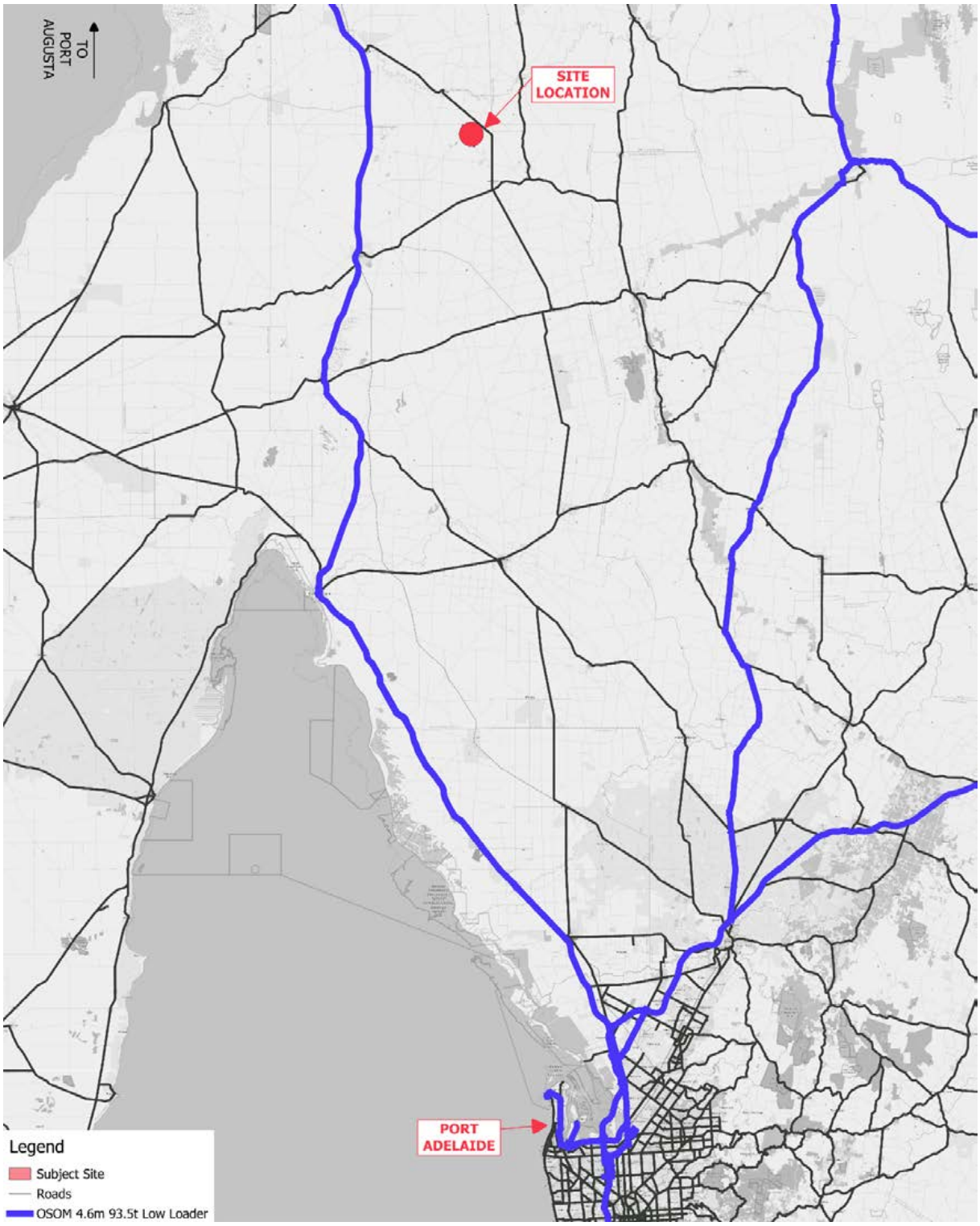
Figure 5.9: Route Option Summary



5.3 Oversize Vehicles

The preferred route for these components is likely to be from Outer Harbour and therefore would require transportation via the approved OSM road network where possible. While the dimensions of the oversize components are not known at this stage, the road network along the Augusta Highway from Outer Harbour to the vicinity of the site is approved for vehicles up to 4.6 metres wide and a length of 30 metres. The existing approved OSM routes are shown in Figure 5.10.

Figure 5.10: OSM Approved Network - 4.6m Wide Load Low Loader



An option to provide a connection from the Augusta Highway for over dimension loads could occur via Lake View Drive. The access route could be from Port Adelaide, via Port River Expressway, Northern Connector, Port Wakefield Highway, Augusta Highway, Lake View Drive then onto Powers Station Road. This route would minimise the locations where an oversize load is required to travel through a

township, however will require vehicles to cross an uncontrolled level crossing and travel along unsealed roads.

While the dimensions of the oversize vehicles are not known at this stage, a swept path assessment of key intersections outside of the approved routes have been undertaken for a 3 metre wide vehicle. The swept path assessment outlined in Figure 5.11 and Figure 5.12 indicate that these vehicles are able to undertake the turning movements without impacting on the existing intersections.

Figure 5.11: 25 metre Long, 3 metre Wide Semi Trailer – Augusta Highway/Lake View Road

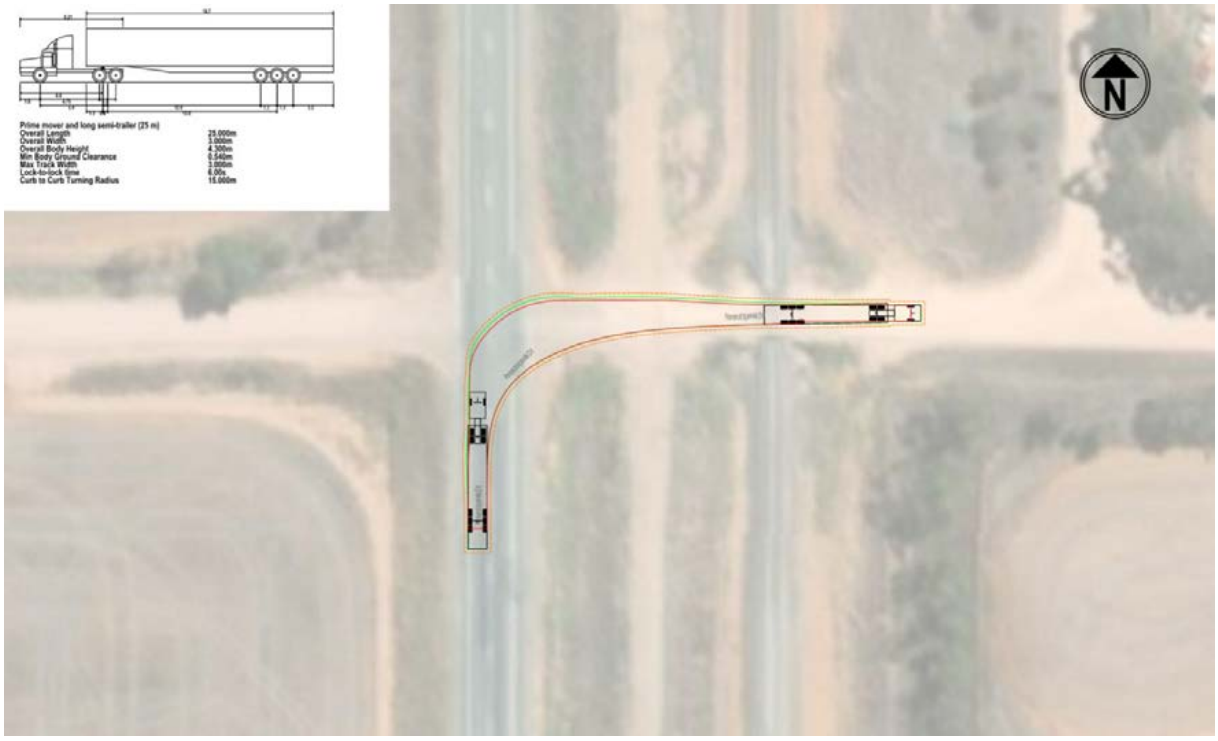


Figure 5.12: 25 metre Long, 3 metre Wide Semi Trailer –Lake View Road/Power Station Rd

Notwithstanding, the final route and vehicle dimensions will be subject to the relevant requirements and permits.

6 SITE ACCESS

6.1 Sight Distance

Adequate sight distance must be provided at the access points to ensure safe operation of access points and road intersections. The Austroads *Guide to Road Design - Part 4A: Unsignalised and Signalised intersections* provides intersection sight distance requirements for various road speeds. Sight distance requirements for private access points is outlined in Australian Standards *Parking Facilities Part 1 and Part 2 (AS2890.1:2004 and AS2890.2:2018)* for light and commercial vehicles. It is noted that if a sight access can meet the intersection requirements of Austroads, it will exceed the requirements of the Australian Standards.

The key sight distance requirement for an intersection is Safe Intersection Sight Distance (SISD), which relates to the sight distance for a vehicle on approach to the intersection to observe an obstruction in the road (e.g. stalled car) and allow sufficient time to decide on a course of action and react.

Based on the requirements for a heavy vehicle and a design speed of 110km/h (posted/default rural speed limit), an intersection would have a SISD requirement of 351 metres.

The sight distance along the impacted roadways and relative intersections in the vicinity of the site has been assessed for SISD.

6.1.1 Power Station Road

The proposed main access for the site is proposed to be located on the southern side of the existing sub station. Power Station Road has a straight alignment with a generally flat topography, as shown in Figure 6.1 and Figure 6.2.

Figure 6.1: Power Station Road (looking north-east)

Photo taken 3rd December 2022

Figure 6.2: Power Station Road (looking south-west from Koolunga Road)

Photo taken 3rd December 2022

While the road has some small undulations, the size and position of these undulations will not impact on the sightlines for vehicles entering or exiting the subject site.

It is recommended that any access points to the site be positioned a minimum of 351 metres from the intersections of Koolunga Road and Lake View Drive, to enable adequate sight distance in accordance with SISD requirements.

6.1.2 Lake View Road

The maintenance and construction access points are likely to be provided on Lake View Road to provide access to the southern most site. Lake View Road has a straight alignment and flat topography enabling sight distance up the length of the road, as shown in Figure 6.1 and Figure 6.2.

Figure 6.3: Lake View Road (looking north-west)

Photo taken 9th June 2023

Figure 6.4: Lake View Road (looking south-east)

Photo taken 9th June 2023

It is recommended that any access points to the site be positioned a minimum of 351 metres from the intersections of Power Station Road, to enable adequate sight distance in accordance with SISD requirements.

6.1.3 Boucaut School Road

Boucaut School Road is a lower category unsealed road with a straight and flat alignment allowing for sight distance to be visible along the length of the road, as shown in Figure 6.1 and Figure 6.2. The above ground water pipe located on the southern boundary impacts on the ability to provide additional access points to the southern site, with two existing locations currently available for access into/out of the existing paddocks.

Figure 6.5: Boucaut School Road (looking east)

Photo taken 9th June 2023

Figure 6.6: Boucaut School Road (looking west)

Photo taken 9th June 2023

It is recommended that any access points to the site be positioned a minimum of 351 metres from the intersections of Power Station Road, to enable adequate sight distance in accordance with SISD requirements. To minimise impacts to the road surface, it is recommended that any access points provided on Boucaut School Road be for maintenance access only during the operation phase.

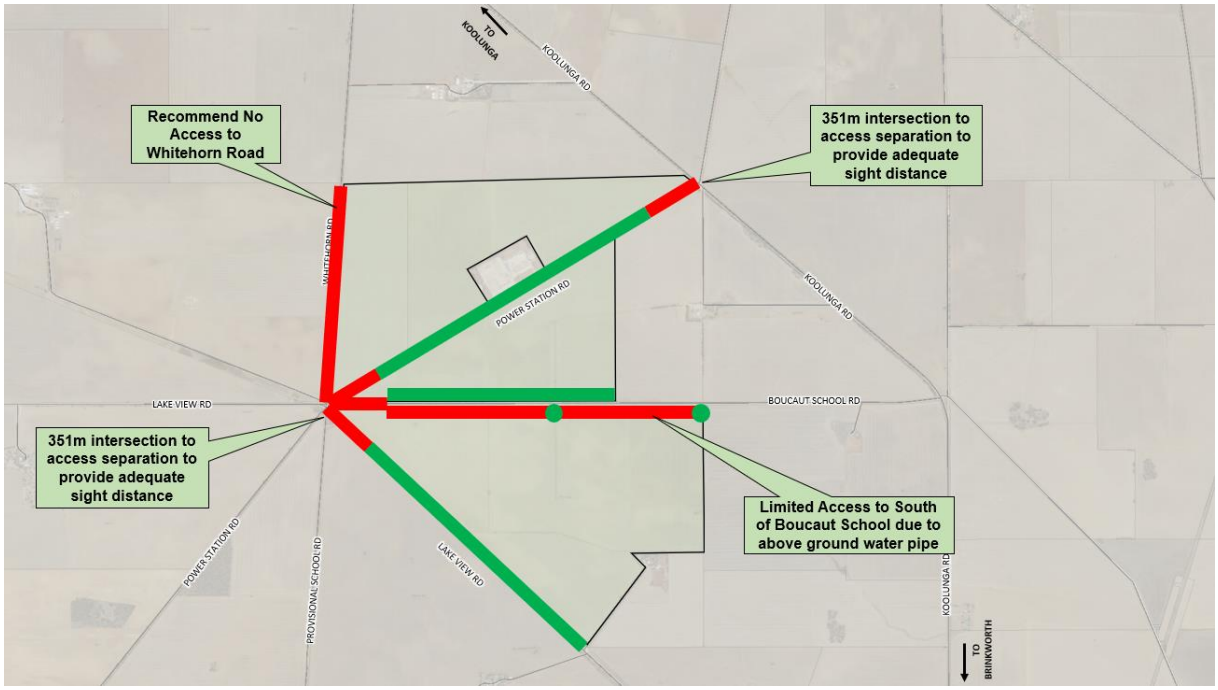
6.1.4 Whitehorn Road

Whitehorn Road is a lower category unsealed road, with a narrow carriageway with a lower surface quality (category 6 Formed Graded Road). To minimise impacts on the existing road, it is recommended that no access points be provided directly onto Whitehorn Road, with access to this portion of the site occurring via the main Power Station Road access.

6.2 Recommended Access Locations

Based on the above findings, the recommended location of the access points (including maintenance access points) is outlined in Figure 6.7.

Figure 6.7: Recommended Access Locations



It is noted with the access recommendations that emergency access points may be proposed as part of the construction management plan, for instance Whitehorse Road may be a suitable emergency access alternative if required. These locations will be confirmed when developed as part of detailed design.

7 CONSULTATION

7.1 Wakefield Regional Council

Consultation with Wakefield Regional Council (WRC) was undertaken in September 2023 with the route options identified in this report provided to Council for review and comment.

WRC indicated that Option 1 is their preferred route based on lowest risk to public and infrastructure given the existing B-Double route and controlled railway crossing along the route.

WRC agreed with ETA's recommendation that Option 2 is not desirable given the upgrade and maintenance that would be required in the presently unsealed road, in conjunction with likely upgrades at the highway intersection required. The uncontrolled railway crossing was also of concern.

Option 3 was also not preferred due to current maintenance issues on that road, and lack of existing B-Double route (permit required).

8 CONCLUSIONS

The proposed development consists of a solar photovoltaic (PV) farm, battery energy storage system (BESS) and the associated infrastructure on land located on Power Station Road in Brinkworth.

The components of the solar modules and other facilities will be delivered to the site by heavy vehicles up to 26 metre B-Doubles, with a small number of OSM vehicles accessing the site. The site is anticipated to generate up to 280 vehicle trips (160 light vehicle and 120 heavy vehicle) during the peak construction period.

Across the civil, construction and commissioning phase, a peak of 80 staff are anticipated to be on site at any one time. These personnel will travel to the site by private vehicles and potential mini bus services, generating up to 80 vehicle arrivals/departures associated with the site in the peak hour.

Based on the analysis and discussions presented within this report, the following conclusions are made:

Route Assessment and Site Access

1. It is recommended that 26 metre B-Double vehicles access the site via Redhill and Koolunga Road (Option 1), utilising the existing gazetted network and utilising the existing right turn facility on the Augusta Highway.
2. Oversize Vehicles are expected to travel from Outer Harbour and therefore would require transportation via the approved OSM road network where possible. While the dimensions of the oversize components are not known at this stage, vehicles could utilise existing approvals of the road network to the Augusta Highway to be in the vicinity of the site. The final route and vehicle dimensions will be subject to the relevant requirements and permits.
3. The locations of the proposed site access and egress points are considered appropriate, with good sight distance available in accordance with relevant design standards and guidelines.
4. The access points will be constructed to accommodate the largest design vehicles expected to enter and exit the site.
5. Wakefield Regional Council support the use of the recommended route (Option 1).

Traffic Impact

6. During the peak construction phase, the anticipated number of vehicle movements is anticipated to be in the order of 400 vehicles per day. Outside of the peak construction/civil period, the anticipated traffic movements are anticipated to reduce the in the order of 150 vehicles per day during the operation period of the site.
7. This forecast daily traffic volumes fall within the typical current practice where unsealed roads can carry up to 500 vehicles per day.
8. When comparing the additional traffic volume generated by the site during the construction and operational phases against current traffic volumes on the road network, it is not expected the site traffic will impact on the safety or function of the surrounding road network.

Empirical
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Appendix I
Flooding and Surface Water Assessment

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8 April 2024

Re: Planning regulations relating to the Brinkworth Solar Farm and Battery Surface Water Assessment

This letter should be read in conjunction with the Water Assessment (18 Sept 2023) for the Brinkworth Solar Farm and BESS Project (the project), which assessed both construction and operation phase effects to surface water of the project. The assessment considered both the solar PV and the battery energy storage facility (BESS) of the Brinkworth project.

Since preparing this report, and prior to the development application being submitted, the Planning, Development and Infrastructure (General) Regulations 2017 (PDI Regulations) have been varied, which has made battery storage facilities in designated locations, including the subject land where the BESS is proposed, exempt from planning approval. Further, we understand that our client now wishes to proceed with the development of the BESS as Stage 1 of the project (as development exempt from approval) and subsequently Stage 2 being the solar farm (the subject of this development application).

The assessment undertaken in our report remains valid, irrespective of the amended application and approval processes, and noting that our client is not seeking approval for the BESS or supporting infrastructure.

Yours sincerely

Jarrah Muller CPEng NER RPEQ RPEV
Associate Civil and Environmental Engineer
Team Leader, Surface Water & Land
Technical Lead, Surface water

Brinkworth Solar Farm and Battery Surface Water Assessment

Prepared for Akaysha Energy Pty Ltd

September 2023

Brinkworth Solar Farm and Battery Surface Water Assessment

Akaysha Energy Pty Ltd

E221126 R1

September 2023

Version	Date	Prepared by	Approved by	Comments
v1 draft	08 February 2023	Dan Farrow	Jarrah Muller	
v1	05 July 2023	Jason O'Brien	Jarrah Muller	
v2	18 September 2023	Jarrah Muller	Jarrah Muller	Update based on client comments

Approved by

Jarrah Muller
Associate Civil and Environmental Engineer
18 September 2023

Level 4 74 Pirie Street
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Executive Summary

Akaysha Energy Pty Ltd proposes to develop the Brinkworth Solar Farm (the project), which is a mid-sized solar photovoltaic (PV) generation facility, utility-scale battery energy storage system (BESS) and associated infrastructure at Koolunga Road, Brinkworth, South Australia (SA). The project is located approximately 150 kilometres (km) north of Adelaide within the Wakefield local government area (LGA) of the Northern and York region of SA.

The development application will be assessed against the requirements outlined in the South Australian Planning and Design Code (2022). This Surface Water Assessment has been submitted in support of the development application that is being prepared by Akaysha Energy and considers potential impacts to water and describes the proposed mitigation and management measures.

The site has an indicative development footprint of approximately 474 hectares (ha). The site is traversed by the existing ElectraNet Brinkworth – Davenport 275 Kilovolt (kV) line. The development footprint encompasses an existing substation located on Power Station Road, which will provide a connection to South Australia's grid. The development footprint encompasses five land parcels, currently and historically used for cropping and grazing for wool production. The surrounding land is used for farming as well as renewable energy generation.

The site is located in the north-eastern corner of the surface water subcatchment of Lake View (415 km^2). The Lake View watershed is delineated by the Skilly Hills to the east, and the Burunga Range to the west. Drainage is west to south-west, in the direction of Snowtown and towards Lake Bumbunga on the Condowie Plains. The Broughton River is the nearest surface water feature, located approximately 4 km north of the site.

Existing flooding characteristics for the site and surrounds have been established by flood modelling (Appendix A). The site is not considered to be at risk of flooding from the 1% annual exceedance probability (AEP) Broughton River flow, and development of the site will not interact with Broughton River flooding. The solar farm is not expected to interact with storm runoff; runoff would flow around panel footings and continue to flow downstream via the current drainage pathways. The solar farm installation would not change the overall catchment permeability, and infiltration of rainfall into the soil and underlying aquifers would still occur.

A summary of the proposed measures to manage and mitigate potential impacts to surface water is provided in Section 6. As detailed design advances and construction plans are developed, an assessment can be made about water demand and water sources. Most of the water demand will be for dust suppression and vehicle and equipment washdown. Relatively small volumes of imported water will be required for construction and ongoing maintenance activities, supplemented where feasible with reticulated mains supply and opportunistic use from rainwater storage collecting roof runoff.

Overall, potential surface water impacts during construction and operation are considered minor and can be adequately managed through the implementation of the mitigation measures outlined in Section 6 and included in the draft contractor's environmental management plan (CEMP) provided with the development application.

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Appendices

Tables

Figures

1 Introduction

1.1 Overview

Akaysha Energy Pty Ltd proposed to develop the Brinkworth Solar Farm and Battery (the project) in Wakefield Regional Council, South Australia (SA). The project will harness reliable solar resources to generate renewable energy through the construction and operation of up to 209 megawatt (MW) peak solar capacity and includes 300 MW of energy storage capacity with four hours of energy storage. The project would operate for a period of at least 20 years. The solar farm would generate more than 454 gigawatt hours (GWh) of renewable electricity to the National Electricity Market (NEM) each year.

The project is located approximately 7 kilometres (km) north of the township of Brinkworth, 4 km southeast of the township of Koolunga and approximately 150 km north of Adelaide. The project is located within an area of freehold land that is cleared, largely used for cropping, and is zoned Rural.

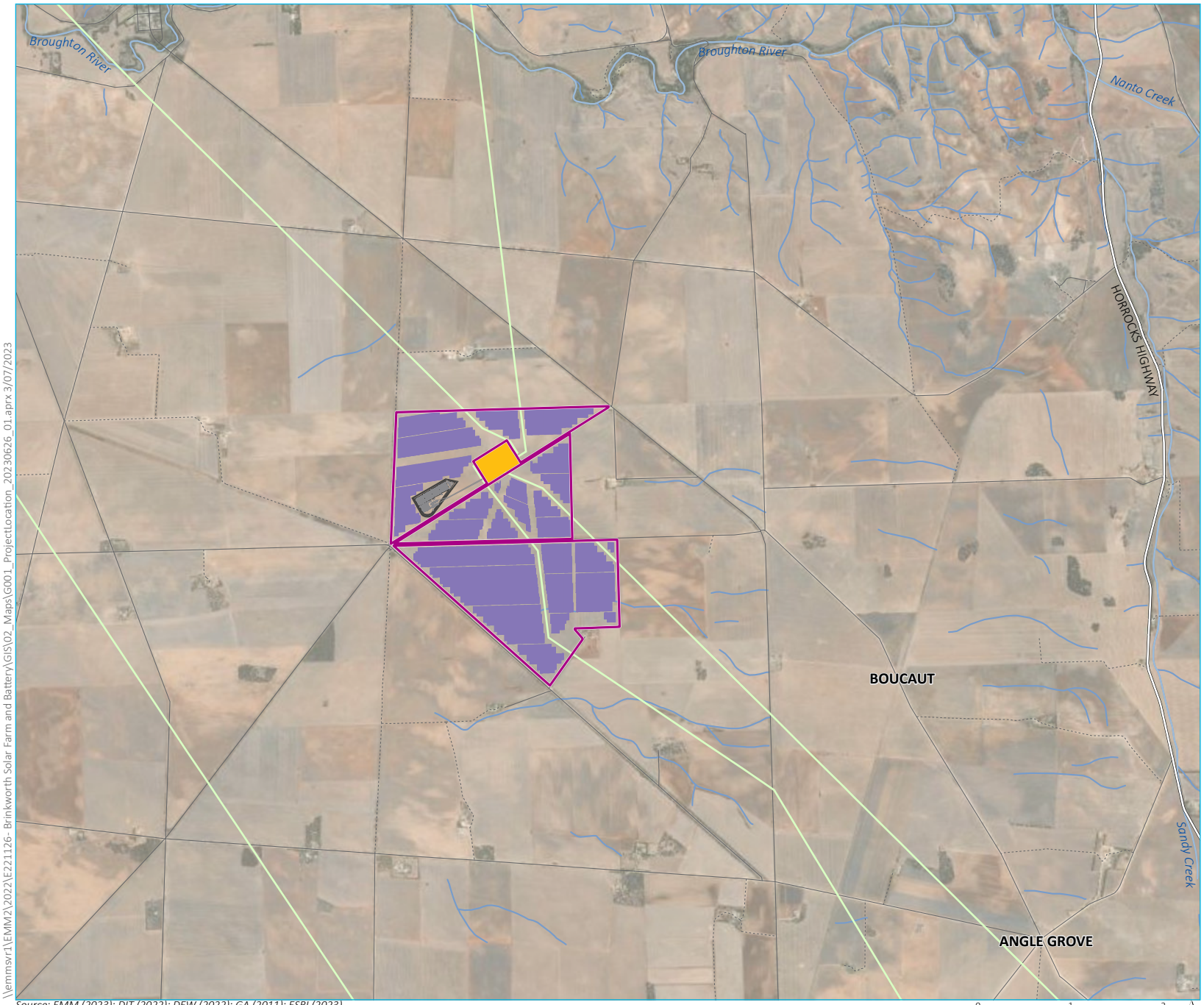
Electricity produced by the project will be fed through underground cables and/or overground transmission lines to the on-site substation, from where it will be exported to the NEM via the ElectraNet Brinkworth Substation and the existing 275 kilovolt (kV) transmission line.

1.2 Project description

The project's main features are summarised in Table 1.1. The project location and development footprint are shown in Figure 1.1.

Table 1.1 Summary of key project features

Project feature	Description
Development footprint	The project site encompasses an area of approximately 474 hectares of private land.
Site access	Site access would be via Koolunga Road and Power Station Road.
Solar panels	Solar panels are approximately 2.28 m long by 1.13 m wide. An estimated 367,360 panels will be used.
Battery energy storage system (BESS)	An on-site battery energy storage facility with a capacity of 300 MW/1200 MWh is proposed to be located adjacent to the on-site substation. The BESS would consist of a series of 20-foot modularised batteries with transformers, high voltage AC coolers and other electrical plant.
On-site substations	Two separate substations are required to connect the BESS and solar farm components of the project separately to the existing Brinkworth Substation. Each substation would include a 275/33kV transformer, earthing/auxiliary transformers, outdoor switchgear, control room and switch room, and cable termination structures.
Operations and maintenance facility	An operations and maintenance facility would be located adjacent to the on-site substation and provide office, storage, and maintenance facilities.
Temporary components	A temporary construction compound would be located within the project site and include office facilities, amenities, and car parking.
Construction period	Construction in two separate phases. Approximately four years in total.
Project life	Up to 20 years following a period of up to four years of pre-development and construction activities. Pre-development would include detailed design and early works, where permitted.
Decommissioning	The solar farm and battery would be decommissioned within 12 months of solar farm and/or BESS permanently ceasing to generate electricity. This would include removing all above ground equipment, restoration of all areas associated with the project, unless otherwise useful to the ongoing management of the land, and post-decommissioning revegetation with pasture or crop.



KEY

- Project boundary
- Battery energy storage system
- Brinkworth substation
- Transmission line
- Solar panel

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Watercourse/drainage line

\\emmsvr1\EMM2\2022\E221126- Brinkworth Solar Farm and Battery\GIS\02_Maps\G001_ProjectLocation_20230626_01.aprx 3/07/2023

Source: EMM (2023); DIT (2022); DEW (2022); GA (2011); ESRI (2023)

0 1 2 km

GDA 1994 MGA Zone 54

N

Project site

Brinkworth Solar Farm and Battery
Surface water assessment
Figure 1.1

EMM
creating opportunities

1.3 Structure of this report

The following report is structured as follows:

- Section 2 outlines the legislation framework/assessment criteria used to inform this Surface Water Assessment;
- Section 3 describes the project setting, the area climate, existing surface water features and provides details of the flood modelling assessment;
- Section 4 identifies and assesses the potential impacts of the project construction on surface water resources;
- Section 5 identifies and assesses the potential impacts of the project operation on surface water resources;
- Section 6 presents mitigation and management measures proposed to control potential adverse impacts to surface water resources.

2 Legislation, policy, and guidelines

2.1 South Australian Planning and Design Code 2022

The South Australian Planning and Design Code (2022) outlines the requirements that must be met for development applications. For the development of the project the following provisions are relevant:

- Part 3 – Overlays:
  - Water resources overlay:
    - Desired outcome: Protection of the quality of surface waters considering adverse water quality impacts associated with projected reductions in rainfall and warmer air temperatures as a result of climate change.
    - Desired outcome: Maintain the conveyance function and natural flow paths of watercourses to assist in the management of flood waters and stormwater runoff.
    - PO 1.1: Watercourses and their beds, banks, wetlands, and floodplains (1% AEP flood extent) are not damaged or modified and are retained in their natural state, except where modification is required for essential access or maintenance purposes.
    - PO 1.4: Watercourses, areas of remnant native vegetation, or areas prone to erosion that are capable of natural regeneration are fenced off to limit stock access.
    - PO 1.5: Development that increases surface water run-off includes a suitably sized strip of vegetated land on each side of a watercourse to filter runoff to: a) reduce the impacts on native aquatic ecosystems b) minimise soil loss eroding into the watercourse.
    - PO 1.6: Development resulting in the depositing of an object or solid material in a watercourse or lake occurs only where it involves any of the following: a) the construction of an erosion control structure b) devices or structures used to extract or regulate water flowing in a watercourse c) devices used for scientific purposes d) The rehabilitation of watercourses.
    - PO 1.7: Watercourses, floodplains (1% AEP flood extent) and wetlands protected and enhanced by retaining and protecting existing native vegetation.
    - PO 1.8: Watercourses, floodplains (1% AEP flood extent) and wetlands are protected and enhanced by stabilising watercourse banks and reducing sediments and nutrients entering the watercourse.
    - PO 1.9: Dams, water tanks and diversion drains are located and constructed to maintain the quality and quantity of flows required to meet environmental and downstream needs.
  - Hazards (flooding – evidence required) overlay:
    - Desired outcome: Minimise potential impacts on people, property, infrastructure, and the environment from potential flood risk through the appropriate siting and design of development.

- Performance outcome: Development sited, designed, and constructed to minimise the risk of entry of potential floodwaters where the entry of flood waters is likely to result in undue damage to or compromise ongoing activities within buildings.

2.2 Landscape South Australia Act 2019

The *Landscape South Australia Act 2019* defines a watercourse as a creek, river, or other natural watercourse with a bed and banks in which water is contained or flows whether permanently or time to time. The legislation places several controls on potentially water affecting activities. Pertinent controlled activities include:

- the erection, construction, or placement of any building or structure on the floodplain of a watercourse;
- draining or discharging water directly or indirectly into a watercourse; and
- the use of imported water.

The legislation establishes regional landscape boards, such as the Northern and Yorke Landscape Board, which dictate control policies and procedures for water affecting activities within their jurisdiction.

2.2.1 Northern and Yorke Water-Affecting Activity Control Policy

Region specific policies and procedures are provided in the Northern and Yorke Water-Affecting Activity Control Policy (WAACP) that ensure state requirements are met whilst enabling local natural resource management goals. For the activities outlined above, these are:

- The erection, construction, or placement of any building or structure on the floodplain of a watercourse:
    1. Construction and placement of *structures* in the floodplain of a watercourse:
        a) shall be designed to minimise the risk of erosion resulting from the construction and location of the *structure*;
        b) must not adversely affect the provision of *environmental water requirements*;
        c) must not adversely affect the migration of aquatic biota;
        d) must not result in flooding, either upstream or downstream; and
        e) must not be constructed where it, or any debris collected by it, would increase the risk of damage to property or the risk to safety of persons.
- Draining or discharging water directly or indirectly into a watercourse:
    1. The draining and discharge of water into a watercourse must not:
        a) adversely affect the natural character of the watercourse; or
        b) increase the risk of flooding downstream of the point where water is drained or discharged.
    2. Water may only be drained or discharged into a watercourse or lake where protective measures have been provided to minimise erosion or degradation in the quality of the receiving water.
- The use of imported water:

1. A permit for the use of imported water is required where:

    a) the water is used at a rate that exceeds 1 ML/water use year, where the rate is based on the total volume of imported water used on contiguous land parcels owned or leased by the applicant; and

    b) the imported water is applied to land for irrigation purposes, either directly or flowing use in another process.

2. A permit should not be granted unless the relevant authority is satisfied that the use of the imported water will not:

    a) cause, or be likely to cause, a rise in the underground water level resulting in detrimental effects to structures or ecosystems; or

    b) result, or be likely to result, in adverse effects on the natural flow or quality of another water resource; or

    c) result, or be likely to result, in adverse effects to the productive capacity of the land including but not limited to, increases in land salinisation, waterlogging, or perched water tables; or

    d) adversely affect water dependent ecosystems.

3. The total volume of water that the permit applicant will be authorised under the Act to apply to the relevant land should not exceed 1 megalitre per hectare of the relevant land per annum, unless the relevant authority is satisfied that the application of more than 1 megalitre of water per hectare in any specified area of the land will not result in any of the adverse effects referred to in principle 2.

4. Imported water containing residual chlorine or other treatment chemicals must not be discharged. into surface water or watercourses or on land adjacent to surface water or watercourses.

5. Imported water must not be transported in a watercourse or along a drainage path.

2.2.2 Water Affecting Activities Best Practice Operating Procedure

The Water Affecting Activities Best Practice Operating Procedure (WAA BPOP) is a document produced by the Department for Infrastructure and Transport offering planning, construction, operations, and maintenance guidelines to ensure projects comply with the *Landscape South Australia Act 2019* at all stages.

2.3 Australian Rainfall and Runoff (ARR)

Australian Rainfall and Runoff 2019 (ARR) is a national guideline for the estimation of flood characteristics in Australia. In addition to establishing best practices, ARR provides software to aid in this estimation, notably the *Regional Flood Frequency Estimation model* which enables estimations of peak flows in regional locations with sparse data.

3 Project setting and existing surface water environment

The site is located approximately 150 kilometres (km) north of Adelaide in the local government area (LGA) of Wakefield Regional Council, in South Australia's Mid North region. At an elevation of approximately 145 m Australian Height Datum (AHD), the site is situated on the (non-prescribed) Broughton Plains between the ridges of the northern Mount Lofty Ranges and Southern Flinders Ranges, with the Skilly Hills to the east and the Burunga Range to the west.

Broadscale cropping and grazing for wool production are the dominant land uses, although viticulture (vines, lucerne and olives) is a major land-use in the higher rainfall areas of the Clare Valley, approximately 25 km southeast. The site topography is gently inclined to the southwest, with a 1% slope. The soils are mostly deep clay loams, commonly sub-group class A5 Calcareous loam on clay, and class A6 Calcareous gradational clay loam (Hall, 2009).

Tertiary sandstones, limestones and marls of the shallow St Vincent Basin are found in the area between the Mount Lofty Ranges and the Yorke Peninsula. Sedimentary strata reach a maximum thickness of around 40 m and are underlain by Permian sands, Cambrian or Adelaidean quartzite, sandstone, limestone, dolomite, slate, marble, siltstone, phyllite, schist and gneiss. Groundwater salinities are relatively high in the St Vincent Tertiary sediments, and these resources are used mostly for stock water supply (Alcoe and Berens, 2011).

The site is roughly equidistant to the local communities of Brinkworth and Koolunga. The site has good access to north-south transport links with the B82 Horrocks Highway, A1 Augusta Highway, and Blyth Plains Road. There is extensive reticulated water supply in the area sourced from the River Murray, and regional communities also rely on captured rainwater and groundwater for stock and domestic use.

The development footprint encompasses five land parcels and lies outside and to the west of the Ngadjuri Nation native title register #2 which was recently granted determination in 2021 (National Native Title Tribunal, 2023).

3.1 Current climate

The Northern & Yorke region is a semi-arid climatic zone characterised by hot, dry summers and cool winters, with the majority of rainfall falling in the winter months (Green et al, 2011). Tropical low-pressure systems and northwest cloud bands occasionally drift down, bringing short outbursts of localised heavy rainfall, particularly during summer (Deane, 2005).

Patched point climate data was obtained from the Scientific Information for Land Owners (SILO) database hosted by the Science Division of the Queensland Government's Department of Environment and Science (Queensland DSE, 2022). SILO patched point data consist of interpolated estimates based on historically observed data from Bureau of Meteorology weather stations. For this assessment, SILO data was obtained for the grid point located at -33.65, 138.40. The annual climate statistics are displayed in Table 3.1 and monthly averages shown graphically in Figure 3.1

Table 3.1 Rainfall and evaporation data

Key annual statistic	Rainfall (mm/year)	Evaporation (mm/year)
Average	410	1917
Minimum	183	1590
5th percentile	249	1803
Median	405	1899

Table 3.1 Rainfall and evaporation data

Key annual statistic	Rainfall (mm/year)	Evaporation (mm/year)
95th percentile	576	2101
Maximum	706	2315

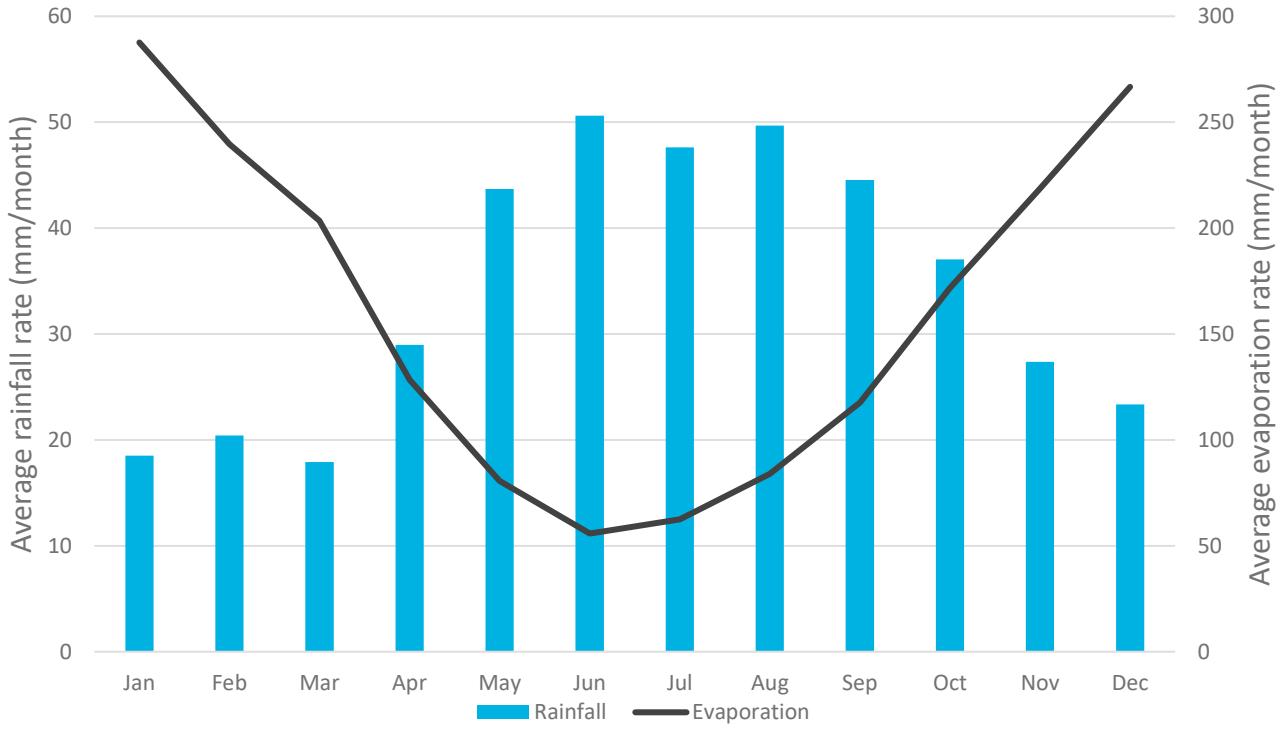


Figure 3.1 Rainfall and evaporation data

3.2 Future climate

Climate change scenarios suggest that by the end of the 21st century average annual temperatures in the Northern & Yorke region could increase by up to 1.6 to 3.2 degrees Celsius, and annual average rainfall could decrease by up to 14 to 27% (Charles and Fu, 2014). By 2030, projected rainfall reductions are similar under both 'medium' and 'high' emissions scenarios, and under both scenarios there is agreement that by 2070 summer and autumn may on occasion be wetter, whereas winter and spring would be drier (Charles and Fu, 2014). Reduced rainfall would result in less surface water runoff, lower groundwater recharge rates, and increased fire risk.

3.3 Site observations

A site visit was conducted by EMM personnel on 28 March 2023. The objective of the site visit was to verify the existing surface water environment in regard to existing drainage paths and soil characteristics.

EMM field staff visited each 'waterway' marked in public data within the project domain. None were found to have the characteristics of a waterway (ie a defined bed and banks), and should be considered instead as drainage lines. Site photographs are included in Appendix B.

Drainage lines are relevant when considering erosion and transport of material towards waterways.

Soils testing undertaken on site (Photograph 3.1) indicated the soils across the project site:

- contain clay, silt, and sand
- are not dispersive when exposed to water.

As soils were not found to be dispersive, standard erosion and sediment control measures are expected to be appropriate to prevent movement od sediment into waterways during construction.

Photograph 3.1 Soil

3.4 Surface water features

The site is located in the north-eastern corner of the surface water subcatchment of Lake View (415 km^2). The Lake View watershed is delineated by the Skilly Hills to the east, and the Burunga Range to the west, with the northern extent roughly following Collinsfield Road, immediately north of the site.

Drainage is west to south-west, in the direction of Snowtown and towards Lake Bumbunga on the Condowie Plains.

The Broughton River is the nearest surface water feature, located approximately 4 km north of the site. The Broughton River adjacent to the site meanders onto the plain from the base of Skilly Hills, and is confined to a single incised channel within a broad floodplain.

The 'watercourses' spatial data published by the South Australian Government (blue lines on Figure 1.1) includes both drainage lines and watercourses. To the east of the study site and elsewhere on the plain north of Brinkworth, discontinuous mapped blue lines indicate broad swales in cultivated paddocks. Surface runoff in the form of overland flow is likely to accumulate on saturated soils within these drains following prolonged or intense rainfall. Drainage alignments may be coincident with relic channels that fanned across the valley floor prior to the introduction of modern land management practices, or prior to infilling from erosion and deposition. Drainage lines which do not have a defined bank and bed are not watercourses, however construction activities within drainage lines may still be required to comply with sections of the *Landscape South Australia Act 2019* and

Northern and Yorke Water Affecting Activity Policy relating to indirect effects on watercourses, as in many cases drainage lines will convey runoff towards watercourses.

All watercourses in the Mid-North region exhibit ephemeral or intermittent flow regimes (Alcoe and Berens, 2011). To the west of the site, gullies on the ridgelines and seeps at the base of the Burunga Range form ephemeral channels or drains that fan out across cultivated paddocks on the valley floor towards the network of salt lakes located on the Condowie Plain.

The band of salt lakes represent the only semi-permanent surface water features downstream from the site. The lakes border cultivated land and have been largely cleared of native vegetation. Some stands of low open shrubland buffer the lakes to the east and north and these habitats will mostly support drought-tolerant species of flora and fauna.

3.5 Description of flood risk

Appendix A provides a detailed description of the flood assessment methods and results. In summary, there are two potential sources of flooding.

The two potential sources of flooding investigated are:

- flooding from the Broughton River; and
- flooding from incident rainfall.

In order to assess these potential sources of flooding, EMM developed a direct rainfall (rain-on-grid) hydraulic model using the TUFLOW 2D software (BMT, 2018). TUFLOW is a 2D numerical simulation free-surface water flow modelling tool for rivers, floodplains, estuaries, coastlines, and urban environments commonly used within Australia for assessing drainage and flooding.

This study was carried out in accordance with guidance in the current edition of Australian Rainfall and Runoff (ARR 2019) (Ball, et al., 2019), using associated datasets where available, and industry standard software packages.

3.5.1 Broughton River flooding

The ephemeral Broughton River is the nearest surface water feature to the study site and drains an area of 5,671 km^2. The study site is located in a subcatchment that is hydrologically separated from the Broughton River by a watershed, formed by a low ridgeline that follows Collinsfield Road immediately north of the study site, and this restricts the likelihood of any hydrological connection.

The Broughton River adjacent to the site meanders onto the plain from the base of Skilly Hills and is confined to a single incised channel within a broad floodplain. Flow data is available from the Mooroola river flow monitoring site, and recorded annual flows range from 4,260 ML to over 100,000 ML (Roberts, 2007).

The Mooroola monitoring site records the river water-level continuously, and this is converted to flow using a stage-discharge relationship derived from a series of spot flow gaugings carried out over time, under a range of different flow conditions. EMM analysis has revealed that the stage-discharge rating curve for Mooroola is not well defined for extreme flood events, and the HEC-RAS modelling platform has been used to better define and extend the rating for more accurate representation of extreme events.

Flood modelling requires a ‘design flood’, which is based on statistical analysis of the frequency and magnitude of observed flood flows and water levels. For assessment purposes, the design flood is typically the 1% annual exceedance probability (AEP) flow, and the South Australian Planning and Design Code 2022 makes reference to the 1% AEP flood extent.

The results of the flood modelling show that the 1% AEP Broughton River flow will not reach the elevation of the project site (Figure A.4). Therefore, the site is not considered to be at risk of flooding from the Broughton River, and development of the site will not interact with Broughton River flooding.

3.5.2 Direct rainfall flooding

The other component of the flood modelling is to assess whether the site is at risk of flooding from intense rainfall and resulting overland flow. The catchment response to rainfall depends on the intensity and duration of the storm, and the amount of infiltration and runoff. Where rainfall exceeds the infiltration capacity of the soil, which happens when soils become fully saturated, the excess rainfall will generate overland flow that could potentially flood across the site.

The gentle south-westerly slope of the site means surface run off will flow in a west to south-west direction. The site is located in the north-eastern corner of the subcatchment, and so the vast majority of the catchment area contributing to runoff generation is downslope of the site, and this limits the quantity of overland flow that could feasibly accumulate at the site.

The results of the flood modelling suggest that concentration of runoff generated from overland flows is likely to occur as sheet flow across the site, approximately 100 to 300 mm deep, and forming broad channels conforming to surface depressions in paddocks and linear drainage features. These broad channels present a low hazard (H1) and so there is likely to be minimal impacts on people, property, infrastructure, and the environment from potential flood risk through the appropriate siting and design of development. The BESS location was shifted away from the overland flow paths, thereby avoiding these potential impacts.

The photovoltaic (PV) modules and associated infrastructure will generally be mounted on vertical piles driven or screwed into the ground, or on discrete concrete pads. These narrow structures are unlikely to divert, impede, or concentrate flood flow in any significant way, and this reduces the likelihood of any increase in waterlogging, or erosion, or enhanced flood risk, due to the construction and operation of the site.

4 Construction phase effects

4.1 Overview

The project comprises of a medium sized solar PV generation facility and associated infrastructure, with an indicative development footprint of approximately 474 ha. The project will have a solar capacity of up to 209 MW. The site is traversed by the existing Brinkworth – Davenport 275 kV line, and the development footprint encompasses an existing substation located on Power Station Road, which will provide a connection to South Australia's grid. Akaysha Energy are seeking approval for an indicative development footprint rather than a specific project layout.

The construction period is anticipated to commence in 2023 and take four years consisting of two separate phases. Site access will primarily be via Koolunga Road and Power Station Road. A number of minor public access roads are within the development footprint (Whitehorn Road, Lake View Road, and Boucaut School Road).

The project will involve the development of separate arrays of PV modules (solar panels). The exact location, number, and configuration of the PV modules will be optimised for the development footprint and will be subject to a finalised connection agreement with ElectraNet, based on network transmission capacity, and will be determined at the detailed design stage.

The project involves the use of single axis tracking PV modules installed on racking frames fixed onto a horizontal tracker tube, with this mounted on top of vertical piles driven or screwed into the ground; and installed in rows generally spaced 6.5 m apart (centre to centre) with a minimum gap of 4.3 m between panel edges. Spacing would increase around access roads and easements. The rows of PV modules will be aligned in a north-south direction, allowing the panels to rotate from east to west during the day, tracking the sun's movement.

The maximum height of the panels to the higher edge from ground level at the maximum tilt angle is expected to be 4.5 m, with the leading (lower) edge of each PV module up to 1.2 m from the ground (when in a horizontal position) and no less than 0.3 m (maximum tilt).The system design will incorporate power conversion units (PCUs) consisting of inverters, transformers and a ring main unit. The PCUs convert DC electricity generated by the arrays into AC, compatible with the network connection.

The PCUs will also increase the voltage of the electricity generated by the PV modules, to 33 kV for transmission to the substation. DC cabling will be installed in trenches between the ends of the PV trackers and the PCUs. 33kV AC cabling will be installed in trenches between the PCUs and the 33 kV collection station adjacent to the solar farm substation. PCUs are normally housed within shipping container-like open structures that measure approximately 6–12 m long x 2.5 m wide x 2.9 m high. PCUs will be skid mounted open structures on either a concrete pad or driven steel piles. The quantity and exact dimensions of the PCUs will be determined during detailed design.

In addition to the infrastructure described above, the project will also require a site office and sign-in point, vehicle wash-down, operations and control room, workshop and equipment shed, underground and aboveground cables, and car parking. Temporary infrastructure during the construction phase of the project may also be required, including laydown and storage areas and a site compound, as well as improvements to roads, track upgrades, additional fencing, and incidental landscaping upon completion.

4.2 Proposed water management

Detailed layout configuration will be updated at the detailed design stage of the project. Project infrastructure will be positioned to avoid identified constraints. Prior to construction, a Soil Erosion and Drainage Management Plan (SEDMP) will be developed as part of the overall contractor's environmental management plan (CEMP) to address temporary and site-specific risks to surface water during the construction phase. A draft CEMP which includes the

management measures outlined below will be provided with the development application. The CEMP will be refined during detailed design.

The proposed project site and low-impact design intend to maximise efficiency and minimise environmental impacts. From a water perspective this has included considerations associated with:

- selecting a site with no existing watercourses and associated riparian corridors; and
- minimising development in flood prone areas, and locating sensitive infrastructure in suitable areas compatible with flood risk.

A similar approach to low impact design will apply to future design refinement through the detailed design process and into construction. Key principles and objectives for stormwater management, flood risk management, and erosion and sediment control are described below.

The general approach to stormwater management will involve:

- grading to minimise earthworks and be consistent with the existing prevailing grade and landforms and to fall to existing drainage lines, to minimise changes to existing flow paths;
- surface drainage measures as required to control runoff generated within the site;
- existing flow paths and sheet flow conditions will be maintained to the extent practicable, with construction of diversion drains, channels and table drains to be minimised, to:
    - minimise soil erosion potential; and
    - minimise changes to flow regimes in receiving watercourses.
- suitable treatments, including rock rip rap where appropriate, will be used to armour earthwork batters and site drainage as needed for scour protection and to achieve stable waterways where flow concentrations cannot be avoided;
- specific stormwater management measures for the substation area will include:
    - diversion of clean runoff away from potentially oil-contaminated areas such as substations;
    - bunding of potentially oil-contaminated areas in accordance with relevant standards; and
    - provision of stormwater treatment device(s) to remove oil/grease, hydrocarbons and sediment from runoff prior to discharge to the downstream drainage system.
- prompt stabilisation of disturbed areas and progressive rehabilitation as early as practicable;
- maintaining drainage, erosion and sediment control measures;
- monitoring and adjustment protocols for drainage, erosion and sediment control practices to achieve the desired performance standard;
- drainage, erosion and sediment control personnel competence; and
- stormwater runoff from buildings will be captured in rainwater tanks for use on site, to minimise demand for imported water.

These principles will be applied to the extent practicable as part of further design development. In addition to the above, the SEDMP will include measures to:

- implement procedures for hazardous material storage and spill management as defined in applicable guidelines;
- maintain spill kits onsite at all times during construction and operation;
- consider weather preparedness and response planning; and
- identify requirements for monitoring and maintenance of water management and drainage systems.

The general approach to flood risk management will involve:

- locating sensitive infrastructure on high ground above 1% AEP flood levels (or other suitable level of flood immunity as may be determined during detailed design), and avoiding or otherwise diverting local overland flow paths around infrastructure;
- appropriate placement of temporary works, plant, materials and workforce facilities, that gives due consideration to overland flow paths;
- development of a flood management plan (FMP) or similar to describe required site management and protocols in the event of flood events that could impact construction sites or access, including:
  - suitable early warning/prediction measures and communication protocols;
  - site preparedness activities and procedures;
  - triggers for closure, evacuation and recovery; and
  - emergency response and support.

These principles will be applied to the extent practicable as part of further design development.

4.3 Construction water requirements and sources

Potential impacts to water resources from the project are expected to include demand for water during the construction of the project, as well as for land management during operations. The project is not likely to impact groundwater during construction, operation and decommissioning due to the limited amount of subsurface disturbance activities required during the installation and decommissioning of project infrastructure.

Water demands will be relatively small, as the construction and operation of a solar PV electricity generation facility are non-water intensive. Water required on site during the construction phase will primarily be used for:

- construction staff and site visitor potable water supply and amenity;
- concrete mixing for construction of pads;
- vehicle and equipment washdown; and
- fire and dust suppression.

Construction water will be trucked to site from a commercial water supply operation.

4.4 Water demand

Water demand during construction is anticipated to be relatively minor due to the small disturbance area.

The primary use of water is expected to be during construction for dust suppression purposes. Dust suppression will be managed reactively by hiring a water cart during dry and windy conditions, if dust occurs. Dust generation is not expected to exceed that generated by the current farming land use heavy machinery during harvest.

4.5 Changes to flow regime

The low-impact project design means that the site will only require minimal site preparation and civil works (such as grading/levelling and compaction). No large areas of reshaping or excavation are required, aside from the excavation of cable trenches and formations of level pads for PCUs and related infrastructure.

During construction there is the potential for a temporary increase in site runoff as a result of clearing, earthworks, compaction of soils and installation of impervious surfaces, leading to additional runoff leaving the project site and impacting downstream properties and receptors. However, potential construction phase impacts to site runoff volumes and rates are considered minor and manageable with implementation of management measures that are described in Section 6. All temporary works will be designed to account for any short-term changes to catchment areas, runoff potential and flow paths that may be required during construction. Stormwater runoff from buildings will be captured in rainwater tanks for use on site where practical, which will also assist in reducing any additional risk of runoff from the site.

4.6 Water quality

The primary risks to water quality during construction will occur as a result of:

- soil erosion and transport of sediment into receiving watercourses;
- accidental spillage of fuel or other hazardous materials used to support construction activities;
- poor or ineffective wastewater management practices; and
- entrainment of construction materials in floodwaters.

If unmanaged, ground disturbance during bulk earthworks and other site activities (eg material handling, installation of PV modules, trenching for services and grading for new access roads) may lead to exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses. The key risks to the soil and land resources associated with the construction of the project, and accordingly risks to downstream water quality, can be effectively managed by proposed soil and water management measures. These measures are described in Section 6 and will be further developed as part of detailed design and documented in the SEDMP for the project.

Contamination of surface water as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support construction activities could also adversely impact water quality. Appropriate controls to effectively manage these activities, consistent with best practice and relevant guidelines, will also be incorporated in the SEDMP.

All wastewater generated by the project during construction will be collected and transported offsite for disposal at a suitable licensed facility. This avoids any discharge to receiving watercourses. Appropriate protocols for wastewater handling and transport will be incorporated in the SEDMP.

Specific recommendations and proposed management measures for erosion and sediment control and stabilisation of disturbed surfaces during construction will form part of the SEDMP. At the end of the construction phase, the operational disturbance footprint requirement will be reduced. Construction areas no longer required to support the operational phase will be rehabilitated. A principal aim of site rehabilitation will be to stabilise

disturbed areas and minimise the potential for ongoing soil erosion and subsequent mobilisation/transport downstream of each site.

4.7 Flooding

During construction, there is potential for inundation of site works, compounds, storage areas and plant/equipment if these are located within flood prone areas, which could lead to undesirable flooding impacts either offsite or within the project area. Flooding conditions may also present a safety hazard to construction workers.

This risk can be adequately managed by suitable construction site planning that considers flood risk, avoids use of higher risk areas (ie subject to more frequent and/or severe flooding) and implements suitable controls for areas subject to lower risk (ie less frequent and/or severe flooding). Appropriate protocols for minimising potential flood entrainment of materials will be incorporated in the SEDMP.

5 Operation phase effects

5.1 Water requirements

Fire suppression water will be required for the BESS for use in the event of a battery fire. A fire suppression system will be installed which uses water from a storage tank (size to be confirmed during detailed design, expected to be 72 kL with additional 20 kL tanks located at other access points). The fire suppression tank would be filled via water tanker as required.

Stormwater runoff from buildings will be captured in rainwater tanks for use on site where practical to minimise demand for imported water, which will also assist in reducing minor increases in runoff from the site.

5.2 Changes to flow regime

The potential for surface water impacts downstream of the project associated with hydrologic changes due to increased runoff rates from PV modules and proposed new impervious surfaces is considered negligible. PV modules will shed runoff directly to the ground, which will be stabilised and vegetated to promote retention and infiltration similar to existing conditions. Overall, the project is expected to result in no measurable net change to site runoff potential, provided stabilisation and revegetation recommendations identified in Section 6 are implemented.

The general approach and key principles for stormwater management and flood risk management described for construction will also apply to operations.

5.3 Water quality

The key risk to water quality during operation is that poor site stabilisation and reestablishment of ground cover revegetation could lead to ongoing exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses. This risk to the soil and land resources associated with the operation of the project and subsequent risks to downstream water quality can be effectively managed by proposed soil and water management measures described in Section 6 and incorporated into the operational SEDMP.

Potential discharge of stormwater contaminated with hydrocarbons from onsite substations will be avoided by upgrading or implementing suitable operational phase controls including separation of clean and oil-contaminated runoff, bunding of oil-contaminated areas and provision of treatment devices to remove oil/grease, hydrocarbons and sediment from runoff prior to discharge to the downstream drainage system.

A spills procedure would be developed describing methods to prevent contamination of surface water as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals.

The BESS fire suppression system management area will be bunded to contain fire water to prevent lithium entering the environment. Firewater and stormwater runoff from the BESS area would be directed to a sump. The sump would have an automatic float trigger and would pump stormwater out to the neighbouring flow path during rainfall. In the event of a fire, the system would lock out the pump and water would be contained.

All wastewater generated by the project during operations will be collected and transported offsite for disposal at a suitable licensed facility. This includes firewater and any hydrocarbons captured at the substation site. This avoids potential discharges to receiving watercourses.

Overall, potential impacts to water quality during operation are considered minor and manageable with proposed management measures in place.

5.4 Flooding

During operation there is the potential for inundation of PV array areas and permanent infrastructure if these areas are located within flood prone areas. This could also lead to undesirable flooding impacts either offsite or within the project area. Flooding conditions may also present a safety hazard for staff or visitors to the site.

The preliminary design has considered flooding constraints and makes appropriate responses in terms of locating flood-sensitive infrastructure away from watercourses and their associated floodplains.

Shallow inundation of PV array areas will have negligible impact on broader flooding conditions and potential for adverse flooding impacts due to the minimal obstruction to floodwaters presented by spaced PV panel support posts.

In response to the flood modelling results, the proposed BESS pad has been repositioned such that it will not interact with overland flow paths during flooding.

The proposed use of the site is considered to be generally compatible with the flood hazard, in that the majority of the PV array and infrastructure areas and internal access roads are either free of flooding or subject to flood hazard (H1) that is generally safe for people, vehicles and buildings for events up to the 1% AEP.

6 Management and mitigation measures

A summary of the proposed measures to manage and mitigate potential impacts to surface water and groundwater is provided in Table 6.1.

Table 6.1 Management and mitigation measures summary

Management/mitigation measure	Timing
Stormwater management	
Key stormwater management principles will include: • appropriate siting of proposed infrastructure within the development footprint, which will minimise (and avoid where possible) disturbance to existing drainage lines and overland flow paths; • grading to minimise earthworks and consistent with the existing prevailing grade and landforms; • provision of surface drainage infrastructure comprising: – diversion of upslope runoff around infrastructure (excluding PV modules); – surface drainage measures as required to control runoff generated within the site, minimise soil erosion potential and direct runoff towards receiving drainage lines. Sheet flow conditions will be maximised, and construction of diversion drains, channels and table drains to be minimised to the extent practicable; – suitable treatments, including rock rip rap where appropriate, will be used to armour earthwork batters and site drainage as needed for scour protection and to achieve stable waterways where flow concentrations cannot be avoided; and – maintain existing flow paths where possible and minimise catchment diversions, with the objective of minimising changes to flow regimes in receiving watercourses. • prompt stabilisation of disturbed areas and progressive revegetation as early as practicable; • maintaining drainage, erosion and sediment control measures; • monitoring and adjustment protocols for drainage, erosion and sediment control practices to achieve the desired performance standard; • drainage, erosion and sediment control personnel competence; • stormwater runoff from buildings will be captured in rainwater tanks for use on site, to minimise demand for imported water; • implement procedures for hazardous material storage and spill management as defined in applicable guidelines; • maintain spill kits onsite at all times during construction and operation; • consider weather preparedness and response planning; and • identify requirements for monitoring and maintenance of water management and drainage systems.	Pre-construction
Specific stormwater management measures for the substation area will include: • diversion of clean runoff away from potentially oil-contaminated areas; • bunding of potentially oil-contaminated areas; and • provision of stormwater treatment device(s) to remove oil/grease, hydrocarbons and sediment from runoff prior to discharge to the downstream drainage system.	Pre-construction
Required site management and protocols to address ongoing site-specific risks to surface water during the operational phase. This will address: • rehabilitation of temporary works and construction disturbance areas not utilised for operations; and • continuation and maintenance of stabilised and vegetated surfaces, drainage and sediment and erosion control measures that will be retained for operations.	
Erosion and sediment control	

Table 6.1 Management and mitigation measures summary

Management/mitigation measure	Timing
Implementation of erosion and sediment control measures and site rehabilitation and revegetation in accordance with best practice comprising Water Affecting Activities Best Practice Operating Procedure (WAA BPOP) and use standard construction site management practices to comply with Master Specification Part PC-ENV2 (DIT, 2021) **Earthworks** • Undertake earthworks in a manner that conserves topsoil and minimises disturbance • Avoid any soil disturbance beyond the limit of approved development • Use appropriate treatment measures to treat runoff • When necessary, install erosion and sediment control structures before the commencement of site disturbance and construction works • Schedule earthworks to retain as much protective ground cover as possible at all times • Program site stabilisation and revegetation as soon as possible after completion of earthworks. Options available include installation of the permanent landscape or a temporary cover of a sterile or non-seeding grass species (eg sterile rye grass), chipped or mulched vegetation, biodegradable mats or soil binders **Drainage** • Divert off site and "clean" drainage around disturbed areas • Intercept and redirect runoff on the site to protect exposed areas • Where appropriate, install sediment detention basins early so that site drainage can be directed to them as soon as possible • Consider the impact of all works including minor works such as service trenches, pavement cutting	Pre-construction
Flood risk management	
Develop and implement site management and protocols in the event of flood events that could impact construction sites or access, including: • suitable early warning/prediction measures and communication protocols • site preparedness activities and procedures • triggers for closure, evacuation and recovery • emergency response and support	Pre-construction
Construction site planning at detailed design stage to: • consider flood risk and adopt appropriate placement of temporary works, plant, materials and workforce facilities, that gives due consideration to overland flow paths and mainstream flood risk • ensure that temporary works minimise offsite flooding impacts as far as practical	Pre-construction/ construction

7 References

Alcoe, DW and Berens V, 2011. Non-prescribed groundwater resources assessment – Northern and Yorke Natural Resources Management Region. Phase 1 - Literature and Data Review, DFW Technical Report 2011/17, Government of South Australia, through Department for Water, Adelaide

Bureau of Meteorology (BoM) 2022, *Water Data Online*, accessed 8 December 2022 from http://www.bom.gov.au/waterdata/.

Charles SP, Fu G,2014. Statistically Downscaled Projections for South Australia – Task 3 CSIRO Final Report. Goyder Institute for Water Research Technical Report Series No. 15/1 Adelaide, South Australia

Deane, D, 2005. Rocky River Catchment water resources assessment, Report DWLBC 2005/34, Department of Water, Land and Biodiversity Conservation, Adelaide.

Department of Infrastructure and Transport (DIT), 2021. Protecting Waterways Guideline Environment and Heritage Technical Manual Attachment 6A

Department of Planning and Local Government (DPLG), Government of South Australia, 2011. Mid North Region Plan. A volume of the South Australian Planning Strategy.

Department of Environment and Water Northern Region DEWNR, 2013. Non-prescribed Surface Water Resources Assessment – Northern and Yorke Natural Resources Management Region, Government of South Australia, through Department of Environment, Water and Natural Resources, Adelaide Government of South Australia.

Green, G, Gibbs, M, and Wood, C, 2011. Impacts of Climate Change on Water Resources, Phase 3 Volume 1: Northern and Yorke Natural Resources Management Region, DFW Technical Report 2011/03, Government of South Australia, through Department for Water, Adelaide

Hall, JAS, Maschmedt, DJ, Billing, NB, 2009. The Soils of Southern South Australia. The South Australian Land & Soil Book Series, Vol 1; Geological Survey of South Australia, Bull 56, Vol 1.

National Native Title Tribunal 2023, *Register of Native Title Claims Details*, National Native Title Tribunal, accessed 1 August 2023 from http://www.nntt.gov.au/searchRegApps/NativeTitleClaims/Pages/details.aspx?NTDA_Fileno=SC2011/002.

Rahman, A & Khaled, H 2013, 'Regional flood frequency estimation model', Australian Rainfall & Runoff, 4 edn.

Roberts, S 2007, Northern and Yorke Natural Resources Management Region water monitoring review, DWLBC Report 2006/15, Department of Water, Land and Biodiversity Conservation, Adelaide.

Glossary

AEP	Annual Exceedance Probability. The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year. This notation is preferred by industry over *ARI*.
ARI	Average Recurrence Interval. The average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration. It is implicit in this definition that the periods between exceedances are generally random. *ARI* terminology is analogous to *AEP* and occurs in many historical documents but is now less preferred by industry than *AEP* as the likelihood of a rainfall event or flood occurring is more accurately described with an annual probability.
BoM	Australian Bureau of Meteorology.
CEMP	Contractor's Environmental Management Plan
Drainage line	Drainage alignments not necessarily consisting of eroded beds or banks. Natural or artificial means of intercepting and removing surface or subsurface water.
FMP	Flood Management Plan
HEC-RAS	HEC River Analysis System (HEC-RAS)
PCU	Power conversion units
PV	Photovoltaic
RFFE	Regional flood frequency estimation model
SEDMP	Sediment and Erosion Management Plan
Stormwater	The runoff of water as a direct consequence of rainfall, whether surface flow, or flow within conduits, including any contaminants collected by the water during its passage.
Stormwater Drains	Stormwater pipe infrastructure and open drainage network.
Swale	A low place in a tract of land, usually moister and often having ranker vegetation than the adjacent higher land.
TUFLOW	TUFLOW is a computer program for simulating depth-averaged, one and two-dimensional free-surface flows such as occurs from floods and tides, with the 2D solution occurring over a regular grid of square elements.
Watercourse	A creek, river, or other natural watercourse with a bed and banks in which water is contained or flows whether permanently or time to time

Appendix A
Flood assessment

EMM
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A.1 Introduction

A.1.1 Overview

Flood modelling of the existing environment at the proposed Brinkworth Solar Farm Project (the Project) location was undertaken to assist with Project layout design and approvals. This appendix describes the flood modelling undertaken, and provides maps illustrating 1% AEP (1 in 100 year) flood behaviour.

Two potential sources of flooding were investigated:

- Flooding from the Broughton River; and
- Flooding from incident rainfall.

A.1.2 Modelling approach

This study was carried out in accordance with guidance in the current edition of Australian Rainfall and Runoff (ARR 2019) (Ball, et al., 2019), using associated datasets where available, and industry standard software packages.

EMM developed a direct rainfall (rain-on-grid) hydraulic model using the TUFLOW 2D software (BMT, 2018), release 2020-10-AF, which was the latest major TUFLOW release at the time of modelling. The 2D heavily parallelised compute (HPC) solver was used in conjunction with sub-grid sampling (SGS). TUFLOW is a 2D numerical simulation free-surface water flow modelling tool for rivers, floodplains, estuaries, coastlines, and urban environments commonly used within Australia for assessing drainage and flooding. Roads, channels, culverts, and embankments can be included in TUFLOW models, and comparisons made between pre- and post-development flood behaviour.

A.1.3 Data

The following datasets were used in the development of the TUFLOW model:

- 20 m resolution digital elevation model, captured by Aerometrex in 2017;
- design storm Intensity Frequency Duration (IFD) data, downloaded via the Design Rainfall Data System (Bureau of Meteorology, 2016); and
- design storm data for the modelled catchment area, downloaded from the ARR Data Hub (http://data.arr-software.org/); and
- recorded stream gauge data for the 'Broughton River at Mooroola' flow gauge (station number A5070503), located upstream from the project site.

A.2 Broughton River flooding

A.2.1 Determination of design flows

i Introduction

Analysis of the Mooroola flow gauge data revealed that the gauge used a rating curve which did not cover large flood flows, and subsequently, published estimates of the 1% AEP flow at Mooroola were incorrect. A corrected and extended rating curve was developed from the Ortho DEM utilising HEC-RAS.

HEC-RAS is 1D hydraulic simulation software developed by the US Army Corps of Engineers and is commonly used for modelling open channel flow within natural and designed channels.

ii Rating curve development

Cross sections were extracted from the Ortho DEM and used to create a HEC-RAS model of the Broughton River in the vicinity of the gauge (Figure A.1). The model was run in steady state for a range of flows and the resulting depth at the gauge location then used to create a rating curve (Figure A.2). The updated rating curve maintains the gauged estimation of in channel flows, whilst offering a better estimate of the higher flows.

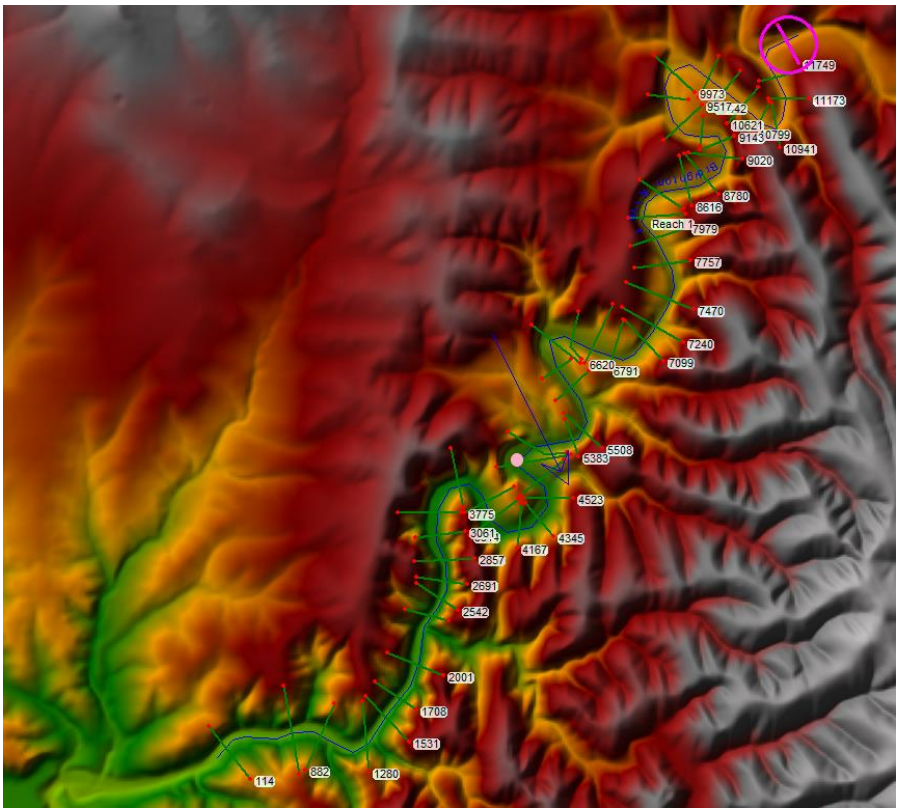


Figure A.1 **HEC-RAS model showing the locations of the cross sections used (green lines with red dots) and the flow gauge (pink dot)**

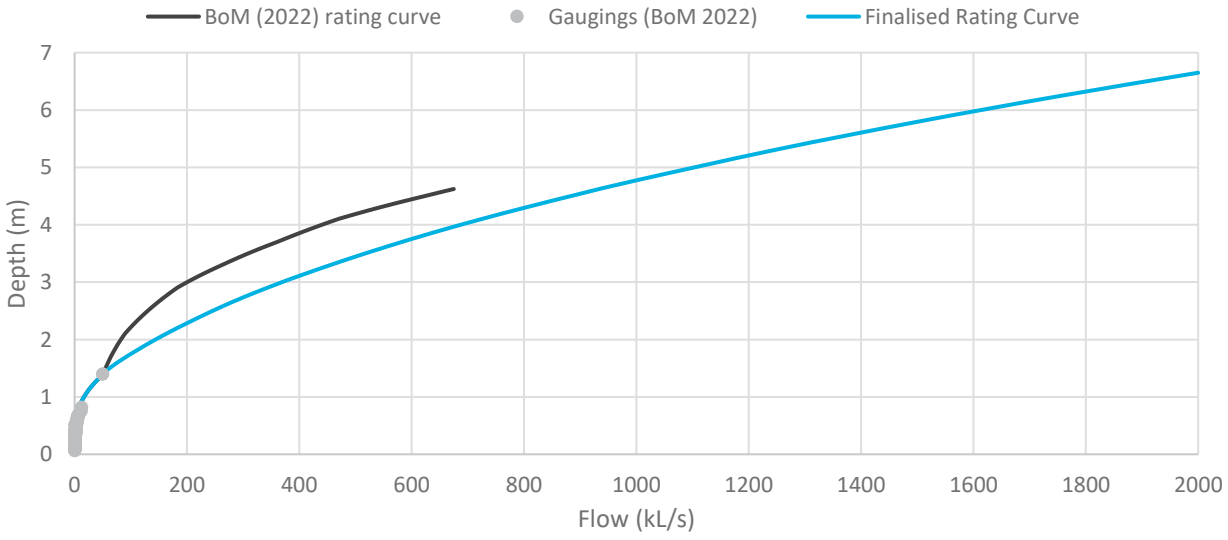


Figure A.2 **Revised rating curve (blue) shown with the original BoM (2022) rating curve and gauged data**

iii Flow data analysis

Using the rating curve and the daily maximum flow depth data obtained from the flow gauge, daily maximum flow data was generated and refined into a series of annual peak flows, shown in Figure A.3. Across the 50 year dataset, there were 605 days of missing data spread across 14 periods. Of these periods, 10 took place entirely or predominantly in summer, minimising the likelihood of an unrecorded peak flow.

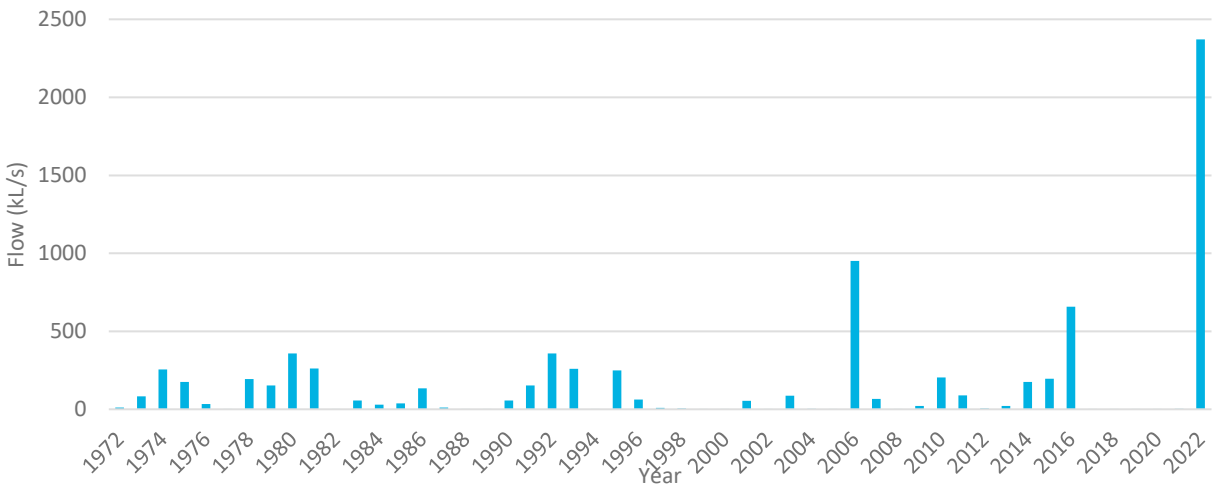


Figure A.3 Annual series of peak flows 1972 – 2022 derived from the developed rating curve

A flood frequency analysis was undertaken using the annual peak flow series using FLIKE. FLIKE software applies Bayesian methods to estimate the probability of flow events from historical records and is recommended in Book 3 of Australian Rainfall and Runoff (Ball, et al., 2019).

Log-Pearson III (LP3) and Generalised Extreme Value (GEV) models were fit to the peak flow data. A comparison of the resulting model outputs and confidence limits for various AEPs is shown in Table A.1.

Table A.1 Comparison of LPIII and GEV FLIKE model outputs – lower and upper limit refer to the confidence limits of the expected flow

	LPIII			GEV		
AEP (1 in Y yrs)	**Expected flow (kL/s)**	**Lower limit (kL/s)**	**Upper limit (kL/s)**	**Expected flow (kL/s)**	**Lower limit (kL/s)**	**Upper limit (kL/s)**
1.5	0.66	-34.45	25.1	12.44	50.0	25.2
1.75	21.3	-7.64	50.0	22.28	11.02	41.5
2	39.9	10.95	75.2	33.46	18.29	60.3
3	103	60.87	168	85.15	50.48	151
5	207	131	334	197	117	354
10	411	255	756	459	260	918
20	730	415	1682	887	467	1923
50	1449	682	4990	1783	826	5133
100	**2367**	932	11166	**2770**	1150	10605
200	3821	1229	25801	4076	1484	23016

The resulting 1% AEP flows were 2,770 kL/s for the LPIII model and 2,368 kL/s for the GEV model. The higher estimate of 2,770 kL/s was selected for assessment.

A.2.2 Broughton River Flood Model Results

The flood model results show that the 1% AEP Broughton River flow will not reach the elevation of the Project site (Figure A.4). The site is not considered to be at risk of flooding from the Broughton River, and development of the site will not interact with Broughton River flooding.

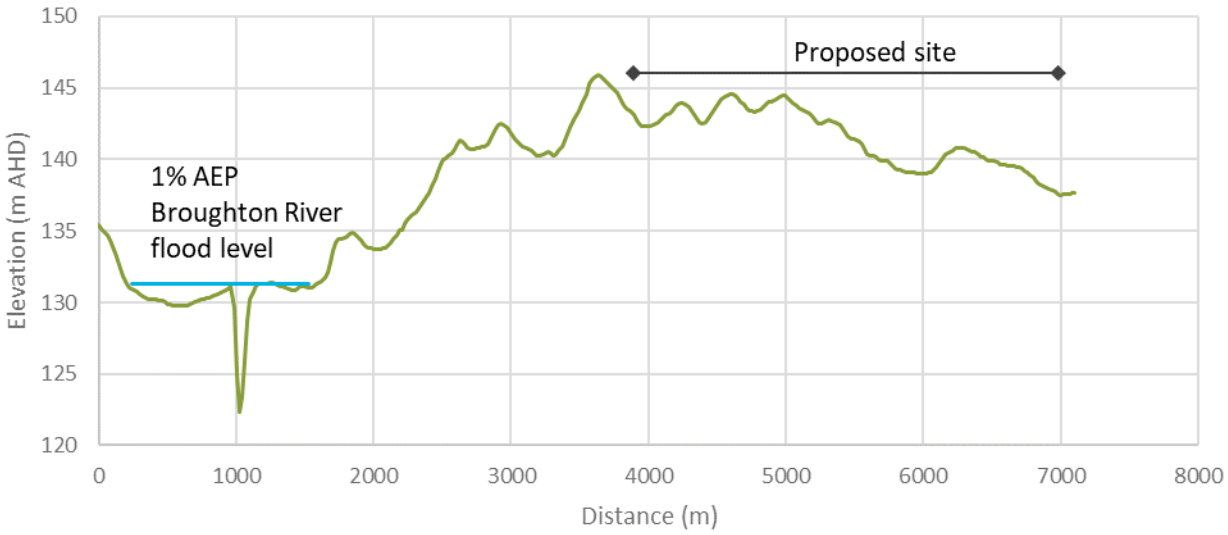


Figure A.4 Broughton River 1% AEP flood level comparison to site elevation

A.3 Direct rainfall flood model

Design storms for direct rainfall flood modelling were developed using *Australian Rainfall and Runoff* (2019). *Australian Rainfall and Runoff* (ARR 2019) is a national guideline document, data source and software suite that can be used for the estimation of design flood characteristics in Australia. In 2016, a major revision to ARR was released, followed by a major update in 2019 (Ball, et al., 2019). ARR 2019 is the 4th edition of ARR and represents industry best practice. It is published and supported by the Commonwealth of Australia and is publically available online and free of charge via the ARR Data Hub (http://data.arr-software.org/).

Design storms modelled in TUFLOW were developed following ARR 2019 methodology, using the following data:

- design storm Intensity Frequency Duration (IFD) data, downloaded via the Design Rainfall Data System (2016) (Bureau of Meteorology, 2016); and
- design storm data for the modelled catchment areas, downloaded from the ARR Data Hub, including:
  - Areal Reduction Factors (ARFs);
  - temporal patterns;
  - initial loss and continuing loss (ILCL) values (Note that ILCL values were not available across the entire project catchment and hence modelled ILCL values were chosen based on the best available information); and

- pre-burst rainfall depths.

The solar farm is not expected to interact with storm runoff; runoff would flow around panel footings and continue to flow downstream via the current drainage pathways. The solar farm installation would not change the overall catchment permeability, and infiltration of rainfall into the soil and underlying aquifers would still occur. Due to the minimal effect on runoff flow patterns, modelling has included only the current (or 'baseline') topography without explicitly including solar farm infrastructure.

A.3.1 Rainfall data (IFD)

IFD data describes the relationship between rainfall intensity, storm frequency and storm duration and forms the basis of design storms for hydrologic modelling. Figure A.5 shows IFD curves typical for the project area.

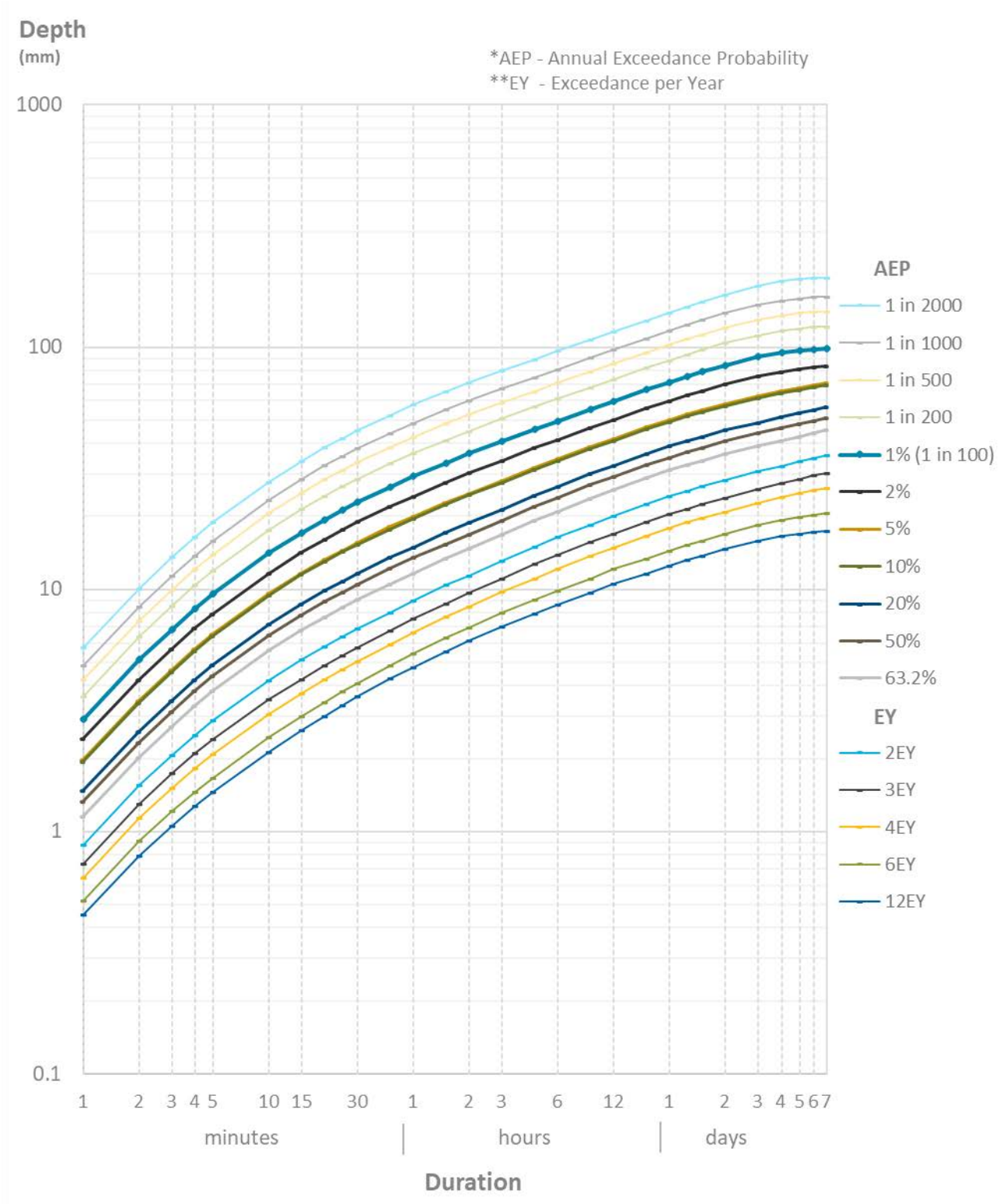


Figure A.5 IFD curves for the project area

A.3.2 Temporal patterns

Temporal patterns describe how rainfall is distributed over the duration of a storm and can significantly affect estimated peak flow. For each storm duration, ten temporal patterns are published via the ARR Data Hub. The ten temporal patterns include some with a greater percentage of rain occurring near the start of the storm (front-

loaded), some with a greater percentage towards the middle of the storm (middle-loaded) and some with a greater percentage near the end of the storm (back-loaded).

The recommended approach described in ARR 2019 for using the temporal patterns is to model them as an ensemble for each storm duration and AEP (ie all ten patterns are modelled for each duration and AEP). This approach is illustrated in Figure A.6.

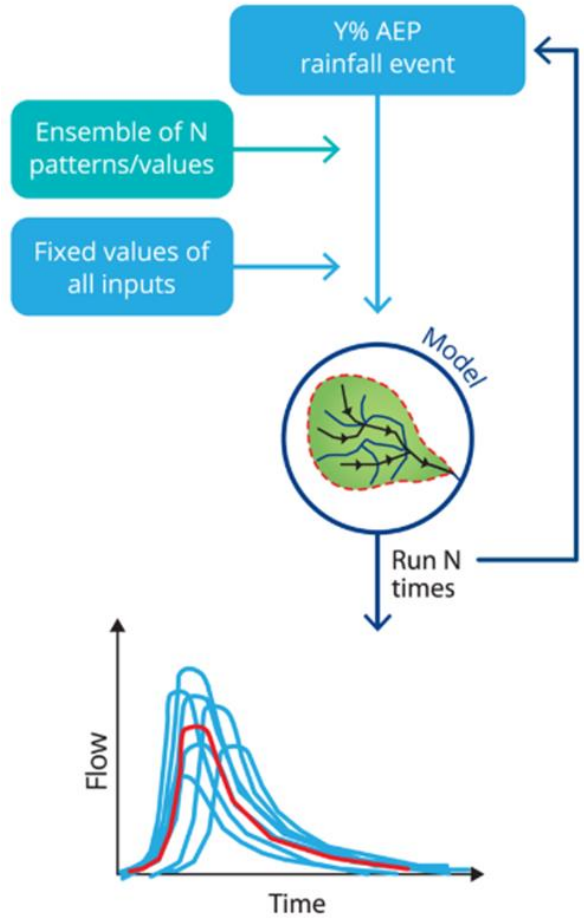


Figure A.6 Ensemble approach to flood modelling using the temporal patterns (Ball, et al., 2019)

Using temporal patterns and the ensemble approach significantly increases the number of model runs required to produce results for a catchment. Peak flows for each storm duration can be calculated by taking the median peak flow result across all ten patterns. The critical duration storm is determined as the storm duration that resulted in the highest peak flow.

A.3.3 Rainfall losses

Not all rainfall is converted to runoff, with 'rainfall losses' attributed to the following key processes: interception by vegetation; infiltration into the soil; retention on the surface (depression storage); and transmission loss through the stream bed and banks. These key processes are illustrated in Figure A.7

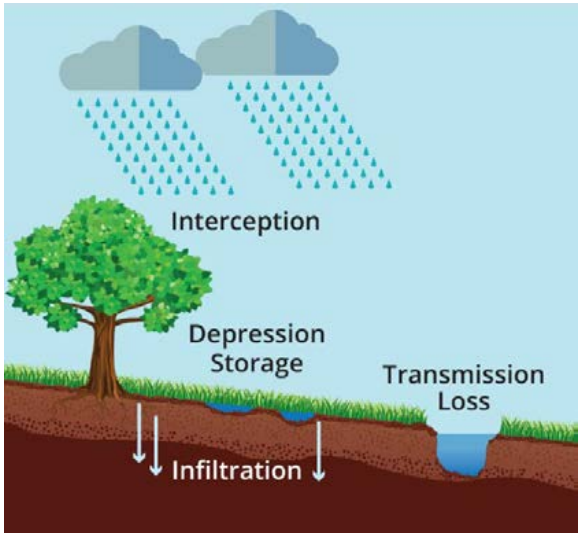


Figure A.7 Key processes contributing to rainfall loss (Ball, et al., 2019)

While there are several ways to model rainfall losses, ARR 2019 recommends the Initial Loss–Continuing Loss model (ILCL) whereby rainfall loss mechanisms are lumped together as:

- Initial loss – occurs in the beginning of a storm before any runoff is generated. The first rain falling on a catchment wets the vegetation, fills depressions and infiltrates into the soil (ie before the soil surface is saturated).
- Continuing loss – is applied for the remainder of the storm. Once parts of the catchment become saturated runoff begins, though some rain continues to be lost to infiltration and evaporation.

This is consistent with the concept of runoff produced by infiltration excess, ie that runoff occurs when rainfall intensity exceeds the infiltration capacity of the soil. Figure A.8 depicts the ILCL model.

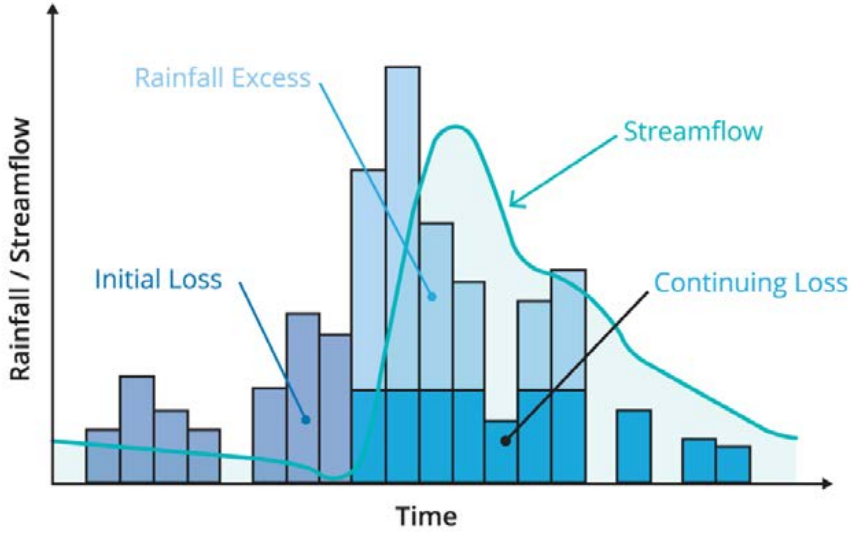


Figure A.8 Initial Loss–Continuing Loss (ILCL) model (Ball, et al., 2019)

ILCL data was revised in 2016 as part of the ARR revision process resulting in a spatial dataset of ILCL values across Australia which are available via the ARR Data Hub. The available ILCL data from the ARR Data Hub (location: latitude = -33.63, longitude = 138.39) are:

- Storm initial loss = 16 mm

- Storm continuing loss = 0.4 mm/hr

A.3.4 Grid size

Within the model domain, the available DEM had a horizontal resolution of 20 m. The model grid was developed with the same resolution (20 m) such that each model calculation cell drew elevation data from one DEM data point.

A.3.5 Model time step

TUFLOW HPC uses an adaptive timestep approach to maintain unconditional stability during simulations. Timesteps are automatically adjusted during the simulation to maintain stability, based on a range of criterion (BMT, 2018).

A.3.6 Catchment roughness

Catchment roughness was included in the model using the Manning's n formula. As the catchment was predominantly cleared grazing paddocks, a Manning's n value of 0.035 was used, which is appropriate for 'cultivated areas with mature crops', and 'pasture with high grass' (Chow, 1959).

A.3.7 Structures

No structures were included in the development of the TUFLOW model.

A.3.8 Boundary conditions

Automatic outlet boundaries were applied at the downstream edges of the model. At these boundaries, the catchment slope is used by the software to calculate the depth-flow relationship, and flow arriving at the boundary is removed from the model.

A.3.9 Calibration and validation

The TUFLOW model was not calibrated as there are no gauged creeks within the model domain to use as calibration targets. The installation of site based gauging stations could be used to update/calibrate this model in the future.

While the model is uncalibrated, it is considered appropriate as a screening tool to determine the approximate risk of flooding.

A.3.10 Model runs

The model was run for the 1% AEP storm only.

The following storm durations were considered:

- 1 hour;
- 2 hour;
- 3 hour;
- 6 hour;
- 12 hour;

- 18 hour; and
- 24 hour.

Ten temporal patterns were simulated for each storm duration.

The shorter design storms were critical for locations higher in the catchment where short, flashy rainfall caused the greatest flood depth. The longer design storms were critical for locations at the bottom of the catchment where as at these locations it takes time for flood waters to flow through the catchment and build up to the peak depth.

The peak flows were found to be generated by storms with duration less than 24 hours.

Results presented below were generated by collating the results from the various runs, with the results showing the median temporal pattern result from the critical duration storm at each location within the model domain.

A.3.11 Model results

For each modelled AEP, the TUFLOW model produced gridded results across the mine site model domain for water surface, depth, velocity, and hazard. Results were trimmed using a cut off depth of 0.1 m (water depths shallower than 0.1 m are not shown on any result maps). The following results are included:

- peak design depth (and peak flood inundation extent);
- peak design velocity; and
- peak design hazard.

Figure A.9 shows the general flood hazard vulnerability curves from the Australian Disaster Resilience Handbook (AIDR, 2017) and describes the hazard categories which are produced as results from the model.

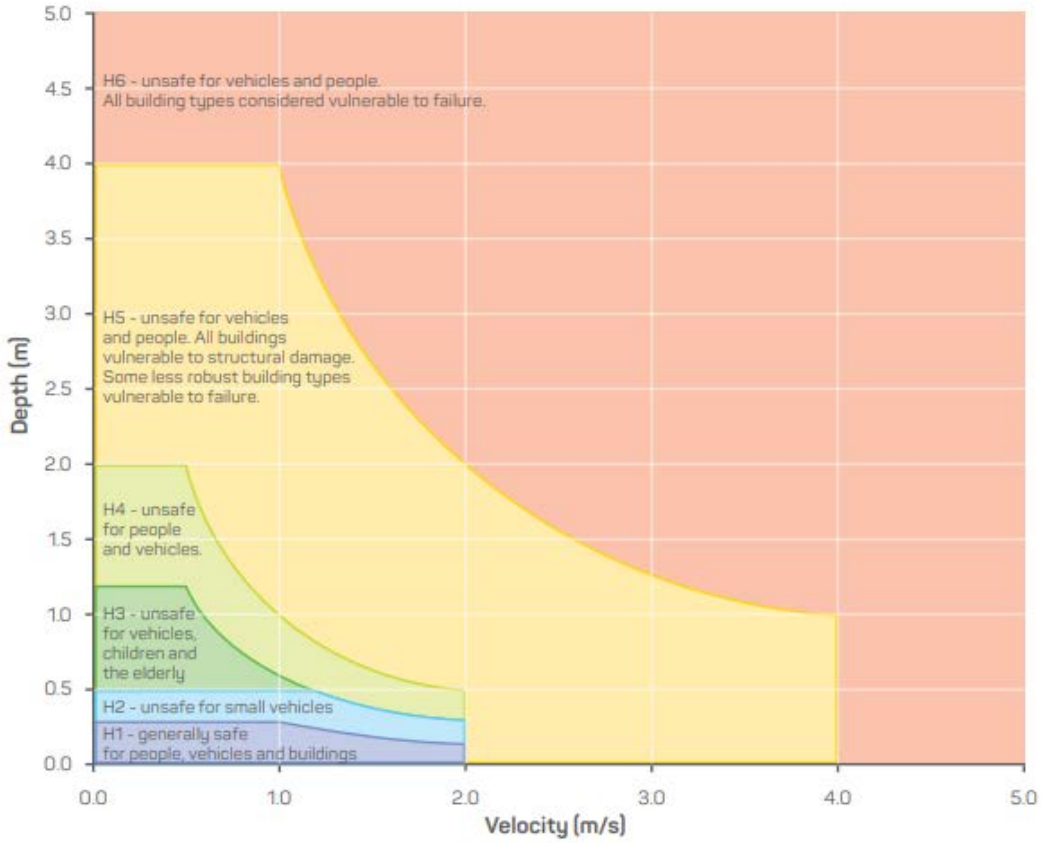
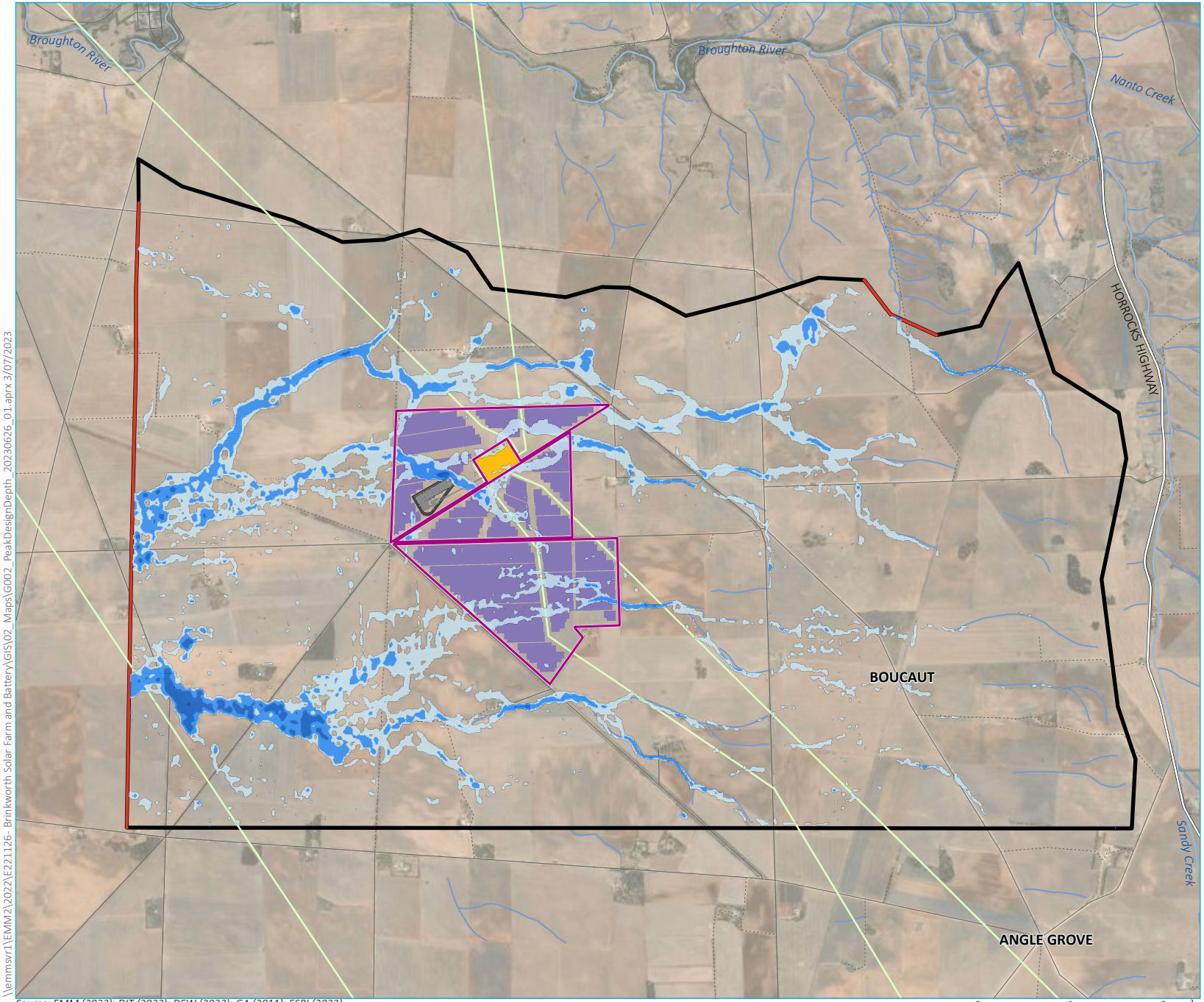


Figure A.9 General flood hazard vulnerability curves (AIDR, 2017)



KEY

- Project boundary
- Battery energy storage system
- Brinkworth substation
- Transmission line
- Solar panel

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Watercourse/drainage line

TUFLOW model

- Model boundary
- Model extent

Maximum water depth (m)

- 0.1- 0.25
- 0.25- 0.5
- 0.5- 1
- 1- 1.5
- 1.5- 2
- > 2

1% AEP Peak flood depth

Brinkworth Solar Farm and Battery
Surface water assessment
Figure A.10

\\emmsvr1\EMM2\2022\E221126- Brinkworth Solar Farm and Battery\GIS\02_Maps\G002_PeakDesignDepth_20230626_01.aprx 3/07/2023

Source: EMM (2023); DIT (2022); DEW (2022); GA (2011); ESRI (2023)

0 1 2 km

GDA 1994 MGA Zone 54

N

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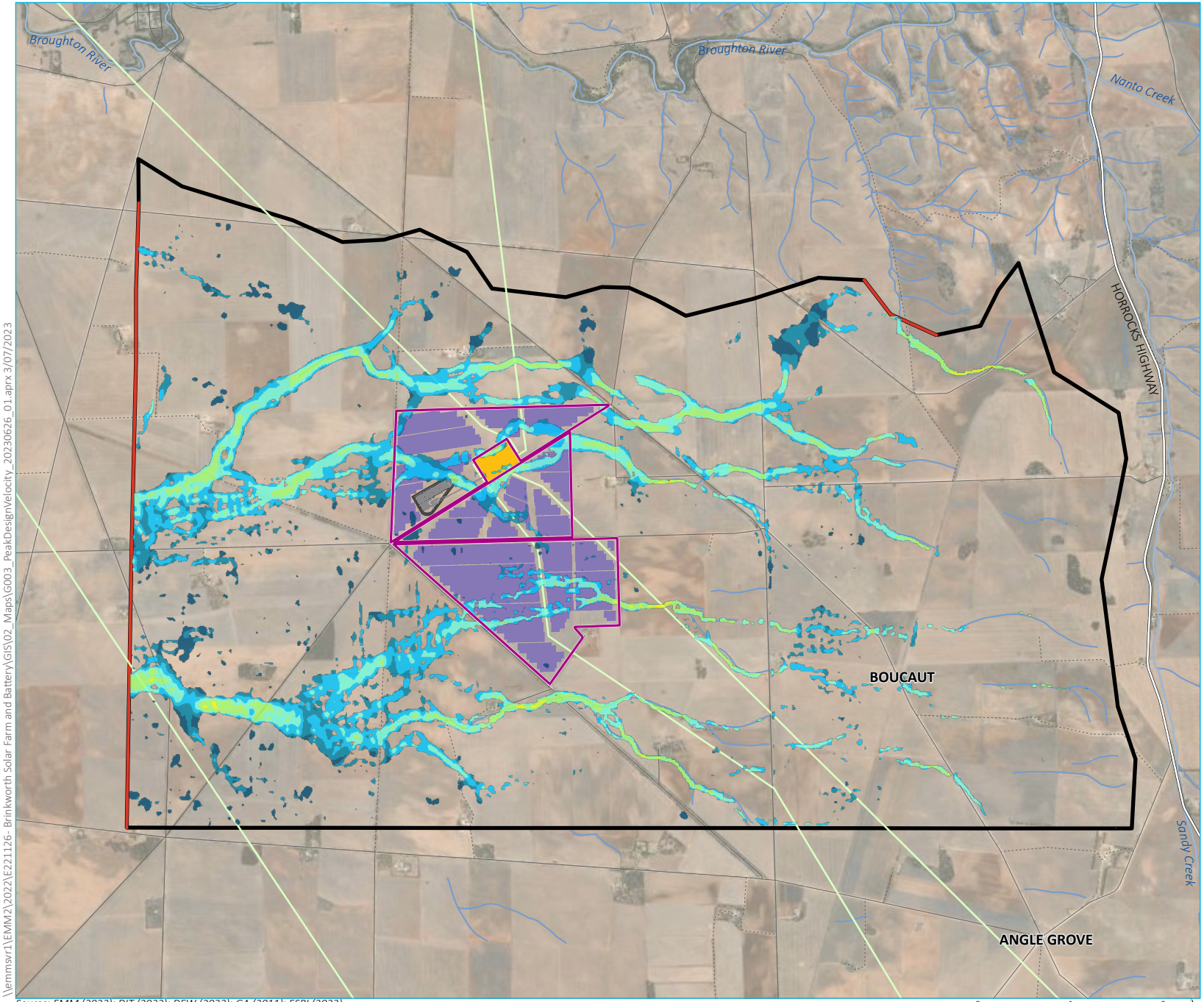

KEY

- Project boundary
- Battery energy storage system
- Brinkworth substation
- Transmission line
- Solar panel

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Watercourse/drainage line

TUFLOW model

- Model boundary
- Model extent

Maximum water velocity (m/s)

- < 0.25
- 0.25- 0.5
- 0.5- 0.75
- 0.75- 1
- 1- 1.5
- < 2

\\emmsvr1\EMM2\2022\E221126- Brinkworth Solar Farm and Battery\GIS\02_Maps\G003_PeakDesignVelocity_20230626_01.aprx 3/07/2023

Source: EMM (2023); DIT (2022); DEW (2022); GA (2011); ESRI (2023)

0 1 2 km

GDA 1994 MGA Zone 54

N

1% AEP Peak velocity

Brinkworth Solar Farm and Battery
Surface water assessment
Figure A.11

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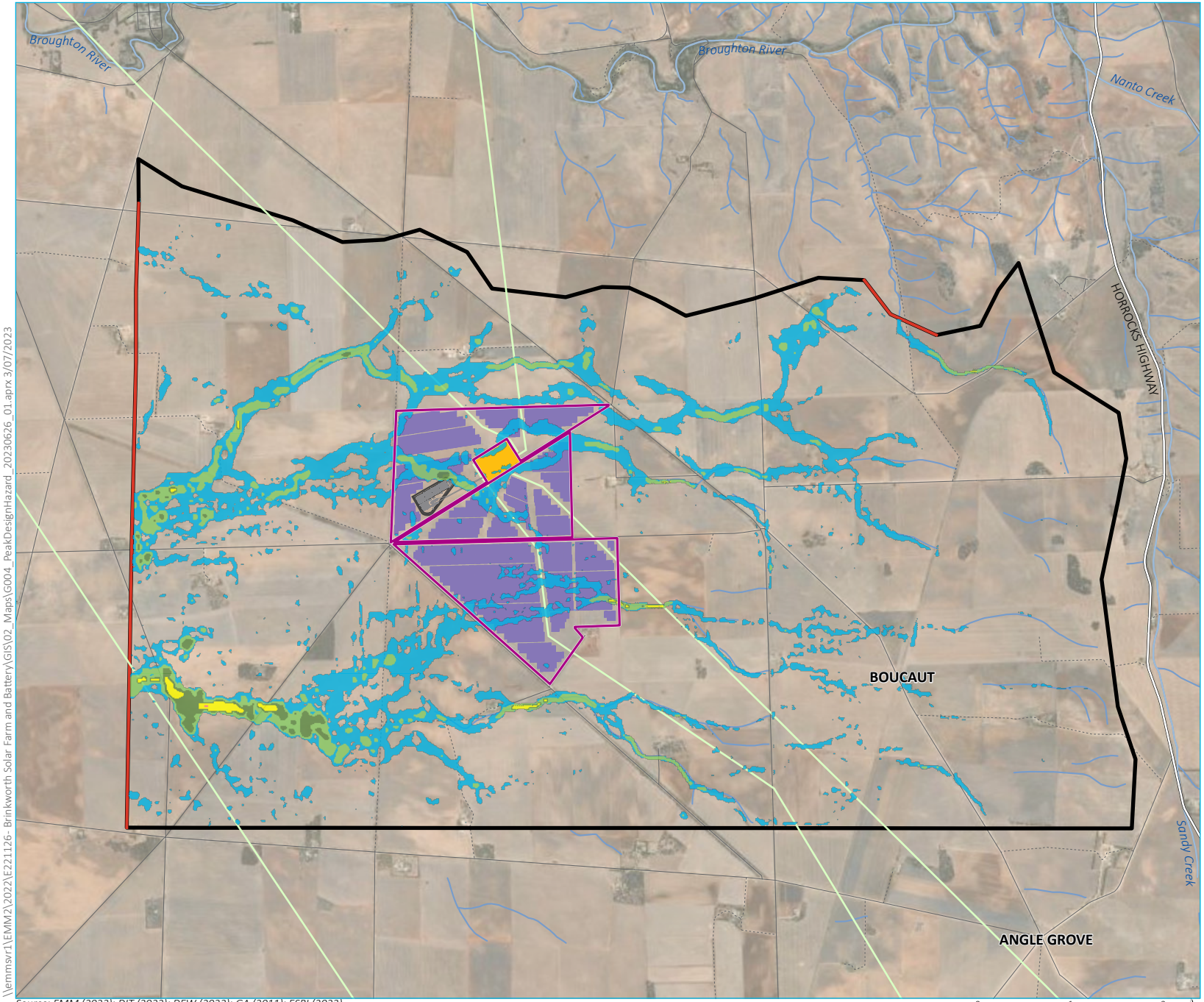

\\emmsvr1\EMM2\2022\E221126- Brinkworth Solar Farm and Battery\GIS\02_Maps\G004_PeakDesignHazard_20230626_01.aprx 3/07/2023

Source: EMM (2023); DIT (2022); DEW (2022); GA (2011); ESRI (2023)

1% AEP Peak hazard category

Brinkworth Solar Farm and Battery
Surface water assessment
Figure A.12

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A.3.12 Flood model results interpretation

The direct rainfall flood model for the 1% AEP storm illustrated that:

- drainage across the site is likely to occur along broad swales, with depths of up to 0.3 m and widths of over 200 m;
- runoff velocities of around 1 m/s are expected; and
- hazard would generally be in the range of H1 (generally safe for people and vehicles), but could reach H3 (unsafe for vehicles, children and the elderly) in deeper pockets.

It is likely that the solar farm would not experience damage from flooding of the modelled magnitude, as modelled depths indicate flood waters would remain below the level of the installed panels. Footings are not expected to be damaged by water with the modelled velocity.

Appendix B
Waterway investigation

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EMM field staff visited each ‘waterway’ marked in public data within the project domain. None were found to have the characteristics of a waterway (ie a defined bed and banks), and should be considered instead as drainage lines.

Drainage lines are relevant when considering erosion and transport of material towards waterways.

Figure B.1 Drainage line 1a

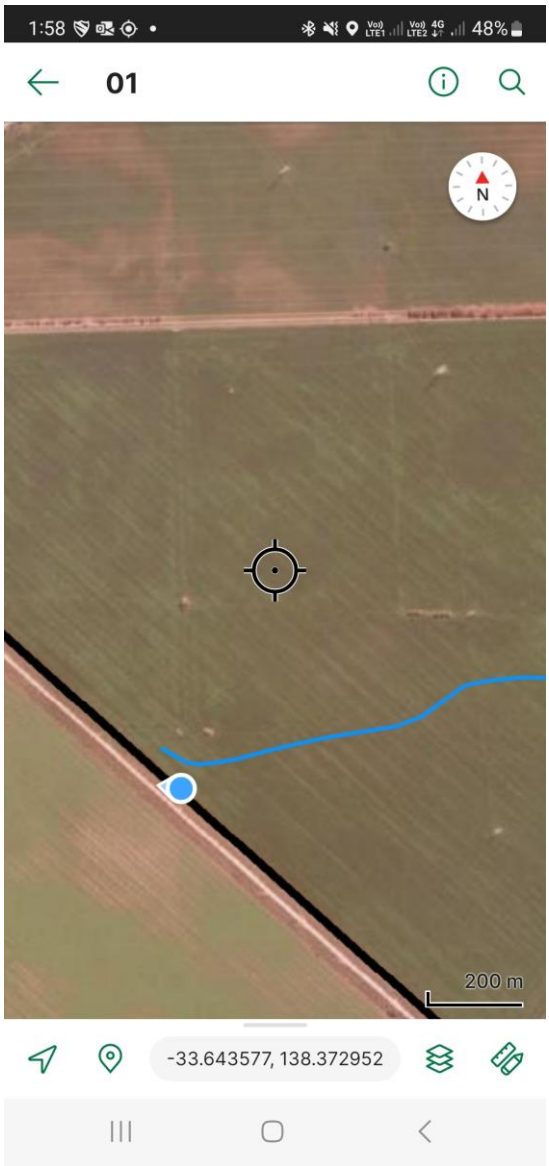

Figure B.2 Drainage line 1b

Figure B.3 Drainage line 1c

Figure B.4 Drainage line 2

Appendix C
Field test for dispersion

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Dispersion testing result sheet

Date:	29/03/23
Location:	Brinkworth solar
Job number:	E22126

Testing staff	
Joseph Muller	
Matthew Bull	

Site ID	Latitude	Longitude	Sample Depth	Result	Initials
1	-33.63	138.4	Surface	Little dispersal - didn't do much	MB
1	"	"	80mm	Little dispersal - didn't do much - settled quickly	MB
2	-33.63	138.369	Surface	No dispersion - Little settling, loss test conducted w/ short timespan	MB
5	-33.629	138.372	surface	- loss test conducted, some settling - Little dispersal	MB
10	-33.627	138.374	surface	No dispersion	MB


Koolunga
Brinkworth
Yacka
Brinkworth
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

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Appendix J
Native Vegetation Clearance Data Report

Brinkworth Solar Farm

Native Vegetation Clearance

Data Report

Clearance under the *Native Vegetation Regulations 2017*

24 May 2024

Prepared by A. Carpenter – EBS Ecology (NVC Accredited Consultant)

Native Vegetation Clearance Brinkworth Solar Farm Project Data Report

24 May 2024

Version 2

Prepared by EBS Ecology for Wind Prospect Pty Ltd

Document Control					
Revision No.	**Date issued**	**Authors**	**Reviewed by**	**Date Reviewed**	**Revision type**
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2	24/05/2024	A. Carpenter (NVC Accredited Consultant)	-	-	Final

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Project Number: EX240411

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Cover photograph: Roadside vegetation within the Project Area.

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Glossary and abbreviations

BAM	Bushland Assessment Method
BDBSA	Biological Database of South Australia (maintained by DEW)
BESS	Battery Energy Storage System
CEMP	Construction Environmental Management Plan
CT	Certificate of title
DA	Development Application
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DEW	Department for Environment and Water (South Australia)
EBS	Environment and Biodiversity Services Pty Ltd, trading as EBS Ecology
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ha	Hectare(s)
IBRA	Interim Biogeographical Regionalisation of Australia
INTG	Iron-grass Natural Temperate Grassland of SA
km	Kilometre(s)
LSA Act	*Landscapes South Australia Act 2019*
MNES	Matters of National Environmental Significance
NatureMaps	Initiative of DEW that provides a common access point to maps and geographic information about South Australia's natural resources in an interactive online mapping format
NPW Act	*National Parks and Wildlife Act 1972*
NV Act	*Native Vegetation Act 1991*
NVC	Native Vegetation Council
PBGW	Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia
PDI Act	*Planning, Development, and Infrastructure Act 2016*
PMST	Protected Matters Search Tool (under the EPBC Act; maintained by DCCEEW)
Project	The Brinkworth Solar Farm and Battery Project
Project Area	As shown in Figure 3
Proponent	Brinkworth Solar Farm Pty Ltd
PV	photovoltaic
SA	South Australia(n)
Search Area	5 km buffer of the Project Area considered in the desktop assessment database searches
SEB	Significant Environmental Benefit
sp.	Species
ssp.	Sub-species
STAM	Scattered Tree Assessment Method
TEC	Threatened Ecological Community
var.	Variety (a taxonomic rank below that of species and subspecies, but above that of form).

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Attachments

Attachment 1 – Bushland Assessment scoresheets (excel format)

Attachment 2 – Spatial data package (zipped shapefiles)

1. Application Information

Details of the native vegetation clearance applicant are summarised in Table 1 with a summary of the proposed clearance provided in Table 2.

Table 1. Application details.

Applicant:	Brinkworth Solar Farm Pty Ltd		
Key contact:	Michael Sale Regional Development Manager at Wind Prospect Pty Ltd Suite 10 / 19-35 Gertrude Street, Fitzroy, Victoria 3065 PO Box 110, Fitzroy, Victoria 3065. Mob: +61 401 915 034 Email: michael.sale@windprospect.com.au		
Landowner:	Eulunga Pty Ltd (north of Power Station Road) see Appendix 1 W & S Weckert (south of Power Station Road) see Appendix 2		
Site Address:	Power Station Road, Brinkworth SA 5464		
Local Government Area:	Wakefield Regional Council	**Hundred:**	Boucaut
Title ID:	CT/5559/453 CT/5864/896 CT/5776/58 CT/5588/666 CT/6169/612 CT/5776/59	**Parcel ID**	H230400 S256W F 199935 A96 D52787 A501 H230400 S257 D27337 A102 D52782 A502

Table 2. Summary of the proposed clearance.

Purpose of clearance:	Clearance is required for the construction of a solar farm.
Native Vegetation Regulation:	Regulation 12(34)—Infrastructure
Description of the vegetation under application:	Two Vegetation Associations: **A1:** *Enchylaena tomentosa* (Ruby Saltbush) Low Open Shrubland +/- *Atriplex stipitata* (Bitter Saltbush) +/- *Lycium australe* (Australian Boxthorn) +/- *Maireana aphylla* (Cotton-bush) +/- *Senna artemisioides* ssp. X *artemisioides* (Desert Senna) +/- Planted Eucalypt Overstorey. **A3:** *Senna artemisioides* ssp. (Desert Senna) +/- *Eremophila longifolia* (Weeping Emubush) Shrubland.
Total proposed clearance – area (ha) and/or number of trees:	The total proposed area of clearance is 0.17 hectares (ha) of native vegetation, which includes two vegetation associations: • A1 – 0.14 ha • A3 – 0.03 ha
Level of clearance:	Level 3
Overlay (Planning and Design Code):	Native Vegetation Overlay
Map of proposed clearance area:	See Figure 4 on page 18.
Mitigation Hierarchy:	**Avoidance** The Proponent has avoided native vegetation by choosing a location on cropping land for the placement of the proposed Brinkworth solar farm. The infrastructure layout has been designed to avoid the majority of roadside native vegetation and scattered native trees, as far as possible. Seven access points will be used as either main and emergency access to the solar farm. These access points are positioned at existing gates where vegetation has previously been cleared. Northern

	access points do not require clearance of native vegetation, but southern access points will require minor clearance of native vegetation, as applied for in this report. **Minimisation** Clearance of native vegetation cannot totally be avoided at the seven entry points to the Brinkworth solar farm. However, the vegetation located at the proposed entry points is considered to be low quality as the area has previously been cleared and impacted. Vegetation at the entry points provides limited resources for threatened species. **Rehabilitation** It is not possible to rehabilitate the site once the solar farm is in place, however there may be more opportunity for some native ground covers to regenerate underneath the solar panels and in areas where there is no impact.
Significant Environmental Benefit (SEB) Offset proposal	SEB will be achieved via payment into the Native Vegetation Fund of **$7,020.77 (**including admin fee of $366.30).

2. Purpose of clearance

2.1. Description

Brinkworth Solar Farm Pty Ltd (ACN 630 724 579) (the Proponent) a member of the Akaysha Energy group is proposing to construct the Brinkworth Solar Farm (the Project) on land either side of Power Station Road and Boucaut School Road in Brinkworth, South Australia (SA). The Project is located approximately 6 kilometres (km) northwest of the township of Brinkworth, and 7 km of the township of Koolunga, in the Northern and Yorke region of SA (Figure 1).

EBS Ecology Pty Ltd (EBS) was engaged by the Wind Prospect Pty Ltd on behalf of the Proponent to undertake a native vegetation clearance assessment and prepare a native vegetation clearance report for the construction of the Brinkworth Solar Farm and associated infrastructure, not including the BESS.

Objectives

The native vegetation assessment, in accordance with the *Native Vegetation Act 1991* (NV Act) and *Native Vegetation Regulations 2017*, has the primary objectives to:

- Undertake a desktop assessment of the likelihood of occurrence and status of threatened flora and fauna protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and State *National Parks and Wildlife Act 1972* (NPW Act);
- Assess native vegetation within the Project Area for clearance using the Native Vegetation Council (NVC) endorsed Bushland Assessment Method (BAM) in accordance with the NV Act;
- Calculate the Significant Environmental Benefit (SEB) offset requirements for the Project based on the impact footprint as supplied by the Proponent on 12 April 2024.

2.2. Background

The Project is located 5 km north west of Brinkworth township, and directly adjacent to the Brinkworth Substation (Project Area). The Project Area is approximately 471 hectares (ha) and is situated in the Hundred of Boucaut and the Local Government Area of Wakefield Regional Council.

This land is currently used primarily for cropping and sheep grazing with two parcels of land (CT/5776/58 Parcel ID D52787 A501 and CT/5776/59 Parcel ID D52782 A502).

An initial desktop flora and fauna assessment and field survey at the Project Area was conducted by EBS in 2018 (EBS 2018). The ecological information from this assessment was used to inform the design and initial placement of infrastructure for the proposed Project, with the aim to avoid impacts to native vegetation as much as possible.

Bioregions

Interim Biogeographical Regionalisation of Australia (IBRA) is a landscape-based approach to classifying the land surface across a range of environmental attributes, which is used to assess and plan for the protection of biodiversity.

The Project Area falls within the Crystal Brook IBRA association which has a remnancy figure of 2%. The surrounding landscape has been heavily cleared since European settlement. The IBRA subregion that the Project Area falls into is Saint Vincent which has 8% remnancy.

2.3. General location map

A map of the general location of the Project Area is provided in Figure 1.

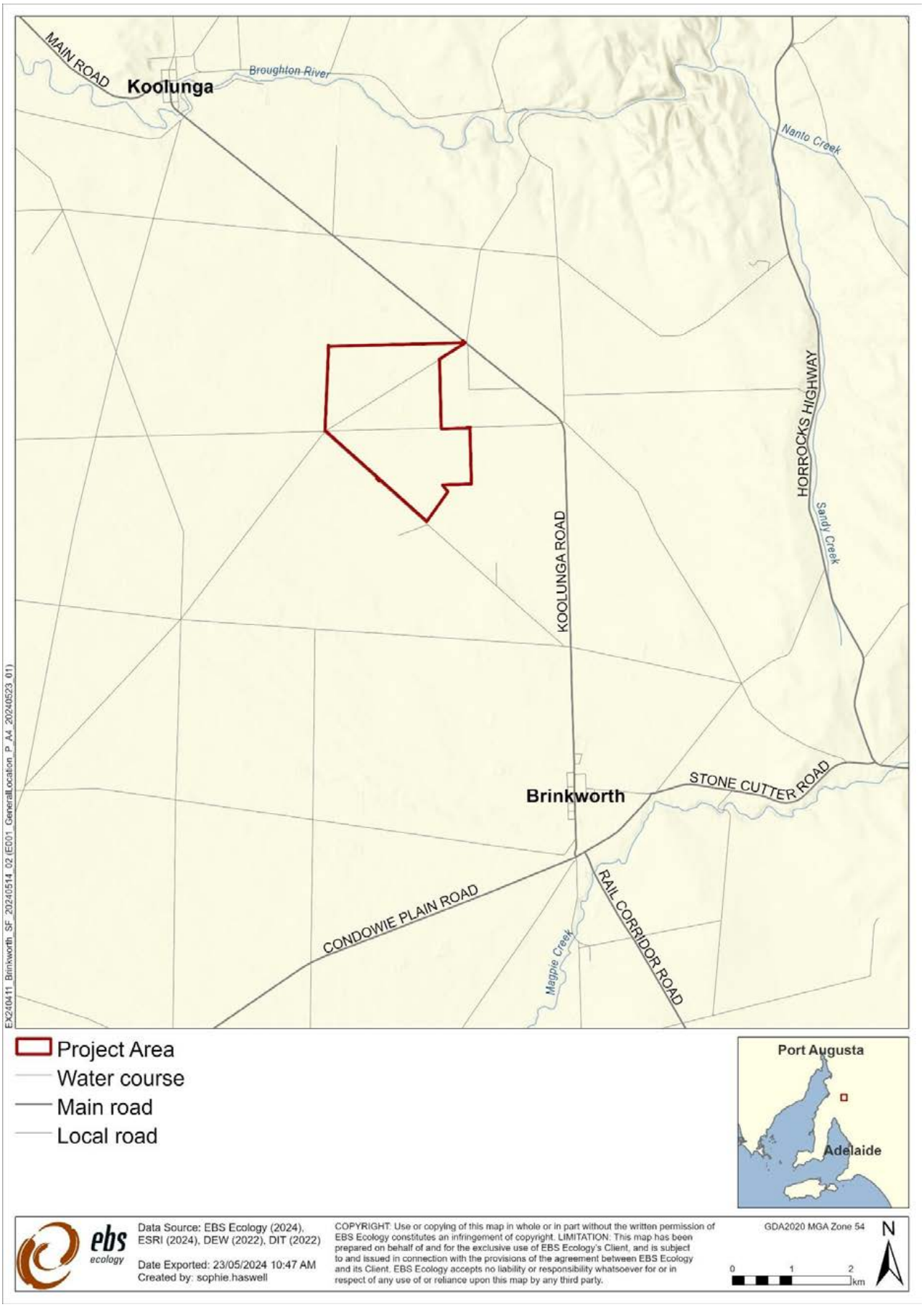


Figure 1. General location of the Project Area.

2.4. Details of the proposal

The Project will consist of a utility-scale solar farm and battery energy storage system with the following components:

- Installation of solar photovoltaic (PV) modules (up to 209 MWp) mounted on single axis tracking racks, distributed across the site (as displayed in Figure 2 and Figure 3).
- Development of seven site access points across the site (as displayed in Figure 3).
- Footings and racking for solar modules.
- Power Conversion Systems (Inverters).
- An electrical substation including step up transformers stepping up the voltage to 275 kiloVolt.
- Associated underground cables connecting groups of solar panels to inverter stations and underground and/or overhead transmission lines from inverter stations to the Project's switching substation.
- Associated cables and poles to connect the Project to ElectraNet's Brinkworth Substation.
- Installation of rainwater tanks for fire-fighting purposes (with the precise number and location to be determined in liaison with the SA Country Fire Service).
- Operations and maintenance area including:
    - Installation of closed-circuit TV devices
    - Internal access roads / tracks within the subject site; and
    - Security fencing around the perimeter of the site.

The site plan for the Brinkworth solar farm is shown in Figure 2, and layout of the Project Area is provided in Figure 3. Both figures show the location of the BESS, although clearance associated with the BESS is not part of this clearance application.

Seven access points will be used as either main and/or emergency access to the Brinkworth solar farm. The majority of these access points are positioned at existing gates where vegetation has previously been cleared. Northern access points do not require clearance of native vegetation, but some southern access points will require minor clearance of regenerated native vegetation.

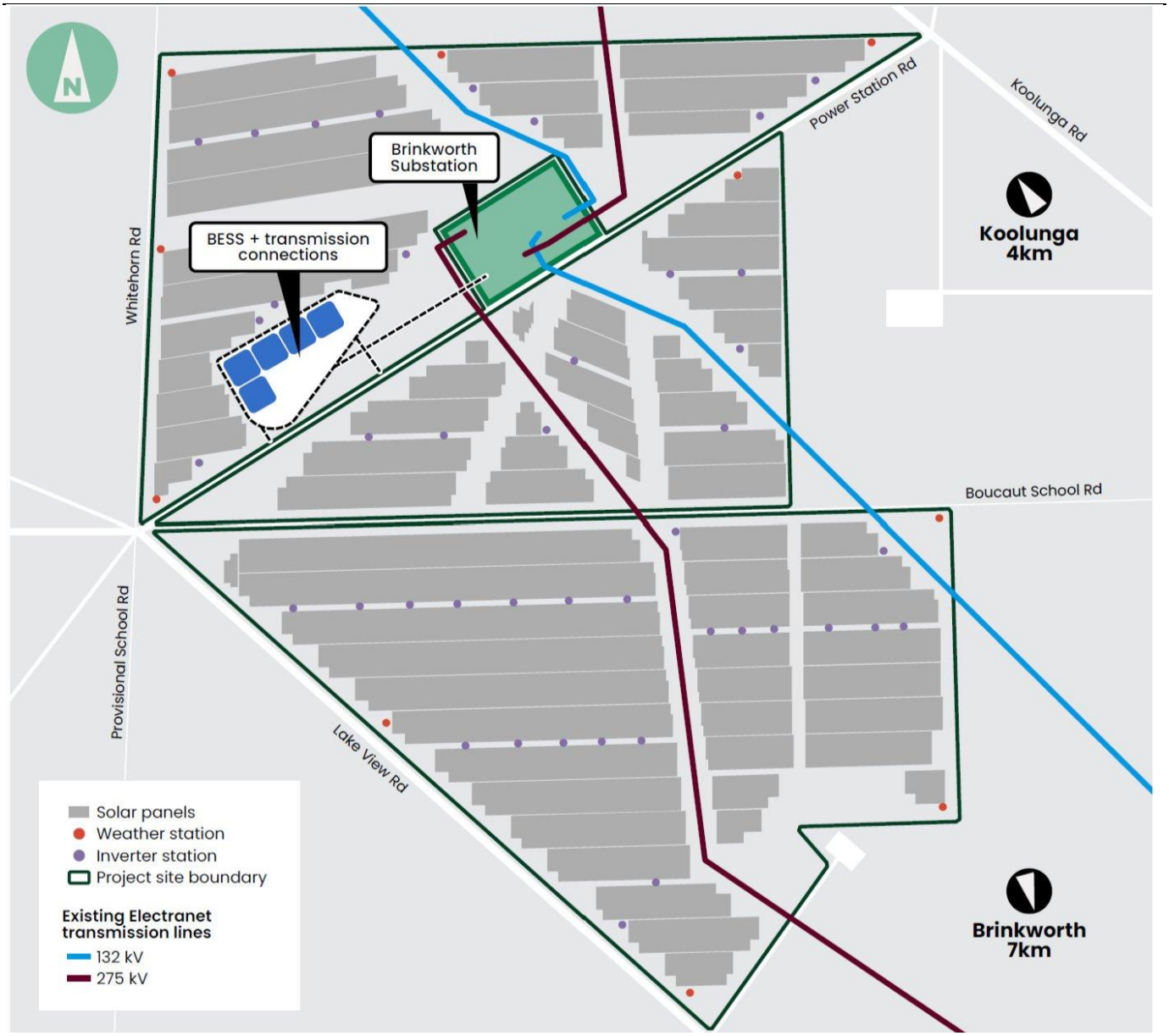


Figure 2. The Project Area with the site plan and location of BESS and Brinkworth Substation (Source: Akaysha Energy 2024, https://akayshaenergy.com/projects/project-brinkworth). Note that clearance for the BESS is not included in this report and will be lodged as a separate clearance data report.

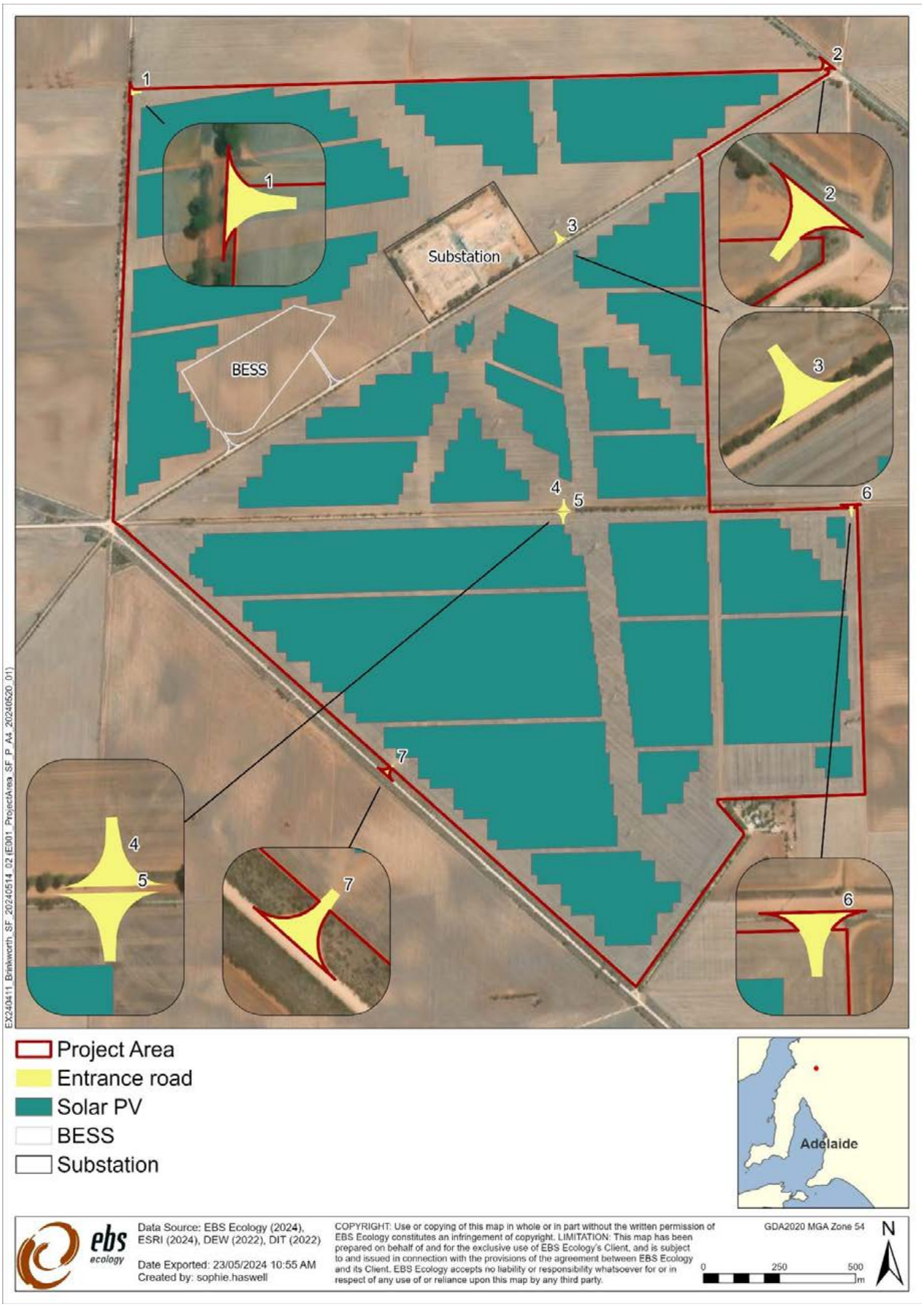


Figure 3. The Project Area with the Brinkworth solar farm Design Plan including the seven entry points (Designs provided by Wind Prospect Pty Ltd to EBS on 12 April 2024).

2.5. Approvals <u>required</u> *or* <u>obtained</u>

- ***Native Vegetation Act 1991*** **(NV Act)** - The Project Area is within the area covered by the Native Vegetation Overlay. Clearance of native vegetation will require approval under the NV Act.
- ***Planning, Development and Infrastructure Act 2016*** **(PDI Act)** – approval is required under the PDI Act. A Development Application (DA) is currently in preparation.
- ***Environment Protection and Biodiversity Conservation Act 1999*** **(EPBC Act)** – A referral is not required.
- ***National Parks and Wildlife Act 1972*** **(NPW Act)** – EBS hold the required scientific permit for the collection of native flora and fauna under the NPW Act: Scientific Research License - K25613-23.
- ***Landscapes SA Act 2019*** **(LSA Act)** - A water affecting permit is not likely to be required for this Project. All land managers have a duty to manage environmental and Declared weeds on their property. A permit to transport Declared weeds on a public road may be required for this Project.
- ***Aboriginal Heritage Act 1988*** - Approval will be required if any sites, objects or remains are uncovered during construction works.
- ***Native Title Act 1993*** **and the** ***Native Title Act (South Australia) 1994*** – There are no active Native title Claims or Determinations for the land on which the proposed solar farm is to be located, nor is there a current Indigenous Land Use Agreement over the Project Area.

2.6. Native Vegetation Regulation

The proposed clearance is suggested to be assessed under Schedule 1 *Regulation 12 (34) Infrastructure*.

34 — Infrastructure

(1) Clearance of vegetation—

(a) incidental to the construction or expansion of a building or infrastructure where the Minister has, by instrument in writing, declared that the Minister is satisfied that the clearance is in the public interest; or

(b) required in connection with the provision of infrastructure or services to a building or proposed building, or to any place, provided that any development authorisation required by or under the Development Act 1993 has been obtained.*

*Note that the *Development Act 1993* has been superseded by the PDI Act.

2.7. Development Application information

DA information that is relevant to this native vegetation clearance application is listed in Table 3.

Table 3. Development Application information.

Local Government Area	Wakefield Regional Council.
Hundred	Boucaut.
Parcel	H230400 S256W, F199935 A96, D52782 A501, H230400 S257, D27337 A102 and D52782 A502.
Title	CT/5559/453, CT/5864/896, CT/5776/58, CT/5588/666, CT/6169/612, and CT/5776/59.
Zone	Rural.
Overlays	Native Vegetation, Dwelling Excision, Hazards (Bushfire – General), Hazards (Flooding – Evidence Required), Limited Land Division and Water Resources.
DA Number	*In preparation.*

3. Method

3.1. Flora assessment

An initial ecological assessment was undertaken by NVC Accredited Consultant M. Laws from 4 to 5 October 2018. The assessment was conducted in accordance with the Bushland Assessment Method (BAM) and Scattered Tree Assessment Method (STAM), both devised by the NVC (NVC 2017a, 2017b).

A second flora and fauna assessment was undertaken by NVC Accredited Consultant A. Carpenter and Ecologist N. Piscioneri on 10 November 2022 in accordance with the with BAM (NVC, 2020a), for the redesign of the Project.

3.1.1. Bushland Assessment Method

The BAM is derived from the Nature Conservation Society of South Australia's Bushland Condition Monitoring methodology (Croft *et al.* 2007). The BAM was used to assess areas of native vegetation requiring clearance and calculate the Significant Environmental Benefit (SEB) requirements.

Details of site selection/stratification and assessment protocols, and the biodiversity value components assessed and the factors that influence these components are outlined in the *Bushland Assessment Manual* (NVC, 2020a).

The Conservation Significance Scores were calculated from direct observations of flora and direct and historical observations of fauna species of conservation significance. All fauna identified as known to occur in the Protected Matters Search Tool (PMST) Report, and fauna with Biological Databases of South Australia (BDBSA) records since 1995 and with a spatial reliability of less than 1 km, within 5 km of the Project Area, were included in the BAM scoresheets. Species determined as unlikely to occur within the Project Area will be removed by the Native Vegetation Branch if the finding is supported. Marine and/or wetland species were omitted from the scoresheets given the Project Area is terrestrial.

3.1.2. Provisional List of Threatened Ecosystems

The *Provisional List of Threatened Ecosystems* (DEH 2005) was reviewed to determine whether any vegetation associations impacted meet the criteria for listing as a threatened ecosystem at the State level.

3.2. Fauna assessment

A desktop assessment was undertaken to determine the potential for any threatened fauna species and Threatened Ecological Communities (TECs) to occur within the Project Area. This included species listed under both the EPBC Act and the NPW Act.

This was achieved by undertaking database searches using a 5 km buffer of the Project Area (Search Area). The following databases were searched to obtain records of threatened species:

- Protected Matters Search Tool report - A report was generated by the Department of Climate Change, Energy, Environment and Water (DCCEEW) to identify any Matters of National Environmental Significance (MNES) that may or are known to occur in the Search Area.
- Biological Databases of South Australia - Data extract obtained from the Department for Environment and Water (DEW) that identifies the location of historical records of flora and fauna in the Search Area.

3.2.1. Protected Matters Search Tool report

A PMST report was generated on 1 May 2024 to identify flora, fauna and TECs listed under the EPBC Act as threatened or migratory (DCCEEW 2024a). Only species and TECs identified in the PMST report as known to occur within the Search Area were assessed for their likelihood of occurrence within the Project Area.

Species identified as known to occur were entered into the scoresheets for the purposes of calculating the threatened fauna score, conservation significance score and SEB obligations of the clearance. Species assessed as unlikely to occur in the Project Area may be removed by the Native Vegetation Council (NVC) during the approvals process.

3.2.2. Biological Databases of South Australia data extract

A data extract from the BDBSA was obtained from the Department for Environment and Water (DEW) to identify flora and fauna species that have been recorded within 5 km of the Project Area (data extracted 6 May 2024; DEW 2024b Recordset number: *DEWNRBDBSA240506-1*).

The BDBSA is comprised of an integrated collection of species records from the South Australian Museum, conservation organisations, private consultancies, Birds SA, Birdlife Australia and the Australasian Wader Study Group, which meet the DEW's standards for data quality, integrity and maintenance. Only species with records since 1995 and a spatial reliability of less than 1 km were assessed for their likelihood of occurrence.

All threatened fauna identified by the BDBSA extract were entered into the scoresheets for the purposes of calculating the threatened fauna score, conservation significance score and SEB obligations of the clearance. Species assessed as unlikely to occur in the Project Area may be removed by the Native Vegetation Council (NVC) during the approvals process.

3.2.3. Field survey

Fauna was surveyed opportunistically during the field surveys in 2018 and 2022 and was recorded by direct observations or signs such as calls, scats, tracks, nests, and burrows.

3.2.4. Likelihood of occurrence

Threatened species that were identified by the desktop assessment were assessed for their likelihood of occurrence in the Project Area. All species with historical records since 1995 with a spatial reliability of <1 km and species listed as 'known to occur' by the PMST report were assessed.

The assessment was based on recency or records, habitat preferences and the results of the field survey, with criteria for the likelihood of occurrence described in Table 4. Marine, wetland, and aquatic species were not assessed, as the clearance does not impact these or associated habitats.

Table 4. Criteria for the likelihood of occurrence of threatened species within the Project Area.

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species. Recorded within 20 -40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within the previous 20 years, but the area provides no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter. Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records despite adequate survey effort.

3.2.5. Limitations

The desktop assessment was based on existing datasets and references from a range of sources. EBS has not attempted to verify the accuracy of any such information. The findings and conclusions expressed by EBS are based solely upon information in existence at the time of the assessment.

Flora and fauna records were retrieved from the PMST and BDBSA extract. The BDBSA only includes verified flora and fauna records submitted to DEW or partner organisations. It is recognised that information is imperfectly captured, and it is possible that significant species may occur in the Project Area that are not reflected by database records. Although much of the BDBSA data has been through a variety of validation processes, the lists may contain errors and should be used with caution. DEW gives no warranty that the data is accurate or fit for any particular purpose of the user or any person to whom the user discloses the information.

No species-specific targeted flora or fauna surveys were undertaken as part of the field assessment, as this was outside of the scope ow works. There might be changes to the vegetation present as the most recent vegetation assessment was completed by EBS in November 2022. The recorded flora and fauna observed in 2018 and 2022 are included in this report, but new species may have become established within the Project Area since the 2022 assessment. The most recent data recorded by EBS was used in the SEB calculations throughout the report.

3.2.6. Spatial data limitations

All spatial data has been captured or converted to the following coordinate reference system.

Datum: Geocentric Datum of Australia 2020 (GDA2020).

Projection: Map Grid of Australia 2020 (MGA2020), Zone 54

All location coordinates listed in this report are expressed using this system. Spatial data converted from other coordinate reference systems may have accuracy limitations.

4. Assessment outcomes

4.1. Vegetation assessment

4.1.1. General description of the vegetation, the site and matters of significance

The landform within the Project Area was flat with loamy clay soil and was partially saturated in areas at the time of the 2022 field survey due to recent rainfall. Most of the Project Area was under crop of cereals and pulses with the only native vegetation present being roadside vegetation. The native vegetation that was present mostly consisted of shrublands dominated by either *Enchylaena tomentosa* (Ruby Saltbush) or *Senna artemisioides* spp. (Desert Senna). Occasionally, exotic vegetation and native grasslands were present along the roadside on the edges of the Project Area. Four scattered *Eucalyptus camaldulensis* trees are present on the eastern boundary of the Project Area. These are not impacted and are not discussed further in this report.

Four vegetation associations (VA) were identified in the Project Area. These are listed below and described in further detail in Section 4.1.2:

- **A1:** *Enchylaena tomentosa* (Ruby Saltbush) Low Open Shrubland +/- *Atriplex stipitata* (Bitter Saltbush) +/- *Lycium australe* (Australian Boxthorn) +/- *Maireana aphylla* (Cotton-bush) +/- *Senna artemisioides* ssp. X *artemisioides* (Desert Senna) +/- Planted Eucalypt Overstorey.
- **A2:** *Lomandra* spp. (Mat-rush) and *Dianella brevicaulis* (Short-stem Flax-lily) Open Sedgeland.
- **A3**: *Senna artemisioides* ssp. (Desert Senna) +/- *Eremophila longifolia* (Weeping Emubush) Shrubland.
- **A4**: *Austrostipa eremophila* (Rusty Spear-grass) and *Lomandra effusa* (Scented Mat-rush) Open Grassland.

Some native shrubs have regenerated along the roadsides since the 2018 survey. Consequently some areas that were previously mapped as grassland (A2) have been included in the shrubland community. Much of the overstorey vegetation surveyed consists of planted roadside Australian native trees and shrubs, which are not indigenous to the area. No watercourses are present within the Project Area.

Of the four VA listed above, only two are impacted by the Project (A1 and A3), as indicated in Table 5.

Table 5. Summary of impact to vegetation associations.

VA no.	Vegetation association	Area (ha)	Area impacted (ha)
A1	*Enchylaena tomentosa* (Ruby Saltbush) Low Open Shrubland +/- *Atriplex stipitata* (Bitter Saltbush) +/- *Lycium australe* (Australian Boxthorn) +/- *Maireana aphylla* (Cotton-bush) +/- *Senna artemisioides* ssp. X *artemisioides* (Desert Senna) +/- Planted Eucalypt Overstorey.	7.62	0.14
A2	*Lomandra* spp. (Mat-rush) and *Dianella brevicaulis* (Short-stem Flax-lily) Open Sedgeland.	None*	None
A3	*Senna artemisioides* ssp. (Desert Senna) +/- *Eremophila longifolia* (Weeping Emubush) Shrubland.	0.93	0.03
A4	*Austrostipa eremophila* (Rusty Spear-grass) and *Lomandra effusa* (Scented Mat-rush) Open Grassland.	0.16	None
	Amenity vegetation	1.41	0.22
	Cropping	471.19	289.00
	Exotic Grassland	0.02	0.02
	Planted Shrubs	0.06	None
	Total	**471.20**	**289.41**

*** = VA was recorded in the 2018 survey, however in the 2022 survey the vegetation changed to match another VA.**

4.1.2. Details of the vegetation associations proposed to be impacted

The impact area was refined after the initial field survey and report in 2018, which avoided the four scattered trees on the eastern boundary.

Impact to vegetation is restricted to seven access points which have been placed at existing entry points devoid of native vegetation, where possible. Northern access points do not require clearance of native vegetation, but some southern access points will require minor clearance of regenerated native vegetation, as applied for in this report.

The total proposed area of clearance is 0.17 hectares (ha) of native vegetation, which includes two vegetation associations:

- A1 – 0.14 ha
- A3 – 0.03 ha

The proposed clearance area of the Project is presented in Figure 4 (page 18). Vegetation Associations are described in Table 6 and Table 7

Table 6. Summary of VA1.

<table>
<tr><td>Vegetation Association</td><td colspan="5">A1: Enchylaena tomentosa (Ruby Saltbush) Low Open Shrubland +/- Atriplex stipitata (Bitter Saltbush) +/- Lycium australe (Australian Boxthorn) +/- Maireana aphylla (Cotton-bush) +/- Senna artemisioides ssp. X artemisioides (Desert Senna) +/- Planted Eucalypt Overstorey.</td></tr>
<tr><td>Benchmark Community</td><td colspan="5">NA 6 Inland Tall Shrublands.</td></tr>
<tr><td>Sites:</td><td colspan="5">A1a and A1b</td></tr>
<tr><td colspan="3"> 
Site A1a, Photo facing West, Waypoint: E: 257172.21 N: 6274800.95</td><td colspan="3"> 
Site A1b, Photo facing South, Waypoint: E: 255169.33, N: 6276300.98</td></tr>
<tr><td>General description</td><td colspan="5">Low open shrubland dominated by Enchylaena tomentosa (Ruby Saltbush), with other dominant species present in different areas of the association. The association is diverse within the Project Area however is highly disturbed due to being roadside vegetation. There was planted Eucalypt overstory with the shrubs in the midstorey regenerating.

There is a high number of weed species with high cover rating, with Carrichtera annua (Wards Weed) being the most dominate weed species.
<table>
<tr><th>Over storey</th><th>Mid storey</th><th>Under storey</th></tr>
<tr><td>Planted Eucalypt overstorey</td><td>Enchylaena tomentosa (Ruby Saltbush)
Atriplex stipitata (Bitter Saltbush)
Lycium australe (Australian Boxthorn)
Maireana aphylla (Cotton-bush)
Senna artemisioides spp. X artemisioides (Desert Senna)</td><td>*Carrichtera annua (Wards Weed)
*Avena barbata (Bearded Oat)
*Hordeum leporinum (Barley Grass)
*Salvia verbenaca (Wild Sage)</td></tr>
</table></td></tr>
<tr><td>Threatened species or community</td><td colspan="5">This vegetation association does not support or constitute a TEC.

One NPW listed fauna species was observed within this vegetation association:
• Elegant Parrot (Neophema elegans elegans) – NPW Act Rare.

The vegetation may provide some limited habitat for the following threatened fauna species that wasn't recorded in the VA during the field surveys:
• White-winged Chough (Corcorax melanoramphos) – NPW Act Rare.
• Brown Quail (Coturnix ypsilophora) – NPW Act Vulnerable.</td></tr>
<tr><td>Landscape context score</td><td>Both Sites: 1.13</td><td>Vegetation Condition Score</td><td>A1a: 62.50
A1b: 43.63</td><td>Conservation significance score</td><td>Both Sites: 1.06</td></tr>
<tr><td>Unit biodiversity Score</td><td>A1a: 74.86
A1b: 52.27</td><td>Area (ha)</td><td>0.14</td><td>Total biodiversity Score</td><td>A1a: 10.48
A1b: 7.32</td></tr>
</table>

Table 7. Summary of VA3.

<table>
<tr><td>Vegetation Association</td><td colspan="5">A3: Senna artemisioides ssp. (Desert Senna) +/- Eremophila longifolia (Weeping Emubush) shrubland.</td></tr>
<tr><td>Benchmark Community</td><td colspan="5">NA 6 Inland Tall Shrublands.</td></tr>
<tr><td colspan="6"> 
Site A3, Photo facing West, Waypoint: E: 256214 N: 6273730.01</td></tr>
<tr><td rowspan="3">General description</td><td colspan="5">Tall Shrubland dominated by Senna artemisioides spp. (Desert Senna) along with Eremophila longifolia (Weeping Emubush) with a mixture of native grasses and forbs in the understorey. The association is diverse within the Project Area however is highly disturbed due to being roadside vegetation. There is regeneration of shrubs present in the association.

There is a high number of weed species with high cover rating, especially Avena barbata (Bearded Oat) and Vulpia sp. (Fescue).</td></tr>
<tr><td>Overstorey</td><td colspan="2">Midstorey</td><td colspan="2">Understorey</td></tr>
<tr><td>No overstorey</td><td colspan="2">Senna artemisioides ssp. (Desert Senna)
Eremophila longifolia (Weeping Emubush)</td><td colspan="2">Mixed native grasses and forbs</td></tr>
<tr><td>Threatened species or community</td><td colspan="5">This vegetation association does not support or constitute a TEC.

One NPW listed fauna species was observed within this vegetation association:
• Elegant Parrot (Neophema elegans elegans) –NPW Act: Rare.

The vegetation may provide some limited habitat for the following threatened fauna species that wasn't recorded in the VA during the field surveys:
• White-winged Chough (Corcorax melanoramphos) – NPW Act Rare.
• Brown Quail (Coturnix ypsilophora) – NPW Act Vulnerable.</td></tr>
<tr><td>Landscape context score</td><td>1.13</td><td>Vegetation Condition Score</td><td>49.70</td><td>Conservation significance score</td><td>1.06</td></tr>
<tr><td>Unit biodiversity Score</td><td>59.53</td><td>Area (ha)</td><td>0.03</td><td>Total biodiversity Score</td><td>1.79</td></tr>
</table>

4.1.3. Site map showing areas of proposed impact

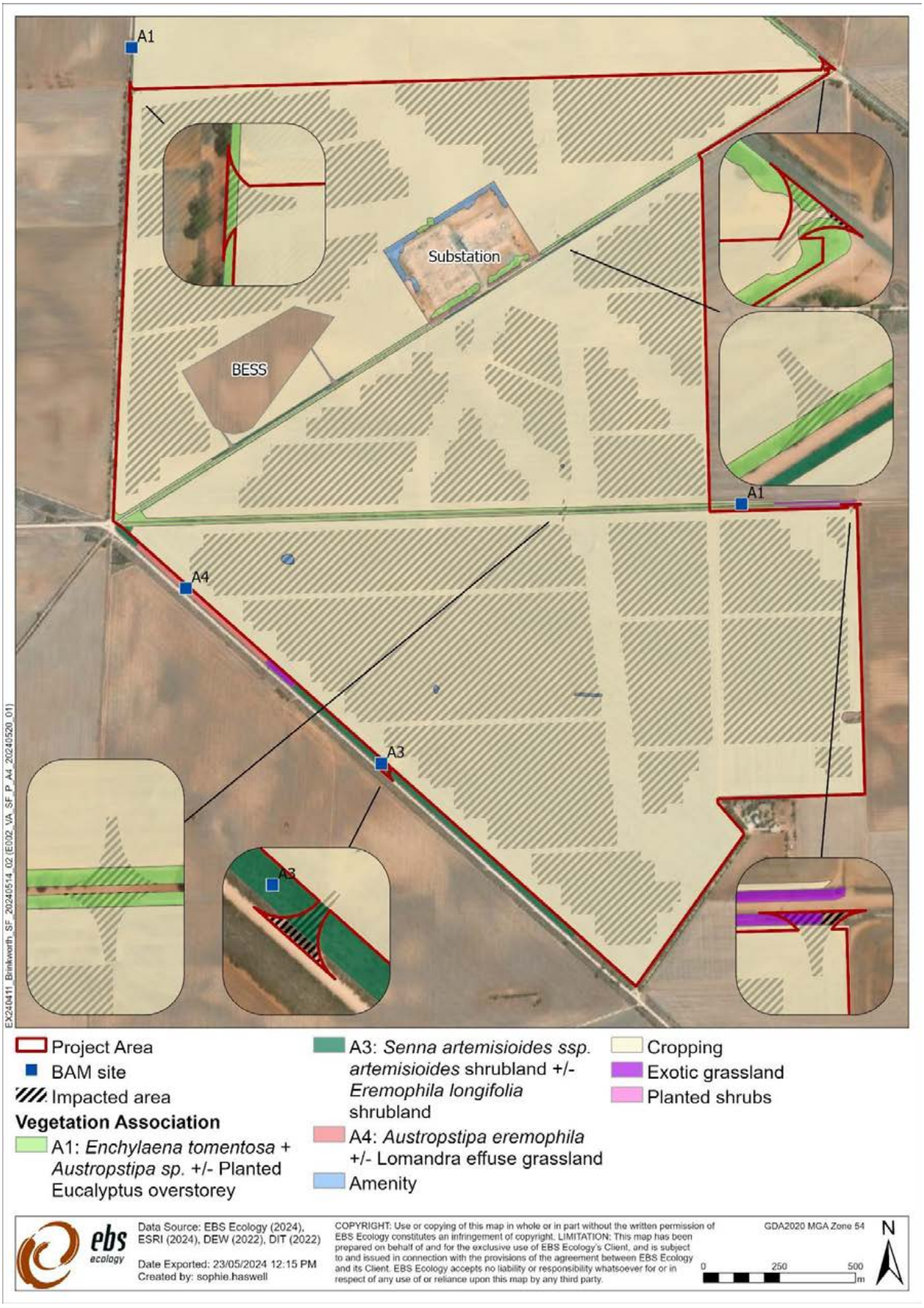


Figure 4. The Vegetation Associations within the Brinkworth solar farm Project Area (BESS excluded).

4.1.4. Photo log

Photographs of the vegetation present and clearance needed for the Project were taken during the 2018 field survey. These photographs are shown in Appendix 6.

4.2. Threatened species assessment

This section presents the results of the desktop assessment, including a summary of both the PMST and BDBSA search results, as well as an assessment of the likelihood of identified threatened species and ecological communities occurring in the Project Area.

4.2.1. Threatened Ecological Communities

The database searches indicated that two Threatened Ecological Communities (TEC) might occur within the Project Area:

- Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia – EPBC Act Listed: Critically Endangered.
- Iron-grass Natural Temperate Grassland of South Australia – EPBC Act Listed: Critically Endangered.

Vegetation in the Project Area has been assessed against the definitions of each TEC identified in Table 8.

The assessment found that there either TEC wasn't present in the Project Area.

Table 8. Assessment for the presence of Threatened Ecological Communities in the Project Area.

Threatened Ecological Community	Conservation Status	Definition	Assessment
Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of SA (PBGW)	Critically Endangered	PBGW is restricted to SA and consists of an open too dense woodland dominated by *Eucalyptus odorata* and typically occurs with other tree species including *E. leucoxylon*, *E. microcarpa* or *E. porosa.* Canopy height comprises low trees, generally 5-10 metres tall with an understorey comprised of diverse grasses and herbs including *Austrostipa* sp.*, Lomandra* sp. and *Acacia pycnantha.* (DEWHA 2008a; Turner 2012). This TEC can be categorised under three different condition Classes (A, B and C), based on remnant patch size and native species diversity and composition. Class C does not make up the TEC but is of sufficient biodiversity value to target for restoration (DEWR 2007; Turner 2012).	Not Present – No *Eucalyptus odorata* recorded in Project Area.
Iron-grass Natural Temperate Grassland of SA (INTG)	Critically Endangered	INTG is endemic to SA and consists of tussock-forming perennial grasses, Iron-grasses (*Lomandra effusa* and/or *L. multiflora ssp. dura)* and a low presence (<10%) of trees and tall shrubs (DEWR 2007; Turner 2012). This TEC can be categorised under three different condition Classes (A, B and C), based on patch size, native species diversity and composition, and tussock density. Class A and Class B, make up this TEC, while Class C does not make up the TEC but is of sufficient biodiversity value to target for restoration (DEWHA 2008b).	Not Present – No *Lomandra* spp. recorded in Project Area.

4.2.2. Threatened flora and fauna species

The desktop database searches identified 35 threatened species (10 flora and 25 fauna) within the Search Area, listed under either the EPBC Act or NPW Act (Appendix 5). Of these, nine threatened fauna species had historical records within the Search Area as of 1995 and had a spatial reliability of less than 1 km (Figure 5).

A total of 79 flora and 31 fauna species were recorded across the Project Area (Appendix 3 and Appendix 4). One NPW Act listed Vulnerable flora species, *Maireana excavata* (Bottle Fissure-plant), and one NPW Act listed Rare fauna species, Elegant Parrot (*Neophema elegans elegans*), were recorded in the Project Area.

Maireana excavata was found in roadside vegetation that is not proposed to be impacted by the proposed Project. It was recorded along Lake View Road in the A4 vegetation association and in the northeast part of Power Station Road. Elegant Parrot was observed across the Project Area in 2018.

Based on the habitat in the Project Area, 1 threatened flora species and four threatened fauna species have been assessed as known, likely or possibly to occur in the Project Area. These species are listed in Table 9.

The likelihood of occurrence assessment for all threatened species identified by the database searches is provided in Appendix 5.

Table 9. Likelihood of occurrence of threatened flora and fauna species within the Project Area that are known, likely or possibly occurring in the Project Area.

Scientific Name	Common Name	Conservation status		Data Source	Last Sighting (year)/ PMST	Likelihood of Occurrence in Project Area
		EPBC Act	NPW Act			
Flora						
Maireana excavata	Bottled Fissure-plant		V	3	2018	Known - Recorded
Fauna						
Corcorax melanorhamphos	White-winged Chough		V	2	2013	Possible
Coturnix ypsilophora australis	Brown Quail		V	2	2005	Possible
Falco subniger	Black Falcon		R	2	2012	Possible
Neophema elegans elegans	Elegant Parrot		R	2, 3	2018, 2019	Known - Recorded

Conservation status

EPBC Act: (*Environment Protection and Biodiversity Conservation Act 1999*). NPW Act (*National Parks and Wildlife Act 1972*). Conservation Codes: VU/V: Vulnerable, R: Rare. Mi: listed as migratory under the EPBC Act. Ma: marine.

Source of Information

1. **EPBC Act Protected Matters Report (DCCEEW 2024a) – 5 km buffer applied to Project Area.**
2. **Biological Database of South Australia data extract (DEW 2024b) - 5 km buffer applied to Project Area.**
3. **Recorded during the field survey.**

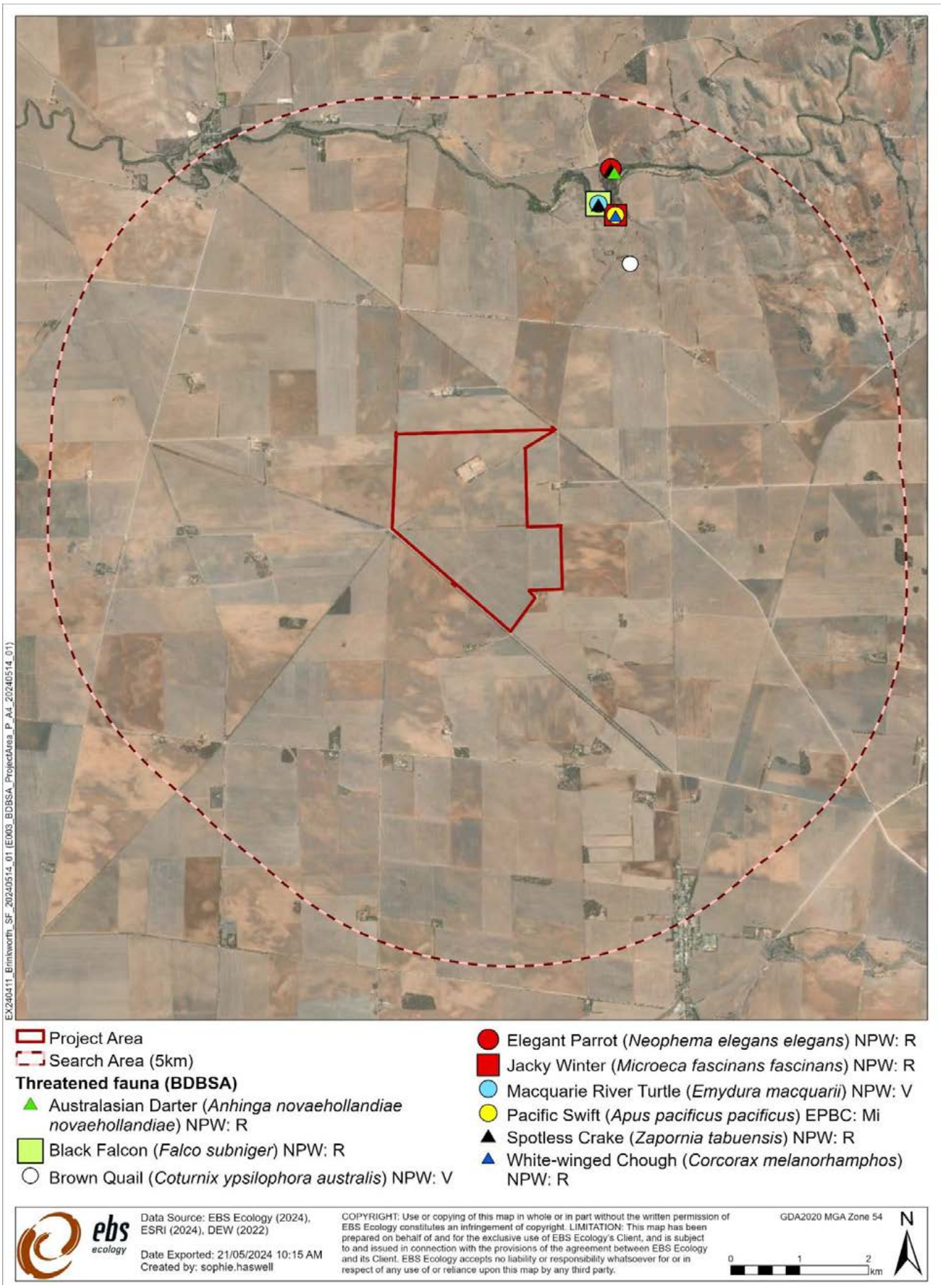


Figure 5. Historical EPBC Act and NPW Act listed threatened species database records within 5 km of the Project Area since 1995 (<1 km reliability) (DEW 2024b).

4.3. Cumulative impacts

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must consider the potential cumulative impact, both direct and indirect, that is reasonably likely to result from a proposed clearance activity.

Direct clearance of native vegetation associated with the Project includes:

- The clearance of 0.17 ha includes that required for solar farm and associated access points and tracks.
- The clearance of 0.17 ha includes that required for associated impacts, including 10 metres around all buildings, temporary laydown areas and site compounds.

Cumulative impacts associated with, but not included in, the application, includes the following;

- The clearance of 0.05 ha of native vegetation required for the BESS and supporting infrastructure which is included in a separate clearance report.

Indirect impacts to native vegetation and fauna may include:

- Potential increase in dust deposition from clearance associated with solar panel installation (at least until understory vegetation regenerates).
- Impacts to retained vegetation from effects of sunlight, and heat radiation from infrastructure.
- Disturbance to nesting fauna species, particularly during construction.
- Reduction in or deterrent of access to ephemeral water resources for local birds following rainfall events (including dams).

4.4. Addressing the Mitigation Hierarchy

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimize, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.

a) Avoidance – outline measures taken to avoid clearance of native vegetation

The Proponent has avoided native vegetation by choosing a location on cropping land for the placement of the proposed Brinkworth solar farm. The infrastructure layout has been designed to avoid the majority of roadside native vegetation and scattered native trees, as far as possible. Seven access points will be used as either main and emergency access to the solar farm. These access points are positioned at existing gates where vegetation has previously been cleared. Northern access points do not require clearance of native vegetation, but southern access points will require minor clearance of native vegetation, as applied for in this report.

b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative).

Clearance of native vegetation cannot totally be avoided at the seven entry points to the Brinkworth solar farm. However, the vegetation located at the proposed entry points is considered to be low quality as the area has previously been cleared and impacted. Vegetation at the entry points provides limited resources for threatened species.

Indirect and unintentional impacts to native vegetation and fauna will be managed by preparing and implementing a Construction Environmental Management Plan (CEMP). The CEMP will document management strategies for minimising impacts to biodiversity, including accidental clearing of vegetation.

c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.

It is not possible to rehabilitate the site once the solar farm is in place, however there may be more opportunity for some native ground covers to regenerate underneath the solar panels and in areas where there is no impact.

d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.

The NVC will only consider an offset once avoidance, minimization and restoration have been documented and fulfilled. The SEB Policy explains the biodiversity offsetting principles that must be met.

The Proponent wishes to offset the clearance by paying into the SEB fund.

4.5. Principles of Clearance (Schedule 1, *Native Vegetation Act 1991*)

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the Principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

The clearance is assessed against the Principles of Clearance as set out in Table 10.

Table 10. Assessment against the Principles of Clearance.

Principle of clearance	Considerations
Principle 1(a) – it comprises a high level of diversity of plant species	Relevant information The Project Area was found to be comprised of 79 flora species consisting of 52 native species and 27 weed species across the two surveys. Patches; Bushland Plant Diversity Scores – A1: 22 A3: 20
	Assessment against the principles At Variance – A3 Seriously at Variance – A1
	Moderating factors that may be considered by the NVC The clearance impacts only 0.17 ha of native vegetation. If this represents <0.25% of the native vegetation present within 5 km radius of the Project Area, the impact may be reduced to 'at variance'.

Principle of clearance	Considerations
Principle 1(b) – significance as a habitat for wildlife	**Relevant information** One EPBC Act listed threatened species was detected during the field survey: • Elegant Parrot (*Neophema elegans elegans*) – NPW Act: Rare. Based on proximity of and time since the most recent record and the type of habitats available within the Project Area, other threatened species which may utilise the Project Area includes: **Possible** • Black Falcon (*Falco subniger*) – NPW Act: Rare • White-winged Chough (*Corcorax melanorhamphos*) – NPW Act: Vulnerable • Brown Quail (*Coturnix ypsilophora australis*) – NPW Act: Vulnerable No EPBC listed species are known to occur in the Project Area, or have been assessed as possible, likely or highly likely to occur. Patches; Threatened Fauna Score: 0.06 (all sites) *(scores of ≥0.05 are Seriously at Variance*). Unit biodiversity Score: A1a – 74.86, A1b – 52.27 A3 – 59.53
	Assessment against the principles Seriously at Variance – A1, A3 (Threatened Fauna Score >0.05).
	Moderating factors that may be considered by the NVC *Impact Significance* The small area of vegetation under application (0.17 ha) is highly fragmented and surrounded by cleared land used for cropping purposes. It is generally in poor condition and impacted by weeds. It is unlikely to provide important or critical habitat for any threatened species. Clearance is not likely to cause significant impact to any threatened species, and will not: • lead to a long-term decrease in the size of a population; • reduce the area of occupancy of a species; • fragment an existing population into two or more populations; • decrease availability of habitat such that the extent of a species is likely to decline; • result in invasive species becoming established in the threatened species habitat; • interfere with the recovery of a species.
Principle 1(c) – plants of a rare, vulnerable or endangered species	**Relevant information** One NPW Act listed threatened plant species were recorded in the Project Area in the 2018 field survey. This includes: • *Maireana excavata* (Bottled Fissure-plant) – NPW Act: Vulnerable However, no other threatened plant species were recorded between the two field surveys or identified as possibly occurring in the Project Area. *M. excavata* was found in roadside vegetation that is not proposed to be impacted. Threatened Flora Score(s) – 0.0
	Assessment against the principles Not at Variance – VA1 and VA3
	Moderating factors that may be considered by the NVC Not applicable.
Principle 1(d) – the vegetation	**Relevant information** No TEC was identified within the Project Area.

<table>
<tr><th>Principle of clearance</th><th>Considerations</th></tr>
<tr><td rowspan="2">comprises the whole or part of a plant community that is Rare, Vulnerable or endangered</td><td><u>Assessment against the principles</u>
N/A</td></tr>
<tr><td><u>Moderating factors that may be considered by the NVC</u>
Not applicable.</td></tr>
<tr><td rowspan="3">Principle 1(e) – it is significant as a remnant of vegetation in an area which has been extensively cleared</td><td><u>Relevant information</u>
The Project Area contains one IBRA Subregion (and association): Saint Vincent (Crystal Brook). The Saint Vincent subregion (Crystal Brook land system name) is largely cleared as it is often utilised for agriculture, with the remanent vegetation mostly consisting of mallee, woodlands, and grasslands.
The clearance of the Project Area may be considered insignificant as majority of the Project Area has previously been cleared for agriculture.
<table>
<tr><th>Subregion</th><th>Remnancy</th><th>Association</th><th>Remnancy</th></tr>
<tr><td>Saint Vincent</td><td>8%</td><td>Crystal Brook</td><td>2%</td></tr>
</table>
Total Biodiversity Score – 10.69</td></tr>
<tr><td><u>Assessment against the principles</u>
Seriously at Variance</td></tr>
<tr><td><u>Moderating factors that may be considered by the NVC</u>
Most of the Project Area that will be impacted by construction has historically been cleared for agriculture or the construction of roads and entry points. With the native vegetation that is present being limited to grasses and shrubs that has regenerated along the roadside with the trees that are present being planted. It is in poor or degraded condition.</td></tr>
<tr><td rowspan="3">Principle 1(f) – it is growing in, or in association with, a wetland environment</td><td><u>Relevant information</u>
There are multiple creek lines across the Project Area. However, these could be considered not important.</td></tr>
<tr><td><u>Assessment against the principles</u>
N/A</td></tr>
<tr><td><u>Moderating factors that may be considered by the NVC</u>
Not applicable.</td></tr>
<tr><td rowspan="3">Principle 1(g) – it contributes significantly to the amenity of the area in which it is growing or is situated</td><td><u>Relevant information</u>
The block under application is situated away from the main highway on minor agricultural and access roads and is unlikely to contribute significantly to the local amenity. It is adjacent to an existing substation and extensively cleared agricultural land.

Large trees in the area are not impacted by the clearance.</td></tr>
<tr><td><u>Assessment against the principles</u>
N/A</td></tr>
<tr><td><u>Moderating factors that may be considered by the NVC</u>
Not applicable.</td></tr>
</table>

4.6. Risk assessment

The level of risk associated with the application is presented in Table 11.

Table 11. Summary of the level of risk associated with the application.

Total clearance	No. of trees	0
	Area (ha)	0.17
	Total biodiversity Score	10.69
Seriously at variance with principle 1(b), 1(c) or 1 (d)		1 (b)
Risk assessment outcome		Level 3

5. Clearance summary

Clearance summary tables for the clearance application are shown in Table 12. The summary table indicates the SEB points and SEB payment obligations of the clearance.

The total SEB obligations of the clearance are summarised in Table 13.

Table 12. Clearance summary and total SEB obligations for vegetation associations impacted by the Project.

Block	Site	Species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
A	A1a	28	1	0	0.06	74.86	0.14	10.48	1			11.00	$6,602.76	$363.76
A	A1b	16	1	0	0.06	52.27	0.14	7.32	1			7.68	$4,506.47	$247.86
A	A1 Mean	22	1	0	0.06	63.57	0.14	8.90	1			9.34	$5,554.62	$305.81
A	A3	20	1	0	0.06	59.53	0.03	1.79	1			1.88	$1,099.85	$60.49
						Total	0.17	10.69				11.22	$6,654.47	$366.30

Table 13. Summary of the total SEB obligations of the clearance.

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	10.69	11.22	$6,654.47	$366.30	$7,020.77

Economies of Scale Factor	0.5
Rainfall (mm)	393

6. Significant Environmental Benefit

A SEB is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

ACHIEVING AN SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

☐ Establish a new SEB Area on land owned by the proponent.

☐ Use SEB Credit that the proponent has established.

☐ Apply to have SEB Credit assigned from another person or body.

☐ Apply to have an SEB to be delivered by a Third Party.

☒ Pay into the Native Vegetation Fund.

PAYMENT SEB

If a proponent proposes to achieve the SEB by paying into the Native Vegetation Fund, summary information must be provided on the amount required to be paid and the manner of payment.

The total SEB payment for the clearance of 0.17 ha of native vegetation with a Total Biodiversity Score of 10.69 is $7,020.77 (which includes the administration fee).

7. References

Akaysha Energy (2024). Brinkworth BESS & Solar Farm. Online resource. Available from https://akayshaenergy.com/projects/project-brinkworth [Date Accessed 17/05/2024].

Blakers, M., S.J.J.F. Davies & P.N. Reilly (1984). The Atlas of Australian Birds. Melbourne, Victoria: Melbourne University Press.

Birdlife Australia (2024a). Bird Profiles. Online resource. Available from: https://birdlife.org.au/bird-profiles/ [Date Accessed 16/05/2024]

Birdlife Australia (2024b). Birds in Backyards. Online resource. Available from: https://www.birdsinbackyards.net/finder/all-species [Date Accessed 16/05/2024].

Clarke, A., M.A. Robertson & A. Pieck (2013). Recovery Plan for *Acanthocladium dockeri* (Spiny Daisy). Department of Environment, Water and Natural Resources, Clare, South Australia. Available from: http://www.environment.gov.au/resource/recovery-plan-acanthocladium-dockeri-spiny-daisy. In effect under the EPBC Act from 30-Jan-2014 as *Acanthocladium dockeri*. [Accessed 16/05/2024]

Croft S.J., Pedler J.A., Milne T.I. (2007) Bushland Condition Monitoring Manual – Northern Agricultural & Yorke Peninsula Regions. Nature Conservation Society of South Australia, Adelaide.

Cutten J.L., Hodder M.W. (2002) Scattered Tree Clearance Assessment in South Australia: Streamlining, Guidelines for Assessment and Rural Industry Extension. Prepared for Business Information Service, Office of Aus Industry, Commonwealth Department of Industry, Science and Tourism.

Department for Environment and Heritage (DEH) (2005). Provisional List of Threatened Ecosystems. Unpublished and provisional list by the Department for Environment and Heritage, Adelaide.

Department for Environment and Heritage (DEH) (2007). Adelaide and Mount Lofty Ranges Regional Recovery Pilot Project Database. Unpublished data extracted and edited from BDBSA, SA Herbarium (July 2007) and other sources.

Department for Environment and Heritage (DEH) (2014a) Adelaide and Mount Lofty Ranges South Australia Threatened Species Profile. *Coturnix ypsilophora* Brown Quail. Biodiversity Conservation Unit, Adelaide Region. Available at: https://cdn.environment.sa.gov.au/landscape/docs/hf/pa-fact-brownquail.pdf [Accessed 16/05/2024].

Department for Environment and Heritage (DEH) (2014b) Adelaide and Mount Lofty Ranges South Australia Threatened Species Profile. *Microeca fascinans fascinans* Jacky Winter. Biodiversity Conservation Unit, Adelaide Region. Available from: https://cdn.environment.sa.gov.au/landscape/docs/hf/pa-fact-jackywinter.pdf [Accessed 16/05/2024].

Department for Environment and Water (DEW) (2024a). Biological Databases of South Australia (BDBSA) data extract: Recordset number DEWNRBDBSA240506-1. Adelaide.

Department for Environment and Water (DEW) (2024b). NatureMaps. Available at: http://data.environment.as.gov.au/NatureMaps/Pages/default.aspx [Accessed 10/05/2024].

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023a). Conservation Advice for *Aphelocephala leucopsis* (southern whiteface). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/529-conservation-advice-31032023.pdf. [Accessed 16/05/2024]

Department of Climate Change, Energy, the Environment and Water (DCCCEW) (2023b). Conservation Advice for *Calidris ferruginea* (curlew sandpiper). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/856-conservation-advice-18122023.pdf. In effect under the EPBC Act from 18-Dec-2023. [Accessed 16/05/2024]

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023c). Conservation Advice for *Melanodryas cucullata cucullata* (hooded robin (south-eastern)). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/67093-conservation-advice-31032023.pdf. In effect under the EPBC Act from 31-Mar-2023. [Accessed 16/05/2024]

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023d). Conservation Advice for *Neophema chrysostoma* (blue-winged parrot). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/726-conservation-advice-31032023.pdf. In effect under the EPBC Act from 31-Mar-2023. [Accessed 16/05/2024]

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023e). Conservation Advice for *Stagonopleura guttata* (diamond firetail). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/59398-conservation-advice-31032023.pdf. In effect under the EPBC Act from 31-Mar-2023. [Accessed 16/05/2024]

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023f). Conservation Advice for *Tiliqua adelaidensis* (pygmy blue-tongue lizard). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1270-conservation-advice-31082023.pdf. In effect under the EPBC Act from 31-Aug-2023. [Accessed 16/05/2024]

Department of the Environment (DotE) (2015). Conservation Advice *Pedionomus torquatus* plains-wanderer. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/906-conservation-advice.pdf. In effect under the EPBC Act from 08-Jul-2015. [Accessed 16/05/2024]

Department of Agriculture, Water and the Environment (DCCEEW) (2024a). Protected Matters Search Tool. Available at: https://www.environment.gov.au/epbc/protected-matters-search-tool [Accessed 10/05/2024].

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024b). Species Profile and Threats Database. Department of Agriculture, Water and the Environment. https://www.environment.gov.au/cgibin/sprat/public/sprat.pl [Accessed 6/05/2024].

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024c). Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/874-conservation-advice-05012024.pdf. [Accessed 16/05/2024]

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024d). Conservation Advice for *Gallinago hardwickii* (Latham's snipe). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/863-conservation-advice-05012024.pdf. In effect under the EPBC Act from 05-Jan-2024. [Accessed 16/05/2024]

Department of the Environment and Water Resources (DEWR, now DCCEEW) (2007). EPBC Act Policy Statement 3.7 Nationally Threatened Species and Ecological Communities. Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia and Iron-grass Natural Temperate Grassland of South Australia. Australian Government.

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008a). *Approved Conservation Advice for Peppermint Box* (*Eucalyptus odorata*) *Grassy Woodland of South Australia*. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/36-conservation-advice.pdf. In effect under the EPBC Act from 16-Dec-2008. [Date Accessed 6/05/2024].

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008b). Approved Conservation Advice for Iron-grass Natural Temperate Grassland of South Australia. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/37-conservation-advice.pdf. In effect under the EPBC Act from 16-Dec-2008. [Date Accessed 6/05/2024].

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008c). Approved Conservation Advice for *Aprasia pseudopulchella* (Flinders Ranges Worm-lizard). Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1666-conservation-advice.pdf. In effect under the EPBC Act from 26-Mar-2008. [Accessed 16/05/2024].

Duncan M (2010a). National Recovery Plan for the Desert Greenhood *Pterostylis xerophila*. Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-desert-greenhood-pterostylis-xerophila. In effect under the EPBC Act from 13-Aug-2010. [Accessed 16/05/2024].

Duncan, M. (2010b). National Recovery Plan for the Sturdy Leek-orchid *Prasophyllum validum*. Department of Sustainability and Environment, Melbourne. Available from: https://www.dcceew.gov.au/sites/default/files/documents/prasophyllum-validum.pdf. [Accessed 16/05/2024].

EBS Ecology (2018). Brinkworth Solar Farm Project: Flora and Fauna Assessment Report. Report to Brinkworth Solar Farm Pty Ltd. EBS Ecology, Adelaide

Emison, W.B., C.M. Beardsell, F.I. Norman, R.H. Lyon & S.C. Bennett (1987). Atlas of Victorian Birds. Melbourne: Department of Conservation (Forest & Lands) & Royal Australian Ornithological Union.

Morcombe, M. (2021) Field guide to Australian birds. Archerfield, Queensland: Steve Parish.

Moritz, K.N. & D.C. Bickerton (2010a). Recovery Plan for the Osborn's Eyebright *Euphrasia collina* subsp. *osbornii*. Report to the Recovery Planning and Implementation Section, Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-endangered-osborns-eyebright-euphrasia-collina-subsp-osbornii. In effect under the EPBC Act from 13-Aug-2010. [Accessed 16/05/2024].

Moritz, K.N. & D.C. Bickerton (2010b). Recovery Plan for the Peep Hill hop-bush *Dodonaea subglandulifera* 2010. Report to the Recovery Planning and Implementation Section, Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-peep-hill-hop-bush-dodonaea-subglandulifera. In effect under the EPBC Act from 13-Aug-2010 *as Dodonaea subglandulifera*. [Accessed 16/05/2024].

Native Vegetation Council (NVC) (2020). Bushland Assessment Manual July 2020. Native Vegetation Council, Adelaide. Available at: https://www.environment.sa.gov.au/topics/native-vegetation/clearing/vegetation-assessments. [Accessed 16/05/2024].

Native Vegetation Council (NVC) (2017a). Bushland Assessment Manual. Available at http://www.environment.sa.gov.au/managing-natural-resources/native-vegetation/clearing-offsetting/vegetation-assessments. [Accessed 16/05/2024].

Native Vegetation Council (NVC) (2017b). Scattered Tree Assessment Manual. Available at http://www.environment.sa.gov.au/managing-natural-resources/native-vegetation/clearing-offsetting/vegetation-assessments. [Accessed 16/05/2024].

Officer, H.R. (1969). Australian Flycatchers and Their Allies. Melbourne: The Bird Observers Club.

Threatened Species Scientific Committee (TTSC) (2016a). Conservation Advice *Caladenia tensa* Rigid spider-orchid. Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/91648-conservationadvice-05072023.pdf. In effect under the EPBC Act from 16-Jul-2000. [Accessed 16/05/2024].

Threatened Species Scientific Committee (TSSC) (2016b). Conservation Advice *Pterostylis despectans* lowly greenhood. Canberra: Department of the Environment and Energy. Available

from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/6272-conservation-advice-16122016.pdf. In effect under the EPBC Act from 16-Dec-2016. [Accessed 16/05/2024].

Threatened Species Scientific Committee (2019). Conservation Advice *Botaurus poiciloptilus* Australasian Bittern. Canberra, ACT: Department of the Environment and Energy. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1001-conservation-advice-18012019.pdf. In effect under the EPBC Act from 18-Jan-2019. [Accessed 16/05/2024].

Threatened Species Scientific Committee (2020). Conservation Advice *Falco hypoleucos* Grey Falcon. Canberra: Department of Agriculture, Water and the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/929-conservation-advice-09072020.pdf. In effect under the EPBC Act from 09-Jul-2020. [Accessed 16/05/2024].

Tonkinson, D. & G. Robertson (2010). National Recovery Plan for Yellow Swainson-pea *Swainsona pyrophila*. Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-yellow-swainson-pea-swainsona-pyrophila. [Accessed 16/05/2024].

Turner, J. (2012). National Recovery Plan for the Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia ecological community 2012. Department of Environment, Water and Natural Resources, South Australia.

8. Appendices

Appendix 1 – Landowner permission Eulunga Pty Ltd

Angela Carpenter

From: Paula Weckert <paula.weckert@bigpond.com>
Sent: Wednesday, 31 May 2023 5:52 PM
To: Michael Sale
Subject: RE: Brinkworth solar farm permission sought

Hi Michael,
Yes we are happy for you to use our Property name.
Kind Regards
Shane & Paula Weckert

From: Michael Sale <Michael.Sale@windprospect.com.au>
Sent: Wednesday, 31 May 2023 1:14 PM
To: paula.weckert@bigpond.com
Subject: Brinkworth solar farm permission sought

Hi Paula and Shane

I hope you're both well.

As part of the flora and fauna study that is being completed to support the Development Application for the Brinkworth solar farm and battery, we need to your permission to include the landowner/property name (i.e., yours), since we are not the owner.

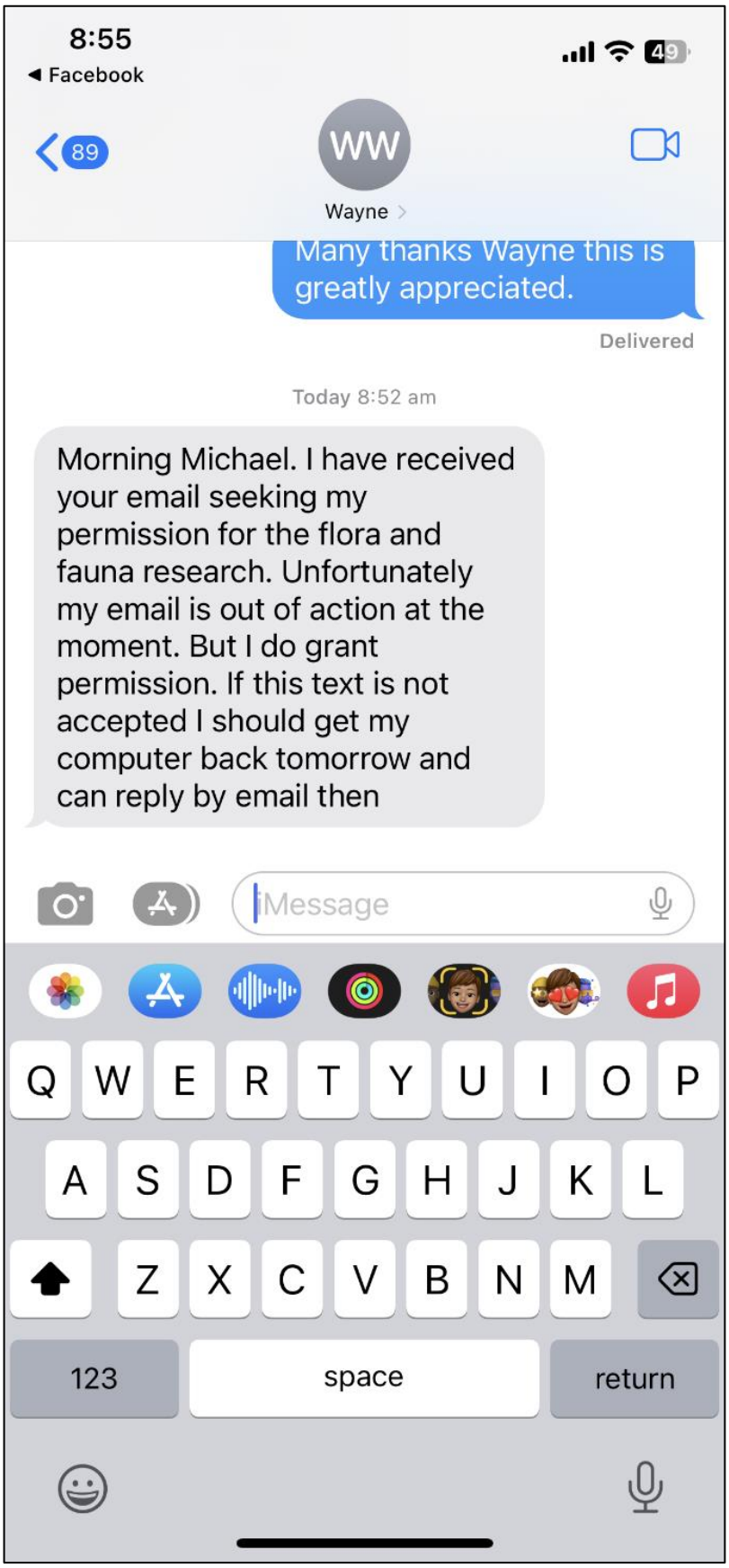
Are you able to provide me this permission as a response to this email?

Many thanks
Michael

Michael Sale
Regional Development Manager
Wind Prospect Pty Ltd
Suite 10 | 19-35 Gertrude St | Fitzroy | Victoria 3065
PO Box 110 | Fitzroy | Victoria 3065
Mob: +61 401 915 034
Email: michael.sale@windprospect.com.au
www.windprospect.com.au

Wind Prospect respectfully acknowledges the Traditional Owners of the land on which our office and each of our projects are located. We also acknowledge and uphold their continuing relationship to the land and pay our respect to their Elders past, present and emerging.

Appendix 2 – Landowner permission Wayne Weckert



Appendix 3 – Flora recorded during the field survey (2018 and 2022 all sites)

Species	Common name	EPBC Act	NPW Act	Exotic, non-indigenous or planted	Declared Weed under the LSA Act
Acacia ligulata	Umbrella Bush				
Acacia notabilis	Notable Wattle				
Acacia sclerophylla var. *sclerophylla*	Hard-leaf Wattle				
Arctotheca calendula	Cape Weed			Y	
Aristida behriana	Brush Wire-grass				
Asphodelus fistulosus	Onion Weed			Y	
Atriplex semibaccata	Berry Saltbush				
Atriplex stipitata	Bitter Saltbush				
Austrostipa elegantissima	Feather Spear-grass				
Austrostipa eremophila	Rusty Spear-grass				
Austrostipa sp.	Spear-grass				
Avena barbata	Bearded Oat			Y	
Bromus diandrus	Great Brome			Y	
Bromus madritensis	Compact Brome			Y	
Carrichtera annua	Ward's Weed			Y	
Carthamus lanatus	Saffron Thistle			Y	
Chloris truncata	Windmill Grass				
Chrysocephalum apiculatum	Common Everlasting				
Convolvulus angustissimus ssp.	Narrow-leaf Bindweed				
Convolvulus remotus	Grassy Bindweed				
Dianella brevicaulis	Short-stem Flax-lily				
Dianella revoluta var.					
Dodonaea baueri	Crinkled Hop-bush				
Echium plantagineum	Salvation Jane				Y
Einadia nutans ssp.	Climbing Saltbush				
Enchylaena tomentosa var.	Ruby Saltbush				
Enneapogon nigricans	Black-head Grass				
Eremophila longifolia	Weeping Emubush				
Eucalyptus camaldulensis	River Red Gum				
Eucalyptus sp.				Y	
Euphorbia drummondii group					
Exocarpos aphyllus	Leafless Cherry				
Geijera linearifolia	Sheep Bush				
Goodenia pinnatifida	Cut-leaf Goodenia				
Goodenia pusilliflora	Small-flower Goodenia				
Grevillea huegelii	Comb Grevillea				
Hordeum leporinum	Wall Barley-grass			Y	
Limonium lobatum	Winged Sea-lavender			Y	
Lolium sp.	Ryegrass			Y	
Lomandra effusa	Scented Mat-rush				
Lomandra multiflora ssp.	Many-flower Mat-rush				

Species	Common name	EPBC Act	NPW Act	Exotic, non-indigenous or planted	Declared Weed under the LSA Act
Lycium australe	Australian Boxthorn				
Lycium ferocissimum	African Boxthorn				Y
Maireana aphylla	Cotton-bush				
Maireana brevifolia	Short-leaf Bluebush				
Maireana excavata	Bottle Fissure-plant		V		
Malva sp.	Mallow			Y	
Medicago minima var. *minima*	Little Medic			Y	
Medicago sp.	Medic			Y	
Moraea setifolia	Thread Iris			Y	
Oxalis pes-caprae	Soursob			Y	
Panicum miliaceum	Broom Millet			Y	
Pimelea curviflora var.	Curved Riceflower				
Pimelea micrantha	Silky Riceflower				
Rapistrum rugosum ssp. *rugosum*	Turnip Weed			Y	
Rhagodia parabolica	Mealy Saltbush				
Rytidosperma sp.	Wallaby-grass				
Salsola australis	Buckbush				
Salvia aethiopis	Woolly Sage			Y	
Salvia sp.	Sage			Y	
Salvia verbenaca var.	Wild Sage			Y	
Scabiosa atropurpurea	Pincushion			Y	
Scaevola aemula	Fairy Fanflower				
Senna artemisioides ssp. *artemisioides* x ssp. *coriacea*	Desert Senna				
Senna artemisioides ssp. *artemisioides* x ssp. *filifolia*	Desert Senna				
Senna artemisioides ssp. X *artemisioides*	Silver Senna				
Senna artemisioides ssp. X *coriacea*	Broad-leaf Desert Senna				
Sida corrugata var.	Corrugated Sida				
Sonchus asper ssp.	Rough Sow-thistle				
Sonchus oleraceus	Common Sow-thistle				
Stackhousia aspericocca ssp.	Bushy Candles				
Teucrium sessiliflorum	Mallee Germander				
Velleia arguta	Toothed Velleia			Y	
Vicia sativa ssp.	Common Vetch			Y	
Vittadinia blackii	Narrow-leaf New Holland Daisy				
Vittadinia cuneata var.	Fuzzy New Holland Daisy				
Vulpia sp.	Fescue				
Zygophyllum aurantiacum/eremaeum	Shrubby Twinleaf			Y	
Zygophyllum confluens	Forked Twinleaf				

V = NPW Act Vulnerable.

Appendix 4 – Fauna observed during the field surveys (2018 and 2022 all sites)

Species	Common name	EPBC Act	NPW Act	Introduced species	Observed in 2018	Observed in 2022
Aves						
Alauda arvensis	Eurasian Skylark			Y	Y	Y
Anthochaera carunculata	Red Wattlebird					Y
Anthus australis	Australian Pipit				Y	Y
Aquila audax	Wedge-tailed Eagle					Y
Artamus cinereus	Black-faced Woodswallow					Y
Barnardius zonarius barnardi	Mallee Ringneck					Y
Cincloramphus cruralis	Brown Songlark					Y
Coracina novaehollandiae	Black-faced Cuckooshrike					Y
Corvus mellori	Little Raven				Y	Y
Coturnix pectoralis	Stubble Quail					Y
Eolophus roseicapilla	Galah				Y	Y
Falco cenchroides	Nankeen Kestrel				Y	
Gavicalis virescens	Singing Honeyeater				Y	
Grallina cyanoleuca	Magpie-lark				Y	Y
Gymnorhina tibicen	Australian Magpie				Y	Y
Hirundo neoxena	Welcome Swallow					Y
Manorina melanocephala	Noisy Miner				Y	Y
Megalurus cruralis	Brown Songlark					Y
Neophema elegans	Elegant Parrot		R		Y	
Northiella haematogaster haematogaster	Eastern Bluebonnet (eastern and central SA)				Y	
Ocyphaps lophotes	Crested Pigeon				Y	Y
Passer domesticus	House Sparrow			Y	Y	Y
Rhipidura leucophrys	Willie Wagtail				Y	Y
Sturnus vulgaris	Common Starling			Y	Y	Y
Turdus merula	Common Blackbird			Y		Y
Mammalia						
Macropus fuliginosus	Western Grey Kangaroo				Y	Y
Oryctolagus cuniculus	European Rabbit			Y	Y	
Reptilia						
Pogona barbata	Eastern Bearded Dragon					Y
Pseudonaja textilis	Eastern Brown Snake				Y	
Tiliqua rugosa	Sleepy Lizard				Y	
Tiliqua scincoides	Eastern Bluetongue				Y	

R = NPW Act Rare.

Appendix 5 – Likelihood of Occurrence Assessment.

Scientific Name	Common Name	Conservation status		Source of Information	Last Sighting (year)/ PMST	Habitat Preferences	Likelihood of occurrence within Project Area
		EPBC Act	NPW Act				
Threatened Ecological Communities							
Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia		CE		1	May	N/A	Not Present in Project Area.
Iron-grass Natural Temperate Grassland of South Australia		CE		1	Likely	N/A	Not Present in Project Area.
Flora							
Acanthocladium dockeri	Spiny Everlasting	CE	E	1	May	Extant subpopulations of Spiny Everlasting are confined to remnant grassland on low hills and plains in the mid-north of South Australia. All known extant subpopulations of Spiny Everlasting occur on narrow road reserves that have been repeatedly disturbed in the past (Clarke *et al* 2013).	**Unlikely** - There are no historical records in the Search Area, the species was not detected during either of the field surveys and is only listed as 'May Occur' by the PMST.
Caladenia tensa	Greencomb Spider-orchid	EN	E	1	Likely	The Greencomb Spider-orchid occurs in aeolian sand deposits in Native Pine, Blue Gum Woodland and Broombush mallee in Murray-Darling Depression bioregion. Winter active geophyte, with long narrow leaf emerging, followed by 1-2 flowers (TSSC 2016a).	**Unlikely** - There are no historical records in the Search Area, the species was not detected during either of the field surveys and preferred habitat is not present in Project Area.
Dodonaea subglandulifera	Peep Hill Hop-bush	EN	E	1	May	The Peep Hill Hop-bush occurs primarily on low hills on loamy soils associated with rocky outcrops. These low hills occur to the east of the range country, just before the vegetation changes to mallee flats. The species has also been recorded from plains country in sandy soils over limestone (Moritz and Bickerton 2010a).	**Unlikely** - There are no historical records in the Search Area, the species was not detected during either of the field surveys and is only listed as 'May Occur' by the PMST.
Euphrasia collina subsp. *osbornii*	Osborn's Eyebright	EN	E	1	May	There are specific habitat types that appear to be preferred by the Osborn's Eyebright which includes open eucalyptus woodland, coastal cliffs and inland swamps. Even though these habitats vary greatly, they have two features in common; they are relatively moist and relatively open (Moritz and Bickerton 2010b).	**Unlikely** - There are no historical records in the Search Area, the species was not detected during either of the field surveys and is only listed as 'May Occur' by the PMST.

Scientific Name	Common Name	Conservation status		Source of Information	Last Sighting (year)/ PMST	Habitat Preferences	Likelihood of occurrence within Project Area
		EPBC Act	NPW Act				
Maireana excavata	Bottle Bluebush		V	3	2018	The Bottle Fissure-plant is found in grassland with red brown clay loam soils. Relatively common within its rather restricted range and moderately drought resistant. Grazed by stock, particularly during dry periods when few annual grasses or forbs are present (Cunningham et. al. 2011).	**Known -** Species was recorded during 2018 field assessment.
Prasophyllum validum	Sturdy Leek-orchid, Mount Remarkable Leek-orchid	VU	V	1	May	The Sturdy Leek-orchid Grows in drier woodland habitats, generally with a low sparse understorey. Individuals can be found in Sugar Gum woodland with Spinifex understorey, on loamy soils (Duncan 2010a).	**Unlikely** - There are no historical records in the Search Area, the species was not detected during either of the field surveys and is only listed as 'May Occur' by the PMST.
Pterostylis despectans	Lowly Greenhood	EN	E	1	Likely	In SA, the Lowly Greenhood occurs on gently sloping land north of Mount Bryan in grassy mixed Eucalyptus species woodland. The understorey is sparse and typically includes Spear-grasses, Wallaby-grasses, Scented mat-rush, and Narrow-leaved plantain. The species usually grows in hard, clay loam over rock outcrops, covered with micro-phytic crust (TSSC 2016b)	**Unlikely** - There are no historical records in the Search Area, the species was not detected during either of the field surveys and preferred habitat is not present in Project Area.
Pterostylis xerophila	Desert Greenhood	VU	V	1	May	Little is known of the precise habitat requirements of the Desert Greenhood. In South Australia, the species occurs in dry woodland on fertile red loamy soils, on or around granite or quartzite rock outcrops. Species commonly found in areas on the Eyre Peninsula with Broombush, Ridge-fruited Mallee, Beaked Red Mallee and/or Narrow-leaf Red Mallee (Duncan 2010b).	**Unlikely** - There are no historical records in the Search Area, the species was not detected during either of the field surveys and is only listed as 'May Occur' by the PMST.
Senecio macrocarpus	Large-fruit Fireweed	VU	V	1	May	The Large-fruit Fireweed occurs most commonly in depressions in low lying closed sedgeland but may occur in sedgeland, herb land, low shrubland to low open woodland where competition from understorey plants is low. The soils range from clay to loamy sand. (DCCEW 2024b).	**Unlikely** - There are no historical records in the Search Area, the species was not detected during either of the field surveys and is only listed as 'May Occur' by the PMST.

Scientific Name	Common Name	Conservation status		Source of Information	Last Sighting (year)/ PMST	Habitat Preferences	Likelihood of occurrence within Project Area
		EPBC Act	NPW Act				
Swainsona pyrophila	Yellow Swainson-pea	VU	R	1	May	The Yellow Swainson-pea is found in mallee vegetation communities on a variety of soil types including well-drained sands, sandy loams and heavier clay loams. It is usually found after fire growing in association with Eucalyptus species mid mallee woodland over Broombush tall shrubland (Tonkin and Robertson 2010).	**Unlikely** - There are no historical records in the Search Area, the species was not detected during either of the field surveys and is only listed as 'May Occur' by the PMST.
Fauna							
Actitis hypoleucos	Common Sandpiper	Mi (W)	R		May	The Common Sandpiper can be found in varied coastal and interior wetlands like narrow muddy edges of billabongs, river pools, mangroves, among rocks reefs and rocky beaches (Morcombe 2021). The habitat of the species includes is banks, rocks and sandy beaches near water. Found in coastal or inland wetlands, both saline or fresh (Birdlife 2024b).	**Unlikely** - There are no historical records in the Search Area, the preferred habitat is not present and is only listed as 'May Occur' by the PMST.
Anhinga novaehollandiae novaehollandiae	Australasian Darter		R	2	2012	The Australasian Darter is found in wetlands and sheltered coastal waters. Most often seen inland, around permanent and temporary water bodies at least half a metre deep, but may be seen in calm seas near shore, fishing (Birdlife 2024a).	**Unlikely** – Despite the recent record (<20 years old), suitable habitat is not present in the Project Area.
Aphelocephala leucopsis	Southern Whiteface	VU		1	Likely	Southern whitefaces live in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains (DCCEEW 2023a).	**Unlikely** – There are no historical records within 5 km of the Project Area. The species has not been detected in the Project Area, despite two field surveys undertaken by experienced observers.
Aprasia pseudopulchella	Flinders Ranges Worm-lizard	VU		1	Likely	The Flinders Ranges Worm-lizard inhabits open woodland, native tussock grassland, riparian habitats, and rocky isolates, preferring stony or clay soils with a stony / rocky surface, but has also been found sheltering in soil beneath sones and rotting stumps (DEWHA 2008c).	**Unlikely** - There are no historical records in the Search Area and the preferred habitat is not present in the Project Area.
Botaurus poiciloptilus	Australasian Bittern	E	E	1	May	The Australasian Bittern is found mainly in freshwater wetlands and, rarely, in estuaries or tidal wetlands, favouring wetlands dominated by	**Unlikely** - There are no historical records in the Search Area, the preferred habitat is not

Scientific Name	Common Name	Conservation status		Source of Information	Last Sighting (year)/ PMST	Habitat Preferences	Likelihood of occurrence within Project Area
		EPBC Act	NPW Act				
						sedges, rushes and reeds growing over a muddy or peaty substrate. It favours wetlands with tall dense vegetation, where it forages in still and shallow water, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It also favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds or cutting grass growing over a muddy or peaty substrate (TSSC 2019).	present and is only listed as 'May Occur' by the PMST.
Calidris acuminata	Sharp-tailed Sandpiper	VU, Mi (W)		1	May	Sharp-tailed sandpipers occur within all states of Australia. They are found mostly in the south-east and are widespread in both inland and coastal locations. The species also occurs in both freshwater and saline habitats. The species is widely but sparsely scattered inland. Sharp-tailed sandpipers are considered widespread in the eastern half of SA and may be found as far north as Lake Eyre (DCCEEW 2024c).	**Unlikely** - There are no historical records in the Search Area, the preferred habitat is not present and is only listed as 'May Occur' by the PMST.
Calidris ferruginea	Curlew Sandpiper	CE, Mi (W)	E	1	May	The Curlew Sandpiper mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (DCCEEW 2023b).	**Unlikely** - There are no historical records in the Search Area, the preferred habitat is not present and is only listed as 'May Occur' by the PMST.
Calidris melanotos	Pectoral Sandpiper	Mi (W)	R	1	May	The Pectoral Sandpiper shallow fresh to saline wetlands ranging from coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains, and artificial wetlands (DCCEEW 2024b).	**Unlikely** - There are no historical records in the Search Area, the preferred habitat is not present and is only listed as 'May Occur' by the PMST.
Corcorax melanorhamphos	White-winged Chough		R	2	2013	White-winged Choughs are found in open forests and woodlands. They tend to prefer the wetter areas, with lots of leaf-litter, for feeding, and available mud for nest building (Birdlife 2024a).	**Possible** – There recent record (<20 years old) and suitable habitat is present in the Project Area.

Scientific Name	Common Name	Conservation status		Source of Information	Last Sighting (year)/ PMST	Habitat Preferences	Likelihood of occurrence within Project Area
		EPBC Act	NPW Act				
Coturnix ypsilophora australis	Brown Quail		V	2	2005	Brown Quails are cryptic species that occurs in dense crops (especially oats), irrigated pastures, rank grasslands and sedgelands, especially where native species predominate, and often bordering swamps. Prefers dense grasslands, often on the edges of open forests and bracken (DEH 2014a).	**Possible** – There are recent historical records (<20 years old) but no suitable intact habitat is present in the Project Area.
Emydura macquarii	Macquarie River Turtle		V	2	2004	The population of Macquarie River Turtle prefers long pools with a rocky substrate and sheltering features such as snags, overhanging banks or clumps of vegetation such as Hydrilla. They are often found in shallow waters of such pools and they utilise partially submerged logs as basking platforms (DCCEEW 2024b).	**Unlikely** – Despite the recent record (<20 years old), suitable habitat is not present in the Project Area.
Falco hypoleucos	Grey Falcon	VU	R	1	Likely	The Grey Falcon frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter (TSSC 2020).	**Unlikely** - There are no historical records in the Search Area and the preferred habitat is not present in the Project Area.
Falco subniger	Black Falcon		R	2	2012	The Black Falcon is endemic to Australia and is sparsely spread in the inland and across northern, eastern, southern and central Australia. The Black Falcon is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas (Birdlife 2024b).	**Possible** –There is recent historical records (<20 years old) and suitable habitat is present, however not largely intact.
Gallinago hardwickii	Latham's Snipe	VU, Mi (W)	R	1	May	The Latham's Snipe usually inhabit open, freshwater wetlands with low, dense vegetation. Smaller numbers inhabit drier habitat, including open woodlands and high-altitude grasslands or herb lands, usually those being in proximity to surface water (DCCEEW 2024d).	**Unlikely** - There are no historical records in the Search Area, the preferred habitat is not present and is only listed as 'May Occur' by the PMST.
Grantiella picta	Painted Honeyeater	VU	R	1	May	The Painted Honeyeater is dependent on mistletoe berries (Morecombe 2021) and is found in dry open forests and woodlands and is strongly associated with mistletoe. It may also be found along rivers, on plains with scattered trees and on farmland with remnant vegetation.	**Unlikely** - There are no historical records in the Search Area, the preferred habitat is not present and is only listed as 'May Occur' by the PMST.

Scientific Name	Common Name	Conservation status		Source of Information	Last Sighting (year)/ PMST	Habitat Preferences	Likelihood of occurrence within Project Area
		EPBC Act	NPW Act				
						It has been seen in urban parks and gardens where large eucalypts are available (Birdlife 2024a)	
Melanodryas cucullata cucullata	South-eastern Hooded Robin	EN	R	1, 2	Likely, 2012	The Hooded Robin (south-eastern) prefers dry eucalypt and acacia woodlands and shrublands with an open understorey, some grassy areas and a complex ground layer. While they can occur in patches as small as 2.9 ha, in agricultural landscapes they prefer larger patches greater than 10 ha with moderately deep to deep soils (DCCEEW 2023c).	**Unlikely** – Despite the recent record (<20 years old), suitable habitat is not present in the Project Area.
Microeca fascinans fascinans	Jacky Winter		R	2	2013	The Jacky Winter prefers open woodland (Eucalypt and mallee) with an open shrub layer and bare ground. Often seen in farmland and parks (DEH 2014b).	**Unlikely** – Despite the recent record (<20 years old), suitable habitat is not present in the Project Area.
Myiagra cyanoleuca	Satin Flycatcher	Mi (T)	E	1	May	The Satin Flycatcher is known to inhabit forest, woodland, mangroves and coastal heath scrub. Prefers dense, wet gullies of heavy eucalypt forest in breeding season (Morcombe 2021). Heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests (DCCEEW 2024b).	**Unlikely** – Despite being listed as “Known to occur” by PMST, there are no historical records in the Search Area and the preferred habitat is not present
Neophema chrysostoma	Blue-winged Parrot	VU	V	1	Likely	The Blue-winged Parrot inhabits a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones. The species can also be seen in altered environments such as airfields, golf-courses and paddocks (DCCEEW 2023d).	**Unlikely** – There are no historical records in the Search Area and habitat is not intact.
Neophema elegans elegans	Elegant Parrot		R	2, 3	2018, 2019	The Elegant Parrot can be found in a wide variety of habitats, including grasslands, shrublands, mallee, woodlands and thickets, bluebush plains, heathlands, saltmarsh and farmland (Birdlife 2024b).	**Known** - Species was recorded during 2018 field assessment.

Scientific Name	Common Name	Conservation status		Source of Information	Last Sighting (year)/ PMST	Habitat Preferences	Likelihood of occurrence within Project Area
		EPBC Act	NPW Act				
Pedionomus torquatus	Plains-wanderer	CE	E	1	May	Inhabits sparse, treeless, lowland native grasslands with approximately 50% bare ground, most vegetation less than 5 cm in height, with some widely-spaced plants up to 30 cm high. Present in very small numbers in SE South Australia occurring in sparse, treeless native grasslands and/or low shrubland (DotE 2015)	**Unlikely** - There are no historical records in the Search Area, the preferred habitat is not present and is only listed as 'May Occur' by the PMST.
Rostratula australis	Australian Painted Snipe	EN	E	1	Likely	The Australian Painted Snipe occurs in shallow freshwater (occasionally brackish) wetlands, both ephemeral and permanent, such as lakes, swamps, inundated or waterlogged saltmarsh, dams, rice crops, sewage farms and bore drains, rushes and reeds, low scrub, open timber or samphire (DCCEEW 2024b).	**Unlikely** - There are no historical records in the Search Area and the preferred habitat is not present in the Project Area.
Stagonopleura guttata	Diamond Firetail	VU	V	1	Likely	Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees. They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover (DCCEEW 2023e).	**Unlikely** - There are no historical records in the Search Area and the preferred habitat is not present in the Project Area.
Tiliqua adelaidensis	Pygmy Blue-tongue Lizard	EN	E	1	Likely	Pygmy blue-tongues do not appear to be confined to a particular floristic community of native grassland and co-occur with various native grassland species including tussock grasses and perennial herbs (DCCEEW 2023f).	**Unlikely** - There are no historical records in the Search Area and the Project Area is on the edge of the species distribution.
Zapornia tabuensis	Spotless Crake		R	2	2019	The Spotless Crake is found in well vegetated freshwater wetlands with rushes, reeds and cumbungi. Will also frequent muddy areas, reedbeds or wetlands (DEH 2007).	**Unlikely** – Despite the recent record (<10 years old), suitable habitat is not present in the Project Area.

Conservation status

EPBC Act (Environment Protection and Biodiversity Conservation Act 1999). NPW Act (National Parks and Wildlife Act 1972). Conservation Codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. ssp.: the conservation status applies at the sub-species level. Mi: listed as migratory under the EPBC Act. Ma: marine. T: Terrestrial. W: Wetlands.

Source of Information

1. **EPBC Act Protected Matters Report (DCCEEW 2024a) – 5 km buffer applied to Project Area.**
2. **Biological Database of South Australia data extract (DEW 2024b) - 5 km buffer applied to Project Area.**
3. **Recorded during the field survey..**

Appendix 6 – Photos of the access point 1 to 7 taken during the 2018 field survey.

Access Point 1
Photo facing Southeast (-33.626024, 138.360561)

Access Point 2
Photo facing West (-33.626188, 138.385714)

Access Point 3
Photo facing North (-33.631096, 138.375717)

Access Point 5
Photo facing South (-33.639179, 138.375660)
(No photo of Access Point 4 (North of Access Point 5) was taken in the 2018 field survey)

Access Point 6
Photo facing South (-33.639002, 138.385858)

Access Point 7
Photo facing West (-33.646518, 138.369194)

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Appendix K

Socio-economic Impact Assessment

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Via email: Michael.Sale@windprospect.com.au

The Secretary
Sate Commission Assessment Panel
Planning and Land Use Services
Level 10, 83 Pirie Street
ADELAIDE SA 5000

23 April 2024

Dear Sir/Madam

SOCIOECONOMIC IMPACT ASSESSMENT (4 AUG 2023) FOR THE BRINKWORTH SOLAR FARM AND BESS PROJECT

This letter should be read in conjunction with the Socioeconomic Impact Assessment (4 Aug 2023) for the Brinkworth Solar Farm and BESS Project, which assessed both construction and operation phase impacts to socio-economic features as a result of the project. The assessment considered both the solar PV and the battery energy storage facility (BESS) of the Brinkworth project.

Since preparing this report, and prior to the development application being submitted, the *Planning, Development and Infrastructure (General) Regulations 2017* (PDI Regulations) have been varied, which has made battery storage facilities in designated locations, including the subject land where the BESS is proposed, exempt from planning approval. Further, we understand that our client now wishes to proceed with the development of the BESS as Stage 1 of the project (as development exempt from approval) and subsequently Stage 2 being the solar farm (the subject of this development application).

The assessment undertaken in our report of 4 Aug 2023 remains valid, irrespective of the amended application and approval processes, and noting that our client is not seeking approval for the BESS or supporting infrastructure.

Yours faithfully,

Anders Magnuson

Partner

CC: Heather Bailey

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BRINKWORTH SOLAR FARM & BESS SOCIOECONOMIC IMPACT ASSESSMENT

A Report for Wind Prospect

4 August 2023

Prepared by

BDO EconSearch

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
BESS	battery energy storage system
BMC	Brinkworth Management Committee
EIS	environmental impact statement
FTE	full-time equivalent
GRP	gross regional product
GSP	gross state product
IO	input-output
IRENA	International Renewable Energy Agency
LGA	local government area
PIRSA	Department of Primary Industries and Regions
RISE	Regional Industry Structure and Employment
SA	South Australia
SATC	South Australian Tourism Commission
$m	million dollars

DOCUMENT HISTORY AND STATUS

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1	Draft	Michael Sale	1 Word 1 PDF	22/12/22	HB	ADM
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Principal Author/s:	Alex Donnelly-Young and Heather Bailey
Name of Client:	Wind Prospect
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EXECUTIVE SUMMARY

Akaysha Energy have proposed the construction and operation of a solar farm and battery energy storage system ('the Project') near Brinkworth and Koolunga in South Australia. The solar farm is expected to generate enough electricity to supply more than 55,000 South Australian households. The battery energy storage system is expected to store 1,200 MWH of energy. The Project is expected to be constructed over three years (October 2024 to June 2027) and to operate for at least 20 years.

Wind Prospect, on behalf of Akaysha Energy, has engaged BDO EconSearch to conduct a socio-economic assessment of the Project. This report provides an analysis of:

- The baseline conditions of the Project Study Area[1], including information on the local towns, population trends in the region, economic profile, and housing availability.
- Economic impacts of the operation, construction and loss of agricultural production of the Project, including the impact on gross regional/state product (GRP/GSP), the number of full-time equivalent (FTE) jobs and household income of the region[2] and South Australia. This includes the top five industry sectors impacted by GRP/GSP of the Project.
- The impact on local labour competition and local price inflation of the Project.
- The impact on local housing and accomodation availability of the Project.

A range of information sources and models were used to assess the potential impacts. Regional Industry Structure and Employment (RISE) models, developed by BDO EconSearch, for the region (comprising the Yorke and Mid North SA government region) and the state (i.e. South Australia), were used to support the assessment.

Baseline conditions

The population of the Study Area is older, is less diverse, has fewer people earning high income and has lower levels of educational attainment than the South Australian average. The population growth between 2011 and 2021 across the Study Area (1.7 per cent) has been slower than South Australia (5.0 per cent). Within the Study Area the 10-year population growth rates ranged from 0.2 per cent (Port Pirie local government area (LGA)) and 5.0 per cent (Clare and Gilbert Valleys LGA).

The agriculture sector is the largest contributor to regional GRP and the second largest employing sector in the Yorke and Mid North region. The unemployment rate is highly varied between LGAs within the region, with Port Pirie having a higher unemployment rate (7.1 per cent) than the Study Area (5.2 per cent) and South Australia (5.4 per cent) in 2021. The unemployment rates in both the Study Area and South Australia have slightly decreased between 2011 and 2021.

Across the LGAs within the Study Area residential property has become more expensive to rent with relative rent increases rising faster than South Australia as a whole. The vacancy rates across the Study Area have fallen substantially between 2016 and 2021 (92 per cent), which explains the relative rent increases. House

[1] Comprising Wakefield Regional Council, Northern Areas Council, Port Pirie Regional Council and Clare and Gilbert Valleys Council.

[2] Defined as the Yorke and Mid North SA government region (comprising Yorke Peninsula, Copper Coast, Barunga West, Wakefield, Clare and Gilbert Valleys, Goyder, Port Pirie, Northern Areas, Mount Remarkable, Orroroo/Carrieton and Peterborough LGAs).

prices in the Study Area have grown between 8 and 19 per cent, at a similar rate to rural South Australia (11 per cent) and South Australia as a whole (13 per cent) between 2016 and 2021.

Economic impact on economies

Table ES-1 shows the estimated average annual economic impact of the Project's construction and operation to the regional and South Australian economies. The impacts on South Australia are inclusive of the impacts for the region.

Construction phase

The Project is expected to have a capital investment of $822m over the construction period, between October 2024 and June 2027. The average annual estimated total impacts from these capital expenditures are expected to be:

- Region - $54.3m in GRP, 411 FTE jobs and $33.5m of household income
- South Australia - $114.4m in GSP, 852 FTE jobs and $72.3m of household income.

These are the total estimated impacts and include both direct and flow on effects.

Table ES-1 Average annual potential impact of the Project, construction and operation

Indicator	Construction (3 years)		Operation (20 years)	
	Yorke & Mid North	South Australia	Yorke & Mid North	South Australia
GRP/GSP ($m)				
Direct	28.2	43.9	1.0	3.1
Production induced flow-on	14.5	36.1	0.5	0.8
Consumption induced flow-on	11.5	34.4	0.6	1.0
Total[a]	54.3	114.4	2.1	4.9
Employment (FTE jobs)				
Direct[b]	212	328	9	9
Production induced flow-on	123	296	2	3
Consumption induced flow-on	75	228	4	6
Total[a]	411	852	15	19
Household Income ($m)				
Direct	18.5	29.4	1.0	1.0
Production induced flow-on	9.5	25.4	0.2	0.3
Consumption induced flow-on	5.5	17.6	0.3	0.5
Total[a]	33.5	72.3	1.5	1.9

[a] Sums may not add to total due to rounding.

[b] Direct FTE estimates of employment are both on-site and off-site employment by businesses directly supplying the Project with goods and services and use RISE model estimates of direct FTE jobs based on the economy-wide effects of the Project capital expenditure profile.

Source: BDO EconSearch analysis

Operating Phase

The Project is expected to operate for at least 20 years. The average annual estimated impacts from the operational expenses of the Project are expected to be:

- Region – $2.1m in GRP, 15 FTE jobs and $1.5m of household income
- South Australia - $4.9m in GSP, 19 FTE jobs and $1.9m of household income.

These are the total estimated impacts and include both direct and flow on effects.

These impacts are exclusive of the community benefit sharing package which Akaysha Energy have committed $20,000 annually for the BESS and $30,000 annually for the solar farm. These funds will be provided for the life of the project to the sustainable community fund and will be available for various community projects and organisations.

Economic impact on industries

During the Project construction phase, the top five positively impacted sectors, in terms of contribution to GRP/GSP, are expected to include the construction industry (Other Construction and Construction Services), other support sectors to the construction industry (Non-metallic Mineral Product Manufacturing and Professional, Scientific and Technical Services) and Road Transport.

During Project operation phase, the top five positively impacted sectors are expected to include Electricity Supply, Finance, Retail Trade, Wholesale Trade and Education and Training.

Economic impact on agriculture

The potential impact from the loss of agricultural production from the Project over its life was estimated to be a reduction of:

- Region - $0.5m in GRP, 2 FTE jobs and $0.2m in household income annually
- South Australia - $0.6m in GSP, 3 FTE jobs and $0.2m in household income annually.

These are the total estimated impacts and include both direct and flow on effects.

Labour competition and associated price inflation

The potential impacts of the Project's operation and construction on local labour competition and associated likelihood of price inflation in the region is expected to be minimal.

Most of the labour for construction is expected to be sourced from Port Pirie (72 persons at peak construction), followed by Adelaide (54 persons) and Clare (18 persons) with the remaining 36 persons sourced from other local areas. The labour for construction is short term and is not expected to relocate to the region, so is expected to have negligible effect on local labour competition.

For Project operation, the in-migration of employees into local towns is expected to decrease the unemployment rates by between 0.1 per cent (Claire, Crystal Brook, Port Broughton, Port Pirie, Port Wakefield, and Spalding) and 1.0 per cent (Koolunga), based on most recently published locality

unemployment rates (2021)[3]. In those townships where larger decreases in unemployment rate are expected (Brinkworth at 0.6 per cent decrease and Koolunga), the unemployment rates are expected to stay above the long-run unemployment rate (5 per cent) and are not expected to affect competition for labour.

Housing availability

During Project construction, it is expected that 54 construction workers will come from Adelaide and will require temporary accommodation. If peak Project temporary accommodation demand coincides with the high season tourism demand for accommodation, then it is likely that there will be sufficient temporary accommodation available to meet Project demand in each of the three tourism regions (Clare Valley, Yorke Peninsula, and Flinders Ranges and Outback. However, if only 20 per cent of the temporary accommodation vacancies are suitable then the Project demand for rooms would exceed the availability in the Clare Valley tourism region. Conversely, if peak Project temporary accommodation demand coincides with the low season tourism demand for accommodation, then it is likely that there is sufficient availability of temporary accommodation to meet Project demand.

During Project operation, up to two employee households could move into the Study Area. Rental vacancies are extremely limited in the Study Area (with several localities having a three-year trend of nil rental vacancies), and if current trends continue, the Project could demand up to 50 per cent of the rental accommodation supply in Port Pirie.

[3] Noting that the state-wide unemployment rate has dropped from 5.4 per cent to 4.4 per cent between June 2021 and May 2023. So, it can be expected that the unemployment rates in regional SA have also dropped.

1. INTRODUCTION

1.1. Background

Wind Prospect, on behalf of Akaysha Energy, has engaged BDO EconSearch to undertake an economic impact assessment of the proposed construction and operation of a solar farm and battery energy storage system (BESS) near Brinkworth in South Australia ('the Project'). This report presents the finding of that assessment.

This document forms a part of the impact assessment documentation prepared for the environmental impact statement (EIS) being prepared for the Proposal under the major development provisions of the *Development Act 1993* (Section 46).

1.2. Purpose of the Assessment

The main objectives of the specialist economic impact assessment report are to describe the socioeconomic environment in which the Project is set, and to identify and assess the magnitude of potential economic and employment effects of the Project for state and regional contexts.

The assessment covers:

- Economic activity generated by the construction and operation of the Project
- Losses to agricultural production from the Project's footprint
- Impacts on local labour competition and associated price effects
- Impacts on local housing availability.

The socio-economic effects of the decommissioning phase of the Project are not included in this assessment.

1.3. Project Description

Akaysha Energy have proposed the construction and operation of a solar farm and BESS near Brinkworth ('the Project'). The solar farm is expected to generate enough electricity to supply more than 55,000 South Australian households. The battery energy storage system is expected to store 1,200 MWH of energy (Wind Prospect pers. comm.). This is expected to save approximately 272,400 tonnes of carbon dioxide emissions annually (Wind Prospect pers. comm. 2023). The BESS is expected to have a capacity of 300MW with 4 hours of energy storage.

The Project encompasses 478 hectares of cleared land, which is currently used for cropping and occasional livestock grazing and occurs across parts of two properties.

In addition to the physical elements of the proposed development, Akaysha Energy have committed to the establishment of a Community Benefit Sharing Fund. Akaysha Energy have committed $20,000 annually for the BESS and $30,000 annually for the Solar Farm, totalling $50,000 per year (indexed for inflation) for the life of the project to theis fund. The Community Benefit Sharing Fund will be available for various community projects and organisations. Within 12 months of the solar farm or BESS permanently ceasing to generate electricity, the Project will be decommissioned. This would include removing all equipment and the restoration of all areas associated. A summary of the Project's main features is provided in Table 1-1.

Table 1-1 Summary of the Project's main features

Project's main features	Details
Location	The project is located within the Wakefield Regional Council approximately 7km north of the township of Brinkworth, 4km southeast of the township of Koolunga and approximately 150km north of Adelaide.
Setting	The main land use within the project site is for cereals and pulses cropping and sheep grazing. The site is zoned Rural. Native vegetation is largely restricted due to roadside vegetation, which would largely be avoided.
Landowners	Two landowners with project infrastructure on their land.
Solar farm capacity	Up to 209 MW.
Solar panels	Solar panels are approximately 2.28m long by 1.13m wide. An estimated 367,360 panels will be used in the Project.
Annual generation	Solar component to generate approximately 454 GWh per year.
Construction period	Construction in two separate phases. Approximately four years in total.
On-site substations	Two separate substations are required to connect the BESS and solar farm components of the project separately to the existing Brinkworth Substation. Each substation would include a 275/33kV transformer, earthing/auxiliary transformers, outdoor switchgear, control room and switch room, and cable termination structures.
Operations and maintenance facility	An operations and maintenance facility would be located adjacent to the on-site substation and provide office, storage, and maintenance facilities.
Battery Energy Storage System (BESS)	An on-site battery energy storage facility with a capacity of 300MW/1,200MWh is proposed to be located adjacent to the on-site substation. The BESS would consist of a series of 20-foot modularised batteries with transformers, high voltage air conditioners and other electrical plant.
Transport	Transport of solar panels, BESS, and ancillary components would primarily be from the Port of Adelaide via the regional road network.
Site access and access roads	New access gates will be constructed for the operations and maintenance area off Power Station Road. Farm access gates to the sections of land hosting the solar farm access will also be upgraded. The gates to sections of the solar farm shall remain locked at times when not in active use. The site access to the Operations and Maintenance facility will be open during operational hours only.
Development footprint	The project site encompasses an area of approximately 474 hectares of private land. The site is highly modified, being mostly cleared land for intensive agricultural use. Through placement of the project site within cropping paddocks, the project area has largely avoided native vegetation and fauna habitat.
Temporary components	A temporary construction compound would be located within the project site and include office facilities, amenities, and car parking.
Life	Up to 20 years following a period of up to four years of pre-development and construction activities. Pre-development would include detailed design and early works, where permitted.
Decommissioning	Within 12 months of solar farm and/or BESS permanently ceasing to generate electricity, the solar farm and battery would be decommissioned. This would include removing all above ground equipment, restoration of all areas associated with the project, unless otherwise useful to the ongoing management of the land and post-decommissioning revegetation with pasture or crop.

Project's main features	Details
Environmental benefits	The solar component of the project would generate the equivalent to the average electricity usage of more than 55,000 South Australian households. The solar component will save approximately 272,400 tonnes of CO2 equivalent annually.

Source: Wind Prospect.

1.4. Assessment Area

The area of influence of this Proposal in terms of economic values occurs at a number of scales.

The Project's location is 7km north of the township of Brinkworth, 4km southeast of Koolunga and 150km north of Adelaide and is within the Wakefield Regional Council.

The baseline economic profile and the economic impacts were estimated for the construction and operation of the Project on the region and SA economies. The region is defined as Yorke and Mid North SA government region[4].

The region includes the local government areas (LGAs) whose communities and economies are most likely to be impacted by the Project. Four LGAs have been identified for their relevance in proximity and likely impacts stemming from the Project:

- Wakefield Regional Council- the Project's location
- Northern Areas Council- near neighbour
- Port Pirie Regional Council- near neighbour and 2nd nearest service centre (Port Pirie)
- Clare and Gilbert Valleys Council - nearest service centre (Clare).

These LGAs form the Study Area, the scale at which baseline demographic and residential property profiles are described and competition for labour and housing availability are assessed.

1.5. Report Structure

An outline of the assessment approach employed in this study is provided in Section 2, a description of the baseline (existing) conditions is given in Section 3 and the pathway modelling and assessment of potential impacts is described in detail in Section 4.

[4] Comprising Yorke Peninsula, Copper Coast, Barunga West, Wakefield, Clare and Gilbert Valleys, Goyder, Port Pirie, Northern Areas, Mount Remarkable, Orroroo/Carrieton and Peterborough LGAs.

2. ASSESSMENT APPROACH

2.1. Data Sources and Methods of Analysis

The main data and information sources for this assessment were the demographic, economic and property profiles presented in the baseline/existing conditions chapter of this report and the Project Description and other information provided by Wind Prospect.

These sources were supplemented by published data as referenced within this report. This information was used to quantify changes in impact pathways and resulting potential impacts, to provide input to the economic Impact Assessment chapter of the development application.

The methods and information sources used, and models developed to assess the potential impacts are described in detail for each potential impact in Section 4. The economic impact assessment method, data and assumptions used for a number of the potential economic impacts is described in Section 2.3.

2.2. Certainty Analysis

Certainty analysis of the potential impact estimates was undertaken to determine the relative reliability of the results described in this report, and to justify the acceptance of uncertainty and assumptions. The uncertainty analysis considered the following four aspects, which are described in Table 2-1.

Table 2-1 Rating level of certainty

Level of certainty	Data quality	Method quality	Sensitivity
High	Extensive data; field verified; limited use of assumptions.	Recognised method and application; industry standard approach.	Predictions not sensitive to input variation.
Medium	Limited data; use of industry recognised or benchmarked data; some assumptions.	New method or application of existing method; not industry recognised.	Some sensitivity of predictions to input variation.
Low	Plugged data; limited (if any verification); numerous assumptions.	Ad hoc methodology; informal approach.	Predications highly sensitive to input variations; sensitivity not studied/known.

2.3. Economic Impact Assessment Approach

Impacts of the Project (i.e. the change to economic indicators between 'with' and 'without' the Project) were analysed using state (SA) and Yorke and Mid North region[5] RISE models. The RISE models used in this study are based on 2019/20 data. This section describes the economic activity indicators estimated in this analysis GRP/GSP, employment (full-time equivalent (FTE) jobs) and household income and their components (direct, flow-on and total contributions). It is worth noting that the RISE models are representative of the whole economy of the respective region, and the economic impacts should not be added across these regions. For example, the impacts for South Australia include the impacts for the region.

[5] The Yorke and Mid North SA government region is representative of the Study Area of the Project.

2.3.1. Economic activity

Economic activity indicators: the focus of this report is the generation of economic activity resulting from the Project. The key economic activity indicators considered in the analysis are employment, household income and GRP/GSP.

Economic impact: changes in economic activity are referred to as economic impacts. Generally, changes in economic activity indicators result from some stimulus or external shock imposed. In this analysis, the economic impact includes the increases in contributions to the economy stimulated by the Project capital expenditures and by the income generated and operating expenditures made during the operation of the Project.

2.3.2. Indicators of economic activity

Gross regional product (GRP): is a measure of the contribution of an activity to the economy. GRP is measured as value of gross output (business revenue) less the cost of goods and services (including imports) used in producing the output. In other words, it can be measured as the sum of household income, gross operating surplus and gross mixed income net of payments to owner managers and taxes less subsidies on products and production. It represents payments to the primary inputs of production (labour, capital and land). Using GRP as a measure of economic impact avoids the problem of double counting that may arise from using value of output for this purpose. Gross state product (GSP) is the state equivalent to GRP.

Full-time equivalent (FTE) employment is a measure of the number of working proprietors, managers, directors and other employees, in terms of the number of full-time equivalent (FTE) jobs. FTE is a way to measure a worker's involvement in a project. An FTE of 1.0 means that the person is equivalent to a full-time worker, while an FTE of 0.5 signals that the worker is half-time. In this report employment has been reported in terms of FTE units on a per annum basis.

Household income is a component of GRP/GSP and is a measure of wages and salaries, drawings by owner operators and other payments to labour including overtime payments and income tax, but excluding payroll tax.

2.3.3. Components of economic activity

This section describes the components (direct, flow-on and total contributions) of the economic indicators described in Section 2.3.2. Estimates of economic impact are presented in this study in terms of:

Direct impact is the initial round of output, employment and GRP generated by an economic activity.

During construction, direct employment and GRP is the employment in (and contribution to GRP by) those firms, businesses and organisations that are directly engaged in providing goods and services to the project. The employment occurs both on and off the project site.

Flow-on (or indirect) impact is the sum of production-induced effects and consumption-induced effects. Production-induced effects are additional output, employment and GRP resulting from spending by firms (e.g., electricity supply) that receive payments from the sale of goods and services to firms undertaking, for example, freight transportation services. Consumption-induced effects are additional output, employment and GRP resulting from re-spending by households that receive income from employment in direct and indirect activities.

Total contribution is the sum of direct and flow-on contribution.

2.3.4. Economic impact modelling

Over the past decade BDO EconSearch has developed an extended IO model known as the RISE model. BDO EconSearch updates the RISE model annually for use by the Department of the Premier and Cabinet, Government of South Australia. RISE models based on the 2019/20 financial year of the Yorke and Mid North Region and South Australia were used to make economic estimates of the respective regions.

IO models are widely used to assess the economic contribution of existing levels of economic activity and the economic impacts of shocks. The models are based on IO tables that describe the interdependencies between industries within the regional economy and with the economy outside of the region. This makes the comprehensive economic framework provided by the RISE model extremely useful for disentangling the direct and flow-on effects of activity in a regional economy.

The IO method used in the RISE model has been extended to incorporate population and unemployment changes. Modelling population change allows for the estimation of impacts on population driven sectors, such as government administration, health, defence and education. Modelling unemployment change allows estimation of an offsetting effect on consumption-induced flow-on impacts as some new employees may have previously claimed unemployment benefits in the region and some may be new to the region. These extensions improve the reliability of RISE model estimates compared to conventional IO models.

Modelling Assumptions

In addition to the assumptions embodied in the IO model itself, it was necessary to make a number of other general assumptions in estimating the economic impacts:

- The impacts were measured using models that represents the structure of the various economies for the year in which the most recent models we had developed (2019/20). However, over time there are likely to be improvements in primary factor productivity in these economies. To allow for the improvements an across-the-board (all sectors) labour productivity improvement rate of 0.5 per cent per annum for subsequent years of the construction and operation phases have been incorporated into the modelling.
- When new jobs are created, it should be determined where the people come from to fill those jobs. In some cases, the jobs will be taken by previously unemployed locals or by someone who is currently employed locally but whose own job is taken by a previously unemployed local. In both cases the impact of the newly created job and associated income is partially offset by the fact that someone who was previously receiving unemployment benefits for example is no longer doing so. To calculate this effect requires estimates of the parameter rho, the proportion of new jobs that are likely to be filled by previously unemployed locals. The estimated rhos vary depending on the economy represented in the RISE model. The South Australian rho was assumed to be 0.8 and the region rho was assumed to be 0.5.

2.3.5. Data and assumptions

Assessment period

The assessment period is from 2024 to 2046.

Project capital expenditure

Capital expenditure information was provided by Wind Prospect and included expenditures on the equipment, civil and installation costs, logistics and shipping and grid connection for both BESS and the solar farm. The cost of land was excluded from the economic analysis as this is a transfer of value and not an impact to the economy. The capital costs used in the analysis are provided in Table 2-2.

Table 2-2 Annual capital expenditure assumptions used in analysis ($m)

Capital expenditure category	2024/25	2025/26	2026/27
Miscellaneous	0.1	<0.1	0.0
Equipment	339.2	122.3	0.0
Logistics and shipping	12.1	46.5	0.0
Civils and BoP	0.0	40.2	154.1
Grid connection	0.0	22.1	84.9
Total[a]	351.4	231.2	239.0

[a] Sums may not add to total due to rounding.

Source: BDO EconSearch analysis, Wind Prospect pers. comm.

Project revenue

The expected revenue of the Project could not be provided and was estimated by assuming the same ratio of revenue to operating expenses as the electricity generation sector in the SA 2019/20 RISE model (1.28). This is likely to be a conservative estimate, as the operating costs in renewable energy generation are generally lower than their fossil fuel-based counterparts (IRENA 2021). The estimated revenue was:

- $3.2m in 2025/26
- $6.7m in 2026/27
- $10.6m for the remainder of the assessment period (from 2027/28 to 2045/46).

Project operating expenditure

Wind Prospect provided expected operating costs of the Project including the operation and management of BESS and the solar farm, land rental, and an original equipment manufacturing long term service agreement. Land rental has been assumed to be a transfer of value rather than an economic impact and has therefore been excluded from the analysis. Table 2-3 presents the estimated operational expenditures used in the analysis.

Table 2-3 Annual operational expenditure assumptions used in analysis ($m)

Operating expenditure category	2025/26	2026/27	2027/28 - 2045/46
BESS operation	1.46	2.92	2.92
BESS service agreement	0.64	1.28	1.28
Solar operation fixed	0.00	0.17	2.00
Solar operation variable	0.00	0.02	0.25
Wages	0.27	0.59	1.09
Total[a]	2.37	4.98	7.55

[a] Sums may not add to total due to rounding.

Source: BDO EconSearch analysis, Wind Prospect pers. comm.

Project employment

Employment for the operational phase was provided by Wind Prospect as 10 full-time employees. The on-site employment for the construction phase was provided by Wind Prospect in terms of full-time employees and their expected work weeks. This was split between BESS and the solar farm construction. The peak number of employees of 180 personnel was used for estimating the impacts on labour competition and associated price inflation, and housing availability. The economic modelling converted the work weeks into full-time equivalents (FTEs). Table 2-4 presents the total employees for the year (this is not the peak at any one time) alongside the FTEs of these workers for the Project construction.

Table 2-4 Annual total employees and FTE equivalents, construction

	2024/25	2025/26	2026/27
Total employees (no.)	0	135	255
FTE employees	0	23	104

Source: BDO EconSearch analysis, Wind Prospect pers. comm.

2.4. Labour Competition Assessment Approach

Estimating the effect of increased competition for labour in each location requires an estimate of in-migration to those locations and of the current labour force characteristics of each. The locations where employees would live will likely depend on the distance from each location to the Project and the level of services and amenities in each. The proportion of employees who migrate to a location in order to take up work will depend on the surplus demand for employees once local labour has been hired.

The proportion of employees living in each location (excluding interstate and abroad) was estimated using a gravity model which assigns a proportion of employees to each town based on the formula:

$$E_i = \frac{\left(\frac{P_i}{D_i}\right)}{T}$$

where E_i is the proportion of employees in town i, P_i is the population in town i, D_i is the distance in kilometres between town i and the Project by road and T is the sum of $\frac{P_i}{D_i}$ for all towns.

Table 2-5 shows the local towns which were modelled, the population, distance from the Project by road and the resulting E_i estimated. Some small localities were not included as population estimates for them were not available in the 2021 census.

Table 2-5 Local towns, population, distance from the Project and estimated E_i

Town	Population (persons)	Distance by road (km)	E_i
Blyth	518	20	5.5%
Brinkworth	243	7[b]	7.2%
Clare	3,379	32	21.8%
Crystal Brook	1,537	48	6.6%
Koolunga	183	4[b]	9.4%
Lochiel	104	40	0.5%
Port Broughton	1,116	52	4.4%
Port Pirie	13,708	79	35.8%
Port Wakefield	661	72	1.9%
Redhill	147	28	1.1%
Snowtown	356	22	3.4%
Spalding	194	44	0.9%
Yacka	147	21	1.5%

Sources: ABS 2022a, Google Maps 2023

Estimation of the proportion of employees in each location who in-migrate was made by, first, allocating a proportion of the unemployed people in each location to the new jobs, then assuming the remaining jobs are filled by in-migration. The proportion used to estimate how many of the local unemployed people are employed by the Project was the proportion of the labour force in each location who work in technical and trade sectors, around 7 to 17 per cent. While some people who are already employed are also likely to become employed by the Project instead, their jobs would then become vacant and would be filled by people who are unemployed, assuming that there are enough unemployed people in the location to find an appropriate person. The estimated number of people who are appropriate for employment at the Project in most locations was higher than the employees allocated to those locations by the gravity model, a minimum of 10 per cent in-migration was assumed for these locations. The estimate of in-migration of employees was transformed to in-migration of population by multiplying by the average household size in South Australia of 2.4 (ABS 2022a). Table 2-6 shows the estimated unemployed persons and proportion of local workforce employed in technical and trade sectors.

Table 2-6 Factors for estimating in-migration

Town	Estimated unemployed persons	Proportion of employees in technical and trade sectors
Blyth	11	15.2%
Brinkworth	5	9.6%
Clare	53	16.6%
Crystal Brook	47	14.5%
Koolunga	6	12.1%
Lochiel	2	7.7%
Port Broughton	26	13.4%
Port Pirie	418	14.5%
Port Wakefield	14	10.4%
Redhill	4	6.7%
Snowtown	8	7.5%
Spalding	4	8.0%
Yacka	3	8.1%

Source: ABS 2022a, BDO EconSearch analysis

3. BASELINE/EXISTING CONDITIONS

The following subsections describe the baseline (i.e. existing) demographic, economic and housing conditions that occur in the Study Area (Clare and Gilbert Valleys, Northern Areas, Port Pirie and Wakefield LGAs). These profile data inform the socioeconomic impact assessment by establishing the baseline situation for the Project in terms of the factors relevant for understanding its socio-economic impact.

3.1. Local Townships

It is useful to have background information on the nearby townships to the Project to help contextualise its significance on local communities.

Brinkworth, Wakefield Regional Council

Brinkworth is 7km south of the Project location. Brinkworth is a small, but historic and vibrant town in Wakefield SA. It has a declining population of 243 people, with a bias towards males (56.3 per cent) (ABS 2022a). Brinkworth has an aging population with a median age of 50, however this age distribution is cone shaped, with a heavier weight towards elder persons. In the 2021 Census 20.2 per cent of Brinkworth's population were under the age of 20, and 50.1 per cent were over 50 (ABS 2022a). This indicates that younger people and families are moving elsewhere, possibly for work, or that elderly people move here for retirement.

Brinkworth has a comparatively high working population, given its high median age, with 59.2 per cent in the labour force, 35.5 per cent not in the labour force and 3.3 per cent unstated (ABS 2022a). The unemployment rate of 5.6 per cent is similar to the State average of 5.4 per cent (ABS 2022a). Given the relatively average labour force participation, the median weekly household income of $1,156 is quite low (ABS 2022a). In Brinkworth the median weekly rent was $178 and monthly average mortgage repayments were $737 in 2021 (ABS 2022a).

Brinkworth was originally established as a major railway junction in 1892 at Magpie Creek to facilitate northern and western lines (WalkingSA n.d.). Although it no longer functions as a railway junction, the Brinkworth community is strong and vibrant, demonstrated by winning the Brand South Australia Regional Showcase 2018 for the community category (Brinkworth SA n.d.). The town has an array of social infrastructure, attractions and events (BMC 2018, Brinkworth Progress Association 2023):

- Soldiers' memorial hall, which houses a gym, IT hub and youth club
- Museum, which was formerly the Catholic Church
- Lutheran Church, church hall, and a Uniting Church
- Primary school, which includes sport facilities like an oval, tennis and netball courts and a swimming pool
- Sporting facilities; bowling club, recreation ground oval
- Preschool centre
- Police station, and a Country Fire Service
- Annual country fair
- Annual lawnmower race, which attracted 600 people in 2023

- Park and playground.

There are also a variety of local businesses which could benefit from increased visitors such as the hotel, café, garage and post office.

The community action plan (BMC 2018) discusses the lack of local employment opportunities and retention of younger people as their first key issue.

Koolunga, Port Pirie Regional Council

Koolunga is the closest township to the Project, being an estimated 4km northwest of the Project location. Koolunga is a small town of 183 persons, with a relatively even male (52.4 per cent) to female (47.6 per cent) distribution (ABS 2022a). The median age in Koolunga is 46 which is distributed towards children (29.2 per cent) and over 45s (51.7 per cent) (ABS 2022a).

Koolunga has a high proportion of population in the labour force (66.9 per cent) but also a high unemployment rate (10.5 per cent) (ABS 2022a). The median weekly household income is $1,275 which is reasonable given the relatively low median average weekly rent of $175 and monthly mortgage of $635.

Koolunga has limited public infrastructure. The township has the Koolunga Primary School and a park and playground. There is also one business on the main street which sells agricultural farming products. There used to be a hotel, however it appears to have closed in 2022 (Koolunga Hotel 2022).

Blyth, Wakefield Regional Council

Blyth is a mid-sized township located about 20km southeast of Brinkworth. It has a population of 518 with some bias towards males (53.9 per cent) compared to females (46.1 per cent) (ABS 2022a). The median age of the Blyth population is 42, and the age distribution is similar to South Australia as a whole (ABS 2022a).

The labour force participation in Blyth is quite high (65.4 per cent) while the unemployment rate is quite low (4.0 per cent) (ABS 2022a). This indicates that there are reasonable employment opportunities in Blyth and surrounding areas. The median household weekly income is $1,269 while the median weekly rent is $230 and monthly mortgage is $997 (ABS 2022a). The median rent and mortgages are reasonably high compared to other local townships, indicating that Blyth is an attractive place for people to live.

The Blyth township was founded in 1875 in a location which was a part of a large pastoral run (Blyth Progress Association n.d.). Originally, and for many years, Blyth was a large railway town, which at its peak included a flourmill, butter factory, hospital and agriculture and machinery firms (Blyth Progress Association n.d.). By the 2000s much of this activity had died away, however the community works to maintain high level facilities and businesses (Blyth Progress Association n.d.).

Blyth has a variety of public infrastructure, attractions and businesses (Blyth Progress Association n.d.):

- Primary school
- Community hall
- Trinity Lutheran Church
- Country fire service
- Sportsground, playground, walking trail and golf course
- Café and hotel

- A cinema and escape room
- Multiple stores including a party hire store, post office, hair studio, glaziers and an art gallery and plant nursery
- A heavy vehicle mechanic.

Yacka, Northern Areas Council

Yacka is a small township located approximately 21km northeast of Brinkworth. Yakka houses a population of 147 people, of which 54.1 per cent are male and 45.9 per cent are female (ABS 2022a). The population of Yakka are relatively elderly, with a median age of 56 years and a population distribution skewed to over 50-year-olds (64.0 per cent).

Yakka has a low workforce participation rate of 52 per cent, but also low unemployment with nil unemployment being reported in the 2021 Census (ABS 2022a). The median household weekly income is $1,050, which is somewhat offset by the low median weekly rent ($150) and monthly mortgage repayments ($737).

The township of Yacka was first surveyed in 1869, with blocks first sold in 1870 with the intended purpose as a railway and farming town (NA Council n.d.). At its peak, in the late 1800s and early 1900s, Yacka had two churches, a school, a railway station and numerous small businesses (Northern Areas Council n.d.). By the end of the 20th century Yacka had diminished in size, as both government services were reduced and a number of private businesses left (Northern Areas Council n.d.). Currently Yacka has a local crafts and general store, park, archives and community centre and a hall.

Snowtown, Wakefield Regional Council

Snowtown is a mid-sized township located approximately 22km southwest of Brinkworth. Snowtown has a population of 425 people, with a fairly even distribution between male (51.5 per cent) and female (48.5 per cent) (ABS 2022a). The population of Snowtown is weighted towards an older population, with a median age of 54, and 21 per cent of the population between 60 and 70 years old (ABS 2022a). However there is a significant number of young families, with 22.8 per cent of its population under the age of 19 (ABS 2022a).

Snowtown has a low labour force participation rate of 39.5 per cent, alongside a relatively high unemployment rate of 10.8 per cent (ABS 2022a). This leads into the low median weekly household income of $771 which is only partly offset by the low median weekly rent of $150 and monthly mortgage repayments of $628.

Snowtown was first established in 1878 and built around a planned railway line to Brinkworth (Snowtown Museum n.d.). The current facilities in Snowtown include (Wakefield Regional Council 2017):

- Multiple healthcare facilities such as a hospital, GP clinic, and ambulance station
- Public park including playground and skatepark
- Caravan park
- Primary school
- Newsagency
- Historic buildings.

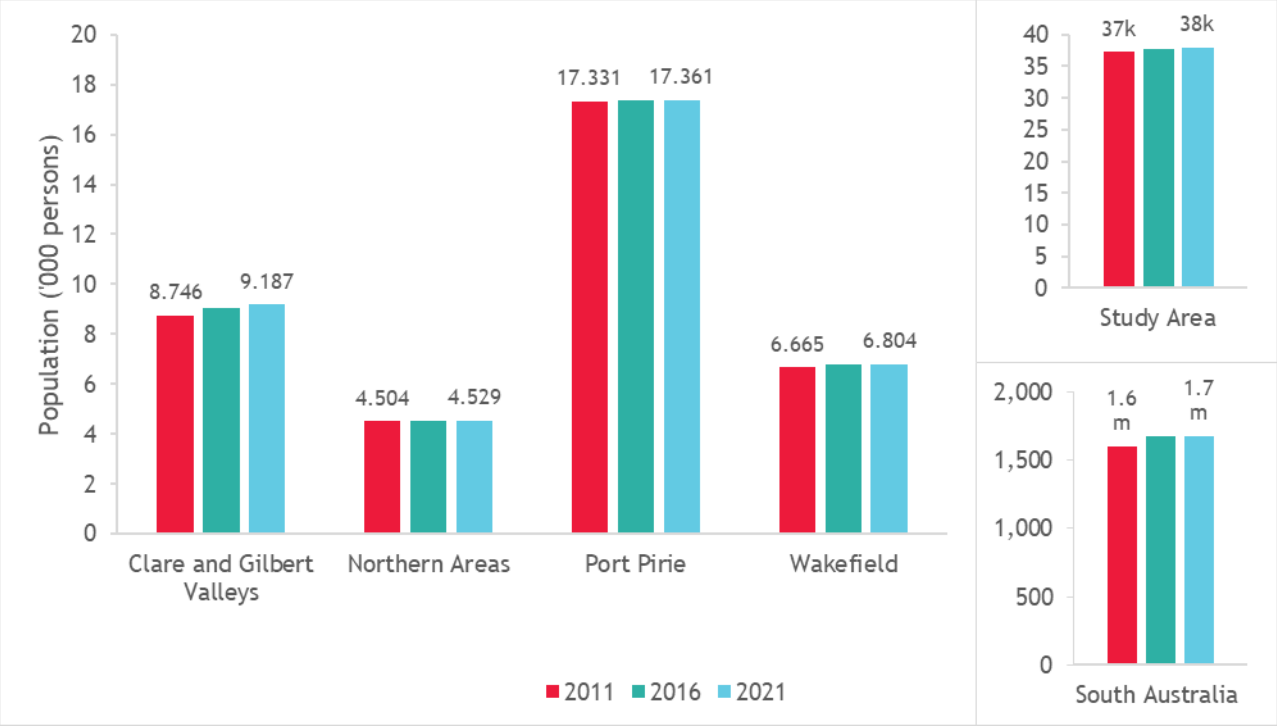
3.2. Regional Demographic Profile

Six demographic indicators inform the socioeconomic impact assessment, namely population, age, gender, language spoken at home, education and proportion of the population earning a high income in the Study Area.

Population trends

The *population* trend from 2011 to 2021 by LGA in the Study Area is presented in Figure 3-1. These trends are compared with the Study Area as a whole and with South Australia over the same period. Across the Study Area the population has increased slightly between 2011 (37,246 persons) and 2021 (37,881 persons), with an increase of 1.7 per cent over that period. In comparison, South Australia's population has increased by 5 per cent over the same period from approximately 1.60 million persons to 1.68 million persons. Within the Study Area, populations have increased in Clare and Gilbert Valleys (5.0 per cent), Wakefield (2.1 per cent) and remained relatively stable in Port Pirie (0.2 per cent) and Northern Areas (0.6 per cent).

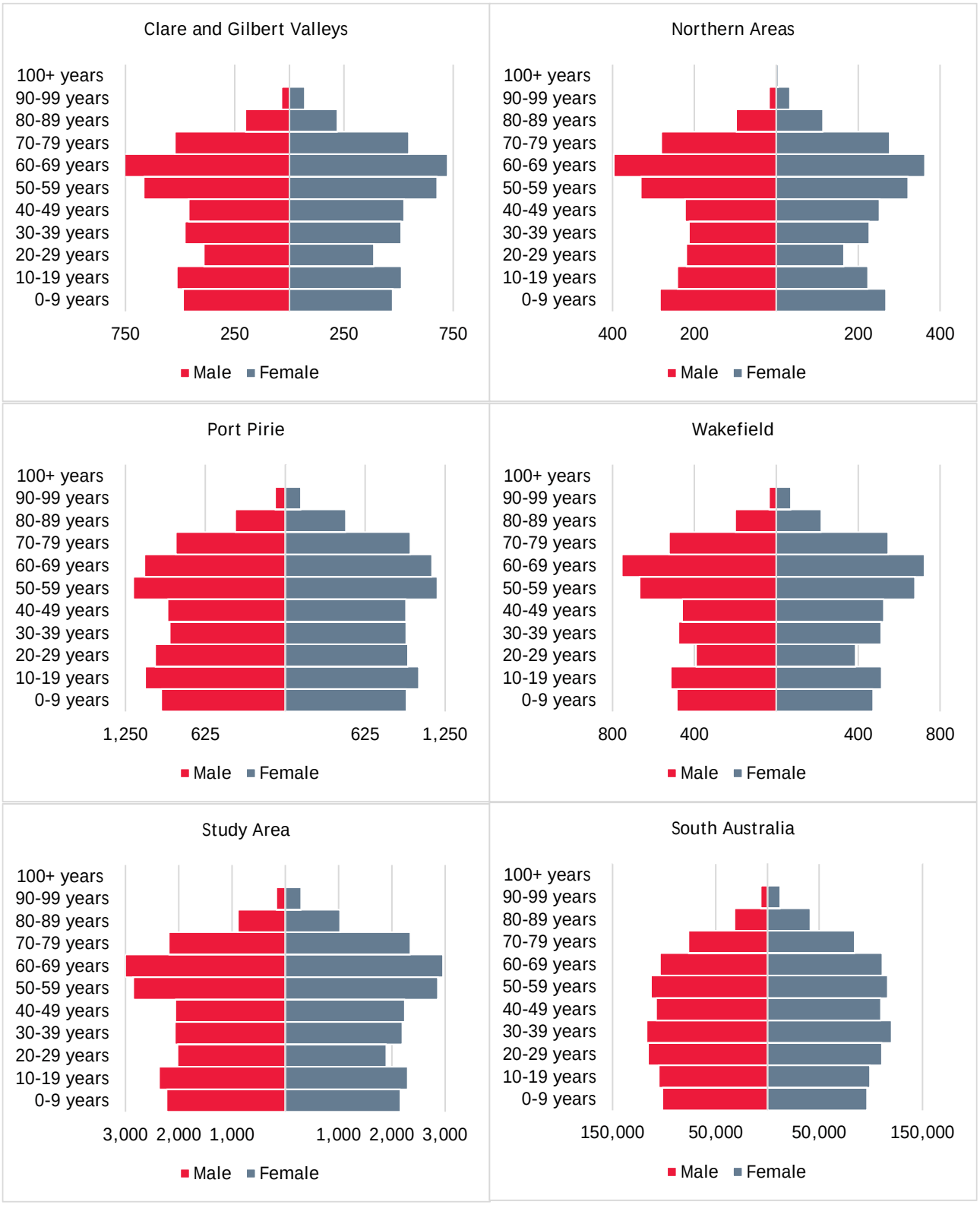
Figure 3-1 Population trend by region (2011 to 2021)



Source: ABS 2022a

Figure 3-2 shows that all regions in the Study Area have older populations with higher numbers of people in the 50-to-69-year age bracket relative to South Australia as a whole. Clare and Gilbert Valleys, and Wakefield show the oldest population with the lowest numbers of young people and children. Northern Areas shows some evidence of a small baby boom with a larger number of children aged 19 and under. Port Pirie most closely matches the South Australian distribution which shows a barrel shaped population that indicates a falling birth rate and a rising life expectancy.

Figure 3-2 Population pyramid by LGA and South Australia (persons), 2021



Source: ABS 2022a

The likely explanation for the relatively lower number of people in the 20-to-39-year age bracket in each LGA in the Study Area is a reflection of wider trends identified across regional Australia as young people seek educational and employment opportunities in regional and metropolitan centres (Luck *et al*. 2010). However, opportunities to encourage counter-urbanisation, where older, urban populations migrate into rural landscapes with high amenity values are also being identified by small regional towns (Luck *et al*. 2010).

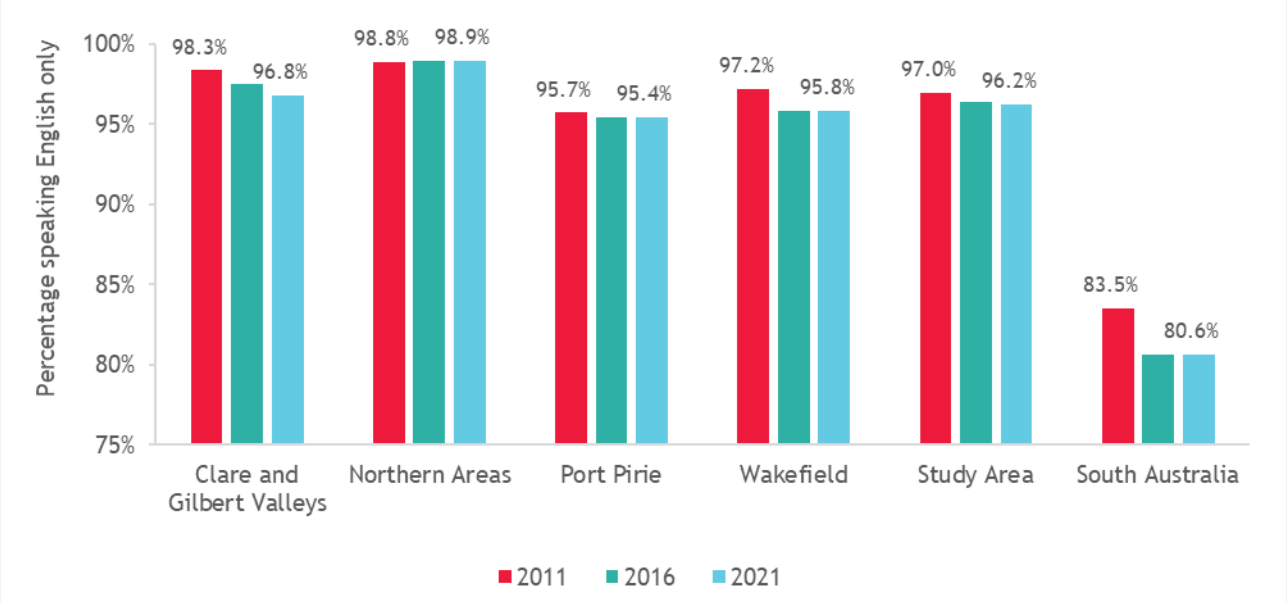
Age and gender trends

Population pyramids that illustrate the age sex distribution for the LGA regions and Study Area are shown in Figure 3-2. These are compared to the distribution for South Australia in the lower-right pane.

Trend in language spoken

The *English as a main language spoken* trend from 2011 to 2021 by LGA in the Study Area is presented in Figure 3-3. These trends are compared with the Study area as whole and with South Australia over the same period.

Figure 3-3 Language spoken trend by LGA (2011 to 2021)



Source: ABS 2022a

Across the Study Area, the proportion of the population speaking English at home as their main language has decreased by 0.8 percentage points from 97.0 per cent in 2011 to 96.2 per cent in 2021. At the local level, the percentage of people who speak English at home remained relatively stable in Northern Areas and Wakefield, while there was a decrease of 1.5 percentage points in Clare and Gilbert Valleys, and a decrease of 1.4 percentage points in Wakefield over the period. In comparison, across South Australia the proportion of the population speaking English at home as their main language has decreased by 2.9 percentage points from 83.5 per cent in 2011 to 80.6 per cent in 2021. This indicates that the Study Area, particularly Northern Areas and Wakefield, is diversifying at a slower rate than the rest of South Australia.

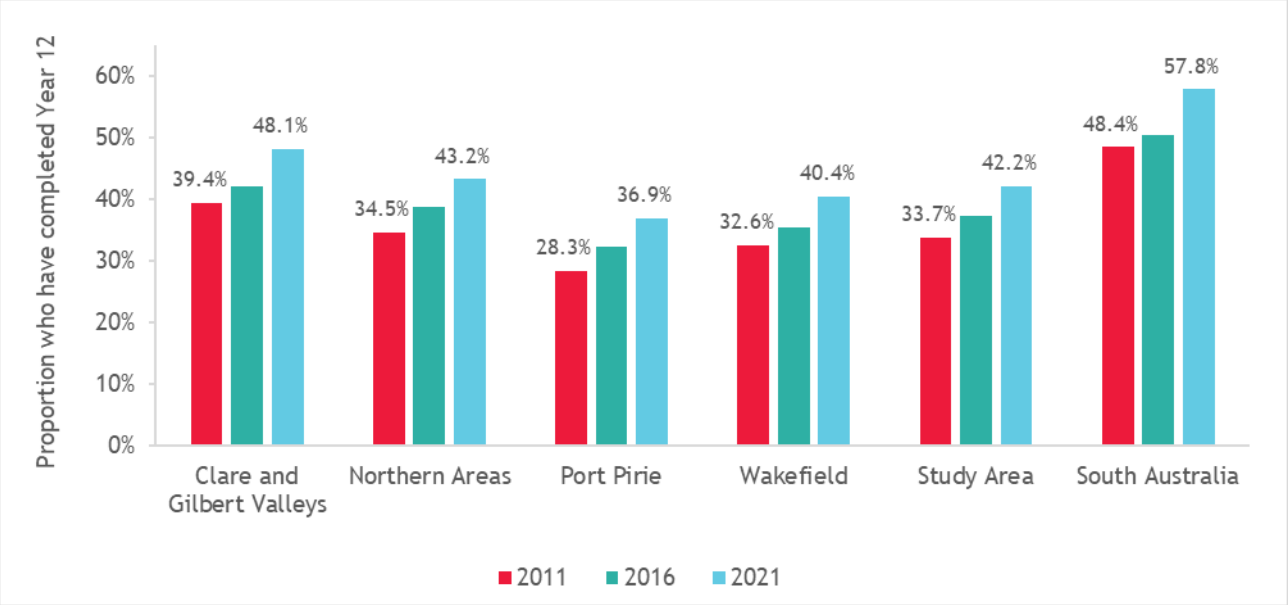
Trend in education

The *proportion of the population with at least year 12 or equivalent education* trend from 2011 to 2021 by LGA in the Study Area is presented in Figure 3-4. These trends are compared with the Study Area as a whole and with South Australia over the same period.

Across the Study Area, the proportion of the population with at least year 12 or equivalent education has increased between 2011 and 2021 from 33.7 per cent to 42.2 per cent, an increase of 8.5 percentage points. This trend is comparable to the broader increase in the proportion of the population with at least secondary education across South Australia which has increased by 8.1 percentage points over the same period from 48.4 per cent to 57.8 per cent.

At the LGA level, the upward trend in the proportion of the population completing year 12 schooling is fairly consistent across the LGAs with an increase of 7.7 percentage points in Clare and Gilbert Valleys, 8.7 percentage points in Northern Areas, 8.6 per cent in Port Pirie and 7.8 percentage points in Wakefield.

Figure 3-4 Education trend by LGA (2011 to 2021)[a]



[a] Excludes persons not stating their level of education.

Source: ABS 2022a

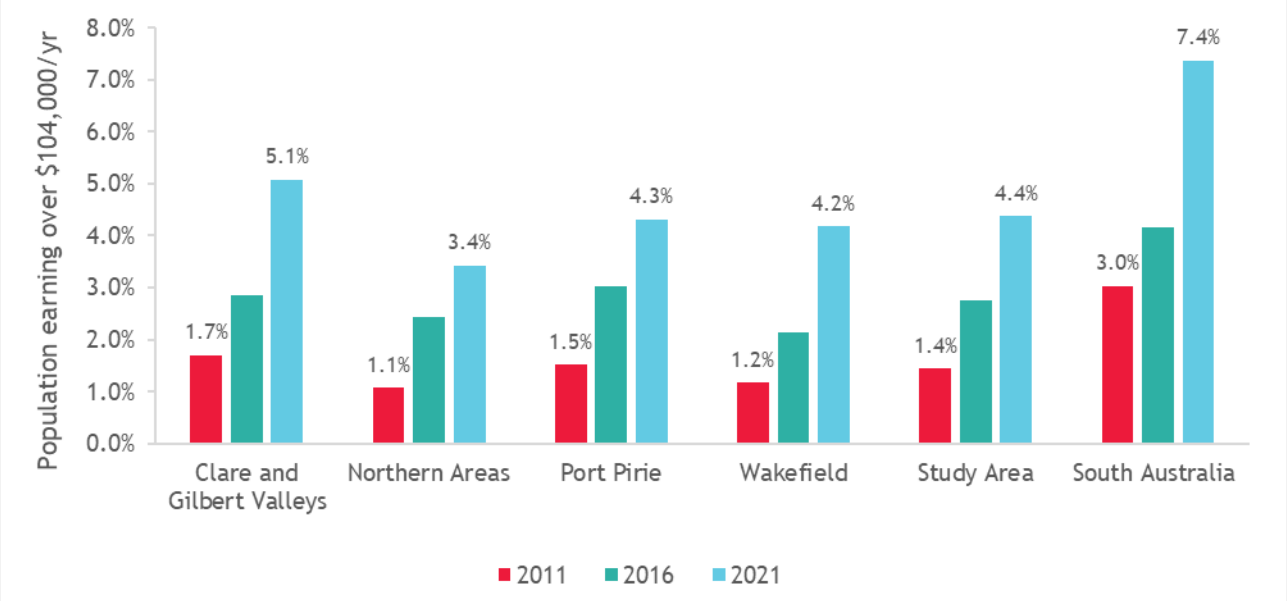
Trends in the proportion of population earning high income

The trends in the proportion of the population earning a high income (over $104,000 per year) from 2011 to 2021 are presented in Figure 3-5. These trends are compared with the Study Area as a whole and with South Australia over the same period.

Across the Study Area as a whole, the population earning over $104,000 per year has increased from around 1.4 per cent to 4.4 per cent between 2011 and 2021, an increase of 3 percentage points. In comparison, in South Australia the proportion has increased from 3.0 per cent to 7.4 per cent, an increase of 4.4 percentage points, a slightly larger increase than the Study Area. The largest increase at the LGA level was in the Clare

and Gilbert Valleys, with a 3.4 percentage point increase, and Wakefield, with a 3-percentage point increase.

Figure 3-5 Trend in the proportion of population earning high income by LGA (2011 to 2021)



Source: ABS 2022a

Summary

The population of the Study Area is older, is less diverse, has fewer people earning high income and has lower levels of educational attainment than the South Australian average. Notably, while the population growth across the Study Area has been slower than the rest of South Australia, this was not even across LGAs, with Clare and Gilbert Valleys having the same (5 per cent) population growth rate, while the other LGAs in the Study Area are lower.

The population of the Study Area is older compared to South Australia, with all LGAs having a higher proportion of people in the 50 to 69 age bracket. There are signs of a baby boom in Port Pirie and Northern Areas, which both have a higher proportion of young people aged between 0 and 19 compared to South Australia. Port Pirie has a similar age distribution to South Australia, while the other LGAs have a top- and bottom-heavy distribution, indicating that people have moved away from the area in their young adulthood.

While educational attainment in the Study Area is lower than the rest of South Australia, the increase in the proportion of population with at least year 12 or equivalent education has been comparable. Clare and Gilbert Valleys show the highest level, but the slowest growth, of educational achievement in the Study Area.

There was an increase in the proportion of high-income earners across all LGAs in the Study Area, mirroring the wider South Australian trend but at a lower rate. The increase was fairly level across the LGAs in the Study Area, with Clare and Gilbert Valleys and Wakefield being slightly ahead.

3.3. Regional Economic Profile

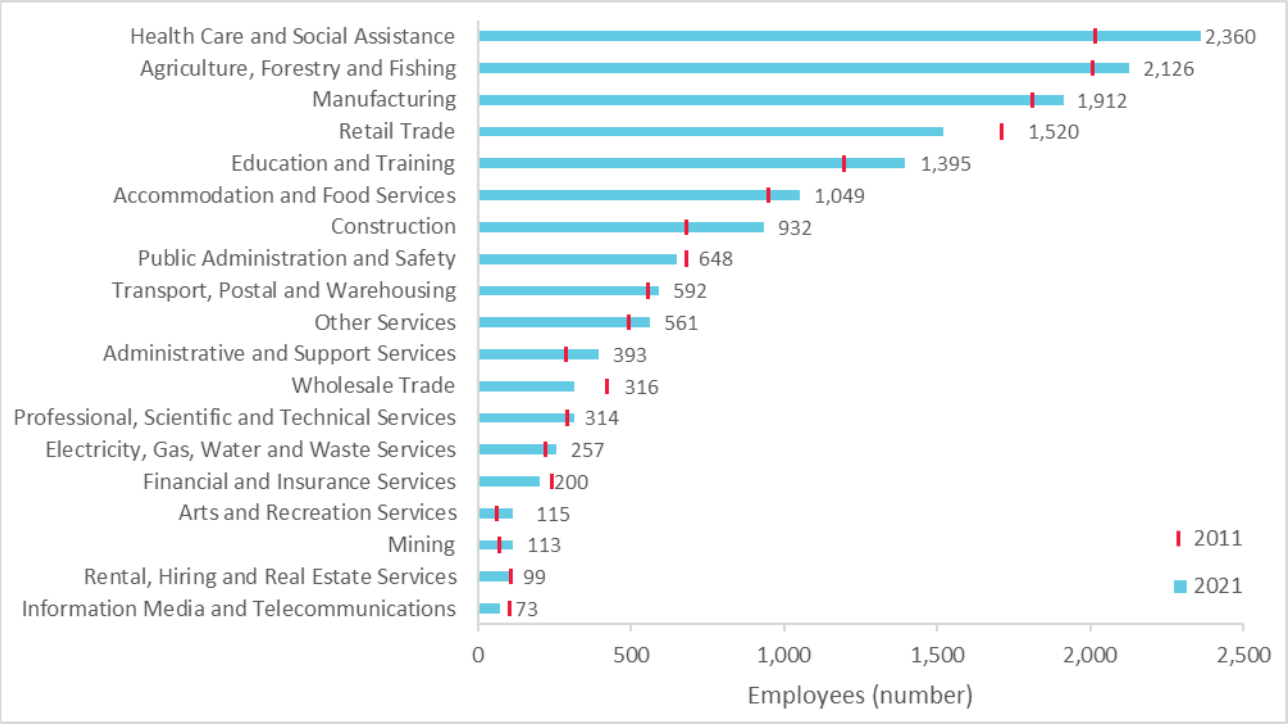
Three economic indicators inform the socioeconomic impact assessment, namely industry of employment, gross regional production (GRP) and unemployment rate in the Study Area.

Trends in industry of employment

The trends in employee numbers by industry sector between 2011 and 2021 for the Study Area are presented in Figure 3-6.

Within the Study Area, the Health Care and Social Assistance sector is the largest employer (15 per cent of employed persons). This is followed by Agriculture, Forestry and Fishing (14 per cent of employed persons), Manufacturing (12 per cent of employed persons), Retail Trade (10 per cent of employed persons) and Education and Training (9 per cent of employed persons). These five sectors accounted for about 60 per cent of the employed persons in the Study Area for 2021. Overall, employee numbers have increased by 10 per cent in the Study Area between 2011 and 2021. The trends in employee numbers by sector in the Study Area have seen growth in all major sectors, beside Retail Trade which has seen a decrease.

Figure 3-6 Industry of employment, Study Area (2011 and 2021)



Source: ABS 2022a

Gross regional product (GRP)

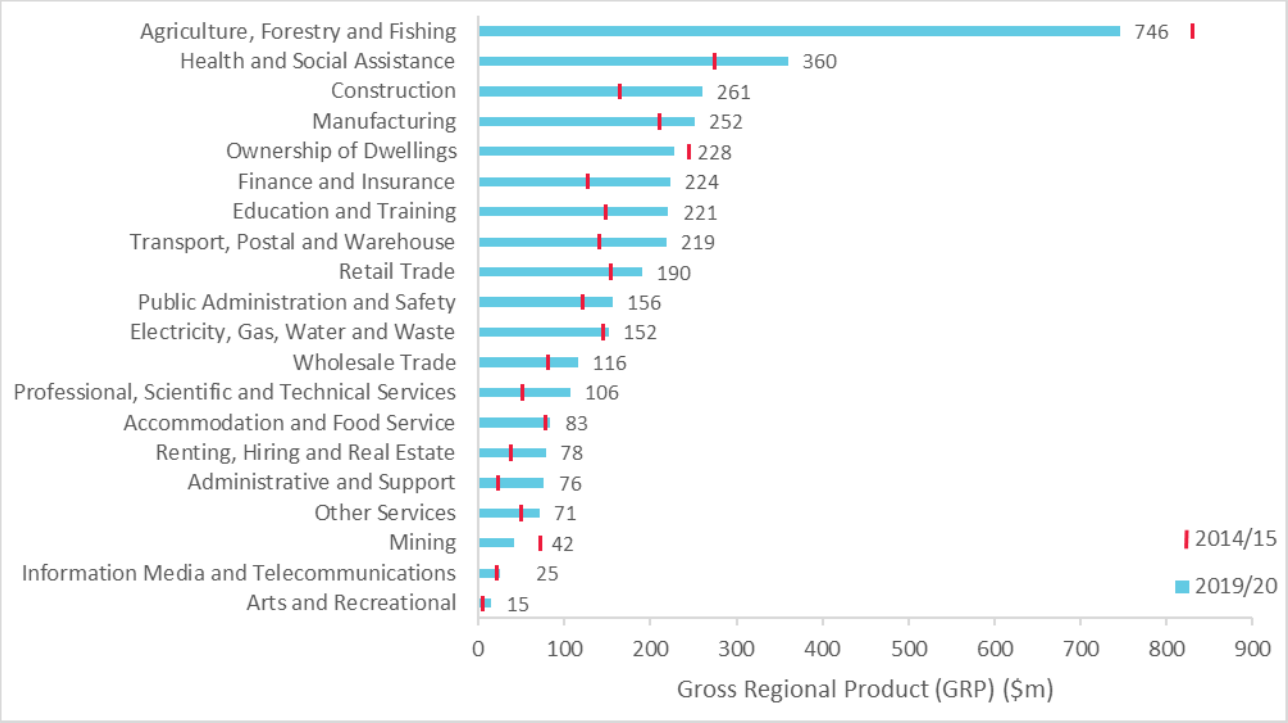
Gross regional product (GRP) is a measure of the net contribution of an activity to the regional economy[6]. GRP estimates are derived from the RISE model of the Yorke and Mid North Government region which

[6] Similarly, contribution to gross state product (GSP) is a measure of the net contribution of an activity to the state economy.

encapsulates the Study Area. RISE models are not available for smaller geographies within the region such as the Study Area LGAs. GRP by industry sector for 2014-15 and 2019-20 for the Study Area are presented in Figure 3-7.

From the profile, it can be seen that the Agriculture, Forestry and Fishing sector dominates the contribution to GRP in the Yorke and Mid North region, contributing approximately 25 per cent of the total GRP. This is followed by Health and Social Assistance (12 per cent), Construction (9 per cent), Manufacturing (8 per cent) and Ownership of Dwellings (8 per cent). These five sectors accounted for 57 per cent of total GRP in 2019-2020 for the Yorke and Mid North region. Electricity, Gas, Water and Waste, which includes generation, supply and storage of electricity for the grid from renewable energy, is the 10th largest sector in the region and accounted for 6 per cent of GRP in 2019-20.

Figure 3-7 Gross regional product by industry, Yorke and Mid North (2014/15 and 2019/20)



Source: BDO EconSearch analysis

Trends in unemployment rates

The trends in unemployment rates by LGA between 2011 and 2021 for the Study Area are presented in Figure 3-8. These trends are compared with the Study Area as a whole and with South Australia[7] over the same period.

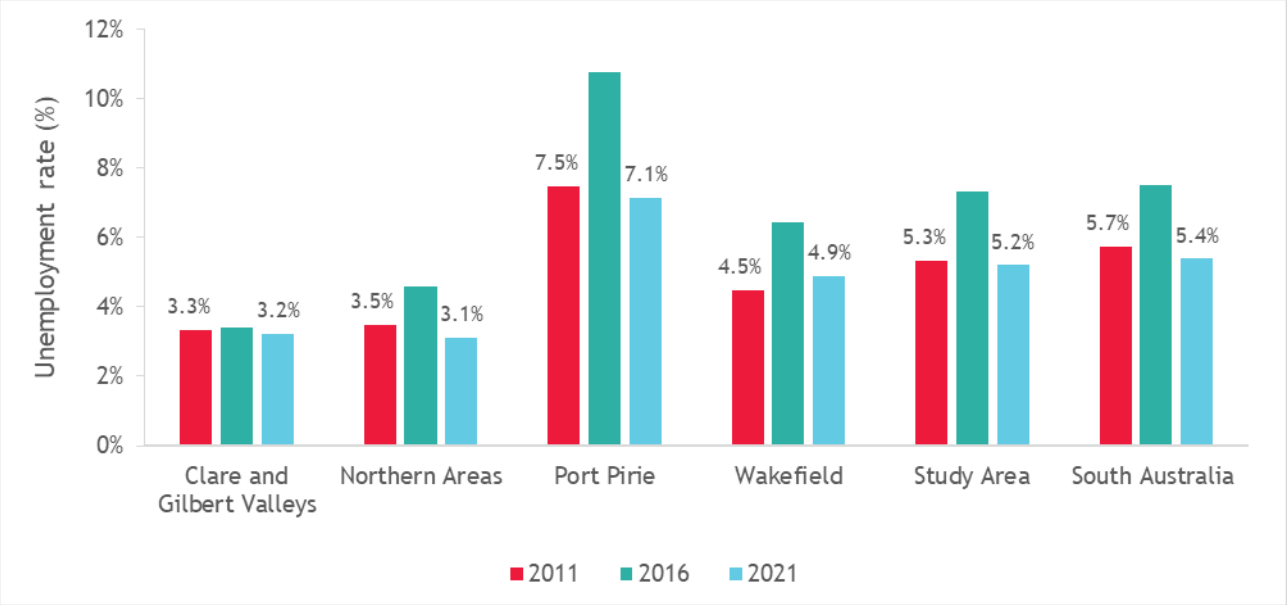
The unemployment rate for the Study Area is lower than the unemployment rate for South Australia as a whole, however this is highly varied between the LGAs. Port Pirie has the highest unemployment rate (7.1

[7] Although the most recent unemployment rate for SA is lower than in 2021 (4.4 per cent as of May 2023 (ABS 2023)), the unemployment rate from 2021 has been used to be consistent with the most recent ABS estimates for the LGAs.

per cent in 2021), considerably higher than Clare and Gilbert Valleys (3.2 per cent) and Northern Areas (3.1 per cent). The unemployment rate spiked in the Study Area spiked in 2016 but declined by 2021 and reached an overall slightly lower level than 2011. This spike was consistent with the trend for South Australia as a whole.

For all LGAs in the Study Area beside Wakefield, the unemployment rates have slightly decreased between 2011 and 2021. The unemployment rate in Wakefield has increased by 0.5 percentage points over this period.

Figure 3-8 Trend in unemployment rate by LGA (2011 to 2021)



Source: ABS 2022a

Summary

The Agriculture, Forestry and Fishing sector dominates the GRP and is the second largest employer for the Study Area. While still playing a prominent role, there is evidence that other sectors are experiencing more growth of importance in the region. Agriculture, Forestry and Fishing has seen a decrease in GRP between 2014-2015 and 2019-2020 of 10 per cent over the period, while other large industries have seen growth. The Healthcare and Social Assistance sector has seen 31 per cent growth, Construction has seen 59 per cent growth, Finance and Insurance has seen 76 per cent growth and Professional, Scientific and Technical Services has seen 107 per cent growth over the period. Electricity, Gas, Water and Waste has been relatively stable over the period, with 6 per cent growth.

The unemployment rate is highly varied between LGAs within the region, with Port Pirie having much higher unemployment than the Study Area and South Australia. As a whole, the Study Area has a lower unemployment rate (5.2 per cent) compared to South Australia (5.4 per cent) in 2021, and this was consistent between 2011 and 2021. Notably, the 2021 census date, 10th of August, was during Covid restrictions within South Australia, leading to a likely spike in unemployment. The unemployment rate has likely dropped since then, and the most recent unemployment rate for South Australia is estimated to be 4.4 per cent, 1.0 percentage points lower than the time of the 2021 census (ABS 2023).

3.4. Residential Property

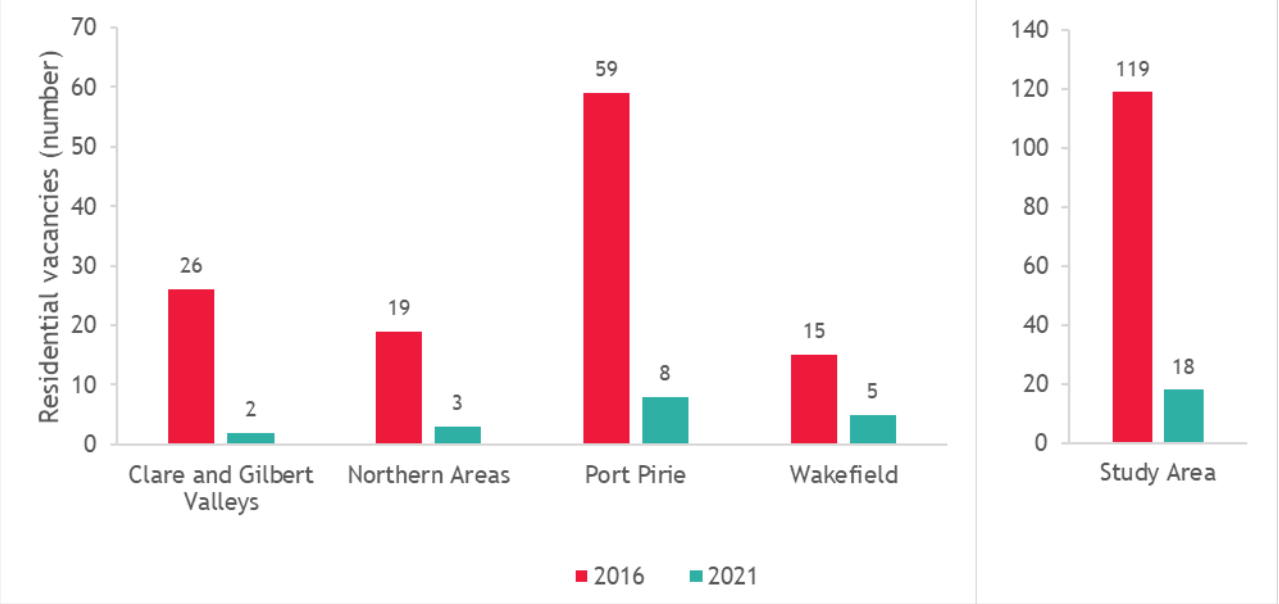
Three residential property indicators inform the socioeconomic impact assessment, residential vacancies, house prices and median weekly rent in the Study Area.

Residential vacancies

The trends in residential vacancies by LGA between 2016 and 2021 are presented in Figure 3-9. These trends are compared with the Study Area over the same period.

Across the Study Area, the number of residential vacancies has declined substantially by 92 per cent between 2016 and 2021. This drop is fairly consistent across the LGAs in the Study Area, with all experiencing substantial drops in vacancies over the period. The number of vacancies in the Study Area was at an extremely low level in 2021 and indicates that there is likely demand for new housing in the area.

Figure 3-9 Trend in residential vacancies by LGA (2016 and 2021)



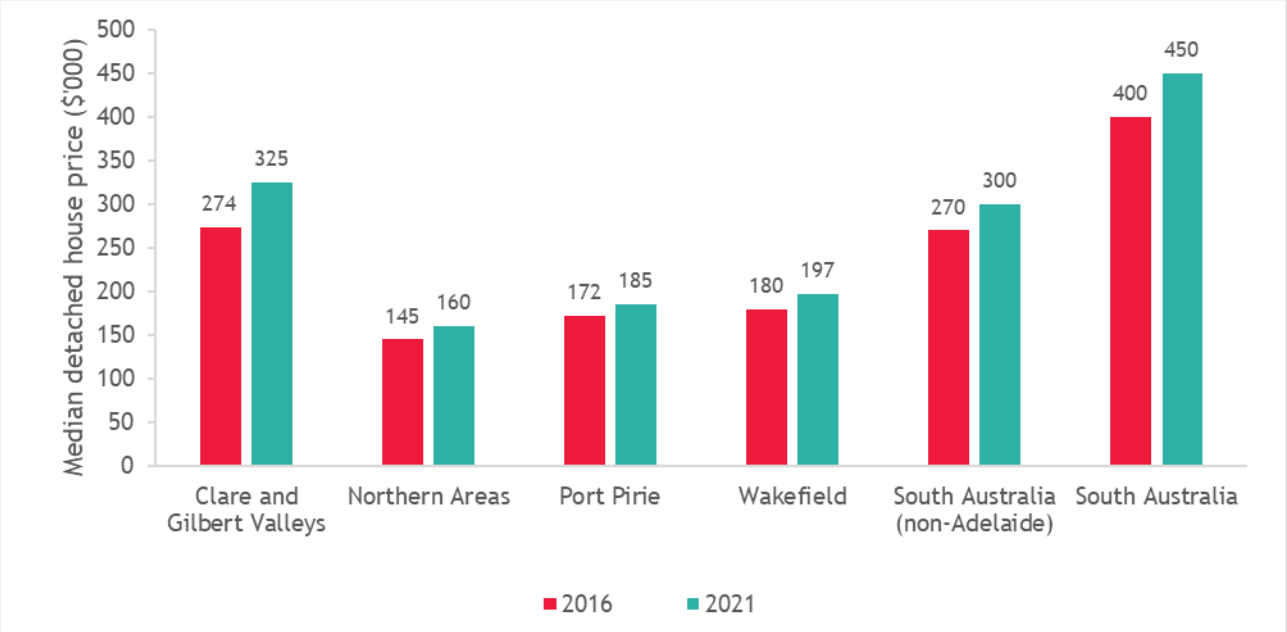
Source: SQM Research 2022

House prices

The trends in detached house prices by LGA between 2016 and 2021 are presented in Figure 3-10. These trends are compared with the non-Adelaide area of South Australia, and South Australia as a whole over the same period.

The house prices for the LGAs in the Study Area have grown at a similar rate to both rural South Australia (11 per cent) and South Australia as a whole (13 per cent) between 2016 and 2021. The largest growth in house pricing has been Clare and Gilbert Valleys (19 per cent) which is higher than the non-Adelaide average. The other LGAs house prices have grown at a slightly lower rate compared to the non-Adelaide average, with Northern Areas growing at 10 per cent, Wakefield growing at 9 per cent and Port Pirie growing at 8 per cent over the period.

Figure 3-10 Trend in median detached house price by region (2016 and 2021)

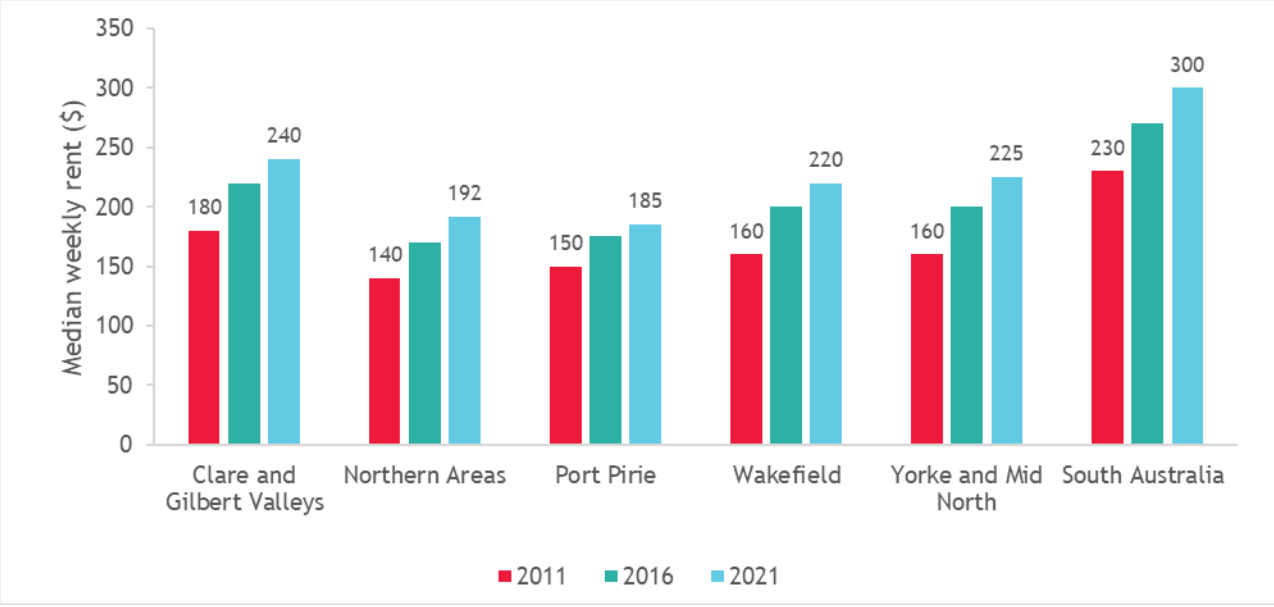


Source: ABS 2022b

Weekly rent

The trends in median weekly rent by LGA between 2011 and 2021 are presented in Figure 3-11. These trends are compared with the Yorke and Mid North region and South Australia over the same period.

Figure 3-11 Trend in median weekly rent by LGA (2011 to 2021)



Source: ABS 2022a

Across the Yorke and Mid North region, the weekly rent paid by households has increased by 41 per cent from $160 per week to $225 per week over the same period. By comparison, in South Australia as a whole, the median weekly rent has increased by 29 per cent from $230 per week to $300 per week. Three of the LGAs in the Study Area experienced higher growth in rent than South Australia, Wakefield (38 per cent), Northern Areas (37 per cent) and Clare and Gilbert Valleys (33 per cent). Port Pirie was the only LGA which had low rent growth (23 per cent). The high level of rent growth in the Study Area is unsurprising given the sharp decrease in vacancy rates.

Summary

Across the LGAs within the Study Area residential property has become more expensive to rent with relative rent increases rising faster than South Australia as a whole. The vacancy rates across the Study Area have fallen substantially between 2016 and 2021 (92 per cent), which explains the relative rent increases. The growth in house prices in the Study Area (between 8 and 19 per cent) have grown at a similar rate to rural South Australia (11 per cent) and South Australia as a whole (13 per cent) between 2016 and 2021.

4. POTENTIAL IMPACTS

Potential impacts, i.e. events associated with the Project which may impact directly or indirectly on economic values within the Assessment Area[8], were identified and are summarised in Table 4-1. Detailed analysis of each of these potential impacts is described in the sub-sections following.

Table 4-1 Potential impacts of the Project on economic values

Source	Receptor	Potential effect
Project construction	Region and SA economies	Positive contribution to gross product (GRP/GSP), employment (FTE jobs) and household income
Project construction	Industries in region and SA	Flow-on economic effects to industries
Project operation	Region and SA economies	Positive contribution to GRP/GSP, employment and household income
Project operation	Industries in region and SA	Flow-on economic effects to industries
Project operation	Regional economy	Loss of cropping area leading to losses of contribution GRP/GSP, employment and household income
Project construction and operation	Regional communities	Creation of employment opportunities during construction and operation influences competition for labour and associated labour costs and localised price inflation
Project construction and operation	Regional communities	Location of the operation encourages people to move to nearby communities, influencing housing availability and/or affordability.

4.1. Potential Effects on Regional and SA economies - Project Construction

4.1.1. Description of the potential impact

The expected positive impacts on the regional and SA economy in terms of contribution to gross product (GRP/GSP), employment (FTE jobs) and household income from construction of the Project.

4.1.2. Impact analysis

Supporting information and analysis

Impacts of the Project (i.e. the change to economic indicators between 'with' and 'without' the Project) were analysed using RISE IO models.

Impacts were estimated for the infrastructure development of the Project on the regional economy (Yorke and Mid North SA government region) and the South Australian economy.

Impacts were measured in terms of the following economic indicators:

- Gross product (GRP and GSP)
- Employment (FTE jobs)

[8] See Section 1.4 for a description of the Assessment Area.

- Household income.

Section 2.1 provides further details of the assessment method and data and assumptions applied.

The direct FTE estimates of employment are a combination of both on-site and off-site employment by businesses directly supplying the Project with goods and services. These estimates are based on RISE model estimates of direct FTE jobs which reflect the economy-wide effects of the capital expenditure profile of the Project. The same principles apply regarding GRP/GSP and household income estimates.

Results of the impact assessment

The potential impacts described here are driven by the capital expenditure made by the Project.

Table 4-2 shows the estimated economic impacts of the Project's construction to the regional economy. The total impact over the three years of construction to GRP of the regional economy is estimated to be $162.8m (and $54.3m per year on average). The average annual total impact over the construction period on employment in the regional economy is estimated to be 411 FTE jobs. The total impact over the construction period on household income in the regional economy is estimated to be $100.4m (and $33.5m per year on average). These are the total estimated impacts and include both direct and flow on effects.

Table 4-2 Potential economic impacts of Project construction, region

Indicator	2024/25	2025/26	2026/27	*Average annual*
GRP ($m)				
Direct	<0.1	17.5	67.2	*28.2*
Production induced flow-on	<0.1	9.0	34.5	*14.5*
Consumption induced flow-on	<0.1	7.2	27.5	*11.5*
Total[a]	<0.1	33.7	129.1	*54.3*
Employment (FTE jobs)				
Direct[b]	<1	132	503	*212*
Production induced flow-on	<1	77	293	*123*
Consumption induced flow-on	<1	47	179	*75*
Total[a]	<1	256	976	*411*
Household Income ($m)				
Direct	<0.1	11.5	44.1	*18.5*
Production induced flow-on	<0.1	5.9	22.6	*9.5*
Consumption induced flow-on	<0.1	3.4	13.0	*5.5*
Total[a]	<0.1	20.8	79.6	*33.5*

[a] Sums may not add to total due to rounding.

[b] Direct FTE estimates of employment are both on-site and off-site employment by businesses directly supplying the Project with goods and services and use RISE model estimates of direct FTE jobs based on the economy-wide effects of the Project capital expenditure profile.

Source: BDO EconSearch analysis

Table 4-3 shows the estimated economic impacts of the Project's construction to the SA economy. The total impact over the three years of construction on the GSP of SA is estimated to be $343.1m (and $114.4m per

year on average). The average annual impact over the construction period on employment in SA is estimated to be 852 FTE jobs. The total impact over the construction period on household income in SA is estimated to be $217.0m (and $72.3m per year on average).

Table 4-3 Potential economic impacts of Project construction, South Australia

Indicator	2024/25	2025/26	2026/27	*Average annual*
GSP ($m)				
Direct	6.4	29.9	95.4	*43.9*
Production induced flow-on	3.9	24.2	80.3	*36.1*
Consumption induced flow-on	4.6	23.2	75.2	*34.4*
Total[a]	14.9	77.4	250.9	*114.4*
Employment (FTE jobs)				
Direct[b]	667	228	690	*328*
Production induced flow-on	33	199	656	*296*
Consumption induced flow-on	31	154	497	*228*
Total[a]	130	581	1843	*852*
Household Income ($m)				
Direct	5.0	20.2	63.0	*29.4*
Production induced flow-on	4.6	5.9	5.6	*25.4*
Consumption induced flow-on	5.0	6.3	6.0	*17.6*
Total[a]	10.0	49.0	158.0	*72.3*

[a] Sums may not add to total due to rounding.

[b] Direct FTE estimates of employment are both on-site and off-site employment by businesses directly supplying the Project with goods and services and use RISE model estimates of direct FTE jobs based on the economy-wide effects of the Project capital expenditure profile.

Source: BDO EconSearch analysis

4.1.3. Certainty analysis

Component	Ranking	Notes
Data quality	High	Project-specific data used which is based on actual investment patterns.
Method quality	High	RISE models (augmented input-output models) of regional and state economies used for impact analysis.
Sensitivity	Medium	Total economic effects are proportional to aggregate local expenditure. For example, decreasing expenditure by 50 per cent decreases total effect by 50 per cent.

4.2. Potential Effects on Industry - Project Construction

4.2.1. Description of the potential impact

The expected positive impacts on industry in the region and in SA in terms of contribution to GRP/GSP from construction of the Project.

4.2.2. Impact analysis

Supporting information and analysis

The results of the impact assessment were derived from the same supporting information and analysis described in Section 4.1.2.

Results of the impact assessment

The potential impacts described here are driven by the capital expenditure made by the Project.

Table 4-4 shows the impact on industry sectors in the region in terms of contribution to GRP by the top five sectors. The contribution to GRP of these sectors accounts for 58 per cent of the total GRP impact to the regional economy. Table 4-5 shows the same for SA. The top five sectors impacted sectors contribute 50 per cent of the total GSP impact of the Project construction to SA.

The two most positively impacted sectors for both the region and SA are construction related. Professional, Scientific and Technical Services and Non-metallic Mineral Product Manufacturing are also important contributors of GRP and GSP impact for both the region and SA, respectively.

Table 4-4 Industry sector impacts by GRP ($m), Project construction, region

Sector	2024/25	2025/26	2026/27
Other Construction	<0.01	8.02	30.76
Construction Services	<0.01	4.34	16.63
Non-metallic Mineral Product Manufacturing	<0.01	2.82	10.83
Professional, Scientific and Technical Services	<0.01	2.45	9.40
Road Transport	<0.01	1.63	6.24

Source: BDO EconSearch analysis

Table 4-5 Industry sector impacts by GSP ($m), Project construction, South Australia

Sector	2024/25	2025/26	2026/27
Other Construction	0.01	12.53	48.04
Construction Services	0.09	7.41	28.12
Professional, Scientific and Technical Services	0.47	6.17	21.81
Non-metallic Mineral Product Manufacturing	0.07	4.82	18.34
Road Transport	0.96	5.12	10.44

Source: BDO EconSearch analysis

4.2.3. Certainty analysis

Component	Ranking	Notes
Data quality	High	Project-specific data used which is based on actual investment patterns.
Method quality	High	RISE models (augmented input-output models) of regional and state economies used for impact analysis.
Sensitivity	Medium	Total economic effects are proportional to aggregate local expenditure. For example, decreasing expenditure by 50 per cent decreases total effect by 50 per cent. This does not change the list of sectors which are most affected.

4.3. Potential Effects on Regional and SA economies - Project Operation

4.3.1. Description of the potential impact

The expected positive impacts on the regional and SA economy in terms of contribution to gross product (GRP/GSP), employment (FTE jobs) and household income from operation of the Project. This covers operation the solar farm and BESS over 20 years.

The operation of the Project includes an expected 10 FTE staff residing in the region, repairs and maintenance of equipment, administration, and the income from electricity generation and storage.

4.3.2. Impact analysis

Supporting information and analysis

Impacts of the Project (i.e. the change to economic indicators between 'with' and 'without' the Project) were analysed using RISE IO models.

Impacts were estimated for the expected 10 FTE staff residing in the region, repairs and maintenance of equipment, administration, and the income from electricity supply by the Project on the regional economy (Yorke and Mid North SA government region) and the South Australian economy.

Impacts were measured in terms of the following economic indicators:

- Gross product (GRP and GSP)
- Employment (FTE jobs)
- Household income.

Section 2.1 provides further details of the assessment method and data and assumptions applied.

Results of the impact assessment

These results are exclusive of agricultural impacts, which are assessed in Section 4.5.

Table 4-6 shows the estimated economic impacts of the Project's operation to the region. The average annual impact on GRP is estimated to be $2.1m in total (and $41.5m in total over the 20-year period). The average annual impact over the operational period on employment in the regional economy is estimated to be 15 FTE jobs. The average annual impact to household income over the operational period of the Project in the region is estimated to be $1.5m (and a total of $30.4m of 20 years). These are the total estimated impacts and include both direct and flow on effects.

Table 4-6 Potential economic impacts of Project operation, region

Indicator	2025/26	2026/27	2027/28	2045/46	*Average annual*
GRP ($m)					
Direct	0.2	0.5	1.0	1.0	*1.0*
Production induced flow-on	0.2	0.4	0.6	0.6	*0.5*
Consumption induced flow-on	0.2	0.4	0.6	0.6	*0.6*
Total[a]	0.6	1.3	2.2	2.2	*2.1*
Employment (FTE jobs)					
Direct	3	5	10	10	*9*
Production induced flow-on	1	1	2	2	*2*
Consumption induced flow-on	1	2	4	4	*4*
Total[a]	4	9	16	16	*15*
Household Income ($m)					
Direct	0.3	0.6	1.1	1.1	*1.0*
Production induced flow-on	0.1	0.2	0.2	0.2	*0.2*
Consumption induced flow-on	0.1	0.2	0.3	0.3	*0.3*
Total[a]	0.4	0.9	1.6	1.6	*1.5*

[a] Sums may not add to total due to rounding.

Source: BDO EconSearch analysis

Table 4-7 shows the estimated economic impacts of the Project's construction to the SA economy. The average annual impact on GSP is estimated to be $4.9m (and a total of $98.9m over the 20 years). The average annual impact over the operational period on employment in South Australia is estimated to be 19 FTE jobs. The average annual impact to household income over the operational period of the Project SA is estimated to be $1.9m (and a total of $37.8m over 20 years).

Table 4-7 Economic impacts, operation, South Australia

Indicator	2025/26	2026/27	2027/28	2045/46	*Average annual*
GSP ($m)					
Direct	0.9	2.0	3.3	3.3	*3.1*
Production induced flow-on	0.3	0.6	0.8	0.8	*0.8*
Consumption induced flow-on	0.3	0.6	1.1	1.1	*1.0*
Total[a]	1.5	3.2	5.2	5.2	*4.9*
Employment (FTE jobs)					
Direct	3	5	10	10	*9*
Production induced flow-on	1	2	3	3	*3*
Consumption induced flow-on	2	4	7	7	*6*
Total[a]	5	12	20	20	*19*
Household Income ($m)					
Direct	0.3	0.6	1.1	1.1	1.0
Production induced flow-on	0.1	0.2	0.4	0.4	0.3
Consumption induced flow-on	0.1	0.3	0.6	0.6	0.5
Total[a]	0.5	1.2	2.0	2.0	1.9

[a] Sums may not add to total due to rounding.

Source: BDO EconSearch analysis

4.3.3. Certainty analysis

Component	Ranking	Notes
Data quality	High	Project-specific data used which is based on actual operation patterns.
Method quality	High	RISE models (augmented input-output models) of regional and state economies used for impact analysis.
Sensitivity	Medium	Total economic effects are proportional to aggregate local expenditure. For example, decreasing expenditure by 50 per cent decreases total effect by 50 per cent.

4.4. Potential Effects on Industry - Project Operation

4.4.1. Description of the potential impact

The expected positive impacts on industry in the region and in SA in terms of contribution to GRP/GSP from operation of the Project.

4.4.2. Impact analysis

Supporting information and analysis

The results of the impact assessment were derived from the same supporting information and analysis described in Section 4.3.2.

Results of the impact assessment

These results are exclusive of agricultural impacts, which are assessed in Section 4.5.

Table 4-8 shows the estimated impact on industry sectors in the region in terms of the top five sectors by GRP contribution. The contribution to GRP of these sectors accounts for 33 per cent of the total GRP impact to the regional economy. Table 4-9 shows the same for SA. These top five sectors account for 7 per cent of the total GSP impact of the Project operation to SA.

Table 4-8 Industry sector impacts by GRP ($m), Project operation, region

Sector	2025/26	2026/27	2027/28	2045/46
Electricity Supply	0.10	0.21	0.36	0.36
Electricity Generation	0.09	0.18	0.27	0.27
Wholesale Trade	0.06	0.12	0.18	0.18
Administrative Support Services	0.05	0.11	0.13	0.13
Professional, Scientific and Technical Services	0.05	0.10	0.13	0.13

Source: BDO EconSearch analysis

Table 4-9 Industry sector impacts by GSP ($m), Project operation, South Australia

Sector	2025/26	2026/27	2027/28	2045/46
Electricity Supply	0.18	0.37	0.55	0.55
Finance	0.04	0.08	0.13	0.13
Retail Trade	0.03	0.06	0.10	0.10
Wholesale Trade	0.02	0.05	0.08	0.08
Education & Training	0.02	0.04	0.07	0.07

Source: BDO EconSearch analysis

4.4.3. Certainty analysis

Component	Ranking	Notes
Data quality	High	Project-specific data used which is based on actual operational patterns.
Method quality	High	RISE models (augmented input-output models) of regional and state economies used for impact analysis.
Sensitivity	Medium	Total economic effects are proportional to aggregate local expenditure. For example, decreasing expenditure by 50 per cent decreases total effect by 50 per cent. This does not change the list of sectors which are most affected.

4.5. Potential Effects on Agricultural Production

4.5.1. Description of potential impact

The potential negative impacts on the regional and SA economy in terms of contribution to gross product (GRP/GSP), employment (FTE jobs) and household income from foregone agricultural production from the Project footprint (478ha of cropping land).

4.5.2. Impact analysis

Supporting information and analysis

Impacts of the Project (i.e. the change to economic indicators between 'with' and 'without' the Project) were analysed using RISE IO models.

Impacts were estimated for the expected loss of agricultural production on the regional economy (Yorke and Mid North Government region) and the South Australian economy.

Impacts were measured in terms of the following economic indicators:

- Gross product (GRP and GSP
- Employment (FTE jobs)
- Household income.

Section 2.1 provides further details of the assessment method and data and assumptions applied.

The estimated loss to agricultural production is based on:

- 478 ha removed from cropping (Wind Prospect pers. comm. 2023)
- Crop yields for the Mid North of South Australia (PIRSA 2023) (Table 4-10)
- Five-year average crop price (PIRSA 2022) (Table 4-10).

Table 4-10 shows the information used to estimate the potential agricultural impact of the Project. A weighted average of the output per ha (estimated at $1,372 per ha) from these data was applied to the area removed (478 ha) to provide an estimate of the annual loss to agricultural output of $0.7 million.

Table 4-10 Baseline agricultural information, Mid North, South Australia

Commodity	Area (ha)	% area	Volume (t)	t/ha	$/t	$/ha
Wheat	248,200	58%	1,090,000	4.4	330	1,449
Durum	5,000	1%	21,500	4.3	428	1,840
Barley	94,700	22%	405,000	4.3	280	1,197
Oats	4,400	1%	16,750	3.8	285	1,083
Triticale	1,700	0%	6,750	4.0	264	1,048
Peas	13,900	3%	30,500	2.2	451	990
Lupins	1,800	0%	3,250	1.8	396	715
Beans	12,900	3%	39,000	3.0	540	1,633
Chickpeas	2,300	1%	4,000	1.7	726	1,263
Lentils	17,100	4%	41,000	2.4	650	1,558
Vetch	4,200	1%	5,000	1.2	590	702
Canola	25,400	6%	56,000	2.2	622	1,371

Source: PIRSA 2022, 2023 and BDO EconSearch analysis

Results of the impact assessment

Table 4-11 shows the estimated economic impacts of the loss of agricultural production to the region. The average annual loss of GRP in the region is estimated to be $0.5m (a total of $11.5m over 21 years). The average annual loss of employment in the region is estimated to be approximately 2 FTE jobs. The average annual loss to household income in the region is estimated to be $0.2m (a total of $3.4m over 21 years).

Table 4-11 Potential economic impact, loss of agricultural production, region

Indicator	2024/25	2025/26	2045/46	*Average annual*
GRP ($m)				
Direct	0.2	0.4	0.4	0.4
Production induced flow-on	0.1	0.2	0.2	0.2
Consumption induced flow-on	0.0	0.1	0.1	0.1
Total[a]	0.3	0.6	0.6	0.5
Employment (FTE jobs)				
Direct	0.7	1.3	1.3	1.2
Production induced flow-on	0.4	0.7	0.7	0.6
Consumption induced flow-on	0.2	0.4	0.4	0.3
Total[a]	1.2	2.4	2.4	2.2
Household Income ($m)				
Direct	0.0	0.1	0.1	0.1
Production induced flow-on	0.0	0.1	0.1	0.1
Consumption induced flow-on	0.0	0.0	0.0	0.0
Total[a]	0.1	0.2	0.2	0.2

[a] Sums may not add to total due to rounding.

Source: BDO EconSearch analysis

Table 4-12 shows the estimated economic impacts of the loss of agriculture to South Australia. The average loss of GSP in South Australia is estimated to be $0.6m for a total of $13.3m over 21 years. The average annual loss of employment in South Australia is estimated to be 3 FTE jobs. The average annual loss of household income Project for South Australia is estimated to be $0.2m for a total of $4.5m over 21 years.

Table 4-12 Potential economic impact, loss of agricultural production, South Australia

Indicator	2024/25	2025/26	2045/46	*Average annual*
GRP ($m)				
Direct	0.2	0.4	0.4	*0.4*
Production induced flow-on	0.1	0.2	0.2	*0.2*
Consumption induced flow-on	0.0	0.1	0.1	*0.1*
Total[a]	0.3	0.6	0.6	*0.6*
Employment (FTE jobs)				
Direct	0.8	1.5	1.5	*1.4*
Production induced flow-on	0.5	1.1	1.1	*1.0*
Consumption induced flow-on	0.3	0.7	0.6	*0.6*
Total[a]	1.6	3.3	3.2	*3.0*
Household Income ($m)				
Direct	0.0	0.1	0.1	*0.1*
Production induced flow-on	0.0	0.1	0.1	*0.1*
Consumption induced flow-on	0.0	0.1	0.1	*0.1*
Total[a]	0.1	0.2	0.2	*0.2*

[a] Sums may not add to total due to rounding.

Source: BDO EconSearch analysis

4.5.3. Certainty analysis

Component	Ranking	Notes
Data quality	High	Project-specific data used which is based on actual operational patterns.
Method quality	High	RISE models (augmented input-output models) of regional and state economies used for impact analysis.
Sensitivity	Low	Whilst total economic effects are proportional to loss of agricultural production, the overall effects across sensitivity ranges is small.

4.6. Increased Competition for Labour and Associated Price Inflation

4.6.1. Description of potential impact

The creation of employment opportunities during construction and operation has the potential to influence competition for labour and associated costs in the region.

4.6.2. Impact analysis

Supporting information and analysis

Supporting information and analysis is described in Section 2.4.

Estimating the effect of increased competition for labour in each location requires an estimate of in-migration to those locations and of the current labour force characteristics of each. The estimated changes

for in-migration are for long term impacts to labour (i.e. during the operating phase), and not for short term relocation which would impact shorter term accommodation supply (i.e. workers in the construction phase are likely to stay locally while they are working, but not permanently relocate to the region).

Construction phase workforce numbers are based on peak workforce demand (180 on-site personnel, Wind Prospect, pers. comm. 2023). The construction workforce is expected to originate from Port Pirie (40 per cent), Adelaide (30 per cent), Clare (10 per cent) and the remainder (20 per cent) from elsewhere in the region (Wind Prospect, pers. comm. 2023). The gravity model (described in section 2.4) was used to identify the likely home locations of the workforce in the region, excluding Port Pirie and Clare.

The operation phase workforce is expected to be 10 FTE jobs (Wind Prospect pers. comm. 2023).

Results of the impact assessment

Construction phase

It is expected that up approximately 70 per cent of the construction workforce required for Project construction could be sourced within the region. Noting that labour effects are likely to be temporary (as any construction stage requiring labour within the overall construction period is not likely to exceed 22 weeks (Wind Prospect pers. comm. 2023)). Table 4-13 presents the unemployment rates with and without the Project during peak construction workforce demand. There may be temporary, localised competition for labour in Brinkworth and Koolunga, however employers would likely be able to source workforce from elsewhere within their LGAs (Wakefield and Port Pirie, respectively)[9]. As a result, local price inflation is unlikely to occur.

[9] Total Project construction workforce demand for Wakefield and Port Pirie LGAs is estimated to temporarily reduce the unemployment rates by 0.3 per cent (from 4.9 per cent to 4.6 per cent) and 0.2 per cent (from 7.1 per cent to 6.9 per cent), respectively.

Table 4-13 Estimated unemployment rates, by location, Project construction

Town	Project workforce	Labour force (persons)	Unemployment rate (%)	Estimated unemployment rate with Project (%)
Blyth	5	232	4.7%	3.5%
Brinkworth	6	125	5.6%	1.3%
Clare	18	1,628	3.4%	2.8%
Crystal Brook	6	489	4.1%	3.5%
Koolunga	8	95	10.5%	3.4%
Lochiel	0	52	nil	-
Port Broughton	4	370	5.4%	5.1%
Port Pirie	72	5,836	7.7%	7.6%
Port Wakefield	2	262	5.7%	5.7%
Redhill	1	58	nil	-
Snowtown	3	103	13.6%	11.8%
Spalding	1	77	16.9%	16.9%
Yacka	1	66	nil	-
Adelaide	54	709,968	5.5%	5.5%

[a] Rounding discrepancies are present as fractions of persons have been allowed to preserve the relative effects in the analysis.

Source: BDO EconSearch analysis

Operating phase

Table 4-14 presents the estimated number of employees and in-migration of employees and population into the region stimulated by the Project's operation. The majority of Project employees, during the operating phase, are likely to commute from Port Pirie with the remainder from Clare, Blyth, Brinkworth, Koolunga and Crystal Brook. The employment of 10 FTE workers by the Project is estimated to result in up to 2 households moving into the region and a potential increase in the population of up to 4 persons. During Project operation, in migration of a total of four persons was estimated, spread across Brinkworth, Clare, Koolunga and Port Pirie. This limited in migration is likely to have a negligible effect on local labour market.

Table 4-14 Estimated employees and in-migration of employees and population, by location[a]

Location	Employees	In-migration of employees/households	In-migration of population
Blyth	1	<1	<1
Brinkworth	1	<1	1
Clare	2	<1	1
Crystal Brook	1	<1	<1
Koolunga	1	<1	1
Lochiel	0	<1	<1
Port Broughton	0	<1	<1
Port Pirie	4	<1	1
Port Wakefield	0	<1	<1
Redhill	0	<1	<1
Snowtown	0	<1	<1
Spalding	0	<1	<1
Yacka	0	<1	<1
Adelaide	0	0	0
Total	10	2	4

[a] Rounding discrepancies are present as fractions of persons have been allowed to preserve the relative effects in the analysis.

Source: BDO EconSearch analysis

Table 4-15 shows the estimated decrease in unemployment rates from the Project's operation by location[10]. The estimated decrease in unemployment rates range from less than 0.1 per cent to 1.0 per cent for Project operation. The largest estimated change in unemployment rate is in Koolunga, which is expected to lower the unemployment rate from 10.5 per cent to 9.5 per cent. As this is a very high baseline level of unemployment, this decrease is not expected to lead to price inflation and is likely a positive effect on the Koolunga township. Overall, this expected change to unemployment is minimal and is not expected to have any notable impact on labour competition or associated price inflation.

[10] Noting that the most recently published unemployment rates for these localities (2021) were used and unemployment rates may have dropped since then. State-wide unemployment rate has dropped from 5.4 per cent to 4.4 per cent between June 2021 and May 2023, so it can be expected that the unemployment rates in regional SA have also dropped.

Table 4-15 Estimated unemployment rates, by location, Project operation

Town	Project workforce	Labour force (persons)	Unemployment rate (%)	Estimated unemployment rate with Project (%)
Blyth	1	232	4.7%	4.5%
Brinkworth	1	125	5.6%	5.0%
Clare	2	1,628	3.4%	3.2%
Crystal Brook	1	489	4.1%	4.0%
Koolunga	1	95	10.5%	9.5%
Lochiel	0	52	nil	-
Port Broughton	0	370	5.4%	5.3%
Port Pirie	4	5,836	7.7%	7.6%
Port Wakefield	0	262	5.7%	5.7%
Redhill	0	58	nil	-
Snowtown	0	103	13.6%	13.3%
Spalding	0	77	16.9%	16.8%
Yacka	0	66	nil	-
Adelaide	0	709,968	5.5%	5.5%

Source: BDO EconSearch analysis, ABS 2022a

4.6.3. Certainty analysis

Component	Ranking	Notes
Data quality	High	ABS Census data were used for labour force, household and population characteristics.
Method quality	Medium	A gravity model is used to estimate where employees will live (medium). Number of people who already live in each location who are employed by the Project is estimated by the number of unemployed and proportion of labour force in technical or trade sectors, a minimum in-migration of 10 percent of jobs was used (low). Five per cent unemployment rate is used as a threshold for increased labour market competition, this is generally accepted (high).
Sensitivity	Medium	Increasing the proportion of employees who live in country South Australia decreases the unemployment rates with the Project slightly, but the main conclusions still hold (medium).

4.7. Housing Availability

4.7.1. Description of potential impact

During Project construction, demand for temporary accommodation by workers on the Project may affect the availability of temporary accommodation in the region.

During Project operation, in-migration of Project workers to the region may reduce the availability of housing in the region.

4.7.2. Impact analysis

Supporting information and analysis

Project construction

Analysis was undertaken using peak workforce requirements (180 personnel). Based on the analysis described in Section 4.6.2, it is expected that approximately 70 per cent of the construction work force will come from the region (and will not require temporary accommodation) and the remaining 54 personnel will come from Adelaide and are expected to require temporary accommodation.

Data on available temporary accommodation and occupancy rates were analysed for the following tourism regions:

- Yorke Peninsula: Blyth, Brinkworth, Lochiel, Port Broughton, Port Wakefield, Snowtown
- Clare Valley: Clare
- Flinders Ranges and Outback: Crystal Brook, Koolunga, Port Pirie, Redhill, Spalding, Yacka.

Project demand was analysed using high season and low season room vacancy estimates and conservatively assumed all non-local construction personnel will be accommodated in one tourism region. Room vacancies were estimated on number of rooms available and occupancy rates by tourism region from SATC (2022a 2022b, 2022c).

Since the tourism regions encompass larger areas than may be reasonable for the construction workforce to commute from, the analysis included the estimated vacancies if 100 per cent (high suitability), 50 per cent (medium suitability) and 20 per cent (low suitability) of rooms are suitable for Project construction personnel.

Project operation

The operation phase is expected to require 10 employees. Based on the analysis described in Section 4.6.2, in-migration of up to one household per locality may occur in Brinkworth, Clare, Koolunga, and Port Pirie (see Table 4-14) and require permanent accommodation.

Data on rental housing availability by postcode was sourced from SQM Research (2023).

Results of the impact assessment

Project construction

Table 4-16 shows an estimate of available rooms in peak tourism season and low tourism season and the potential Project demand for these room vacancies.

Table 4-16 Accommodation availability, by tourism region, Project construction

Tourism Region	High season room vacancy[a]	High season Project demand (% of available rooms)	Low season room vacancy[a]	Low season Project Demand (% of available rooms)
100 per cent of available rooms are suitable				
Yorke Peninsula	397	14%	1,315	4%
Clare Valley	169	32%	441	12%
Flinders Ranges and the Outback	815	7%	1,805	3%
50 per cent of available rooms are suitable				
Yorke Peninsula	199	27%	658	8%
Clare Valley	85	64%	221	24%
Flinders Ranges and the Outback	408	13%	902	6%
20 per cent of available rooms are suitable				
Yorke Peninsula	79	68%	263	21%
Clare Valley	34	160%	88	61%
Flinders Ranges and the Outback	163	33%	361	15%

[a] Based on the highest and lowest occupancy rates between December 2020 and December 2022

Source: SATC 2022a,b,c, BDO EconSearch analysis

If the peak demand for temporary accommodation from the Project coincides with low tourism season for all ranges of suitability modelled, there will be sufficient room supply to accommodate demand from the Project in all three tourism regions.

If the peak demand for temporary accommodation from the Project coincides with peak tourism season there is sufficient room to accommodate the project in all three tourism regions if 50 per cent or greater of the beds are suitable. If only 20 per cent of the beds are suitable, then there are sufficient temporary accommodation in York Peninsula and Flinders Ranges and Outback to meet Project demand, but not in Clare Valley.

Project Operation

Table 4-17 shows the estimated Project demand for housing, rental vacancies, recent trends in rental vacancies and the Project effect on rental vacancies for locations where Project personnel are likely to in-migrate. The analysis shows that there has been no rental accommodation available in Brinkworth, Clare or Koolunga, meaning that it is very unlikely, if recent trends persist, for Project personnel to relocate permanently to these townships. Port Pirie has very limited rental vacancies (4 in May 2023 and no change over the past 3 years). If recent trends persist, the Project could demand up to 50 per cent of rental accommodation supply in Port Pirie.

Table 4-17 Housing vacancy and in-migration of households, by location, operation

Location	In-migration of households	Housing vacancies 2023	3 year change in vacancies (%)	Decrease in housing vacancy due to Project (%)
Brinkworth	1	0	nil	-
Clare	1	0	nil	-
Koolunga	1	0	nil	-
Port Pirie	1	4	nil	25%

Source: SQM Research 2023, ABS 2022a, BDO EconSearch analysis

In summary, unless regional long-term accommodation supply significantly eases it is likely that the Project will significantly impact on regional accommodation supply. Housing shortages in regional SA are a known problem, and the SA Government have recently released *The Regional Key Worker Housing Scheme* to attempt to address these issues (SA Government 2023).

4.7.3. Certainty analysis

Component	Ranking	Notes
Data quality	Medium	ABS Census data were used for labour force, household and population characteristics (high). Housing vacancies are sourced from SQM Research. Housing vacancy data are considered to give an imperfect representation of the housing market as they may underestimate vacancies (medium). Temporary accommodation supply data for broader regions than required (medium).
Method quality	Medium	A gravity model is used to estimate where employees will live (medium). Number of people who already live in each location who are employed by the Project is estimated by the number of unemployed and proportion of labour force in technical or trade sectors, a minimum in-migration of 10 percent of jobs was used (low). Five per cent unemployment rate is used as a threshold for increased labour market competition, this is generally accepted (high).
Sensitivity	Medium	Increasing the proportion of employees who live in country South Australia decreases the unemployment rates with the Project slightly, but the main conclusions still hold (medium).

REFERENCES

Australian Bureau of Statistics (ABS) 2022a, *Australian Census of Population and Housing 2021,* Australian Government, Australia, and previous issues (2011, 2016).

Australian Bureau of Statistics (ABS) 2022b, *Data by Region 2011-2022*, by LGA (ASGS Ed 3, 2021), Australian Government, Australia.

Australian Bureau of Statistics (ABS) 2023, *Labour Force, Australia; Table 7 Labour Force Status by Sex, South Australia,* Australian Government, Australia, July

Blyth Progress Association n.d., ***Blyth's Rich History,*** South Australia.

Brinkworth Progress Association 2023, *Black and White Rag,* South Australia, May.

Brinkworth SA n.d., *Brinkworth, South Australia,* Accessed 12/07/2023 https://www.brinkworthsa.info/

Department of Primary Industries and Regions (PIRSA) 2022, *2022 Farm Gross Margin and Enterprise Planning Guide*, February.

Department of Primary Industries and Regions (PIRSA) 2023, *Crop and Pasture Report South Australia*, March.

Google 2023, *Google Maps,* Global, Accessed 21/06/2023 https://www.google.com/maps .

International Renewable Energy Agency (IRENA) 2021, *Renewable Power Generation Costs in 2020,* International Renewable Energy Agency, Abu Dhabi.

Koolunga Hotel 2022, *Koolunga Hotel Pub Closure - Facebook Post,* Facebook, South Australia, January, Accessed 22/06/2023 https://www.facebook.com/koolungahotel/ .

Luck, GW, Black, R & Race, D 2010, 'Demographic Change in Rural Australia: Future Opportunities and Challenges', in Demographic Change in *Australia's Rural Landscapes: Implications for Society and the Environment*, vol. 12, Springer Netherlands, Dordrecht, pp. 375-384.

Northern Areas Council n.d., *History of Yacka,* South Australia, Accessed 7/7/2023 https://www.nacouncil.sa.gov.au/community/township-histories/history-of-yacka#:~:text=The%20town%20was%20laid%20out,being%20laid%20out%20in%20farming .

SA Government 2023, *Regional Key Worker Housing Scheme,* Adelaide, February, accessed 22/6/2023 https://www.premier.sa.gov.au/media-releases/news-items/more-homes-for-regional-south-australia .

Snowtown Museum n.d., *From 'Black Point' to Snowtown,* South Australia, Accessed 22/06/2023 https://www.snowtownmuseum.org/township-surveyed .

South Australian Tourism Commission (SATC) 2022a, *Clare Valley Regional Profile,* Tourism SA, Adelaide, December.

South Australian Tourism Commission (SATC) 2022b, *Yorke Peninsula Regional Profile,* Tourism SA, Adelaide, December.

South Australian Tourism Commission (SATC) 2022c, *Flinders Ranges and Outback Regional Profile,* Tourism SA, Adelaide, December.

SQM Research 2023, *Residential Vacancy Rates,* Australia, https://sqmresearch.com.au/graph_vacancy.php.

The Brinkworth Management Committee (BMC) 2018, *Community Action Plan*, Wakefield Regional Council, South Australia, August.

Wakefield Regional Council 2017, *Snowtown CMC Strategic Plan 2017-2022*, Wakefield Regional Council.

WalkingSA n.d., *Brinkworth Historical Walk,* WalkingSA, South Australia, Accessed 22/06/2023 https://www.walkingsa.org.au/walk/find-a-place-to-walk/brinkworth-historical-walk/#:~:text=Brinkworth%20was%20a%20major%20railway,%2C%20Snowtown%20and%20Gladstone%20Railways%E2%80%9D .

Disclaimer

The assignment is a consulting engagement as outlined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 17. Consulting engagements employ an assurance practitioner's technical skills, education, observations, experiences and knowledge of the consulting process. The consulting process is an analytical process that typically involves some combination of activities relating to: objective-setting, fact-finding, definition of problems or opportunities, evaluation of alternatives, development of recommendations including actions, communication of results, and sometimes implementation and follow-up.

The nature and scope of work has been determined by agreement between BDO and the Client. This consulting engagement does not meet the definition of an assurance engagement as defined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 10.

Except as otherwise noted in this report, we have not performed any testing on the information provided to confirm its completeness and accuracy. Accordingly, we do not express such an audit opinion and readers of the report should draw their own conclusions from the results of the review, based on the scope, agreed-upon procedures carried out and findings.

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Appendix L

Fire Risk Management Plan and Fire Safety Study

The Secretary
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5001

29th April 2024

Dear Secretary,

RE: BRINKWORTH SOLAR FARM AND BESS

Fire Risk Consultants (FRC) was engaged to undertake a fire risk assessment of the proposed Brinkworth Solar Farm and Battery Energy Storage System (BESS). Our assessment was completed in October 2023. We have been requested to write to you outlining the status of our report in the context of the Crown Sponsored project allocation.

The Fire Risk Management Plan (October 2023) that was prepared for the Brinkworth Solar Farm and BESS Project, includes assessment of fire risk during both the construction and operations phases. The assessment considered both the solar PV and the battery energy storage facility (BESS) of the Brinkworth project.

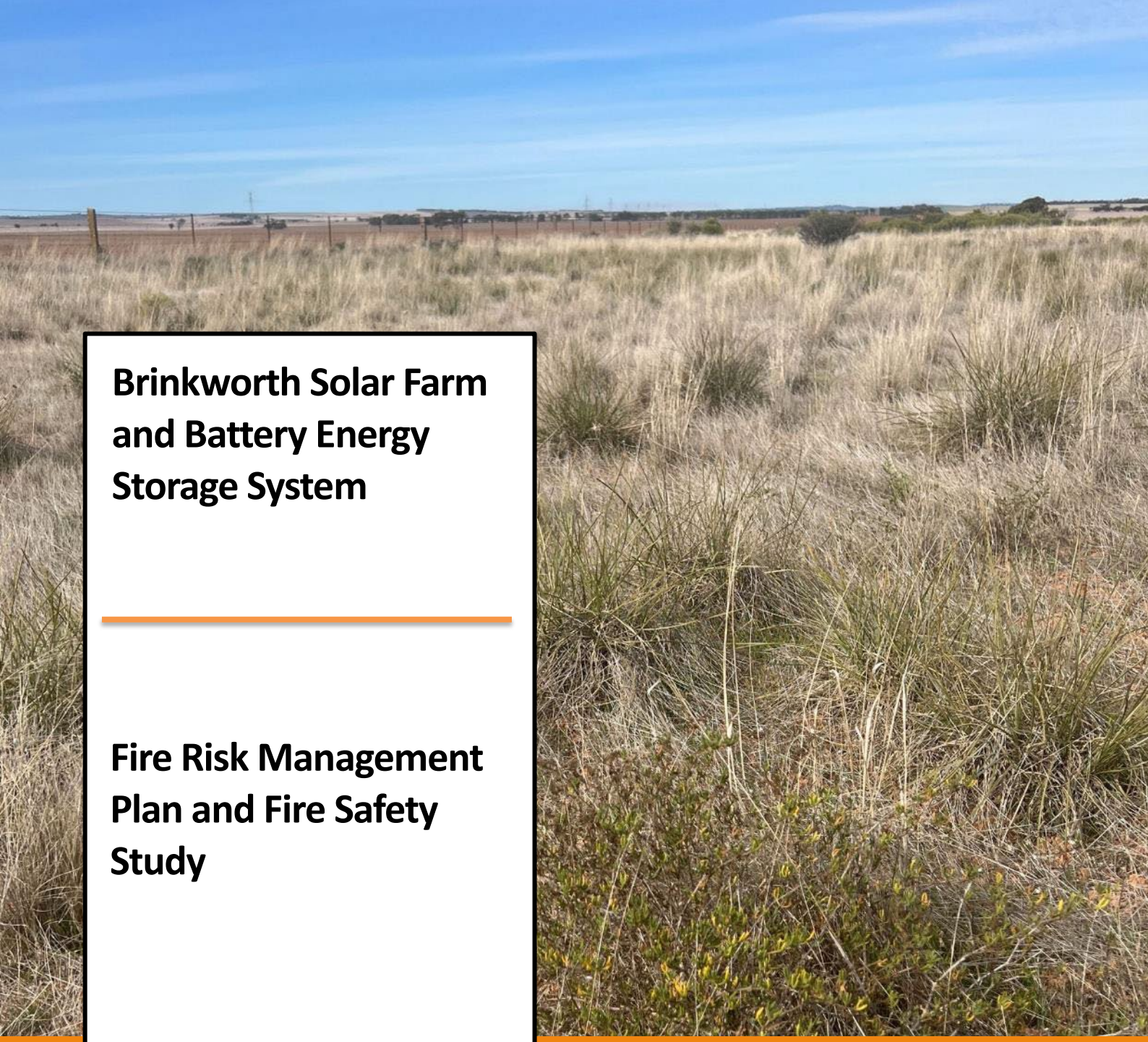
Since preparing this report, and prior to the development application being submitted, the Planning, Development and Infrastructure (General) Regulations 2017 (PDI Regulations) have been varied, which has made battery storage facilities in designated locations, including the subject land where the BESS is proposed, exempt from planning approval. We understand that our client now wishes to proceed with the development of the BESS as Stage 1 of the project (as development exempt from approval) and subsequently Stage 2 being the solar farm (the subject of this development application).

We have considered this minor change, and we believe that the assessment undertaken in our report remains valid, irrespective of the amended application and approval processes.

If you have any questions or require clarification on this matter, please don't hesitate to contact me on 0439 289 234 or at mark@fireriskconsultants.com.au.

Yours sincerely,

Mark Potter
Risk and Emergency Planning Lead



Brinkworth Solar Farm and Battery Energy Storage System

Fire Risk Management Plan and Fire Safety Study

October 2023

FIRE RISK Consultants

Document history and date

Revision	Date	Description	By	Review	Approved
V1.0 - DRAFT	15/9/2023	Initial draft following assessment of available information.	M Potter & FRC Project Team	FRC Review Team	G Taylor Managing Director
V2.1	4/10/2023	Updated following client feedback.	M Potter & FRC Project Team	FRC Review Team	G Taylor Managing Director

Fire Risk Consultants
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Disclaimer and Information Statement

This report is issued by Fire Risk Consultants Pty Ltd and the information in this report is current as at the date of publication. Any Bushfire Emergency Plan or Bushfire Response Plan is current only at the date of issue as it is up to you to maintain the Australian Standard AS3959:2018 (or equivalent) and AS3745:2018 (or equivalent) for the property and/or building. Failure to maintain the property and/or building to these standards may compromise an insurance policy if currently covering any of your assets or those of any third party that may be consequentially affected due such failure. If not insured, and if you are seeking insurance, this report may not influence the decision of any insurer not to offer cover. To the extent permitted by law, Fire Risk Consultants Pty Ltd will not be held liable for any claims, demands, costs or expenses for any personal injury, property damage or death arising out of failure by you to maintain the property and/or building to AS3959:2018 (or equivalent) and AS3745:2018 (or equivalent).

The information and/or the recommendations contained in this report have been compiled and based on the information, records, data and any other sources of information supplied by you. Whilst we have exercised all due care and skill in compiling the report, you should confirm the accuracy and reliability of the information and material we have relied upon in producing the report. The information contained in the report is confidential and you should only read, disclose, re-transmit, copy, distribute or act in reliance on the information as you are authorised to do so. This report may also contain information, systems or data which is the property of Fire Risk Consultants Pty Ltd and Fire Risk Consultants Pty Ltd has in no way waived or altered in any way its ownership right, or provided consent for use by the report recipient, unless expressly provided in the report.

Any fire safety work, including but not limited to planned burning, back burning and/or fire suppression, on any property or building is specifically excluded from this report.

*Where the term **"Bushfire prevention and mitigation related activities"** (or words to that effect) are used, this is to be defined as the clearance of vegetation in accordance with the Victorian State Government guidelines, including clearing and maintenance of existing fire breaks and/or fire access for fire fighters under electricity pylons and properties that have been constructed to Australian Standard AS3959 and/or the National Construction Code.*

Contents

1 Introduction

Fire Risk Consultants has been engaged by Wind Prospect Pty Ltd (the Client) on behalf of Akaysha Energy Pty Ltd to develop a Fire Risk Management Plan (FRMP) for the Brinkworth Solar Farm and Battery Energy Storage System (BESS) (the Project). The Project is located between Koolunga and Brinkworth, to the west of Koolunga Road in South Australia. It is adjacent to the existing Brinkworth Substation.

The Project involves the construction and operation of a Solar Farm and BESS on a 474 hectare site with the project occupying a small area of this. The Project includes a Solar Farm with a capacity of approximately 200MW and a BESS capacity of 300MW with a four hour duration (1200MWh).

This report has been prepared following an assessment of the site, analysis of supplied information relating to the site layout and design and the fire safety systems and testing reports for the proposed battery.

Following advice from Country Fire Service (CFS), as they don't have any documented guidance in place, the design has been undertaken in accordance with the Country Fire Authority Guidelines - *Design Guidelines and Model Requirements – Renewable Energy Facilities* 2022 (CFA Guidelines). The CFA Guidelines also states that the NSW Planning's *Hazardous Industry Planning Advisory Paper 2: Fire Safety Study Guidelines (2011)* should be utilised. The various requirements outlined within the Advisory Paper have been included within this report as it relates to the Project. During the engagement with CFS, they advised that the requirements for firefighting water supply and access to the Solar Farm was different and this could be incorporated into the design.

2 Project Overview

The Project will install, commission and connect a BESS and Solar Farm between Brinkworth and Koolunga. Within this report, it will be referred to as the Brinkworth project. This Project is at feasibility stage and this report has been developed to support the process to obtain the required approvals.

The Project involves the following:

1. 300MW battery energy storage system with a 4-hour duration (i.e., 1200MWh). This will consist of module battery units consisting of an 'enclosure' similar to a shipping container, an inverter and a transformer which are internally or externally connected.
2. Up to 200MWp solar farm situated to the north and south of Power Station Rd using panels on horizontal, single-axis trackers.
3. On-site substation with a connection to the existing Brinkworth substation.
4. A small demountable style office and maintenance facility.
5. Road access immediately to the west of the Brinkworth substation.

The Project will be staged with the battery energy storage system being constructed in the first stage and the solar farm as the second stage.

The Project will also include various fire safety systems including firefighting water supply and detection systems within the system.

The indicative site layout is shown in Figure 2.

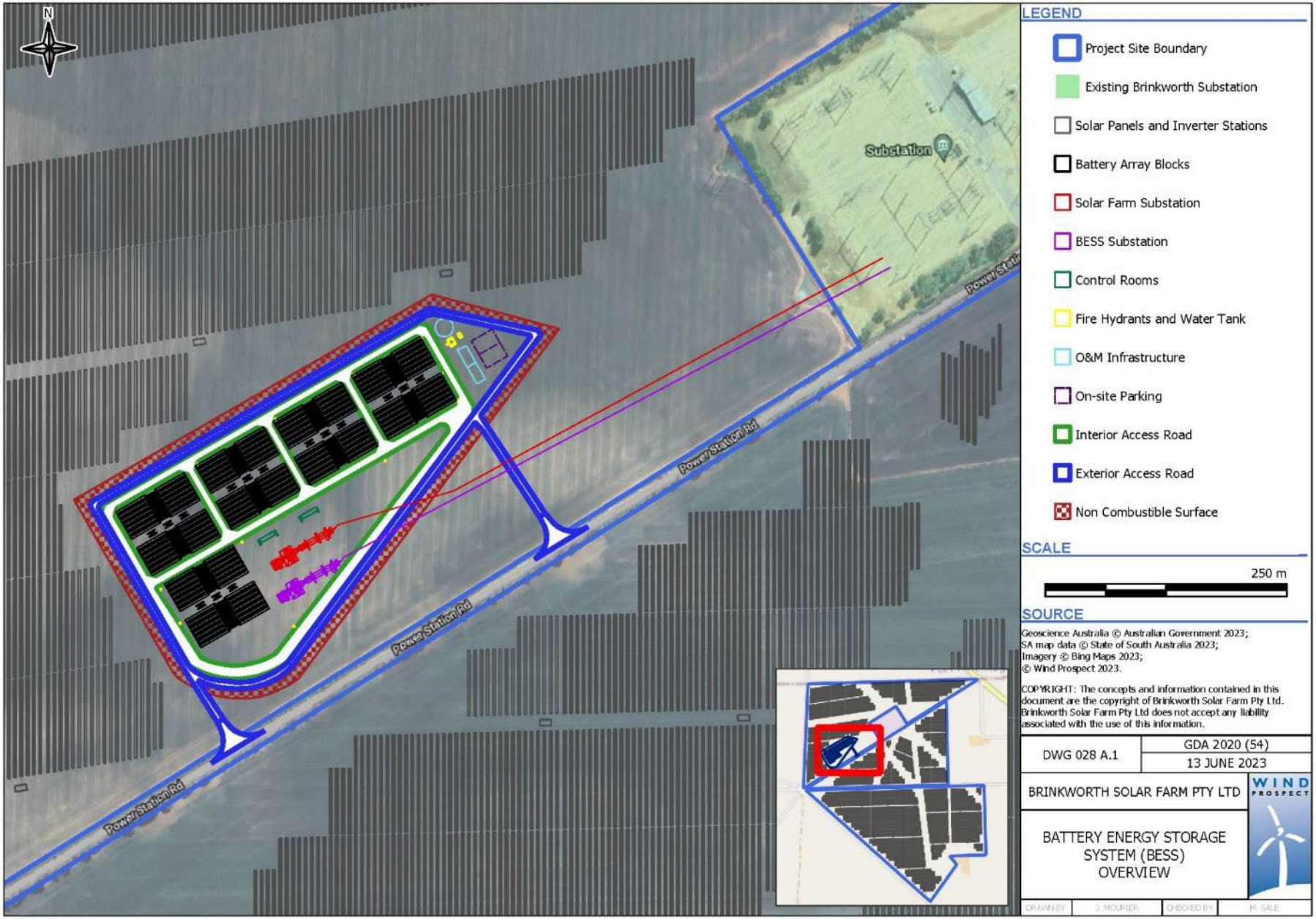

Figure 1 - BESS overview and surrounding area

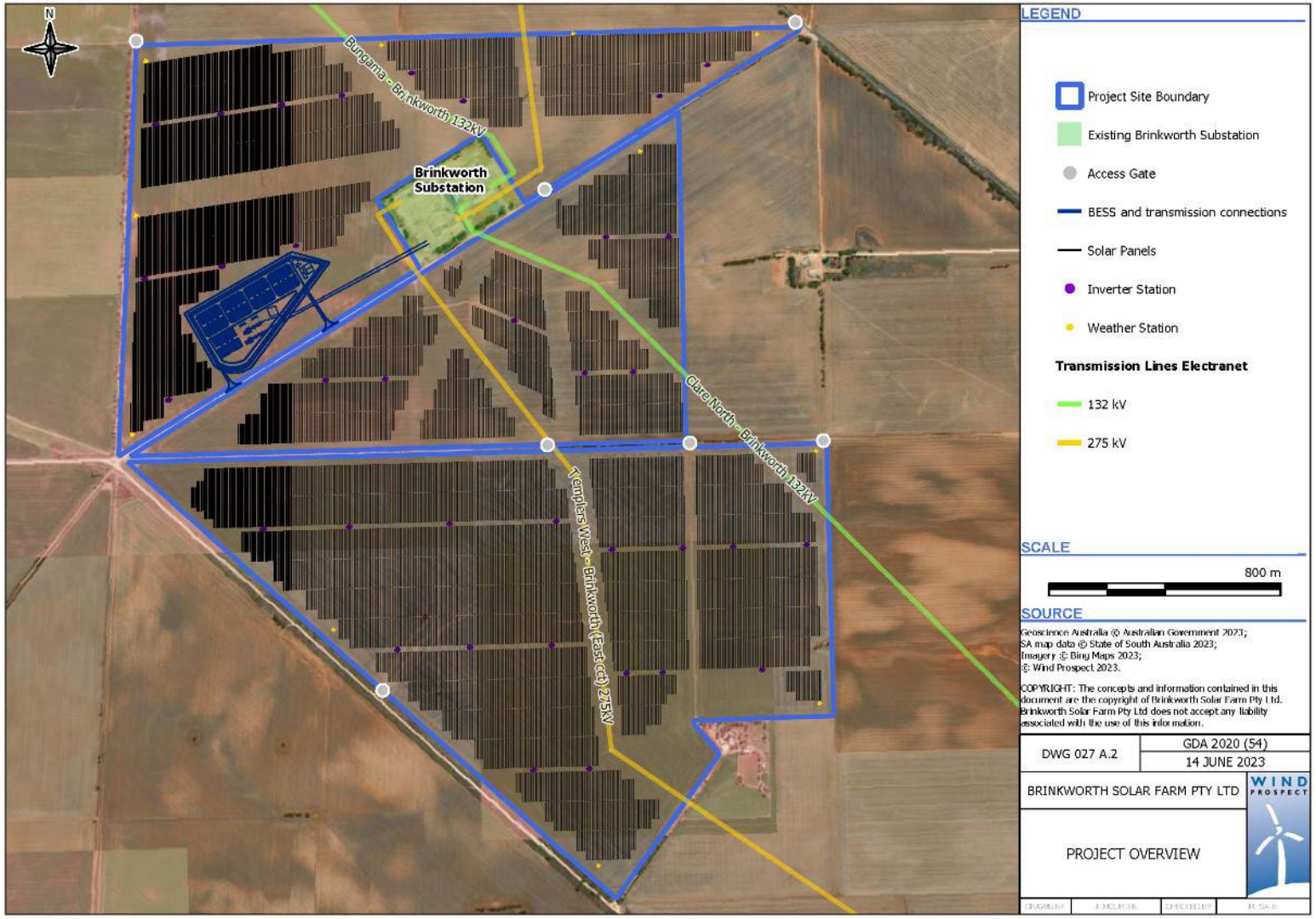

Figure 2 – Brinkworth Solar Farm, and BESS - indicative layout plan

3 Existing conditions assessment

3.1 Site description and location

The Project is located between Koorlunga and Brinkworth and to the west of Koorlunga Road. It is being developed on a 485 hectare parcel of land. The development site is within the Wakefield Regional Council area.

The Solar Farm portion covers the majority of the development site with the BESS located to the south west of the existing substation. The predominant vegetation surrounding the Project site is grassland when assessed in accordance with AS3959 – *Building in bushfire prone areas (2018)* (AS3959) and is contained within the surrounding agricultural properties. The topography on the property and in the surrounding landscape is primarily flat with gentle slopes in some areas.

The surrounding landscape is dominated by farming properties. The farming activities include cropping and grazing. This area of South Australia is known for cropping including wheat, barley and canola.

On the development site, the vegetation is consistent with the surrounding landscape. The farming activities will likely vary but will continue to be focused on stock grazing or cropping. The existing Brinkworth Substation is maintained with it clear that vegetation management activities is occurring regularly.

The elevated risk areas are those where vegetation can accumulate. Some of the roadsides contained elevated levels of fuel. However, the surrounding main road network demonstrated signs of some maintenance occurring. It is likely that maintenance occurs pre the fire danger period.

The surrounding road network is considered excellent and provides effective access to the solar farm and BESS development site and the surrounding landscape. The development is adjacent to the following roads:

- Power Station Road
- Whitehorn Road
- Boucat School Road
- Koonunga Road
- Lakey View Road

The location of the site in relation to the surrounding landscape is shown in Figure 3.

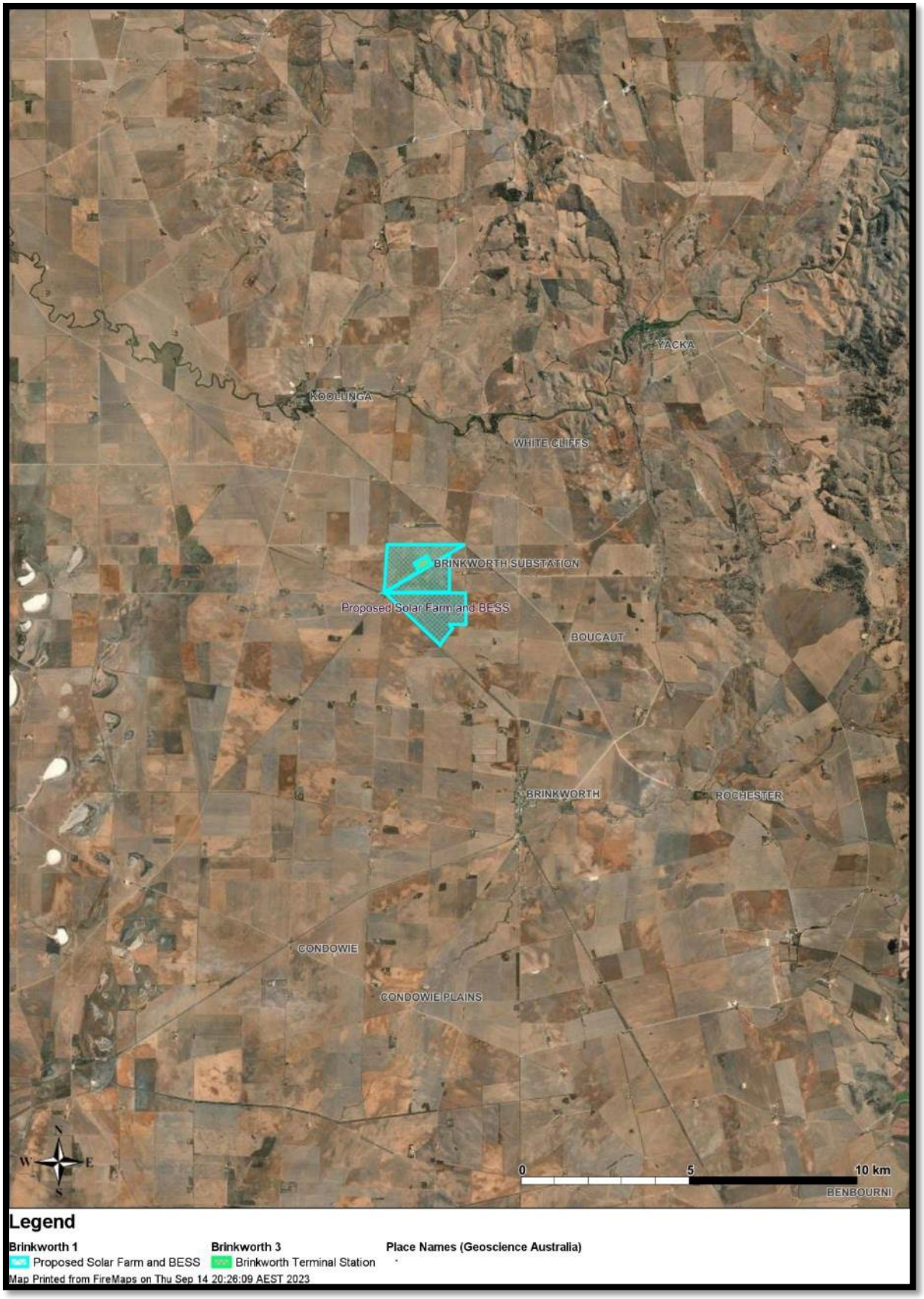

Figure 3 - The Project site and the surrounding landscape

3.2 Risk indicators

In support of the risk assessment contained within Section 5, the following information has been obtained and provides relevant information that informs the analysis of risk. This information relates to the potential bushfire risk and the fire risk relating to a BESS and Solar Farm installation.

3.2.1 Hazards (Bushfire – General Risk) Overlay

The overlay is outlined within the South Australia Planning and Design Code (the Code). South Australia is divided into the following categories that describes the bushfire risk:

- Hazards (bushfire – general risk)
- Hazards (bushfire – medium risk)
- Hazards (bushfire – high risk)
- Hazards (bushfire – urban interface) within 500m of Hazards (bushfire – high risk).

The relevant overlay outlines a range of Performance Outcomes and Deemed to Satisfy criteria. The Desired Outcome for the overlay is:

- DO 1 Development, including land division responds to the general level of bushfire risk by siting and designing buildings in a manner that mitigates the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.
- DO 2 To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.

As outlined further within this report, the Project has been designed to ensure the Desired outcome has been achieved through a design that meets the Performance Outcome and Designated Performance feature (DPF).

3.2.2 Bushfire risk assessment[1]

The Key Hazards and Risk Summary report identifies that bushfire is considered a major hazard within the Yorke and Mid North Zone of South Australia. This was determined following a risk assessment completed as per the State Emergency Management Plan (SEMP).

The report outlines:

South Australia can expect six or seven serious fires every 10 years. The Yorke and Mid North Zone has a long history of bushfires including the Bangor and Pinery fires in 2014 and 2015.

It also states:

The bushfire risk assessment showed that the main risks to people were death and injury. This was a particular concern for vulnerable people including disabled, children, elderly, outdoor workers and emergency services personnel. Bushfire also significantly affects the economy through people not

[1] Key Hazards and Risks Summary – Yorke and Mid North Zone – September 2018, South Australian SES

being able to attend workplaces, as well as disruption and damage to infrastructure such as electricity, water and wastewater infrastructure and telecommunications.

3.2.3 Bushfire history

An analysis of bushfire history in the area surrounding the Project site indicates bushfire history that is reflective of the surrounding grassland environment. Grassfires have occurred in the surrounding landscape as outlined in Figure 4. As discussed in Section 3.2.2, grassfires are expected to occur regularly, and this is demonstrated within the data. Other major fires have also occurred outside those shown in Figure 4. These include the Pinery fire (approximatley 75 kilometres south of this development) which resulted in a significant loss of dwellings, agricultural assets and life loss.

The bushfires which have previously occurred to the west of the Project site are consistent with the weather conditions experienced on elevated fire danger days. This usually consists of a strong north westerly wind followed by a south westerly change during the day. The bushfire that occurred in 2014 to the west of the site, started under a south westerly wind influence and travelled in a north easterly direction.

The smaller bushfires were likely suppressed rapidly and may have been influenced by the landscape features including roads, creeks and other features. Grassfires tend to burn with less intensity when compared to a fire in a forested environment but spread rapidly.

According to the data provided by the South Australian Government, there has been no impact on this site from bushfires in the past.

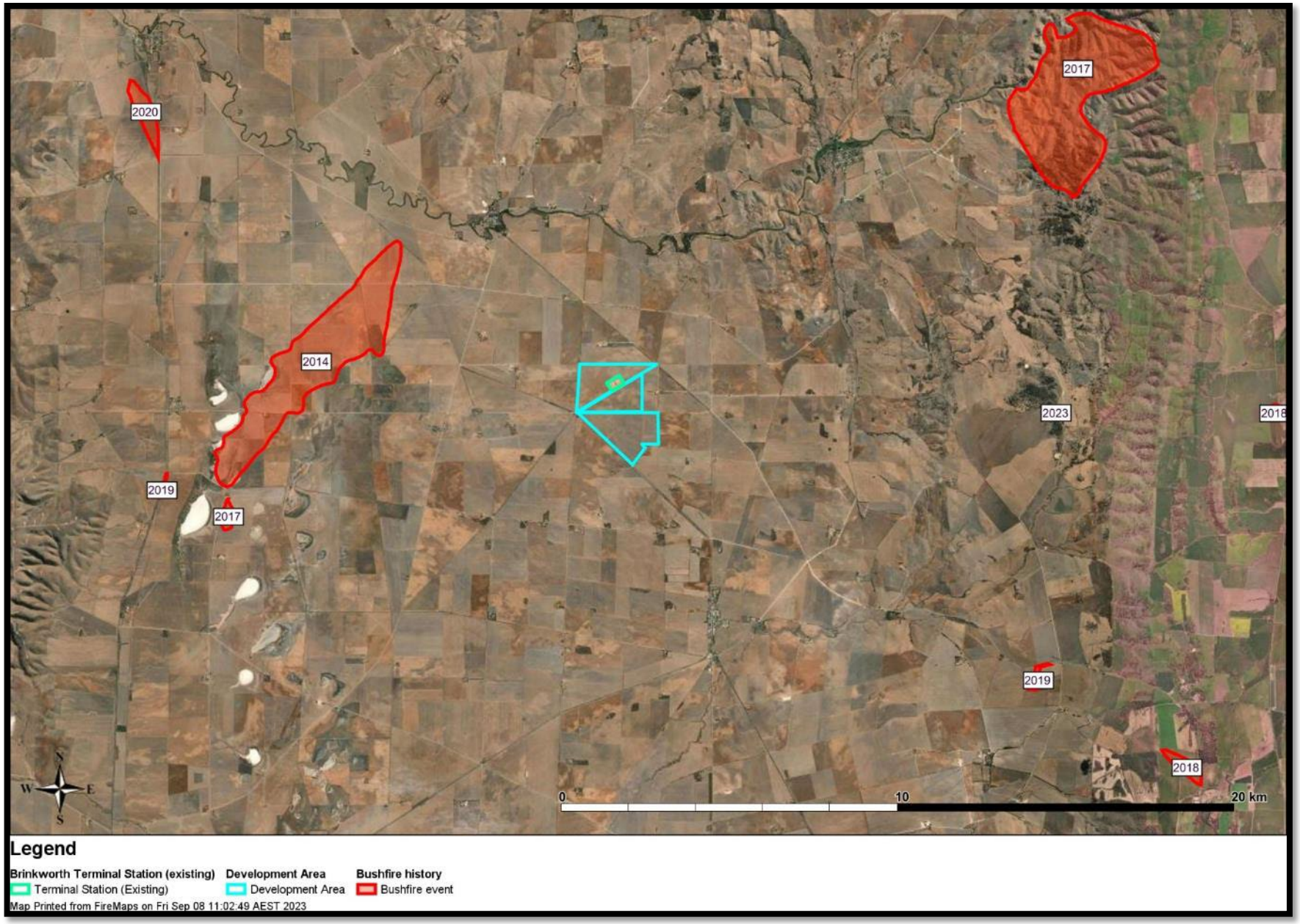

Figure 4 - Bushfire history

4 Risk assessment process

To effectively assess the fire risk associated with the proposal, this report is structured to assess risk using the following frameworks:

- Part 3 – Overlays – Hazards (Bushfire – General Risk) Overlay – South Australian Planning and Design Code[2]
- Assessment against the requirements of the CFA Guidelines *Design Guidelines and Model Requirements: Renewable Energy Facilities 2022*.
- Risk assessment that meets section 5 of the CFA Guidelines.

The risk assessment is based on the information outlined in this report along with industry best practice and our professional expertise. The use of the Country Fire Authority Renewable Energy Guidelines was requested during initial consultation with South Australia Country Fire Service (CFS). CFS advised that compliance with the CFA Guidelines was deemed to be acceptable within South Australia providing the fire water requirements was modified.

4.1 Hazards (Bushfire – General Risk) Overlay

The requirements of the Hazards Overlay are outlined within the Planning and Design Code – Part 3. The requirements and how the Project design achieves these requirements is outlined within Table 1.

The outcome of the analysis indicates that compliance with the CFA Guidelines achieves the requirements outlined within the Hazard Overlay.

[2] https://code.plan.sa.gov.au/home/browse_the_planning_and_design_code?code=browse

Table 1 - Response to Hazards (Bushfire - General Risk) Overlay

Performance Outcome	Designated Performance Feature	Response	Achieved (✓ or ✗)
PO 1.1 **Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.**	DTS/DPF 1.1 None are applicable.	The development is providing fire breaks around the entire perimeter. This along with the requirement to manage all vegetation during the fire danger period will ensure that all structures within the site will be protected by managed areas.	✓
PO 2.1 **Buildings and structures are designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of transportable buildings and buildings on stilts.**	DTS/DPF 2.1 None are applicable.	The development includes a small office and maintenance facility. These are located inside the fire break that is provided around the perimeter. Due to the grassland dominated landscape, it is assumed that the generation of embers able to travel into the development to start fires against or within these buildings is considered unlikely.	✓
PO 2.2 **Extensions to buildings, outbuildings and other ancillary structures are sited and constructed using materials to minimise the threat of fire spread to residential and tourist accommodation (including boarding houses,**	DTS/DPF 2.2 Outbuildings and other ancillary structures are sited no closer than 6m from the habitable building.	There will be appropriate separation between buildings. A minimum of six metres will be provided.	✓

hostels, dormitory style accommodation, student accommodation and Workers' accommodation) in the event of bushfire.			
PO 3.1 **To minimise the threat, impact and exposure to bushfires on life and property, residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited on the flatter portion of allotments away from steep slopes.**	DTS/DPF 3.1 None are applicable.	Whilst this PO is not directly relevant to the project it is utilised as a guide to assess the bushfire risk to the site. The site is generally flat and likely to not elevated bushfire activity. There are no accommodation buildings being provided and the occupants will be alert and awake whilst on site.	✓
PO 3.2 **Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited away from vegetated areas that pose an unacceptable bushfire risk.**	DTS/DPF 3.2 Residential and tourist accommodation and habitable buildings for vulnerable communities are provided with asset protection zone(s) in accordance with (a) and (b): a. the asset protection zone has a minimum width of at least: i. 50 metres to unmanaged grasslands ii. 100 metres to hazardous bushland vegetation b. the asset protection zone is contained wholly within the allotment of the development.	Whilst this PO is not directly relevant to the project it is utilised as a guide to assess the bushfire risk to the site. The development does not include any accommodation buildings or buildings to be utilised by vulnerable people. However, the buildings will be located within the developments fire break.	✓

PO 3.3 **Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) has a dedicated area available that is capable of accommodating a bushfire protection system comprising firefighting equipment and water supply in accordance with Ministerial Building Standard MBS 008 - Designated bushfire prone areas - additional requirements.**	DTS/DPF 3.3 None are applicable.	Whilst this PO is not directly relevant to the project it is utilised as a guide to assess the bushfire risk to the site. As the development does not involve residential or tourist accommodation, this requirement is not relevant. The development is providing firefighting water supply for the BESS and Solar Farm areas.	✓
PO 5.1 **Roads are designed and constructed to facilitate the safe and effective:** **a. access, operation and evacuation of fire-fighting vehicles and emergency personnel** **b. evacuation of residents, occupants and visitors.**	DTS/DPF 5.1 Roads: a. are constructed with a formed, all-weather surface b. have a gradient of not more than 16 degrees (1-in-3.5) at any point along the road c. have a cross fall of not more than 6 degrees (1-in-9.5) at any point along the road d. have a minimum formed road width of 6m e. provide overhead clearance of not less than 4m between the road surface and overhanging branches	The access roads will comply with the requirements of the CFA Guidelines, and this is aligned with the requirements of this planning control.	✓

	or other obstructions including buildings and/or structures (Figure 1) f. allow fire-fighting services (personnel and vehicles) to travel in a continuous forward movement around road curves by constructing the curves with a minimum external radius of 12.5m (Figure 2) g. incorporating cul-de-sac endings or dead end roads do not exceed 200m in length and the end of the road has either: i. a turning area with a minimum formed surface radius of 12.5m (Figure 3) or ii. a 'T' or 'Y' shaped turning area with a minimum formed surface length of 11m and minimum internal radii of 9.5m (Figure 4) h. incorporate solid, all-weather crossings over any watercourse that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes.		
PO 5.2 **Access to habitable buildings is designed and constructed to facilitate the safe and effective:**	Access is in accordance with (a) or (b): a. a clear and unobstructed vehicle or pedestrian pathway of not greater than 60 metres in length is available between the most distant part of the habitable building and the nearest part of a formed public access road	Access and egress provisions has been designed to comply with the CFA Guidelines.	✓

a. access, operation and evacuation of fire-fighting vehicles and emergency personnel **b. evacuation of residents, occupants and visitors**	b. driveways: i. do not exceed 600m in length ii. are constructed with a formed, all-weather surface iii. are connected to a formed, all-weather public road with the transition area between the road and driveway having a gradient of not more than 7 degrees (1-in-8) iv. have a gradient of not more than 16 degrees (1-in-3.5) at any point along the driveway v. have a cross fall of not more than 6 degrees (1-in-9.5) at any point along the driveway vi. have a minimum formed width of 3m (4m where the gradient of the driveway is steeper than 12 degrees (1-in-4.5)) plus 0.5 metres clearance either side of the driveway from overhanging branches or other obstructions, including buildings and/or structures (Figure 1) vii. incorporate passing bays with a minimum width of 6m and length of 17m every 200m (Figure 5) viii. provide overhead clearance of not less than 4.0m between the driveway surface and overhanging branches or other obstructions, including buildings and/or structures (Figure 1)		

	ix. allow fire-fighting services (personnel and vehicles) to travel in a continuous forward movement around driveway curves by constructing the curves with a minimum external radius of 12.5m (Figure 2) x. allow fire-fighting vehicles to safely enter and exit an allotment in a forward direction by using a 'U' shaped drive through design or by incorporating at the end of the driveway either: A. a loop road around the building B. a turning area with a minimum radius of 12.5m (Figure 3) C. a 'T' or 'Y' shaped turning area with a minimum formed length of 11m and minimum internal radii of 9.5m (Figure 4) xi. incorporate solid, all-weather crossings over any watercourse that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes.		
PO 5.3 **Development does not rely on fire tracks as means of evacuation or access for fire-fighting purposes unless there are no safe alternatives available.**	DTS/DPF 5.3 None are applicable.	This development does not rely on fire tracks for access or egress from the site. The site is providing its own access roads which direct site occupants to exits that lead directly to the public road network.	✓

4.2 Analysis against CFA Guidelines

The South Australian CFS have advised to utilise the *Design Guidelines and Model Requirements – Renewable Energy Facilities 2022* (CFA Guidelines) to guide the design of the Solar Farm and BESS. How this design meets the CFA Guidelines is outlined in Table 2. Those requirements that are Victorian specific have been removed from the assessment.

The Guidelines outline the requirements to address fire risk within renewable energy installations. In addition, further analysis occurs (Section 5) that is aimed at addressing the risk assessment requirements outlined within Section 5 of the CFA Guidelines is provided below:

Fire Risk Management

A Risk Management Plan must be developed for facilities with battery energy storage systems, in conjunction with CFS, before development starts.

The Risk Management Plan must:

a) Describe the risks and hazards at the facility to and from the battery energy storage system and related infrastructure.

b) Specify and justify, in accordance with Section 6.2 of this guideline:

- *The location of the battery energy storage system on-site and in the landscape.*
- *Emergency vehicle access to and within the facility that:*
    - *Includes site access points of a number suitable to the size and hazard of the facility (a minimum of two).*
    - *Provides access to battery energy storage systems, substations and fire service infrastructure.*
- *Firefighting water supply for the facility.*
- *A fire break width of 10m or greater, based on radiant heat flux (output) as an ignition source:*
    - *Around the perimeter of the facility.*
    - *Between any landscape buffer/vegetation screening and battery energy storage systems (and related infrastructure).*
- *The separation distance, based on radiant heat flux (output) as an ignition source, between:*
    - *Adjacent battery containers/enclosures.*
    - *Battery containers/enclosures and related battery infrastructure,*
    - *buildings/structures, and vegetation.*
- *All other controls for the management of on and off-site hazards and risks at the facility (including all proposed battery energy storage system safety and protective systems).*

c) Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.

d) Be peer-reviewed by a suitably qualified, independent third party.

e) Form the basis for the design of the facility.

Table 2 outlines the model requirements from CFA Guidelines and how the Project addresses the specific areas. Note that references within CFA Guidelines have been adapted to reference local organisations.

Table 2 - Response to CFA Guidelines

Model requirement	Compliance	Comments
Section 3 – Consulting with CFS		
Early consultation, prior to the development of the planning permit application, ensures that the relevant fire service can effectively consider emergency response implications.	✓	A meeting was held with CFS (Community Risk and Resilience section) to introduce the Project and to discuss the Project design and the provision of fire safety measures. The CFS guidance received during this discussion included: • A 72,000 litre tank for the BESS. • 20,000 litre tanks at entry points. • Access gate every two kilometres and a boundary road Additional engagement will occur with CFS to discuss the content of this plan as required.
Section 4 – Planning Applications		
Planning applications must address all relevant aspects of fire safety, including landscape and bushfire hazards, and hazards to and from the proposed technologies.	✓	This report outlines how the Project meets the relevant requirements of the Planning and Design Code – Hazards (Bushfire General Risk) Overlay.
Section 6- Facility Location and Design		
Section 6.1 – Facility Location		
a) The impact of any ignitions arising from the infrastructure (solar panels, wind turbines, battery energy storage systems, electrical infrastructure) on nearby communities, infrastructure and assets.	✓	This report considers the impact of fires that leave the property. Refer to the relevant risk assessment Table for the assessment detail.

Model requirement	Compliance	Comments
b) The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	✓	This report considers the impact of bushfire on the infrastructure. Refer to the relevant risk assessment Table for the assessment detail. The site layout and design offsets the impact of bushfire impact. Whilst the surrounding landscape is dominated by grassland, the potential for bushfires to generate embers whilst limited, is still a possibility. The BESS Units are all surrounded by non combustible surfaces.
c) Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks at the site to an acceptable level.	✓	This report considers this matter and provides various strategies to reduce the impact on the surrounding areas.
Section 6.2 – Facility Design		
Section 6.2.1 – Emergency vehicle access		
All facilities		
a) Construction of a four (4) metre perimeter road within the perimeter fire break.	✓	A four metre wide perimeter road is being provided within the fire break.
b) Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes.	✓	This has been included within the design.
c) Constructed roads should be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface.	✓	This has been included within the design.
d) The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than fifty (50) metres.	✓	The site is mainly flat with only small slopes present. There are no roads that will require assessment of the grade.

Model requirement	Compliance	Comments
e) Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.	✓	The site is mainly flat with only small slopes present. There are no roads that will require assessment of dips.
f) Roads must incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated.	✓	The site will be provided with a road network that will as a minimum achieve the requirements for passing bays. This in addition to the road network that reduces dead ends and will ensure effective access and egress is provided within the site.
g) Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and battery energy storage systems and related infrastructure.	✓	The Access Road along with the perimeter road provides effective access to all parts of the property.
h) The provision of at least two (2) but preferably more access points to the facility, to ensure safe and efficient access to and egress from areas that may be impacted or involved in fire. The number of access points must be informed through a risk management process.	✓	The property is provided with a main entrance that provides a safe approach option for firefighters whilst also providing sufficient off road parking if required. A number of access/egress gates is being provided around the development.
Section 6.2.2 Firefighting Water Supply		
All Facilities		
a) Water access points must be clearly identifiable and unobstructed to ensure efficient access.	✓	The static water supply system will be located and marked to enable efficient access for firefighters.
b) Static water storage tank installations must comply with AS 2419.1-2005: Fire hydrant installations – System design, installation and commissioning.	✓	A compliant static water supply system will be provided. This will be available in the event of a bushfire.
c) The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.	✓	This has been included within the design.

Model requirement	Compliance	Comments
d) The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.	✓	This has been included within the design. The tanks will be either supplied through a street connection and/or an arrangement for water carriers to refill the tanks.
e) The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (solar panels, wind turbines, battery energy storage systems, etc.).	✓	The firefighting water supply for the BESS system will also be sufficient for the provision of fire water supply across the site as per the CFA Guidelines.
f) The hard-suction point must be provided, with a 150mm full bore isolation valve (Figure 1) equipped with a Storz connection, sized to comply with the required suction hydraulic performance. Adapters that may be required to match the connection are: 125mm, 100mm, 90mm, 75mm, 65mm Storz tree adapters (Figure 2) with a matching blank end cap to be provided.	✓	This has been included within the design.
g) The hard-suction point must be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel.	✓	This has been included within the design.
h) An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 15 tonnes GVM, eight (8) metres long and six (6) metres wide or to the satisfaction of the CFA.	✓	This has been included within the design.
i) The road access and hardstand must be kept clear at all times.	✓	This has been included within the design.
j) The hard-suction point must be protected from mechanical damage (e.g. bollards) where necessary.	✓	This has been included within the design.

Model requirement	Compliance	Comments
k) Where the access road has one entrance, a ten (10) metre radius turning circle must be provided at the tank.	✓	This has been included within the design.
l) An external water level indicator must be provided to the tank and be visible from the hardstand area.	✓	This has been included within the design.
m) Signage (Figure 3) indicating 'FIRE WATER' and the tank capacity must be fixed to each tank.	✓	This has been included within the design.
n) Signage (Figure 4) must be provided at the front entrance to the facility, indicating the direction to the static water tank.	✓	This has been included within the design.
Solar Energy Facilities		
a) The fire protection system for solar energy facilities must incorporate at least one (1) x 45,000L static water tank for every 100ha. For example, a 500ha site requires a minimum of five (5) x 45,000L static water tanks.	✓	The Solar Energy Facility will be provided with 20,000 litre static water supplies at each access gate into the site.
b) A fire water tank must be located at the primary vehicle access point to the facility, and elsewhere in consultation with CFA.	✓	The static water tank will be located near the entrance to the Solar Energy Facility section of the site. The access to the Solar Energy Facility will be via the access provisions utilised for the BESS area.
c) Fire water must be provided to cover buildings, control rooms, substations and grid connections, in consultation with CFA.	✓	The 20,000 litre tank will be strategically located to ensure fire water is available within a short distance of the buildings.
d) Additional fire protection systems or equipment required under any Australian Standards for dangerous goods must be provided as prescribed.	✓	There are no dangerous goods being stored within the Solar Energy Facility.
Battery Energy Storage Systems		

Model requirement	Compliance	Comments
1) For facilities with battery energy storage systems, the fire protection system must include as a minimum:		
a) A fire hydrant system that meets the requirements of AS 2419.1-2005: Fire hydrant installations, Section 3.3: Open Yard Protection, and Table 3.3: Number of Fire Hydrants Required to Flow Simultaneously for Protected Open Yards. Except, that fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.	✓	CFS have advised that a 72,000 litre static water supply that complies with the relevant provisions of AS2419.1 is considered acceptable. This tank will be located close to the BESS area.
Substations		
Fire water must be available to substations.	✓	Fire water will be available on the site.
Section 6.2.4 – Fire Breaks		
A fire break must be established and maintained around:		
a) The perimeter of the facility, commencing from the boundary of the facility or from the vegetation screening inside the property boundary.	✓	The required 10 metre fire break that extends from the edge of the BESS infrastructure will be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. To ensure the infrastructure is not exposed to more than 10kW/m², the area between the fire break and the perimeter fence/vegetation screen will be maintained grass to a maximum, of 100mm length during the fire danger period. The Solar Panels will be setback from the boundary to ensure that no part is within 10 metres of the Project boundary.

Model requirement	Compliance	Comments
b) The perimeter of control rooms, electricity compounds, substations and all other buildings onsite. The width of fire breaks must be a minimum of 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.	✓	All infrastructure is protected by the provision of at least a 10 wide fire break.
Battery Energy Storage Systems		
A fire break must be established and maintained around battery energy storage systems and related infrastructure.	✓	This has been included within the design. The BESS also benefits from the managed landscape being introduced by the Solar Energy Facility.
Section 6.2.5 – Design Specific to Facility Type		
Solar Energy Facilities		
Solar energy facilities are to have a minimum six (6) metre separation between solar panel banks.	✓	This will be included within the design.
Battery Energy Storage Systems		
1) The design of the facility must incorporate:		
a) A separation distance that prevents fire spread between battery containers/enclosures and: • Other battery containers/enclosures. • On-site buildings. • Substations. • The site boundary. • Any other site buildings. • Vegetation. *Separation must be at least the distance where the radiant heat flux*	✓	The battery system being provided for this Project has been through UL9540A[3] testing and the outcomes of this testing has determined the appropriate separation distances required during installation and operation. The supplier has also tested the battery systems in a large scale fire test and this data has also informed the layout design of the system.

[3] UL9540A - *Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems* is specified by the CFA Guideline as the minimum test requirement for large scale battery systems.

Model requirement	Compliance	Comments
(output) from a battery energy storage system container/enclosure fully involved in fire does not create the potential for ignition of these site elements.		
b) A fire break around the battery energy storage system and related infrastructure, of a width of no less than 10m, or greater where determined in the Risk Management Plan. Fire breaks must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. *The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping.*	✓	A fire break of 10 metres is being provided around the entire perimeter of the BESS Site. The fire break will be constructed of non-combustible materials and maintained all year round.
c) A layout of site infrastructure that: i. Considers the safety of emergency responders. ii. Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system. iii. Minimises the potential for fires in battery containers/enclosures to impact on-site and offsite infrastructure.	✓	The main entrance to the property is from Power Station Road with a number of access gates provided around the solar energy facility. The emergency responders have a number of options available to them if access is required due to either a fire within the property or threatening the property.
2) Battery energy storage systems must be:		
a) Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles).	✓	The BESS area is provided with two access points. These entrance points allow firefighters to determine the safest access option depending on the wind direction or if the wind direction changes during an event.
b) Located so that the site entrance and any fire water tanks are not aligned to the prevailing wind direction (therefore least likely to be impacted by smoke in	✓	The site entrance is located away from the BESS area. Access to the static water supply will be available from two

Model requirement	Compliance	Comments
the event of fire at the battery energy storage system.)		directions depending on the wind direction. If access to the static water supply becomes untenable, the water supplies provided for the Solar Energy Facility can also be utilised.
c) Provided with in-built detection and suppression systems. Where these systems are not provided, measures to effectively detect and/or suppress fires within containers must be detailed within the Risk Management Plan.	✓	The BESS is provided with a fire safety system that incorporates the following: • Heat detection • Gas detection • Smoke detection • Thermally activated Gas Suppression
d) Provided with suitable ember protection to prevent embers from penetrating battery containers/enclosures.	✓	The IP rating[4] for this Unit (IP 56) ensures that embers are unlikely to enter the Unit. The battery containers are fitted with screens to prevent birds, insects and dust to enter the container. Housekeeping is an ongoing task at the site and during the fire danger period, all vegetation accumulation against the base of the containers and on horizontal surfaces will be removed. It is highly unlikely for an ember to penetrate the unit. If an ember does penetrate, the low temperatures that are maintained within the unit will likely extinguish the ember before it is able to ignite any combustibles. The final defence is the detection system that will activate if the ember is able to cause a fire internally within the unit.

[4] The Ingress Protection Code (IP Code) indicates how well a device is protected against water and dust. It is defined by the International Electrotechnical Commission (IEC) under the international standard IEC 60529 which classifies and provides a guideline to the degree of protection provided by mechanical casings and electrical enclosures against intrusion, dust, accidental contact, and water.

Model requirement	Compliance	Comments
		This activation will also alert the monitoring centre.
e) Provided with suitable access roads for emergency services vehicles, to and within the site, including to battery energy storage system(s) and fire service infrastructure.	✓	Driveway access is provided that allows access and parking inside the main entrance along with perimeter access around the battery storage area.
f) Installed on a non-combustible surface such as concrete.	✓	The battery area and the supporting infrastructure are being stored on a non-combustible surface.
g) Provided with adequate ventilation.	✓	The batteries are stored with sufficient ventilation around and between the pack of containers and conform with the manufacturer's specifications.
h) Provided with impact protection to at least the equivalent of a W guard rail-type barrier, to prevent mechanical damage to battery containers/enclosures.	✓	A site safety policy will be developed that will include requiring vehicles to use site accessways, reversing requirements (e.g., large vehicles requiring a spotter), speed controls and other measures where appropriate.
i) Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.	✓	This will be included within the design.
j) Provided with spill containment that includes provision for management of fire water runoff.	✓	An assessment has occurred, and the Project Area has sufficient area to develop a fire water runoff area. This will be incorporated with the stormwater design. Detailed design will be undertaken to determine size, location and management of a fire water runoff catchment facility. Procedures will be included within the Emergency Management Plan. The minimum size of the fire water runoff system that is incorporated within the stormwater basin design, will be 100,000 litres. The Emergency Management Plan will include contact details for companies that can respond

Model requirement	Compliance	Comments
		and commence the disposal of the contaminated water.
Section 7 – Facility Construction and Commissioning		
Section 7.1.4 – Emergency Management		
An Emergency Management Plan must be developed for the construction and commissioning phase of the facility.	✓	An Emergency Management Plan will be developed for both the construction and operations phase.
Section 8 – Facility Operation		
Section 8.1 – Vegetation and Fuel Management		
Facility operators must undertake the following measures during the Fire Danger Period:		
a) Grass must be maintained at or below 100mm in height during the declared Fire Danger Period.	✓	This requirement will be included within the Fire Management Plan.
b) Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation.	✓	This requirement will be included within the Fire Management Plan.
c) Restrictions and guidance must be adhered to during the Fire Danger Period, days of high (and above) fire danger and Total Fire Ban days (refer to:https://www.cfs.sa.gov.au/warnings-restrictions/restrictions/total-fire-bans-ratings/).	✓	This requirement will be included within the Fire Management Plan.
d) All vehicles and heavy equipment must carry at least a nine (9)-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or firefighting equipment as a minimum when on-site during the Fire Danger Period.	✓	This requirement will be included within the Fire Management Plan.
Section 8.2 – Maintenance		
All Facilities		
Inspection, maintenance and any required repair activities must be conducted for all infrastructure,	✓	This requirement will be included within the Fire Management Plan.

Model requirement	Compliance	Comments
equipment and vehicles at the facility. Maintenance must be in line with any relevant Australian Standards and the manufacturer's requirements.		
Section 8.4 Facility and System Monitoring		
All Facilities		
Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.	✓	In addition to the detection system, the site will be provided with a Supervisory Control And Data Acquisition (SCADA) system that will monitor the day to day operations of the BESS, Solar Farm and associated infrastructure. The system includes a range of sensors that are preprogramed to send alert messages and includes: • Over temperature • Under temperature • Under voltage warning • Power off fault • Voltage and current changes. These alerts are automatically transmitted to a monitoring centre. There are appropriate levels of back up communication systems installed in the event of power failures or other events that may interrupt the communications connections. The Emergency Management Plan will include a requirement that if the monitoring systems are ever disrupted, a technician will be deployed to the site and will remain there until the communication systems are operating again.
Section 9 – Fire Management Planning		
All Facilities		
A Fire Management Plan must be developed for the facility, in	✓	A Fire Management Plan (FMP) will be developed prior to the commissioning

Model requirement	Compliance	Comments
conjunction with CFA, before commissioning of the facility.		of the facility. The FMP will be provided to CFS for their consideration and feedback.
Section 10 – Emergency Management Planning		
All Facilities		
An Emergency Management Plan must be developed specific to the facility, in conjunction with CFA, prior to commissioning of the facility.	✓	An Emergency Management Plan will be developed prior to the commencement of construction of the BESS. This Plan will be provided to CFS for their consideration and feedback.
Section 10.2.1 – Developing an Emergency Information Book		
All Facilities		
An Emergency Information Book must be developed and available to emergency responders. Emergency Information Books must be located in Emergency Information Containers, provided at each vehicle entrance the facility.	✓	An Emergency Information Book will be provided at both site entrances in an Emergency Information Container that is protected from weather.

4.3 Treatment summary

Following the assessment against the CFA Guidelines the following treatments will be provided to manage the risk of fires. The Fire Management Plan will outline the detailed requirements for the provision and maintenance of fire management treatments. The below list is a summary of the requirements:

1. Access to the site to include full perimeter access including appropriate widths and load limits.
2. Perimeter fire break that ensures a sterile area for a distance of at least 10 metres.
3. Static water supplies at the BESS and all access gates.
4. Fire detection system provided within the battery units.
5. Fire Management Plan
6. Emergency Management Plan
7. Emergency Information Books located within Emergency Information Containers.

5 Risk Assessment

This risk assessment has been developed to meet the requirements of Section 5 of the CFA Guidelines. Section 5 of the CFA Guidelines is outlined within Section 4.2 of this report.

5.1 Introduction

The risk assessment process involves identifying, analysing, evaluating and treating the identified risks. The overall risk assessment process requires a consistent approach and follows *AS ISO 31000:2018 Risk management – Guidelines* as incorporated into the National Emergency Risk Assessment Guidelines (NERAG). Figure 1 provides an overview of the risk assessment process as outlined within *AS ISO 31000:2018 Risk management – Guidelines*.

Risk management is the process of recognising risk and developing methods to both minimise and manage the risk. This requires the development of a method to identify, prioritise, treat (deal with), control and monitor risk exposures.

A risk assessment is a function of the likelihood of an adverse event occurring and the consequence of the event. A comprehensive risk assessment will identify potential risks and consequences and therefore assist with the development of mitigation actions.

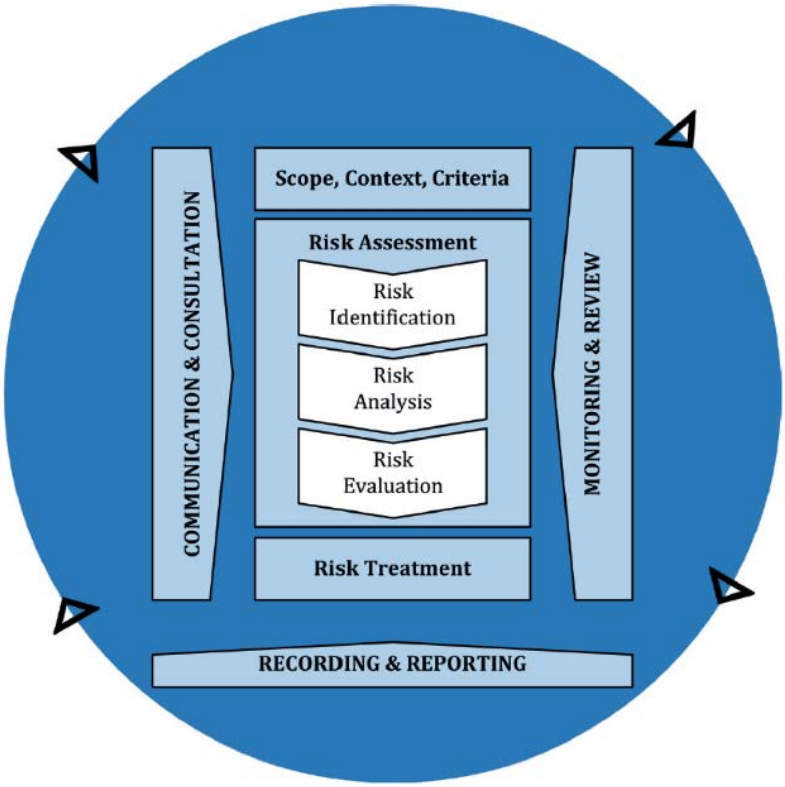

Figure 5 - Overview of AS/NZS ISO 31000-2018 risk management process

This report seeks to follow the steps outlined within the risk management guideline along with the process outlined within NERAG. The outcome of this assessment is a detailed understanding of hazards, the likelihood and consequence of a hazard becoming an emergency, and the treatments identified to manage this risk.

5.2 Context

The assessment of fire risk is a key requirement imposed on the development by CFS through the approvals phase. The CFA Guidelines outlines the types of hazards that may need to be considered in relation to BESS infrastructure and Solar Farms at the design, construction and operational phases.

5.3 Analysis of fire risk

BESS infrastructure is largely acknowledged as having limited potential to cause fires. Fires have occurred previously and where possible these have been considered during the assessment of risk outlined this report. The occurrence of fires in large scale battery packs is not common. Fires have occurred and these are usually contained to a single battery pack. The range of sensors that are fitted to the systems will in most cases enable the early shut down that will prevent thermal runaway from occurring.

It is important the assessment of risk considers the key stages of the Project being the construction and operations phase.

5.3.1 Assessment of fire risk during construction

The construction phase includes various stages including site works, undergoing infrastructure, construction of footings and the installation of the battery units. This stage also includes the commissioning of the battery units and other systems including fire protection systems. This stage also ensures the relevant connectivity is installed to ensure that all alerts and system messages are transmitted to an appropriate monitoring location.

A recent fire that occurred at the Victorian Big Battery[5] installation on the outskirts of Geelong has been assessed and reports are available that outlines what occurred and how system manufacturers and installers should consider this information. This fire occurred during the commissioning phase of the particular unit. In summary, the isolation of the unit whilst it contained a charge was considered an incorrect process[6].

On 28 September 2021, Energy Safe Victoria released their Statement of Findings – Fire at the Victorian Big Battery. They outlined that the root cause was most likely:

[5] https://victorianbigbattery.com.au/wp-content/uploads/2022/01/VBB-Fire-Independent-Report-of-Technical-Findings.pdf

[6] https://esv.vic.gov.au/wp-content/uploads/2021/09/VBB_StatementOfFindings_FINAL_28Sep2021.pdf

a leak within the Megapack cooling system that caused a short circuit that led to a fire in an electronic component. This resulted in heating that led to a thermal runaway and fire in an adjacent battery compartment within one Megapack, which spread to an adjacent second Megapack.

The report outlines the contributory factors and the lessons learned to prevent a reoccurrence. Energy Safe Victoria provided approval to recommence commissioning at the Victorian Big Battery providing the measures outlined are in place. The report states that the affected Megapacks failed safely despite total loss.

The report states that Tesla is investigating why the second Megapack was lost and what they will do to prevent this from occurring in the future. Tesla has altered the design of their Megapack to limit the potential for fire spread to occur.

5.3.2 Assessment of fire risk during operations

The operations phase follows the commissioning stage of the Project, and the role of maintenance becomes critical to ensure that the system operates as it was designed, for the life of the development. The ongoing maintenance of the infrastructure and development is critical to ensure the ongoing management of fire risk.

All the system components are to be considered as critical as they all are contributing to the ongoing safe operations. The system components including monitoring connectivity, fire protection systems, vegetation management, site access controls, battery safety systems and other safety systems.

The BESS manufacturing industry to move from the NMC to the LFP lithium is likely to see a reduction in large BESS fires. As outlined within the UL9540A testing (refer to provided reports) it is difficult to cause the LFP battery to commence thermal runaway.

5.4 Risk identification

Through discussions with the client, review of various documentation and the consideration of previous fire history that involved BESS infrastructure, the following hazards have been identified:

Table 3 - Hazard identification and description

Hazard	Description
Electrical hazards causing a fire	Electrical faults and/or hazards can be a key cause of fire in BESS infrastructure. Hazards including battery faults, overcharging, rapid discharge, loss of remote monitoring systems, internal short circuits and overheating.
Fire causing spread to adjoining infrastructure on the property	A fire that has started in a single battery unit may spread to adjoining batteries, facilities or other infrastructure. Rapid escalation of the fire size and complexity can create issues for onsite staff and contractors, firefighters and the community.

Fire causing offsite impacts	Any fire on the property that is able to spread to adjoining properties most likely through vegetation connectivity, on bushfire risk days can start fires in the surrounding landscape that can threaten the community.
Offsite fire impacting on the site	A bushfire burning through the surrounding landscape can enter the property and threaten the infrastructure by potentially starting new fires.
Fire water runoff	In the event of a fire, firefighters will respond and use water to either extinguish or cool the surrounding area until the infrastructure is deemed safe.
Dangerous Goods exposure	The dangerous goods that are stored within the BESS and associated infrastructure may leak and either ignite or require clean up by either on site staff, contractors or firefighters.
Staff and firefighters	The response to a fire by staff, contractors or firefighters can be dangerous due to the various safety hazards associated with a fire in this type of infrastructure.
Off gassing and	In the event a lithium ion battery commences off gassing or thermal runaway, there may be an impact on staff, contractors and firefighters.

The above list will allow the assessment of most hazards that may be encountered in a development of this type.

5.5 Risk analysis

The analysis of risk requires the consideration of the likelihood and consequence of an event occurring and measuring this against a predetermined matrix to enable the consideration of each risk both individually and collectively.

For this assessment, a risk matrix has been developed that enables the effective consideration of risk and to enable a comparison between the outcome of the hazard assessment.

5.5.1 Likelihood

An assessment of the likelihood of a fire occurring at this development including the potential to impact on people and other infrastructure/property is a key part of the risk assessment. The following will be considered during the assessment of an event occurring:

- Potential for an unplanned fire to occur
- Potential for this ignition to develop and exhibit significant fire behaviour
- Potential for that fire to destroy assets
- Potential for people to be affected or threatened
- The potential for it to develop into a major fire.

Recommendations for mitigation actions in the area may be determined by a number of approaches depending on the level of assessed risk. Strategies to lower risk are provided to ensure the risk is managed to an acceptable level.

An assessment of likelihood considers factors such as:

- Sources of ignition

- Use of the property and/or surrounding area
- History of ignitions within similar infrastructure
- Ability to spread from the property.

Table 4 - Likelihood table

Likelihood scale frequency	Description
Almost certain	The event Is expected to occur in most circumstances. (75%-99%). Has occurred frequently at the location.
Likely	The event will probably occur in most circumstance (50% - 75%). Has occurred frequently in the company.
Possible	The event should occur at some time. Likely to occur sometime (25% - 50%). Has occurred many times in the industry, but not in the company.
Unlikely	The event could occur at some time. Unlikely but possible (10% - 25%). Has occurred once or twice in the industry.
Rare	The event may occur only in exceptional circumstances. Assumed it may not be experienced (0% - 10%). Unheard of in the industry.

5.5.2 Consequence

Consequence refers to the potential damage that could result from a fire occurring in relation to people and assets. In assessing the possible consequences, the assessment considers a variety of hazard, exposure and vulnerability factors including:

- The likely number of people at the facility
- The proximity of other assets
- The location of surrounding properties and the type of activities
- Response capability if an event occurred.

The consequence scale refers to the potential impacts which could occur should a fire occur.

Table 5 - Risk assessment consequence table

Consequence scale	Description		
	People	**Environment**	**Plant/Equipment**
Catastrophic	Multiple fatalities	Permanent widespread ecological damage. Toxic release off-site with detrimental effect. Likely EPA prosecution	Massive widespread equipment damage (i.e. plant/equipment write-off) ($1M +).
Major	Single fatality or permanent disability	Heavy ecological damage with costly restoration. Off-site release contained with outside assistance and little detrimental impact.	Multiple equipment replacements ($200 000 - $1M).

Moderate	Major injuries - Incapacitations or requiring time off work	Major but recoverable ecological damage. On-site release contained with outside assistance.	Equipment level replacement /repair ($50 000 - $200 000).
Minor	Significant injuries - Medical treatment, non-permanent injury	Limited but medium term damage. On-site release immediately contained	Component level replacement /repair ($10 000 - $50 000).
Insignificant	Slight injuries- First Aid Treatments (cuts/ bruises)	Short term damage. Low financial loss, negligible environmental impact	Slight Damage (< $10 000).

The risk rating table (Table 6) is used to combine likelihood and consequence to obtain a risk score. The risk score is used to aid decision making by determining which areas are at the greatest risk of a fire starting and spreading through the development. Actions can be prioritised using this method to determine where risk mitigation works will occur.

Table 6 - Risk matrix

				Impact Score				
				1	2	3	4	5
				Insignificant	Minor	Moderate	Major	Catastrophic
Fire Risk Consultants Risk Assessment Matrix			People	Slight Injuries- First Aid Treatments (cuts/bruises)	Significant Injuries - Medical Treatment, non-permanent injury	Major Injuries - Incapacitations or requiring time off work	Single Fatality or Permanent Disability	Multiple Fatalities
			Environment	Short term damage / Low financial loss, negligible environmental impact	Limited but medium term damage / On-site release immediately contained	Major but recoverable ecological damage / On-site release contained with outside assistance	Heavy ecological damage with costly restoration / Off-site release contained with outside assistance and little detrimental impact	Permanent widespread ecological damage / Toxic release off-site with detrimental effect / Likely EPA prosecution
			Plant / Equipment	Slight Damage (< $10 000)	Component level replacement /repair ($10 000 - $50 000)	Equipment level replacement /repair ($50 000 - $200 000)	Multiple equipment replacements ($200 000 - $1M)	Massive widespread equipment damage (ie plant/equipment write-off) ($1M +)
Likelihood	A	Almost Certain	The event Is expected to occur in most circumstances / 75%-99% / Has occurred frequently at the location	Low (5)	Moderate (10)	Very High (18)	Extreme (23)	Extreme (25)
	B	Likely	The event will probably occur in most circumstance / 50% - 75% / Has occurred frequently in the company	Low (4)	Moderate (9)	Very High (17)	Very High (20)	Extreme (24)
	C	Possible	The event should occur at some time. Likely to occur some time / 25% - 50% / Has occurred many time in the industry, but not in the company	Low (3)	Moderate (8)	High (13)	Very High (19)	Very High (22)
	D	Unlikely	The event could occur at some time. Unlikely but possible / 10% - 25% / Has occurred once or twice in the industry	Low (2)	Low (7)	High (12)	High (15)	Very High (21)
	E	Rare	The event may occur only in exceptional circumstances. Assumed it may not be experienced / 0% - 10% / Unheard of in the industry	Low (1)	Low (6)	Moderate (11)	High (14)	High (16)

The outcomes of the risk assessment are used to inform the recommendations. These are aimed at providing guidance to management to reduce the fire risk at the property.

5.5.3 Risk analysis worksheets

The following worksheets have assessed the hazards identified in Section 5.4 and results in a risk classification along with strategies to lower risk if it is deemed required. The initial assessment of risk is based on the information that has been supplied to date. The development of additional strategies to lower risk are made as either there was no information provided that identified the treatment or further clarity is required to considered.

Table 7 - Risk assessment - Electrical hazards causing a fire

RISK	Electrical hazards causing a fire
CAUSE	Electrical faults and/or hazards can be a key cause of fire in BESS infrastructure and Solar Energy Facilities Hazards including battery faults, overcharging, rapid discharge, loss of remote monitoring systems, internal short circuits and overheating. For BESSs, these events may cause thermal runaway.
LIKELIHOOD	Possible
JUSTIFICATION	**Solar Energy Facility** Solar energy facilities have experienced fire events which are usually due to faulty wiring or connections. To reduce the likelihood of electrical faults resulting in a fire in the Solar Energy Facility, (including the solar panels, connections, substation and inverters) the following will be applied: • Quality components will be selected for the Proposal • During construction and maintenance of the facilities, equipment will be installed in accordance with the manufacturer's specifications and relevant Australian Standards. **BESS** The occurrence of electrical faults and/or hazards has occurred in the past and are likely to occur again in the future. The likelihood of an electrical fault escalating into an emergency such as a fire is unlikely due to the multiple layers of controls in place including sensors, 24/7 system monitoring and maintenance programs. There are examples of fires within BESS technology that indicates that when faults occur, they can escalate into challenging events including thermal runaway. To offset the likelihood of a fault within the BESS that creates a flammable atmosphere in and around the BESS, escalates to a fire, or a fire that affects adjacent infrastructure, the following mitigation treatments are included: • Cooling systems that maintain the temperature of the battery packs during day-to-day operations. • Safety systems that send alerts to the monitoring centre if a sensor is activated. • Internal barriers within and surrounding the Unit to reduce the possibility of thermal runaway events from spreading to adjoining battery units. • Separation distances between individual Units and rows of Units and other infrastructure in accordance with manufacturer installation guidelines. • The BESS will be installed by qualified and competent people in accordance with the manufacturer's specifications to relevant Australian Standards and including compliance with UL9540A – Energy Storage System Requirements.
CONSEQUENCE	Moderate
JUSTIFICATION	**Solar Energy Facility**

	The consequence of an electrical hazard causing a fire in the Solar Energy Facility has been identified as moderate and has been identified as the main cause of fires in solar energy facilities. **BESS** The consequence of an electrical hazard causing a fire in the BESS has been identified as moderate and there are examples of this occurring as outlined previously.
RISK RATING	High (13)
STRATEGY TO LOWER RISK	**Solar Energy Facility** To reduce the identified risk of electrical faults causing fires, various design treatments will be applied in line with the CFA Guideline including: • The solar farm will be compartmentalised into separate areas supported by a network of APZs including APZs protecting: o The substation area. o The operations buildings. o The BESS. o The Proposal as a whole. • The provision of access into and around the Solar Energy Facility complies with the requirements outlined within the CFA Guideline. • The Solar Energy Facility will provide separation between the panel banks of at least six metres. • All inverters can be accessed by the internal access tracks in the case of fires. Inverters are located on hardstands that can be accessed by the internal access tracks. Several operational protocols will be enacted to further reduce the risk of Electrical hazards causing a fire. These include: • During the fire danger period, all ground cover vegetation across the Site will be maintained at 100mm or less at all times. • Maintenance programs will be enacted to ensure all infrastructure within the Solar Energy Facility is maintained in accordance with the manufacturer's specifications and the relevant Australian Standards. • The use of a SCADA system to monitor all system alerts and sensors that indicate the early stages of a fault or emergency event and provides the ability to commence shut down procedures remotely from the Site. • A Site induction outlining fire related risks and providing an overview of the emergency management plan to new staff, visitors and contractors. • Local fire Brigades to be invited to undertake an annual inspection to become familiar with access and egress to the Site and the emergency procedures.

	• A Fire Management Plan which outlines risk control measures required to be implemented within the development. • The development of an Emergency Management Plan to the satisfaction of CFS before development starts and includes (in addition to the CFA Guidelines): o A system to communicate effectively between the monitoring centre and the on site staff and contractors. o Provision of 24/7 contact details for the fire brigade to contact in the event of an emergency or threat of an emergency. **BESS** The early detection of a fault that if not addressed can lead to a fire. Intervention includes shut down, responding a technician or calling the fire brigade. The CFA Guideline requires a range of controls to be implemented and maintained including: • Non-combustible surface that won't support fire spread through vegetation accumulation. • SCADA monitoring system that will send alerts to the monitoring centre • Compliance with UL9540A • Appropriate separation between battery containers and other infrastructure • Smoke detection system connected to a Fire Indicator Panel that will alert the monitoring centre The implementation of the controls outlined above will support the prevention of faults from escalating into fires and if a fire does occur, limit the ability for the fire to spread into an adjoining Unit.
RESIDUAL RISK	Moderate (8)

Table 8 - Risk assessment - Fire causing spread to adjoining infrastructure on the property

RISK	Fire causing spread to adjoining infrastructure on the property
CAUSE	**Solar Energy Facility** A fire that has started within the Solar Energy Facility may spread to adjoining infrastructure. Infrastructure includes other solar panels, substation, inverters or the BESS. Rapid escalation of the fire size and complexity can create issues for on site staff and contractors, firefighters and the community. **BESS** A fire that has started within a component within the BESS may spread to adjoining BESS components or other infrastructure within the Site. Rapid escalation of the fire size and complexity can create issues for on site staff and contractors, firefighters and the community.
LIKELIHOOD	Unlikely
JUSTIFICATION	**Solar Energy Facility** The risk of fire causing spread to adjoining infrastructure at the Site is unlikely due to the low combustible nature of the components that make up the Solar Energy Facility, and the mitigation features incorporated into the design. These include: • The Solar Energy Facility has been designed in accordance with the CFA Guidelines. • Most of the supporting infrastructure that supports the Solar Energy Facility is non-combustible or has low quantities of combustible materials (the substation, the inverters, the panels and the tracking system. • The Solar energy Facility will be compartmentalised into separate areas supported by a network of APZs including APZs protecting: o The substation area. o The operations buildings. o Groups of arrays o The BESS. o The Proposal as a whole. • Access provisions into and around the Site achieve the dimensions required by the CFA Guidelines and provide access to all areas of the development. • A primary and secondary access point from different directions is provided to all areas of the Solar Energy Facility. • The solar panel banks are separated by at least six metres to prevent fire spread and to allow for emergency vehicle access.

	• All infrastructure is installed with separation distances from other infrastructure in accordance with the CFA Guidelines and the manufacturer's specifications. **BESS** The installed monitoring systems will send alerts to the monitoring station. These include smoke detection system and the day-to-day monitoring system that will trigger an immediate response if alerted. The battery system is provided with a detailed operating manual that outlines the likely cause of an alert and how the operators are to respond. The site procedures will include a provision that ensures all alerts are addressed within two hours of activation. This will also include an immediate response to any smoke detector activation. Upon activation of the fire protection systems, the monitoring centre will determine an appropriate response that may include: • Notify the on-call technician to attend the site. • Call 000 and report the activation to the fire brigade in addition to notifying the on call technician to attend. The battery system enclosure is non combustible and will provide a level of protection if a fire does occur inside the enclosure. If a fire occurs in an adjoining area of the site, the same enclosures will provide a level of protection. Most of the infrastructure that supports the BESS is non combustible or has low quantities of combustible materials. There are a small number of fire events within BESS technology where a fire has spread to an adjoining battery. The layout design incorporates spaces that will reduce the risk of fire spread occurring.
CONSEQUENCE	Minor
JUSTIFICATION	**Solar Energy Facility** The consequence of a fire affecting adjoining areas of the infrastructure is likely to be minor. The various protection systems, separation between the infrastructure and early notifications and other treatments will ensure that early intervention can occur. The Solar Energy Facility is provided with at least six metre separation between the solar panel banks as per the requirements of the CFA Guideline. Along with the management of vegetation under the solar panels during the fire danger period, the ability for a fire to spread to other areas is very limited. The inverters, substation and operations and maintenance areas are all provided with non-combustible surfaces along with Asset Protection Zones around them that also assist with reducing fire spread. In the case of a fire the EMP will outline the process to contact the fire brigade and provide clear direction to the fire location. **BESS** The consequence of a fire spreading between components within the BESS or between the BESS and adjoining infrastructure in the Solar Energy Facility is likely to be minor. The various protection systems, separation between the infrastructure and early notifications and other treatments will ensure that early intervention can occur. The separation between the components of the BESS and the infrastructure within the Solar Energy Facility has been design in accordance with the Manufacturer specifications and the CFA Guideline. There is sufficient space provided surrounding the BESS area to enable access for firefighters and technicians.

	The firefighting water supply will enable firefighters to protect exposures for the duration of the fire event. The layout design is in accordance with the manufacturers specifications which ensures there is suitable separation being provided from Unit to Unit and Unit to other infrastructure.
RISK RATING	Low (7)
STRATEGY TO LOWER RISK	The provision of additional controls as required by the CFA Guidelines and the outcome of this assessment will reduce the risk of a fire spreading to other infrastructure. The requirements outlined within the response to the CFA Guidelines will be sufficient to ensure the risk is managed at an acceptable level. Other strategies outlined within the response to the CFA Guidelines that will also assist with managing the risk includes: • Development of Emergency Management Plan that includes in addition to that required by CFA: o A system to communicate effectively between the monitoring centre and the onsite staff and contractors. o Provision of 24/7 contact details for the fire brigade to contact in the event of an emergency or threat of an emergency. • Developing a procedure that requires a technician to be deployed to the site when the site monitoring communications are down.
RESIDUAL RISK	Low (7)

Table 9 - Risk assessment - Fire causing offsite impacts

RISK	Fire causing offsite impacts
CAUSE	Any fire on the property can spread to adjoining properties. This would most likely be through vegetation connectivity. If this occurs on an elevated fire danger day, the fire could spread into adjoining properties.
LIKELIHOOD	Possible
JUSTIFICATION	The likelihood of a fire occurring within the BESS Area and Solar Energy Facility is outlined within Table 7 and 8. In addition to this, the compliance with the CFA Guidelines also requires mitigation strategies implemented including: • Non-combustible surface under the battery containers and other infrastructure. • Provision of a fire break and additional managed areas between the fire break and the boundary fence. • The battery systems are contained within the metal cabinets and any fire activity will likely stay within the cabinets. • The requirement for a Fire Management Plan and Emergency Management Plan that will include prevention and preparedness activities that must occur annually prior to the fire danger period. • The Fire Management Plan will also provide clear direction on the maintenance of the various controls required to manage the fire risk.
CONSEQUENCE	Moderate
JUSTIFICATION	The Assessment against the Planning and Design Code outlines the possible bushfire risk associated with the site and the surrounding landscape. There are reduced dwellings and other infrastructure in the immediate surrounding area. The nearest township is Brinkworth which is approximatley six kilometres to the south of the development.
RISK RATING	High (13)
STRATEGY TO LOWER RISK	The site Emergency Management Plan will include a procedure for managing elevated fuel loads if the vegetation on adjoining properties becomes a fire risk. The local Council may assist in engaging with the relevant property owners to manage the fire risk. Any vegetation growth on the property will be managed and removed and this will be outlined within the Fire Management Plan. During the fire danger period, additional inspections will occur to ensure that all weeds and other vegetation is removed from the fire break and other areas. The site operators will enact standard OH & S policies and procedures including Hot Works, use of naked flames on the property, smoking management, induction of new staff and contractors and contractor management. The induction procedure will include a requirement to ensure people are aware of their obligations of not creating fire risks during their day to day activities.

	All plant and heavy equipment is to carry at least a 9-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or firefighting equipment as a minimum when on-site during the Fire Danger Period.
RESIDUAL RISK	High (12) (Unlikely/Moderate)

Table 10 - Risk assessment - Offsite fire impacting on the site

RISK	Offsite fire impacting on the site
CAUSE	A bushfire burning through the surrounding landscape can enter the property and threaten the infrastructure by potentially starting new fires through ember attack, radiant heat or flame contact.
LIKELIHOOD	Possible
JUSTIFICATION	The assessment within Section 3.2 has identified the potential for bushfires to travel long distances from either the north west or south west. The site layout includes fire breaks and managed areas that will limit the ability for a bushfire to burn on the property. The Fire Management Plan will outline the management arrangements and the maintenance requirements. The ongoing removal of vegetation in and around the BESS and Solar Energy Facility will limit the presence of combustible materials close to the infrastructure. The design of the Battery Units will prevent embers from entering them. The Units are designed to prevent dust, insects and birds from entering. The Units are also fitted with internal climate control systems that will result in the embers likely self-extinguishing due to the cool temperatures.
CONSEQUENCE	Minor
JUSTIFICATION	Due to the primary vegetation in the surrounding landscape being grassed areas associated with farming activities, the ability for a bushfire to generate sufficient radiant heat to affect the Project is unlikely. The requirements to maintain and manage the onsite vegetation will ensure that fire spread onto the property will be limited. It is highly unlikely for flame contact to impact on the BESS or Solar Energy Facility from a bushfire from the surrounding landscape due to the vegetation management programs on the Site.
RISK RATING	Moderate (8)
STRATEGY TO LOWER RISK	Within the Emergency Management Plan ensure the following is included: • When elevated fire danger conditions are forecast, ensure all vegetation maintenance activities have occurred. • During elevated fire danger conditions, only undertake critical maintenance and other activities on the property. All plant and heavy equipment is to carry at least a 9-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or firefighting equipment as a minimum when on-site during the Fire Danger Period.
RESIDUAL RISK	Low (7) (Unlikely/Minor)

Table 11 - Dangerous Goods

RISK	Dangerous Goods
CAUSE	There is the potential for a Dangerous Goods leak to occur that may cause a threat to people, the environment or be involved in a fire.
LIKELIHOOD	Unlikely
JUSTIFICATION	Dangerous goods are located within the Units. The Dangerous Goods are installed within the infrastructure during the manufacturing process. This means that Dangerous Goods are contained and sealed and not readily accessible at the site. Following transportation to the site, any infrastructure with Dangerous Goods will be inspected to ensure it has not been damaged during transportation. If infrastructure with Dangerous Goods is to be stored at site prior to installation, it will be stored in line with manufacturer's specifications to ensure its integrity. Infrastructure will be installed in line with manufacturer's specifications (including inspection and testing). Together, these measures will prevent the likelihood of leaks outside the BESS Site. The design of the BESS including the installation of bollards around the perimeter of the BESS will prevent vehicles from impacting the infrastructure and potentially causing a leak. The products classified as a Dangerous Good located within the BESS and other infrastructure will be listed within the Site's Dangerous Goods register and the site operators will be aware of the locations and quantities of Dangerous Goods. Maintenance programs will be enacted to ensure all infrastructure that contains Dangerous Goods within the BESS will be maintained in accordance with the manufacturer's specifications and the relevant Australian Standards. This will include checking for physical and electrical faults that could result in leaks. Due to the manufacturing and installation procedures, the potential for a Dangerous Good incident to occur is unlikely.
CONSEQUENCE	Moderate
JUSTIFICATION	The largest quantity of Dangerous Goods will be the Lithium Ion (Class 9). Other potentially Dangerous Goods may include refrigerant and oils. These will be assessed when the final design has been endorsed. The Dangerous Goods referred above, are stored in separate components within the infrastructure (Units), or in separate infrastructure (Transformers, Inverters, etc). It is therefore unlikely for the total quantities of Dangerous Goods on the site to be involved in an incident at the Site at the same time. There are other goods that may be utilised and stored on the site, but it would be expected that these would be in small quantities and will be associated with maintenance and operational requirements.
RISK RATING	High (12)
STRATEGY TO LOWER RISK	The fire brigade will be aware of the presence of Dangerous Goods in relation to the Proposal. Further consultation with CFS to confirm the outcomes of this assessment will occur prior to construction and will be ongoing throughout the life of the Proposal. The Emergency Management Plan will include details of the hazards associated with dangerous goods and appropriate procedures in response to this FRMP, including leak management and other response arrangements to Dangerous Goods related emergencies.
RESIDUAL RISK	Moderate (11) (Rare/Moderate)

Table 12 - Risk assessment - Fire water runoff

RISK	Fire water runoff
CAUSE	In the event of a fire, firefighters will respond and use water to either extinguish or cool the surrounding area until the infrastructure is deemed safe.
LIKELIHOOD	Unlikely
JUSTIFICATION	As outlined in previous assessments, the risk of a large fire is very low and unlikely. This is due to the separation between various areas of the BESS and the extensive use of non-combustible materials. The smoke and gas detection system that is monitored 24/7 will also alert technicians and if required, the fire brigade to the site early. If a fire occurs, it will likely be contained to a single Unit. The use of firefighting water will be used to cool the adjoining areas and will be considered largely clean as it has not been exposed to the fire or smoke. The site is mainly flat and will not support fire water to leave the property easily. The provided landscaping will support the containment of fire water runoff.
CONSEQUENCE	Minor
JUSTIFICATION	The site will be provided with a facility to capture fire water runoff. This water will be contained until testing can occur and then in conjunction with EPA determine the most effective disposal method. The Emergency Management Plan will include procedures to capture fire water and then if required, disposal arrangements.
RISK RATING	Low (7)
STRATEGY TO LOWER RISK	Onsite staff will be trained in the fire water runoff management procedures. They will then be available to assist firefighters with managing fire water runoff. The requirement to regularly check the fire water runoff retention basin will be contained within the Fire Management Plan.
RESIDUAL RISK	Low (6) (Rare/Minor)

Table 13 - Risk assessment – Staff and firefighters

RISK	Staff and firefighters
CAUSE	The response to a fire by staff, contractors or firefighters can be dangerous due to the various safety hazards associated with a fire in this type of infrastructure.
LIKELIHOOD	Possible
JUSTIFICATION	There is the potential for firefighters and/or staff and contractors to be present during an emergency event and not being familiar with the site. The CFA Guidelines does impose a variety of controls onto the management of the site through the Emergency Management Plan and how CFS interacts with the site if they are called to a fire. The potential for a fire to occur whilst a low risk, if it does occur, there is the potential for a firefighter to arrive who is unfamiliar with property and the technology installed.
CONSEQUENCE	Moderate
JUSTIFICATION	The provision of an Emergency Information Container that will include the Emergency Management Plan, site plans and contact details for technical specialists will ensure responding firefighters seek information prior to entering the property. The layout of the site will ensure that firefighters will only access the site through the main entrances which is where the Emergency Information Container is located.
RISK RATING	High (13)
STRATEGY TO LOWER RISK	The arrangements for monitoring the SCADA system through the monitoring centre will ensure that an informed decision can be made following an assessment of the alerts being received. In all cases a technician will be dispatched to the site to review the alert at the BESS. The Emergency Management Plan will include a requirement to engage with the responding firefighters early to ensure they are aware that a technician is on their way and that entry to the site can wait until they arrive unless there is a life or property protection emergency. The Emergency Information Container that is required by the CFA Guidelines will provide detailed contact information for responding firefighters to seek specialist advice prior to accessing the property.
RESIDUAL RISK	Moderate (8) (Possible/Minor)

Table 14 - Risk assessment - Off gassing and smoke impacts

RISK	Off gassing and smoke impacting on staff, contractors and firefighters.
CAUSE	In the event of thermal runaway occurring, the lithium ion will cause the production of various gases (referred to as off gassing). The gasses include various flammable products that if ignited, will also cause the production of smoke. *Note: the definition of thermal runaway as provided by United Laboratories is:* *Thermal runaway is one of the primary risks related to lithium-ion batteries. It is a phenomenon in which the lithium-ion cell enters an uncontrollable, self-heating state.*[7]
LIKELIHOOD	Unlikely
JUSTIFICATION	For off gassing and smoke to impact on staff, contractors and firefighters, there needs to be a thermal runaway event. Whilst there is history of these events occurring in large scale battery systems, compared to the total number of systems installed, they are considered a rare event. Due to the remoteness of the BESS facility to residential areas, the likelihood of any off gassing and smoke impacting on these locations is considered unlikely. The likelihood of any impact on staff, contactors and firefighters is considered unlikely due to the following: • All staff and contractors will participate in induction programs that will include the response to various emergencies including thermal runaway. • Firefighters will have access to the Emergency Information Book and the Control Room before entering the site. The Control Room will have access to the data from the various sensors, the smoke detection system and CCTV footage. • All staff, contractors and firefighters will have information supplied prior to any decision being made in relation to next steps. • A Technician will be deployed to the site immediately following alerts being received by the Control Room. If firefighters are deployed to the site prior to the Technician arriving, it is advised within the Emergency Information Book for the firefighters to not enter the site until the Technician arrives.
CONSEQUENCE	Moderate
JUSTIFICATION	The testing completed as per the requirements of UL9540 and in accordance with UL9540A outlines the products that are generated during the off gassing and smoke phases of thermal runaway. The products of off gassing and combustion are consistent with those that are emitted from car and house fires. As the likelihood assessment indicates that staff, contractors and firefighters will have early notification of a thermal runaway event, the ability for a person to be exposed to the products relating to off gassing and smoke are considered low. Therefore, the impact on a person is considered a low consequence.

[7] https://ul.org/research/electrochemical-safety/getting-started-electrochemical-safety/what-thermal-runaway

	The size of the development will allow multiple opportunities to position staff, contractors and firefighters up wind of a Unit that has gone into thermal runaway.
RISK RATING	High (12)
STRATEGY TO LOWER RISK	The layout and design of the BESS facility includes the following risk reducing measures: • The Units are monitored through a SCADA system that provides the Control Room with access to numerous sensors and alerts to indicate thermal runaway triggering situations. The SCADA system also provides the Control Room the opportunity to intervene and commence shut down procedures remotely to prevent a thermal runaway event. • Detection system provides early notification of the event and is connected to the Control Room through a FDCIE. • The site procedures including the Emergency Management Plan will require a Technician to be deployed to the site as soon as the monitoring systems are interrupted or fail, and the Control Room can't monitor the site. • The provision of an Emergency Information Book that will be utilised by firefighters prior to entering the site. The emergency information includes contact information for the Control Room. The Control Room and Emergency Management Plan will provide contact details for technical expertise.
RESIDUAL RISK	Low (2) (Unlikely/Insignificant)

6 Conclusion

The assessment of risk for the proposed BESS and Solar Energy Facility has resulted in a low to medium risk rating.

This low risk is driven by the compliance with the CFA Guidelines and the assessment against the Planning And Design Code – Hazards (Bushfire – General Risk) Overlay during the design phase of the Project.

The systems and procedures that are being implemented during design, construction, commissioning and operation will ensure that any risk is managed to an acceptable level.

Historically, fire events involving these types of facilities is due to inappropriate procedures that include having not considered the risk of fire effectively. This FRMP has considered these examples in the development of risk mitigation treatments for the Project.

BESS and Solar Energy Facilities can present fire risks if not designed, constructed, commissioned and operated effectively. The importance of following design requirements and committing to the ongoing maintenance of the system is critical to reduce fire risk.

Appendix A – UL9540A test overview

The UL9540A S*tandard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems* test is a direct requirement of UL9540 *Energy Storage Systems and Equipment* and is also utilised to demonstrate compliance with NFPA 855 *Standard for the Installation of Stationary Energy Storage Systems*.

The UL 9540A test method includes an evaluation of BESS anatomy at four levels: cell, module, unit, and installation. Cell level testing is conducted to determine if further testing is required. Module level testing is required if the following observations are recorded:

- Thermal runaway is induced in the cell; and,
- Composition of vent gases exceed 25% of the LFL for flammable gases.

Module level testing examines the module design, heat release rate, gas generation, external flaming, and flying debris hazards. Unit level testing is required if the following observations are recorded:

- Module design is unable to contain thermal runaway; and,
- Cell vent gas is flammable.

Unit level testing assesses the design of the unit, heat release rate, gas generation and composition, deflagration and flying debris hazards, BESS and wall surface temperatures, heat flux at the target walls, and reignition. The unit level testing is conducted with Battery Management System, fire protection system, and explosion protection systems disabled. The protection provided by these systems are not evaluated during the unit level test. Installation level testing is required if the following observations are recorded during unit level testing:

- Flaming is observed outside the initiating BESS unit.
- Surface temperature of the modules in the adjacent BESS unit exceeds the temperature at which cell level gas venting occurred.
- Surface temperatures of wall surfaces increases more than 207ºF (97ºC) from ambient; and,
- Explosion hazards are recorded.

Installation level testing is the final level of UL 9540A tests. Installation level testing assesses fire protection system equipment performance in addition to criteria assessed in the unit level test.

Appendix B – Site photos

1 Looking towards the existing Substation. The BESS will be located within this photo.	
2 Typical surrounding road network.	

3 Typical surrounding road conditions.	
4 Typical surrounding land use including cropping activities.	

5 Typical surrounding land use.	
6 Existing road network that provides effective access and egress from the development site.	

7 Existing Brinkworth Substation.	
8 Existing powerline infrastructure.	

9 Typical surrounding land use.	
10 Existing road conditions in the surrounding landscape.	

11 Existing Transmission Line infrastructure.	
12 Existing road conditions in the surrounding landscape.	

13 Typical farming activities in the surrounding landscape.	
14 Areas of grasses in the surrounding landscape, this phots is on a road easement.	

Appendix M

Aeronautical Impact Assessment

FINAL REPORT

AERONAUTICAL IMPACT ASSESSMENT

BRINKWORTH SOLAR FARM

CCP06B

Report to:

Wind Prospect

5 October 2023
V1.0

Chiron Aviation Consultants
Essendon Vic 3040
Australia

DOCUMENT RELEASE APPROVAL

Approved for Final Release:

Name: Ian Jennings

Title: Principal Consultant

Date: 5 October 2023

Distribution: Mike Sale

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V0.1	Draft for Comment	28 July 2023	IJ	RJJ
V0.2	Aviation Impact	5 Oct 2023		
V1.0	Final	5 Oct 2023	IJ	RJJ

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EXECUTIVE SUMMARY

Wind Prospect Pty Ltd has requested Chiron Aviation Consultants undertake an Aeronautical Impact Assessment for the Brinkworth Solar Farm located near Brinkworth in South Australia.

There are no Certified aerodromes or known Uncertified aerodromes within 15km of the Brinkworth Solar Farm boundary.

The proposed solar farm will utilise low reflectivity single axis tracking photovoltaic panels mounted no more than 3m above ground level (AGL). The tracking axis is north/south with the panels rotating through 120° from east to west following the sun.

The Glint and Glare Analysis utilised the Forge Solar tool which incorporates the *Sandia National Laboratories Solar Glare Hazard Analysis Tool (SGHAT).* This tool provides results that comply with the United States of America Federal Aviation Administration (FAA) requirements. The Australian Civil Aviation Safety Authority (CASA) accepts these requirements.

The Brinkworth Solar Farm is not a hazard to aviation safety.

1. INTRODUCTION

Wind Prospect has requested Chiron Aviation Consultants undertake an Aeronautical Impact Assessment and Glare and Glint Analysis for the Brinkworth Solar Farm located on Lake View Road, Brinkworth, South Australia.

1.1 Location

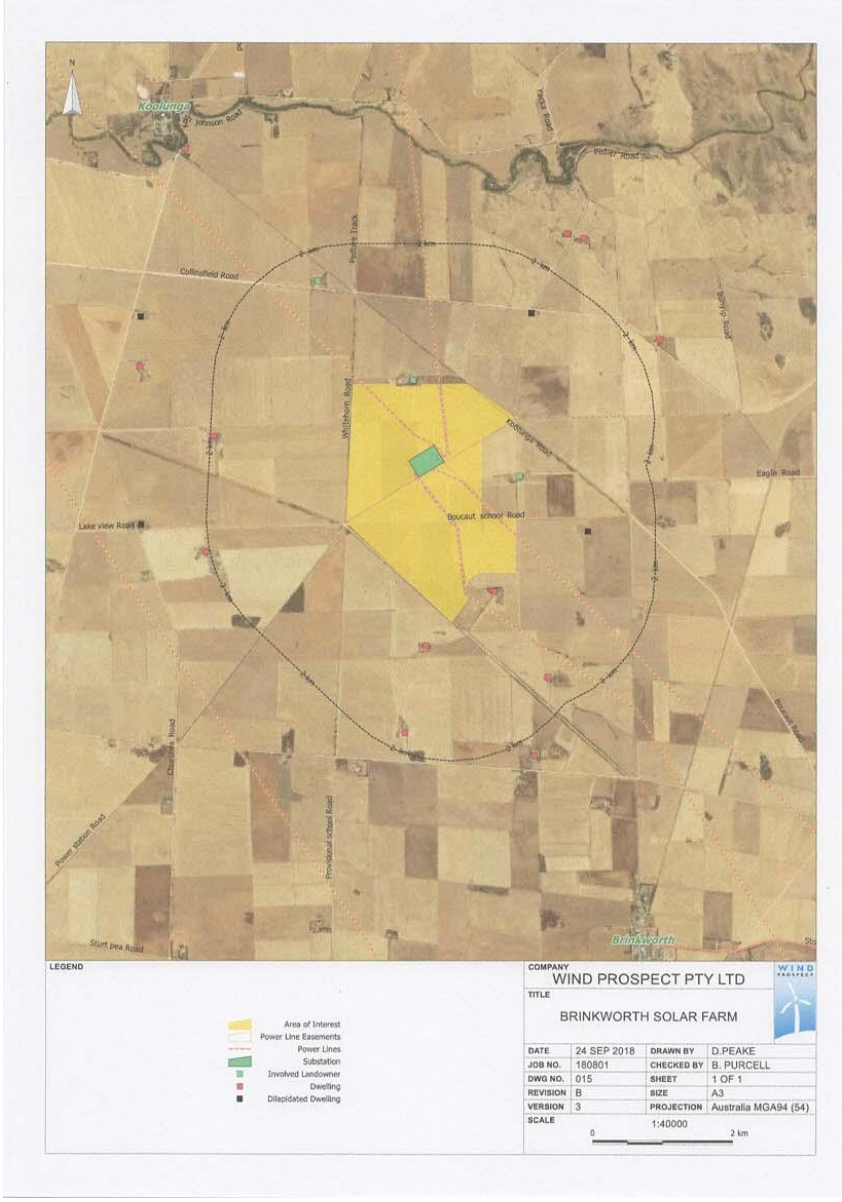

Figure 1 – Brinkworth Solar Farm Location

The proposed Brinkworth Solar Farm (BSF) is located approximately midway between the towns of the Brinkworth and Koolunga, to the west of the Koolunga Road, with the western boundary along Lake View and Whitehorn Roads.

There are no known Certified or Uncertified aerodromes within 15km of the BSF.

1.2 Aerodromes and Airstrips

Aerodromes fall into three categories:

- Military or Joint (combined military and civilian);
- Certified; and
- Uncertified – often referred to as Aeroplane Landing Areas (ALA)

A Military aerodrome is operated by the Department of Defence and is suitable for the operation of military aircraft. A Joint User aerodrome is a Military aerodrome used by both military and civil aircraft.

A Certified Aerodrome is regulated under Civil Aviation Safety Regulation (CASR) 139.030. An aerodrome with a published instrument flight procedure must be certified.

An Uncertified Aerodrome is any other aerodrome or airstrip. These range in capability and size from having a sealed runway with lighting capable of accommodating corporate jet aircraft to a grass paddock that is smooth enough to land a single engine light aircraft or a purpose built aerial agricultural aircraft.

Military, Joint and Certified aerodromes are listed in the Aeronautical Information Publication[1] (AIP) and are subject to a NOTAM[2] service that provides the aviation industry with current information on the status of the aerodrome facilities. This information is held in the public domain, is available through aeronautical publications and charts and is kept current by mandatory reporting requirements.

Uncertified Aerodromes are not required to be listed in the AIP, although many are, so information about them is not necessarily held in the public domain, may not be available through aeronautical publications and charts and is not required to be reported. Where Uncertified aerodrome information is published in the AIP EnRoute Supplement Australia (ERSA)[3] it is clearly annotated that a *full NOTAM service is not available*.

The AIP Designated Airspace Handbook (DAH)[4], at Section 20, lists *Aircraft Landing Areas (ALA) without an ERSA entry – verified*. This listing of verified ALA indicates that Airservices Australia have a registered responsible person providing verified information about the ALA. These verified ALA are also depicted on AIP Charts.

[1] AIP; a mandatory worldwide distribution system for the promulgation of aviation rules, procedures and information
[2] NOTAM (Notice to Airmen); a mandatory reporting service to keep aerodrome and airways information current and available to the aviation industry worldwide
[3] ERSA, part of the AIP that lists aerodrome information in accordance with standards and legislative requirements to ensure integrity.
[4] DAH, part of the AIP that lists the pertinent details of Australian airspace

ALA can come into use and fall out of use without any formal notification to CASA or any other authority. Airstrips that appear on survey maps often no longer exist; others exist but do not feature on maps. Similarly, a grass paddock used as an ALA is not usually discernable on satellite mapping services such as Google Earth.

Military, Joint and Certified aerodromes have Obstacle Limitation Surfaces (OLS) and Procedures for Air Navigation – Operations (PANS-OPS) surfaces prescribed to protect the airspace associated with published instrument approach and landing procedures. An Uncertified aerodrome or ALA cannot have a published instrument approach and landing procedure so does not have associated prescribed airspace protected by OLS or PANS-OPS. All operations into ALA, therefore, must be conducted in accordance with the Visual Flight Rules (VFR) and in Visual Meteorological Conditions (VMC).

1.3 Aerodromes in the Area

There are no Certified aerodromes or known Uncertified aerodromes within 15km of the BSF boundary.

There is a Certified aerodrome at Port Pirie (55km northwest), and Uncertified aerodromes at Clare Valley (19.5km southeast), Hoyleton (43.8km south), Balaklava (48.6km south) and Jamestown (52.9km north northeast).

Figure 2 – Aerodrome locations near Brinkworth Solar Farm.

1.4 Airspace above the Solar Farm

The airspace above the proposed Brinkworth Solar Farm is Class G airspace extending from ground level to 8500ft, the lower limit of the overlying Class E controlled airspace.

Class G airspace is non-controlled airspace where aircraft may operate without an Air Traffic Control (ATC) clearance. Aircraft may operate in accordance with either Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) within Class G airspace.

A Control Area (CTA) is defined as a "controlled airspace extending upwards from a specified limit above the earth.[5]"

Within Class G airspace an aircraft flying in accordance with the Visual Flight Rules (VFR) away from a populous area is, when flying below 3000ft, required by Civil Aviation Safety Regulation (CASR) 91.267[6] to remain at least 500ft above the highest point of the terrain and any obstacle on it within a radius of 300m from a point on the terrain directly below the aircraft. Over a populous area the requirement is 1000ft for the same aircraft.

1.5 Solar Farm Infrastructure

The proposed solar farm will utilise low reflectivity single axis tracking photovoltaic panels mounted no more than 3m above ground level (AGL). The tracking axis is north/south with the panels rotating through 120° from east to west following the sun.

Figure 3 – BSF PV panel layout

[5] AIP Enroute, ENR 1.4 – 3, sec 1.3 dated 15 June 2023,
[6] Civil Aviation Safety Regulation (1998) Part 91, 91.267 *Minimum Height Rules – Other areas*

2. SCOPE

To meet the requirements of the Wind Prospect planning application, the study required Chiron Aviation Consultants to examine the proposed Brinkworth Solar Farm in relation to solar reflection impacts on aviation activity in the area and undertake the following tasks.

2.1 Aeronautical Impact Assessment

The Aeronautical Impact Assessment (AIA) investigates the impact of the Brinkworth Solar Farm (BSF) on aviation activity in the area. Tasks undertaken include:

- Identifying aerodromes within 15km of the BSF boundary
- The identification and assessment of potential aviation risk elements through
  - Reference to Civil Aviation Safety Authority (CASA) publications
  - Reference to the Aeronautical Information Publication (AIP)
- Assessment of the perceived impacts of the solar farm on the operation of nearby aerodromes.

2.2 Glint and Glare Analysis

The Glint and Glare Analysis investigates, using Federal Aviation Administration (FAA) approved software, the likely occurrence of glare and glint and its impact on aerodromes and aviation activity in the area.

3. METHODOLOGY

The following methodology was used to complete the tasks outlined in the scope.

3.1 Aeronautical Impact Assessment

The methodology for the Aeronautical Impact Assessment (AIA) was as follows:

- Review of the Aeronautical Information Publication (AIP) and Civil Aviation Safety Authority (CASA) documents to identify relevant physical and operational aviation issues that may be impacted by the solar farm
- Current aeronautical and topographical charts and maps were studied to assess the local terrain and identify any local aerodromes and other relevant features

3.2 Glint and Glare Analysis

The Glint and Glare Analysis utilises the Forge Solar tool which incorporates the *Sandia National Laboratories Solar Glare Hazard Analysis Tool (SGHAT).* This tool meets the United States of America, Federal Aviation Administration glare analysis requirements (78 FR 63276). These requirements are accepted by CASA.

4. AERONAUTICAL IMPACT ASSESSMENT

4.1 Aerodromes

A review of the appropriate aeronautical charts, the AIP and associated CASA documents identified no Certified or known Uncertified aerodromes in the vicinity of the BSF. A review of charts and Google Earth did not show any airstrips (uncertified aerodromes) in the vicinity of the BSF. Because this AIA is for a solar farm, which does not have tall structures (>40m), only aerodromes within 15km of the solar farm boundary were considered.

4.2 Airspace

The airspace above the proposed Brinkworth Solar Farm is Class G airspace extending from ground level to 8500ft, the lower limit of the overlying Class E controlled airspace.

Within Class G airspace an aircraft flying in accordance with the Visual Flight Rules (VFR) away from a populous area is, when flying below 3000ft, required by Civil Aviation Safety Regulation (CASR) 91.267[7] to remain at least 500ft above the highest point of the terrain and any obstacle on it within a radius of 300m from a point on the terrain directly below the aircraft. Over a populous area the requirement is 1000ft for the same aircraft.

Given the minimum altitude of 500ft AGL, aircraft flying over or near the BSF will be safely above the solar panels to not be affected by glint of glare. Aircraft engaged in authorised low flying, that is below the regulated 500ft AGL, such as aerial applications, survey, and firefighting conduct dynamic risk assessments and extensive preflight planning to ensure their safety. Consequently, the pilots will be aware of the solar farm and plan their low flying accordingly.

The Brinkworth Solar Farm will not be a hazard to aircraft safety.

[7] Civil Aviation Safety Regulation (1998) Part 91, 91.267 *Minimum Height Rules – Other areas*

5. GLARE AND GLINT ASSESSMENT

Glint and glare are momentary and continuous excessive brightness that may affect nearby aviation.

5.1 Aerodromes

As discussed in section 4, there are no known aerodromes within 15km of the BSF, therefore there is no safety hazard to aircraft operations from glare or glint.

Equates to No Impact.

5.2 Airspace

As discussed in section 4, overflying aircraft are required to be at least 500ft above the CSF and at that level glare and glint is not considered a safety hazard. Aircraft conducting authorised low flying below 500ft above ground level will be aware, through pre-flight planning and dynamic risk assessment, of the solar farm and fly accordingly.

Equates to No Impact.

6. CONCLUSIONS

The Aeronautical Impact Assessment demonstrates that the BSF will not be a hazard to aircraft. There are no certified or known uncertified aerodromes within 15km of the BSF boundary. Pilots authorised for low flying, below 500ft AGL, will be aware of the BSF and flight plan accordingly.

Appendix N

Geotechnical Interpretative Report

Design for a better *future* /

Brinkworth Solar Farm Pty Ltd

Brinkworth Solar Farm

Geotechnical Interpretive Report

wsp

June 2023

Confidential

Question today
Imagine tomorrow
Create for the future

Brinkworth Solar Farm
Geotechnical Interpretive Report

Brinkworth Solar Farm Pty Ltd

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Rev	Date	Details
0	30/06/2023	Final

	Name	date	signature
Prepared by:	Marnel de Wet	30/06/2023	
Reviewed by:	Derek Arnott	30/06/2023	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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1 Introduction

WSP Australia Pty Ltd (WSP) has been engaged by Brinkworth Solar Farm Pty Ltd (BSF) to undertake a geotechnical site investigation to inform the preliminary design of a proposed solar farm and battery energy storage system (BESS) near Brinkworth in South Australia. The investigation was undertaken in general accordance with the scope outlined in proposal reference PP200909-ADL-GEO-PRP-001 Rev0 dated 2nd March 2023.

Based on information provided by BSF, it is understood that the proposed development site is located adjacent the existing Brinkworth substation, approximately 7 km north of Brinkworth in South Australia. The development is expected to comprise a 220 MW solar array and 200 MWh battery energy storage system (BESS) across a 500 Ha area.

A desktop study was previously undertaken by WSP based on available geological information and previous investigations near the development site. The findings of the desktop review are presented in document reference PS200909-WSP-ADL-GEO-MEM-001 Rev0 dated 27th April 2023.

This report presents the findings of the geotechnical investigation and provides recommendations for input to design of the proposed development. This final report supersedes our previous draft report (WSP reference: PS200909-WSP-ADL-GEO-REP-0001 RevA dated 16 June 2023) and has been updated to include the results from thermal resistivity testing.

2 Scope and Method of Investigation

2.1 Scope of Investigation

The scope of intrusive investigation included drilling of 50 boreholes to depths ranging between 3 m and 6 m below ground level (m bgl) and the locations are presented in Table 2.1 below. In-situ electrical resistivity testing (ERT) was also undertaken at the site, including 6 No. ERT through proposed solar array areas, and 2 No. at the proposed BESS area.

Table 2.1 Summary of Investigation Locations

Location ID	Location	Easting (UTM Zone 54H)	Northing (UTM Zone 54H)	Depth (m)
BH01	North of Existing Substation	255284	6276027	3.1
BH02	North of Existing Substation	255744	6276065	3
BH03	North of Existing Substation	256088	6276119	3
BH04	West of Existing Substation	255644	6275299	3
BH05	North of Existing Substation	255275	6275740	3
BH06	North of Existing Substation	255876	6275857	3
BH07	North of Existing Substation	255237	6275483	3
BH08	West of Existing Substation	255958	6275364	3
BH09	West of Existing Substation	255230	6274955	3
BH10	South of Existing Substation	255340	6274819	3
BH11	South of Existing Substation	255802	6274832	3
BH12	South of Existing Substation	256354	6274866	3
BH13	South of Existing Substation	256530	6275080	3
BH14	South of Existing Substation	256851	6275125	3

Location ID	Location	Easting (UTM Zone 54H)	Northing (UTM Zone 54H)	Depth (m)
BH15	South of Existing Substation	256290	6274607	3
BH16	South of Existing Substation	257132	6274625	3
BH17	South of Existing Substation	257476	6274715	3
BH18	South of Existing Substation	255770	6274332	3
BH19	South of Existing Substation	256565	6274380	3
BH20	South of Existing Substation	256930	6274321	3
BH21	South of Existing Substation	257447	6274347	3
BH22	South of Existing Substation	256094	6274046	3
BH23	South of Existing Substation	256578	6274054	3
BH24	South of Existing Substation	256890	6274045	3
BH25	South of Existing Substation	257454	6274009	3
BH26	South of Existing Substation	256549	6273698	3
BH27	South of Existing Substation	257006	6273719	3
BH28	South of Existing Substation	256806	6273463	3
BH29	North of Existing Substation	255549	6275938	6
BH30	North of Existing Substation	256419	6275930	6
BH31	West of Existing Substation	255643	6275300	6
BH32	West of Existing Substation	255553	6275478	6
BH33	West of Existing Substation	255229	6275218	6

Location ID	Location	Easting (UTM Zone 54H)	Northing (UTM Zone 54H)	Depth (m)
BH34	South of Existing Substation	256435	6275346	6
BH35	South of Existing Substation	256752	6275665	6
BH36	South of Existing Substation	255947	6275070	6
BH37	South of Existing Substation	256782	6274881	6
BH38	South of Existing Substation	255649	6274599	6
BH39	South of Existing Substation	256883	6274595	6
BH40	South of Existing Substation	256201	6274386	6
BH41	South of Existing Substation	257165	6274338	6
BH42	South of Existing Substation	256341	6273922	6
BH43	South of Existing Substation	257245	6274003	6
BH44	South of Existing Substation	256613	6273515	6
BH45	East of Existing Substation	256637	6275780	6
BH46	BESS Area	255448	6275221	3
BH47	BESS Area	255681	6275340	6
BH48	BESS Area	255719	6275417	3
BH49	BESS Area	255492	6275166	6
BH50	BESS Area	255557	6275260	3

2.2 Method

Prior to commencing site works, a Before You Dig Australia (BYDA) enquiry was undertaken. The proposed borehole locations were reviewed against the services plans.

The fieldwork was undertaken from 10 May 2023 to 16 May 2023. The boreholes were drilled using push tube and solid auger techniques with a 4WD mounted drill rig supplied and operated by SMS Drilling. The boreholes were advanced to target depths measured from existing surface level. To assist with assessing consistency/density of soil, Dynamic Cone Penetrometer (DCP) tests were undertaken next to the boreholes and pocket penetrometer tests were undertaken in suitable cohesive soils. The borehole locations were recorded using hand-held GPS accurate to +/- 5 m horizontally.

Samples were collected during borehole drilling for potential geotechnical laboratory testing. On completion, the boreholes were backfilled with cuttings and tamped in place at the surface.

A field engineer from WSP supervised the investigation and logged the soil profile encountered in each borehole in general accordance with AS1726-2017 *Geotechnical Site Investigations*.

The investigation location plan is presented in Appendix A. The borehole logs with descriptions of the materials encountered and explanatory notes which provide information on the symbols and terminology used during log preparation are presented in Appendix B.

ERT was undertaken at 8 locations across the site (including 6 throughout solar array areas, and two at the proposed BESS). At each location, testing was undertaken along two approximately orthogonal transects. Measurements were taken using a Megger DET5/4D earth resistivity meter. Testing was undertaken with electrodes at nominal spacings of 1, 2, 4, 8, 12, 20, and 30 m spacings.

2.3 Laboratory Tests

Selected soil samples taken during the fieldwork were submitted to a NATA accredited laboratory for a combination of the following geotechnical testing:

- Atterberg Limit test (1-point liquid limit)
- Particle Size Distribution tests (<19 mm)
- California Bearing Ration (CBR) tests incl Standard Compaction
- Shrink Swell Index
- Chemical Suite for Aggressivity (pH, Chloride, Sulfate, Electrical Resistivity)
- Remoulded Thermal Resistivity Tests (single point)

The laboratory test result certificates are presented in Appendix C and Appendix D of this report.

3 Results of Investigation

3.1 Surface Conditions

The observations made during the geotechnical investigation indicate the proposed site is located on relatively flat cropping land with a slight slope falling from west to east. Minor localised areas of lower lying ground (inferred intermittent water courses) are noted to be present in adjacent sites.

3.2 Subsurface Conditions

The following subsurface materials were generally encountered in the boreholes at the time of the investigation. Reference should be made to individual borehole logs for further information on soil profiles.

- TOPSOIL; CLAY, dark brown, low plasticity, encountered to a depth of approximately 0.1 m bgl, overlying;
- CLAY; low to medium plasticity, grey brown, red brown, and orange brown, typically very stiff consistency, with some zones of low to medium plasticity clay and calcareous material throughout this unit, generally encountered to depths of approximately 1.0 m bgl, overlying;
- CLAY; medium to high plasticity, red brown, orange brown, and grey, typically hard consistency, generally encountered to depths of approximately 2-3 m bgl, overlying;
- CLAY/Sandy CLAY; low to medium plasticity, red brown to orange brown, hard to friable consistency, encountered to termination of boreholes at 6 m bgl.

Groundwater was not encountered in any of the boreholes during the investigation. However, it should be noted that groundwater and perched water levels could be subject to seasonal and climatic variations.

3.3 Geotechnical Laboratory Testing

A summary of the geotechnical laboratory testing carried out is presented in Table 3.1 and Table 3.2. The geotechnical laboratory test result certificates are presented in Appendix C. References to the testing procedures adopted are shown on the laboratory test certificates.

Table 3.1 Summary of Geotechnical Laboratory Testing

Borehole ID	Sample Depth (m bgl)	Moisture content (%)	Particle size distribution			Atterberg limits				CBR (%)	SMDD (t/m³)	OMC (%)	Shrink Swell (I_{ss})
			Gravel (%)	Sand (%)	< 75 µm (%)	LL (%)	PL (%)	PI (%)	LS (%)				
BH02	1.5-2.0	12	0	23	77	44	17	27	11.5	-	-	-	-
BH04	1.0-1.5	16	-	-	-	57	18	39	13.0	-	-	-	-
BH05	0.2-0.6	17	8	26	66	48	20	28	11.5	10.0	1.62	21.0	-
BH06	0.8-1.2	15	-	-	-	54	17	37	12.5	-	-	-	-
BH11	0.2-0.6	13	14	28	59	35	16	19	7.5	6.0	1.74	18.0	-
BH12	0.5-1.0	12	-	-	-	47	16	31	10.5	-	-	-	-
BH13	1.0-1.29	7	0	43	57	33	12	21	8.5	-	-	-	-
BH14	0.8-1.2	19	0	25	72	64	20	44	13.5	-	-	-	-
BH17	2.5-3.0	22	-	-	-	64	18	47	12.0	-	-	-	-
BH19	1.0-1.26	-		-	-	-	-	-	-	-	-	-	2.6
BH20	0.8-1.2	-	-	-	-	-	-	-	-	6.0	1.70	18.5	-
BH23	2.5-3.0	13	-	-	-	-	40	17	23	-	-	-	-
BH25	0.8-1.2	14	0.	32	68	45	14	31	13.5	-	-	-	-
BH26	1.0-1.32	-	-	-	-	-	-	-	-	-	-	-	3.3
BH28	0.2-0.6	-	-	-	-	72	22	50	17.0	3.0	1.53	25.0	-
BH29	2.2-3.0	14	-	-	-	33	19	14	6.0	-	-	-	-
BH30	1.0-1.23	-	-	-	-	-	-	-	-	-	-	-	2.4
BH31	0.2-0.7	20	-	-	-	45	19	26	10.5	-	-	-	-
BH33	3.0-3.5	13	0	9	91	39	16	23	8.5	-	-	-	-
BH35	5.5-6.0	9	2	52	47	21	14	7	3.5	-		-	-
BH39	4.5-5.0	13	0	20	80	29	15	14	6.5	-	-	-	-
BH41	1.5-2.0	17	-	-	-	73	18	55	15.5	-	-	-	-
BH47	4.0-4.5	12	1	23	77	27	18	9	4.0	-	-	-	-
BH48	1.0-1.18	10	0	22	78	42	18	24	11.5				-
BH49	3.5-4.0	13	-	-	-	31	17	14	6.5	-	-	-	-
BH50	0.8-1.2	18	0	17	83	51	17	34	14.0	3.5	1.65	22.0	-

LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index; LS = Linear Shrinkage, CBR = California Bearing Ratio, SMDD = Standard maximum dry density, OMC = Optimum moisture content, "-" Neglect

Table 3.2 Summary of Thermal Resistivity Testing

Borehole ID	Sample Depth (m bgl)	Moisture content (%)	Thermal Resistivity (m.K/W)
BH05	0.2-0.6	20.8 (OMC)	0.71
		0	1.46
BH20	0.8-1.2	18.2 (OMC)	0.63
		0	0.99
BH28	0.2-0.6	24.8 (OMC)	0.77
		0	1.20
BH50	0.8-1.2	21.8 (OMC)	0.73
		0	0.99

3.4 Chemical Laboratory Testing

The chemical laboratory test results are presented in Table 3.3. The chemical laboratory test result certificates are presented in Appendix D.

Table 3.3 Summary of Chemical Laboratory Testing

Borehole ID	Sample depth (m bgl)	pH	Sulphate as SO_4^{2-} (mg/kg)	Chloride (mg/kg)	Electrical resistivity @ 25°C (ohm cm)
BH03	1.2-1.3	8.9	540	1,500	580
BH07	0.3-0.4	8.7	<30	31	5,800
BH09	0.7-0.8	9.1	270	540	790
BH11	0.7-0.8	9.4	<30	63	2,400
BH21	0.6-0.7	9.0	560	520	1,100
BH24	0.4-0.5	9.0	94	110	3,900
BH27	0.6-0.7	9.1	130	590	1,500
BH31	0.6-0.7	8.7	310	920	840
BH32	0.2-0.3	8.7	99	220	4,000
BH34	0.1-0.2	8.5	<30	34	8,300
BH37	1.0-1.1	8.8	1,100	1,400	700
BH39	0.8-0.9	9.5	530	580	1,100
BH44	1.0-1.1	9.3	120	360	1,300
BH46	0.5-0.6	9.3	41	190	2,900

3.5 Field Testing

3.5.1 Dynamic Cone Penetrometer Testing

The Dynamic Cone Penetrometer (DCP) test involves dropping (free-fall) a 9 kg hammer a distance of 510 mm to strike an anvil assembly driving a 16 mm cone-tipped rod into the ground. The number of blows is recorded for each 100 mm interval of penetration over the full depth of the test. Practical refusal is taken to be a blow count of 25 or greater per 100 mm of penetration or hammer bounce.

Blow counts from the DCP testing ranged from 3 blows to 25 blows per 100 mm. DCP results are presented on the borehole logs in Appendix B of this report.

3.5.2 Hand Penetrometer Testing

Hand (or pocket) penetrometer tests were undertaken in the field on recovered samples of predominantly cohesive (i.e., clay and sandy clay) soils. The results of the pocket penetrometer testing are used to assess the undrained shear strength and thus consistency of the material. Results of the hand penetrometer testing are summarised in the borehole logs in Appendix B of this report.

3.6 In-situ Electrical Resistivity Test Results

In-situ electrical resistivity test results are summarised in Table 3.4 below. It should be noted that the resistivity of the ground can vary due to seasonal factors such as rainfall, changes in water table level and moisture content.

Table 3.4 In-Situ Electrical Resistivity Test Results

Electrode Spacing 'a' (m)	ERT01				ERT02				ERT03				ERT04			
	East - West		North - South		East - West		North - South		East - West		North - South		East - West		North - South	
	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)
1	2.39	1502	2.72	1709	2.67	1678	3.05	1916	2.49	1565	2.87	1803	2.86	1797	3.07	1929
2	0.56	704	0.61	767	0.71	892	0.67	842	0.51	641	0.47	591	1.17	1470	0.96	1206
4	0.25	628	0.25	628	0.30	754	0.32	804	0.19	478	0.17	427	0.29	729	0.32	804
8	0.10	503	0.10	503	0.14	704	0.15	754	0.09	452	0.08	402	0.16	804	0.13	653
12	0.07	528	0.07	528	0.10	754	0.12	905	0.06	452	0.07	528	0.10	754	0.09	679
20	0.06	754	0.04	503	0.05	628	0.07	880	0.06	754	0.05	628	0.06	754	0.05	628
30	0.02	377	0.05	942	0.03	565	0.03	565	0.03	565	0.03	565	0.03	565	0.03	565
Electrode Spacing 'a' (m)	**ERT05**				**ERT06**				**ERT07**				**ERT08**			
	East - West		North - South		East - West		North - South		East - West		North - South		East - West		North - South	
	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)	Reading (Ω)	Apparent Resistivity (Ω.cm)
1	2.00	1257	1.64	1030	5.08	3192	3.8	2388	1.66	1043	1.27	798	7.12	4474	5.26	3305
2	0.35	440	0.33	415	1.00	1257	0.88	1106	0.31	390	0.51	641	1.04	1307	0.85	1068
4	0.13	327	0.15	377	0.29	729	0.29	729	0.19	478	0.20	503	0.30	754	0.26	653
8	0.07	352	0.08	402	0.13	653	0.13	653	0.08	402	0.08	402	0.14	704	0.12	603
12	0.06	452	0.05	377	0.08	603	0.09	679	0.07	528	0.04	302	0.09	679	0.08	603
20	0.04	503	0.03	377	0.06	754	0.08	1005	0.04	503	0.02	251	0.07	880	0.05	628
30	0.01	188	0.01	188	0.05	942	0.05	942	0.02	377	0.01	188	0.02	377	0.03	565

4 Geotechnical Assessment

4.1 Geotechnical Design Parameters

Geotechnical design parameters for soil strength materials encountered in the boreholes are presented in Table 4.1 below. Reference should also be made to the borehole logs in Appendix B for further information regarding the vertical extent of each subsurface unit.

Table 4.1 Geotechnical Design Parameters

Unit	Approximate Depth Interval (m bgl)	γ (kN/m³)	S_u (kPa)	ϕ' (°)	C' (kPa)	Eu/E' (MPa)	ν
TOPSOIL: CLAY	0.0 to 0.1	16	-	-	-	-	-
CLAY (Very Stiff)	0.1 to 1.0	17	150	5	28	45/35	0.3
CLAY (Hard)	1.0 to >6.0*	18	200	10	26	60/45	0.3

γ = Unit Weight, S_u = Undrained Shear Strength, c' = Effective Cohesion, ϕ' = Internal Angle of Friction, E'/E_u = Drained/Undrained Young's Modulus, ν = Poisson's Ratio, *End of borehole, "-" Neglect

Note: Refer to borehole logs for extent of unit and details of soil type

4.2 Site Classification to AS 2870

Soil characteristic surface movement (y_s) has been calculated in accordance with AS 2870-2011 *Residential slabs and footings*. Although AS 2870-2011 is considered appropriate for this application, design of footings for the proposed development should consider this along with engineering principles.

Based on calculations for the soil swell (y_s) values in accordance with AS 2870-2011, a characteristic surface movement of up to 75 mm could be expected. Based on this assessment, the site in its current condition is classified as CLASS H2-D due to soil reactivity.

4.3 Earthquake Site Classification to AS 1170.4

The methods of assessing earthquake site classification and consequential design implications are outlined in Australian Standard AS 1170.4-2007 *Structural Design Actions Part 4: Earthquake Actions in Australia*. The standard uses a number of factors in assessing an earthquake design category for a particular structure at a given site. Based on materials encountered during intrusive investigation, we recommend adopting a preliminary earthquake site classification of D_e (deep soil site due to the significant thickness of soil above any bedrock layer).

4.4 Shallow Footings for BESS

It is understood that shallow footings are intended for the BESS site. Based on our experience with similar developments, it is expected that the BESS is likely to be constructed on an engineered fill platform comprising granular material. On this basis we recommend adopting the following maximum allowable bearing pressures:

- 200 kPa for shallow footings within the BESS area with a minimum width of 0.5 m embedded at least 0.3 m into the engineered fill platform placed in accordance with Section 4.8.5 below.
- 150 kPa for shallow footings within the BESS area with a minimum width of 0.5 m embedded at least 0.3 m into the underlying natural clay (of very stiff consistency).

The recommendations for bearing pressure provided assume that any loose, disturbed or softened materials (including topsoil) will be stripped from the excavations prior to footing construction. It is important that the excavation surface is as clean as reasonably practicable prior to pouring concrete. If the soil at the base of the excavation becomes wet and softens, it must be over-excavated until competent soil is encountered and replaced with lean mix concrete or compacted granular fill. It will be necessary to ensure that the soils are not disturbed during excavation, do not dry out, or soften due to the pooling of undetected groundwater, rainfall or surface water inflow. It is recommended that the base of the excavation be graded to drain and surfaced with lean mix concrete immediately following excavation and removal of loose material. It is also recommended that the founding material for the footing should be assessed by a suitably qualified geotechnical practitioner prior to construction.

4.5 Piled Footings for Solar Arrays

It is understood that the solar arrays are proposed to be founded on steel driven piles. Piles for the solar array area shall be designed in accordance with AS 2159-2009 *Piling – Design and Installation*. The following sections provide guidance on pile design and installation and geotechnical parameters for the design of piled footings for the solar array.

4.5.1 Pile Type and Installation

Based on the materials encountered in the boreholes during the investigation, it is expected that predominantly very stiff to hard clays will be encountered over the expected piling depth intervals (to a depth of at least 3 m bgl). It is expected that driven piling techniques could be adopted for construction of solar array footings. However, it is recommended that pile testing be undertaken, and piling contractors consulted to allow an assessment that their proposed methodology and piling equipment will be able to penetrate these materials.

4.5.2 Geotechnical Strength Reduction Factor – AS 2159

AS 2159 requires a pile to be proportioned such that the design geotechnical strength ($R_{d,g}$) is not less than the design action effect (E_d). The design geotechnical strength is calculated as the design ultimate geotechnical strength ($R_{d,ug}$) multiplied by a geotechnical strength reduction factor (ϕ_g).

Based on our assessment we have calculated an average risk rating (ARR) of 2.0–2.5 in accordance with Clause 4.3.2 which gives a geotechnical strength reduction factor ϕ_g of 0.56 for low redundancy systems. It is noted that a higher value of ϕ_g can be adopted depending on the percentage of piles tested – for example a ϕ_g of 0.64 could be used if 1% of piles are tested in accordance with Clause 4.3.1 of AS 2159.

4.5.3 *Pile Design Parameters*

Pile design parameters for driven piles are provided in the tables below for use in preliminary sizing of piled footings for solar arrays.

Table 4.2 Pile Design Parameters for Driven Piles

Unit	Approximate Depth Interval (m bgl)	Average Ultimate Skin Friction* $f_{m,s}$ (kPa)	Average Ultimate Base Resistance f_b (kPa)
TOPSOIL: CLAY / CLAY	0.0 to 0.5	-	-
CLAY (Very Stiff)	0.5 to 1.0	85	-
CLAY (Hard)	1.0 to >6.0		1,800

"-" Neglect

For piles in tension the skin friction value in the table above needs to be multiplied by a factor of 0.8.

4.6 Exposure Classification to AS 2159 and AS 3600

An assessment of the chemical testing results will be undertaken to provide a durability assessment in accordance with the methods described in AS 2159-2009 *Piling – Design and installation* and AS 3600-2009 *Concrete structures*.

Based on the chemical laboratory test results, the exposure classification for concrete and steel piled foundations will be assessed in accordance with Table 6.4.2 (C) and Table 6.5.2 (C) from AS 2159-2009. The exposure classifications are summarised in Table 4.3. Results indicate generally mild conditions for concrete piles in groundwater and non-aggressive for concrete piles above groundwater. Results range from non-aggressive to severe for steel piles in groundwater, and non-aggressive to mild for steel piles above groundwater.

For near surface concrete footings refence has been made to Table 4.8.1 from AS 3600-2009 which indicates class A2 for concrete in groundwater and A1 for concrete above groundwater.

Table 4.3 Exposure Classification for Concrete and Steel Piles – AS 2159-2009

Investigation location	Sample depth (m bgl)	Concrete Piles		Steel Piles	
		Granular soils in groundwater	All soils above groundwater	Granular soils in groundwater	All soils above groundwater
BH03	1.2-1.3	Mild	Non-aggressive	Severe	Moderate
BH07	0.3-0.4			Non-aggressive	Non-aggressive
BH09	0.7-0.8			Severe	Moderate
BH11	0.7-0.8			Mild	Non-aggressive
BH21	0.6-0.7			Moderate	Mild
BH24	0.4-0.5			Mild	Non-aggressive
BH27	0.6-0.7			Moderate	Mild
BH31	0.6-0.7			Severe	Moderate
BH32	0.2-0.3			Mild	Non-aggressive

Investigation location	Sample depth (m bgl)	Concrete Piles		Steel Piles	
		Granular soils in groundwater	All soils above groundwater	Granular soils in groundwater	All soils above groundwater
BH34	0.1-0.2			Non-aggressive	Non-aggressive
BH37	1.0-1.1			Severe	Moderate
BH39	0.8-0.9			Moderate	Mild
BH44	1.0-1.1			Moderate	Mild
BH46	0.5-0.6			Mild	Non-aggressive

4.7 Pavement Design

Near surface materials at the site likely to be encountered at subgrade level for pavements and hardstands predominantly comprised clayey soils. Five laboratory soaked CBR tests were undertaken on samples from the site. Soaked CBR values ranged from 3% (BH28) to 10% (BH05). The samples were remoulded to a dry density ratio of approximately 95% compared with Standard Compaction (AS 1289 Cl. 5.1.1), with an applied surcharge of 4.5 kg.

On the basis of the above we recommend adopting a design subgrade CBR value of 3% for the clay subgrade materials anticipated across the development area. Recommended subgrade preparation measures are outlined in Section 4.8.5.

4.7.1 Reactive Subgrades

Swell values up to 3.0% were recorded in the CBR tests undertaken as part of the investigation. Based on this, we recommend that some form of treatment of the subgrade soils is undertaken to reduce the impact of the reactive subgrade soils on the road pavement performance. The designer should assess the need for inclusion of a low reactivity capping layer, or excavation and replacement of reactive soils with low reactive material.

In addition to subgrade treatment outlined above, we recommend the following is considered for pavements and hardstands to reduce the impact of the reactive subgrade materials on the road pavement:

- Drainage is designed to prevent stormwater ingress into the reactive clay subgrade. In addition, clearing of drains to ensure that they do not become blocked over the life of the pavement will reduce the risk of wetting up of the subgrade soils.
- New shrubs and trees should not be planted in close proximity to the roads. We recommend that this exclusion zone from the edge of the sealed area extend a lateral distance equal to the mature height of the proposed tree/shrub (i.e., if the proposed tree has a mature height of 10 m, it should be planted at least 10 m away from the edge of the road).

4.8 Geotechnical Risks and Considerations

4.8.1 Material Excavatability

It is assumed that the excavation works will be within the maximum investigation depth, and likely to encounter very stiff to hard cohesive soils. For the excavation of footings, assuming that the founding level is around 0.5 m bgl to 1.0 m bgl, it is expected that conventional excavation equipment could be used.

4.8.2 Excavation Stability

All excavations shall be battered or fully supported to reduce the risk to personnel safety and adjacent infrastructure and shall comply with the requirements of the Excavation Work Code of Practice (Safe Work Australia, October 2018).

For construction stage excavations (less than 1.5 m depth) required for installation of services, footings etc, temporary (short term) excavations that remain un-surcharged (i.e., no loads at, or behind, the crest of the excavation) may be profiled as per the following:

- where space permits, benching/battering at slope angles of 1V:1.5H in clay and 1V:2H in sand.

The following also needs to be considered when planning temporary excavations:

- batter stability should be considered by a geotechnical engineer or competent person prior to entry into excavations.
- no surcharge (including stockpiling of excavated materials) to be placed within a set back from the crest of the excavation equal to the depth of the excavation.

Excavation stability is affected by water via either erosion or accumulation of water in the soil. We recommend that appropriate drainage be provided around the excavation to reduce the risk of instability.

4.8.3 Trafficability

The near surface materials at the site predominantly comprised clayey soils. If these materials become wet they could become unsuitable for traffic and construction. The use of granular access tracks and construction planning to minimise traffic over areas with sensitive material is recommended, particularly if works are undertaken over wetter months.

4.8.4 Material Re-use

Based on the materials encountered in the boreholes, site won materials are considered suitable for re-use on site for general earthworks, provided any deleterious or organic materials are removed, and oversized particles (≥ 75 mm maximum particle size that do not break down during compaction) are excluded and materials are appropriately moisture-conditioned on placement.

4.8.5 Site Preparation and Fill Placement

General site preparation measures prior to the construction of pavements, hardstands, or footings should be undertaken in accordance with the following recommendations:

- Removal of any organic or deleterious materials across the surface prior to filling.
- Following this, the exposed surface soil should be moistened with a water cart and immediately proof rolled using a smooth drum roller of at least 8 tonne static tonne mass. Any zones displaying signs of excessive deflection (i.e., soft zones) during proof rolling should be tyned to a depth of 0.3 m bgl and recompacted to achieve a minimum dry density ratio of 98% relative to standard compaction (AS1289 Cl. 5.1.1).
- Consideration could be given to placing a nominal thickness of quarry rubble (e.g., 100–200 mm layer) across the exposed surface upon completion of proof rolling to prevent drying out, damage, or disturbance to the exposed surface prior to commencing pavement or hardstand construction.
- Filling should then be undertaken by placing material in loose layers no greater than 300 mm loose thickness and compacted to achieve a dry density ratio of 98 % relative to standard compaction (AS1289 Cl. 5.1.1).

Should there be any soil filling works at the site we recommend that these be conducted under Level 1 Inspection and Testing by a suitably qualified and experienced geotechnical testing and inspection authority (GITA) in accordance with AS3798-2007 (Section 8.2).

5 Limitations

Scope of services

This geotechnical site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

Geotechnical Investigation

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared to meet the specific needs of individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor or even some other consulting civil engineer. This report was prepared expressly for the client and expressly for purposes indicated by the client or his representative. Use by any other persons for any purpose, or by the client for a different purpose, might result in problems. The client should not use this report for other than its intended purpose without seeking additional geotechnical advice.

This Geotechnical Report is Based on Project-Specific Factors

This geotechnical engineering report is based on a subsurface investigation which was designed for project-specification factors, including the nature of any development, its size and configuration, the location of any development on the site and its orientation, and the location of access roads and parking areas. Unless further geotechnical advice is obtained this geotechnical engineering report cannot be used:

- when the nature of any proposed development is changed
- when the size, configuration location or orientation of any proposed development is modified.

This geotechnical engineering report cannot be applied to an adjacent site.

The Limitations of Site Investigation

In making an assessment of a site from a limited number of boreholes or test pits there is the possibility that variations may occur between test locations. Site exploration identifies specific subsurface conditions only at those points from which samples have been taken. The risk that variations will not be detected can be reduced by increasing the frequency of test locations; however, this often does not result in any overall cost savings for the project. The investigation program undertaken is a professional estimate of the scope of investigation required to provide a general profile of the subsurface conditions. The data derived from the site investigation program and subsequent laboratory testing are extrapolated across the site to form an inferred geological model and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Despite investigation the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies.

The borehole logs are the subjective interpretation of subsurface conditions at a particular location, made by trained personnel. The interpretation may be limited by the method of investigation, and cannot always be definitive. For example, inspection of an excavation or test pit allows a greater area of the subsurface profile to be inspected than borehole investigation, however, such methods are limited by depth and site disturbance restrictions. In borehole investigation, the actual interface between materials may be more gradual or abrupt than a report indicates.

Subsurface Conditions are Time Dependent

Subsurface conditions may be modified by changing natural forces or man-made influences. A geotechnical engineering report is based on conditions which existed at the time of subsurface exploration.

Construction operations at or adjacent to the site, and natural events such as floods, or groundwater fluctuations, may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept appraised of any such events, and should be consulted to determine if additional tests are necessary.

Avoid Misinterpretation

A geotechnical engineer should be retained to work with other appropriate design professionals explaining relevant geotechnical findings and in reviewing the adequacy of their plans and specifications relative to geotechnical issues.

Bore/Profile Logs Should not be Separated from the Engineering Report

Final bore/profile logs are developed by geotechnical engineers based upon their interpretation of field logs and laboratory evaluation of field samples. Customarily, only the final bore/profile logs are included in geotechnical engineering reports. These logs should not under any circumstances be redrawn for inclusion in architectural or other design drawings. To minimise the likelihood of bore/profile log misinterpretation, contractors should be given access to the complete geotechnical engineering report prepared or authorised for their use. Providing the best available information to contractors helps prevent costly construction problems. For further information on this matter reference should be made to 'Guidelines for the Provision of Geotechnical Information in Construction Contracts' published by the Institution of Engineers Australia, National Headquarters, Canberra 1987.

Geotechnical Involvement During Construction

During construction, excavation is frequently undertaken which exposes the actual subsurface conditions. For this reason geotechnical consultants should be retained through the construction stage, to identify variations if they are exposed and to conduct additional tests which may be required and to deal quickly with geotechnical problems if they arise.

Report for Benefit of Client

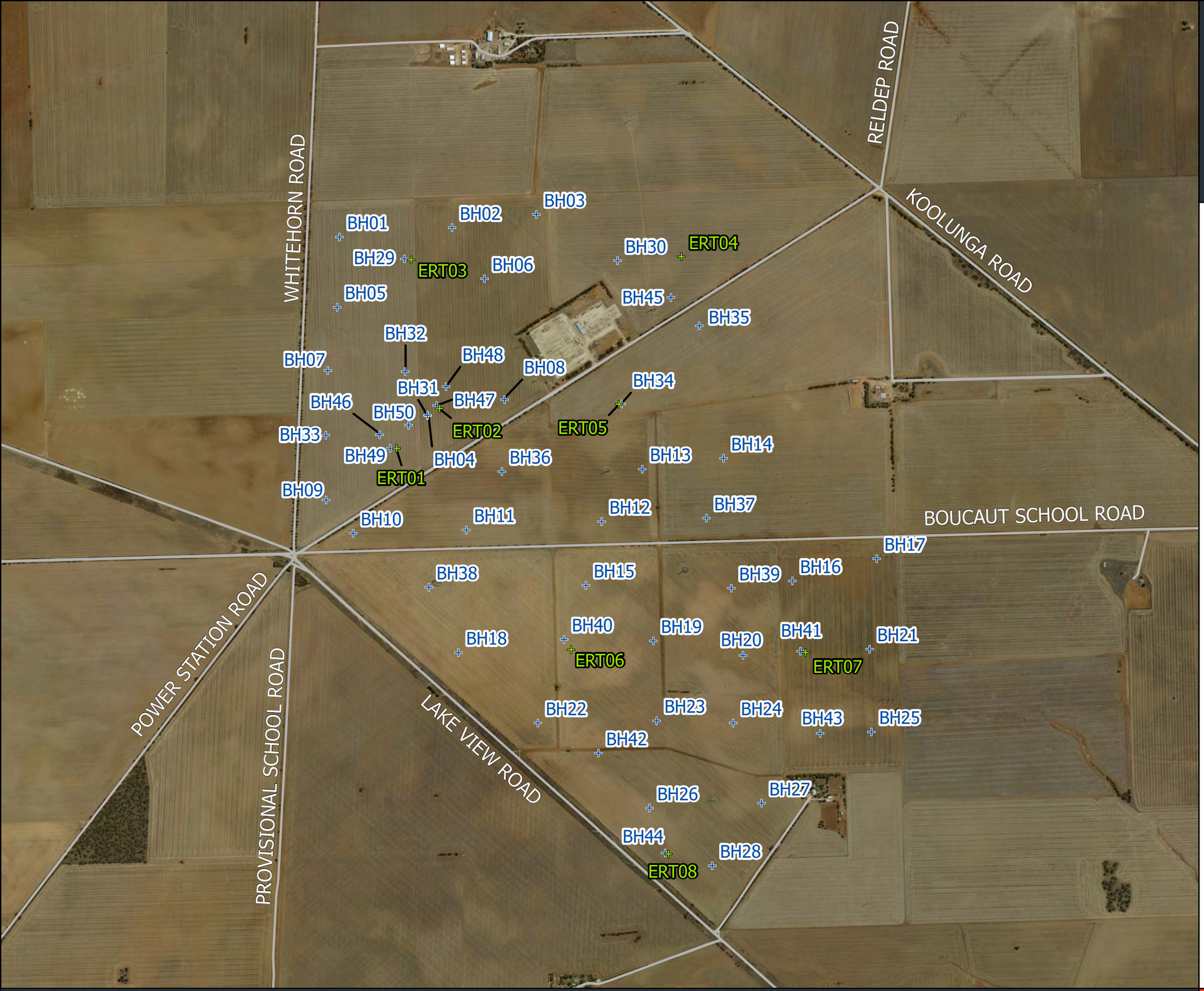
The report has been prepared for the benefit of the client and no other party. WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

WSP will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

Appendix A

Investigation Location Plan

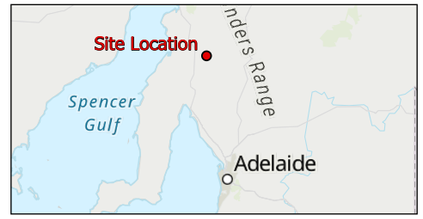


Brinkworth Solar Farm

Figure 1
Site Overview

Legend

- Bore Hole
- Electrical Resistivity Testing
- Roads



0 50 100 200 300 400 500
Metres

Coordinate system: WGS 1984 UTM Zone 54S

Scale ratio correct when printed at A3

1:15,000 Date: 09/06/2023

Data sources: - WSP, SA DIT, Esri

Appendix B

Borehole Logs

Appendix D

Chemical Laboratory Testing Certificates

WSP Australia P/L SA
Level 16, 1 King William St
Adelaide
SA 5000

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Jake Stewart**

Report **995184-S**
Project name BRINKWORTH SOLAR FARM
Project ID PS200909
Received Date Jun 01, 2023

Client Sample ID			**BH03_1.2-1.3**	**BH07_0.3-0.4**	**BH09_0.7-0.8**	**BH11_0.7-0.8**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M23-Jn0002294**	**M23-Jn0002295**	**M23-Jn0002296**	**M23-Jn0002297**
Date Sampled			**May 09, 2023**	**May 10, 2023**	**May 10, 2023**	**May 11, 2023**
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	1500	31	540	63
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	8.9	8.7	9.1	9.4
Resistivity*	0.5	ohm.m	5.8	58	7.9	24
Sulphate (as SO4)	30	mg/kg	540	< 30	270	< 30
Sample Properties						
% Moisture	1	%	19	13	11	12

Client Sample ID			**BH21_0.6-0.7**	**BH24_0.4-0.5**	**BH27_0.6-0.7**	**BH31_0.6-0.7**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M23-Jn0002298**	**M23-Jn0002299**	**M23-Jn0002300**	**M23-Jn0002301**
Date Sampled			**May 14, 2023**	**May 14, 2023**	**May 14, 2023**	**May 09, 2023**
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	520	110	590	920
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	9.0	9.0	9.1	8.7
Resistivity*	0.5	ohm.m	11	39	15	8.4
Sulphate (as SO4)	30	mg/kg	560	94	130	310
Sample Properties						
% Moisture	1	%	15	12	12	15

Client Sample ID			**BH32_0.2-0.3**	**BH34_0.1-0.2**	**BH37_1-1.1**	**BH39_0.8-0.9**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M23-Jn0002302**	**M23-Jn0002303**	**M23-Jn0002304**	**M23-Jn0002305**
Date Sampled			**May 10, 2023**	**May 11, 2023**	**May 11, 2023**	**May 15, 2023**
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	220	34	1400	580
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	8.7	8.5	8.8	9.5
Resistivity*	0.5	ohm.m	40	83	7.0	11
Sulphate (as SO4)	30	mg/kg	99	< 30	1100	530
Sample Properties						
% Moisture	1	%	15	11	16	16

Client Sample ID			BH44_1-1.1	BH46_0.5-0.6
Sample Matrix			Soil	Soil
Eurofins Sample No.			M23-Jn0002306	M23-Jn0002307
Date Sampled			May 14, 2023	May 10, 2023
Test/Reference	LOR	Unit		
Chloride	5	mg/kg	360	190
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	9.3	9.3
Resistivity*	0.5	ohm.m	13	29
Sulphate (as SO4)	30	mg/kg	120	41
Sample Properties				
% Moisture	1	%	12	13

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chloride	Melbourne	Jun 05, 2023	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
pH (1:5 Aqueous extract at 25 °C as rec.)	Melbourne	Jun 05, 2023	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Melbourne	Jun 05, 2023	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
% Moisture	Melbourne	Jun 01, 2023	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins

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Girraween
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NATA# 1261 Site# 18217

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Murarrie
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Mayfield West NSW 2304
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IANZ# 1290

Company Name: WSP Australia P/L SA
Address: Level 16, 1 King William St
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SA 5000

Project Name: BRINKWORTH SOLAR FARM
Project ID: PS200909

Order No.:
Report #: 995184
Phone: 08 8405 4300
Fax: 08 8405 4301

Received: Jun 1, 2023 3:00 PM
Due: Jun 8, 2023
Priority: 5 Day
Contact Name: Jake Stewart

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Chloride	HOLD	pH (1:5 Aqueous extract at 25 °C as rec.)	Resistivity*	Sulphate (as SO4)	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	BH03_1.2-1.3	May 09, 2023	11:37PM	Soil	M23-Jn0002294	X		X	X	X	X
2	BH07_0.3-0.4	May 10, 2023	4:27PM	Soil	M23-Jn0002295	X		X	X	X	X
3	BH09_0.7-0.8	May 10, 2023	5:52PM	Soil	M23-Jn0002296	X		X	X	X	X
4	BH11_0.7-0.8	May 11, 2023	5:02PM	Soil	M23-Jn0002297	X		X	X	X	X
5	BH21_0.6-0.7	May 14, 2023	11:17PM	Soil	M23-Jn0002298	X		X	X	X	X
6	BH24_0.4-0.5	May 14, 2023	8:36PM	Soil	M23-Jn0002299	X		X	X	X	X
7	BH27_0.6-0.7	May 14, 2023	7:13PM	Soil	M23-Jn0002300	X		X	X	X	X
8	BH31_0.6-0.7	May 09, 2023	11:30PM	Soil	M23-Jn0002301	X		X	X	X	X
9	BH32_0.2-0.3	May 10, 2023	9:13PM	Soil	M23-Jn0002302	X		X	X	X	X
10	BH34_0.1-0.2	May 11, 2023	8:55PM	Soil	M23-Jn0002303	X		X	X	X	X
11	BH37_1-1.1	May 11, 2023	6:11PM	Soil	M23-Jn0002304	X		X	X	X	X
12	BH39_0.8-0.9	May 15, 2023	5:42PM	Soil	M23-Jn0002305	X		X	X	X	X
13	BH44_1-1.1	May 14, 2023	5:45PM	Soil	M23-Jn0002306	X		X	X	X	X

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Priority: 5 Day
Contact Name: Jake Stewart

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Chloride	HOLD	pH (1:5 Aqueous extract at 25 °C as rec.)	Resistivity*	Sulphate (as SO4)	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X
14	BH46_0.5-0.6	May 10, 2023	7:14PM	Soil	M23-Jn0002307	X		X	X	X	X
15	BH06	May 10, 2023		Soil	M23-Jn0002308		X				
16	BH15	May 10, 2023		Soil	M23-Jn0002309		X				
Test Counts						14	2	14	14	14	14

eurofins | Environment Testing

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Chloride			mg/kg	< 5			5	Pass	
Sulphate (as SO4)			mg/kg	< 30			30	Pass	
LCS - % Recovery									
Chloride			%	109			70-130	Pass	
Sulphate (as SO4)			%	94			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
pH (1:5 Aqueous extract at 25 °C as rec.)	M23-Jn0004045	NCP	pH Units	8.2	8.2	pass	30%	Pass	
Resistivity*	M23-Jn0004045	NCP	ohm.m	77	77	<1	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	M23-Jn0002297	CP	%	12	12	1.1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M23-Jn0002298	CP	mg/kg	520	590	11	30%	Pass	
Sulphate (as SO4)	M23-Jn0002298	CP	mg/kg	560	650	15	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Catherine Wilson	Analytical Services Manager
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Sample Properties

Glenn Jackson
Managing Director

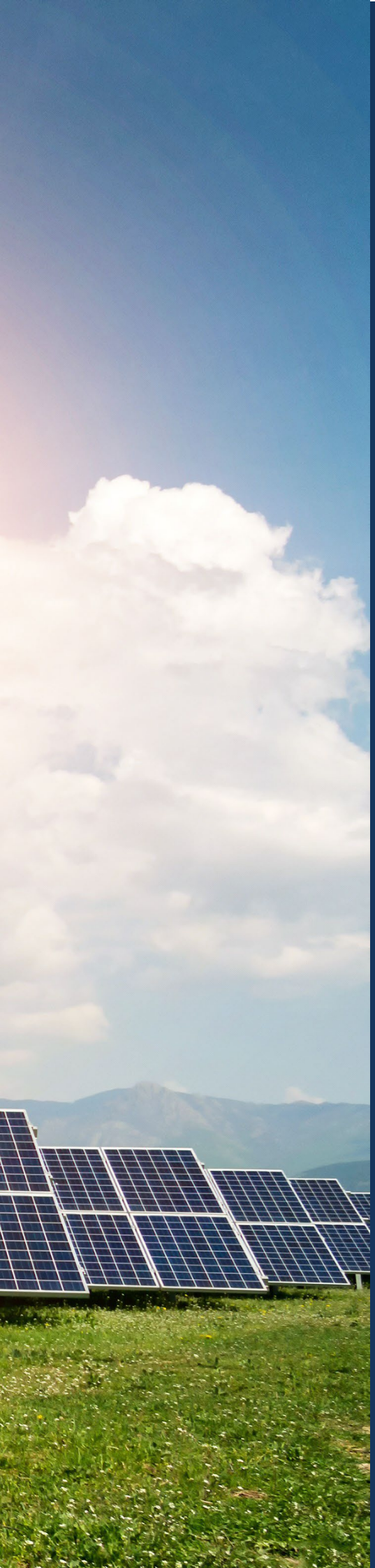
Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Appendix O
Draft Construction Environment Management Plan



Brinkworth Solar Farm

Draft Construction Environmental Management Plan

Akaysha Energy Pty Ltd

May 2024

Brinkworth Solar Farm

Draft Construction Environmental Management Plan

Akaysha Energy Pty Ltd

May 2024

Version	Date	Amendment	Prepared	Review
Draft	16 Sept 2023		Julie Jansen	
Draft	27 Sept 2023	Additional bushfire information	Julie Jansen	Tanzia Matotek and Duwayno Robertson, Akaysha Energy
Final version 1	7 Apr 2024	Amend information relating to BESS – now exempt from planning consent	Julie Jansen	
Final version 2	28 May 2024	Amend information relating to native vegetation clearance for solar facility only		

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Contents

1 Project Description

Akaysha Energy Pty Ltd (Akaysha) propose to develop a renewable energy facility comprising 209 megawatt Solar Farm and 300 megawatt per 1,200 megawatt per hour Battery Energy Storage System (BESS), two (2) substations and associated infrastructure at Brinkworth, South Australia.

The Brinkworth Solar Farm and Battery Project (the Project) is proposed to be located adjacent to the existing Brinkworth substation, approximately 7.0 kilometres north of the town of Brinkworth, 4.0 kilometres south-east of Koolunga, and around 145 kilometres north of Adelaide. The Project will occupy approximately 474 hectares of freehold land currently being used largely for cropping.

The Brinkworth Solar Farm and BESS Project is proposed to be developed in two (2) stages, with the BESS component of the Project being developed as the first stage and the solar farm the second stage. The BESS will be developed as exempt from approval, pursuant to Schedule 13, Clause 2(3) of the *Planning, Development and Infrastructure (General) Regulations 2017* (PDI Regulations). This draft Construction Environmental Management Plan relates to the development application for the 209MW solar farm and associated infrastructure, structures, equipment, and ancillary work.

Located within the Mid North Region of South Australia, the Project is located within the Wakefield Regional Council (Local Government) area. The townships of Koolunga and Brinkworth are located to the north and south of the project area respectively and within 5.0 kilometres.

Overall the size of the development is approximately 474 hectares with infrastructure occupying approximately 320 hectares of the site. The site has frontage to Power Station Road, Koolunga Road, Whitehorn Road and Lake View Road.

Elements of the solar farm development include:

- Solar Photovoltaic (PV) modules incorporating:
  - single axis tracking racks that are orientated north-south;
  - the racks vary in length depending on location and are between 67 and 101 metres;
  - approximately 367,360 panels;
  - overall height will depend on the ground level, but at maximum tilt the height is approximately 4.5 metres with the lower edge of each PV module up to 1.2 metres from the ground (in a horizontal position) and no less than 0.3 metres (maximum tilt); and
  - footings and racking for solar modules either driven piles, screw pile or concrete. Preliminary geotechnical investigations indicate driven post foundations are the most likely to be used.
- Power Conversion Systems (Inverters) -
  - approximately 70 inverters for the solar farm; and
  - typically inverters are prefabricated in shipping containers and contain step up transformers.

- One electrical substations, including:
  - step up transformers (stepping up the voltage to 275 kilovolt); and
  - connection to ElectraNet owned Brinkworth Substation via transmission lines.
- associated underground cables connecting groups of solar panels to inverter stations and underground and/or overhead transmission lines from inverter stations to the Project's switching substation;
- operations and maintenance area including:
  - control room and site office;
  - operations and maintenance building with amenities; and
  - car parking sufficient for employees and contractors during operation.
- laydown/compound area and future battery storage area;
- access tracks/driveways;
  - site access for the operations and maintenance area will be constructed from Power Station Road; and
  - internal access tracks will be constructed within the site to a width of between 4.0 and 6.0 metres of a gravel surface.
- stormwater management;
- security fencing and CCTV:
  - black mesh fencing around each element of the project to an anticipated height of 2.93 metres; and
  - CCCTV on buildings. Motion sensor or infrared security lighting (and CCTV cameras) would be installed at sensitive boundary locations and around the substation, battery storage facility, O&M facilities, and office areas.
- Lighting:
  - Lighting will be installed where necessary for safety, maintenance, and security purposes to be used in case of night works or an emergency only; and
  - Lighting would be installed around the substation, battery storage facility and O&M facilities.

These elements are shown on the plans prepared by Wind Prospect and Akaysha and **enclosed** in with the development application.

Wind Prospect Plans:

Figure 3.1: Project Overview - Plan Ref: DWG 0.27.

Figure 1.2: Sensitive Receptors – Plan Ref: DWG 030.

Figure 3.7: Solar Farm Overview and Vehicle Access – Plan Ref: DWG 039.

Figure 3.8: Solar Farm Typical Plan – Plan Ref: DWG 042.

Figure 3.9: Solar Farm Separation Distances to Closest Neighbouring Dwelling – Plan Ref: DWG 043.

Figure 5.1: Land Use Zones – Plan Ref: DWG 031.

Akaysha Plans:

Other Equipment Elevations and Details Rev 1.0 – Sheet 3 and 4.

O&M Plan and Elevation Rev 1.0 – Sheet 4.

Control and Switch Rooms Elevations Rev 1.0 – Sheet 5 (3 pages).

2 Subject Site

2.1 Legal Description

Located on land adjacent the existing Brinkworth substation, the site of the development is described as:

- Lot 256W Power Station Road, Brinkworth - Section 256W, H230400, Hundred of Boucaut in Certificate of Title Volume 5559 Folio 453;
- 873 Koolunga Road, Koolunga – Allotment 96 F199935, Hundred of Boucaut in Certificate of Title Volume 5864 Folio 896;
- 653 Koolunga Road, Brinkworth – Section 257, H230400, Hundred of Boucaut in Certificate of Title Volume 5588 Folio 666; and
- Lot 102 Lakeview Road, Brinkworth – Allotment 102, D27337, Hundred of Boucaut in Certificate of Title Volume 6169 Folio 612.

2.2 Project Region

The townships of Koolunga and Brinkworth are located to the north and south of the project area respectively and within 5.0 kilometres. Within this 5.0-kilometre-radius is also scattered rural dwellings and associated outbuildings typical of the rural landscape.

Located within the Mid North Region of South Australia, the area comprises several north-south ridgelines, resulting in parallel ridges and wide valleys. The project is located within a valley which is characterised by open agricultural landscape with cultivated paddocks and open fields utilised for grazing. The nearest watercourse is the Broughton River, which is located to the north adjacent Koolunga township.

The Brinkworth substation and overhead powerlines are a significant element within the locality. On the ridgelines to the west is the Snowtown wind farm.

The extent of the project area is shown in the context of townships and land use zones on the plan **below**.

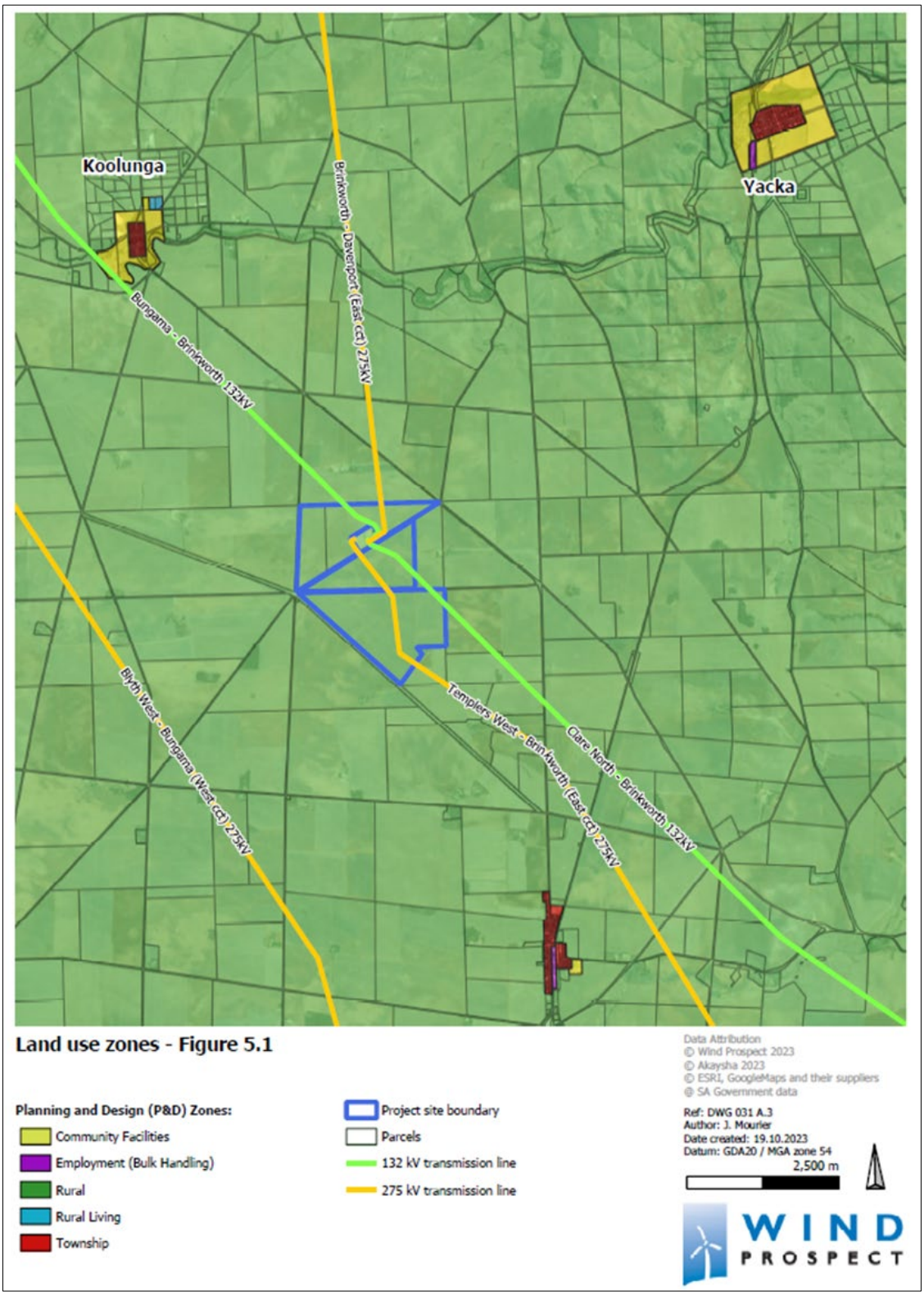


Figure 1 Context of Townships and Land Use Zones.

2.3 Climate

The Mid North region of South Australia is a semi-arid climatic zone characterised by hot, dry summers and cool winters with the majority of rainfall in the winter months. Tropical low-pressure systems and north-west cloud bands occasionally drift down, bringing short outbursts of localised heavy rainfall, particularly during summer.

The nearest weather station for the site is Snowtown, South Australia, with records from 1998. **Figure 2** illustrates the mean maximum temperature and the mean rainfall for years 1998 to 2023 (Source Bureau of Meteorology).

SNOWTOWN (RAYVILLE PARK)

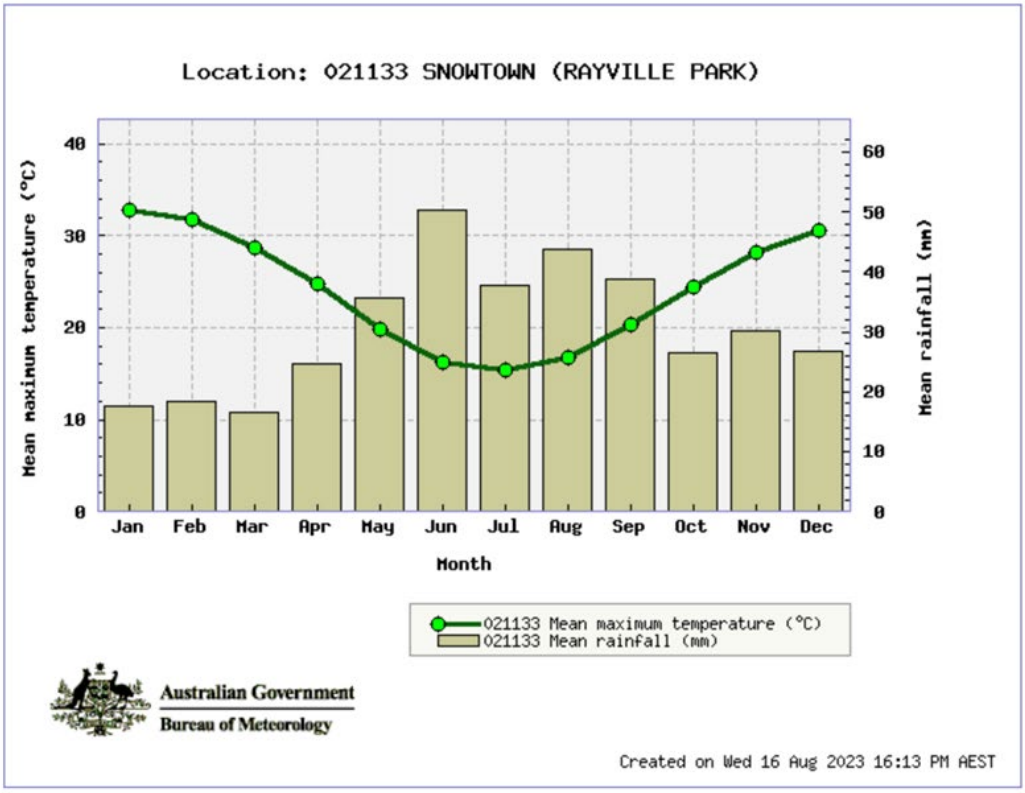
Mean maximum temperature (°C)

Site details

Site name: SNOWTOWN (RAYVILLE PARK) **Site number:** 021133 **Commenced:** 1998
Latitude: 33.77 °S **Longitude:** 138.22 °E **Elevation:** 109 m **Operational status:** Still Open

Yearly data | 30 year statistics | Comparison site | First statistic | Second statistic **Note:** Only one option can be redrawn at a time

Temperature | Mean maximum temperature (°C) | Redraw



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean maximum temperature (°C) for years 1998 to 2023	32.8	31.8	28.7	24.8	19.8	16.2	15.4	16.8	20.4	24.5	28.1	30.6	24.2	25
Statistics	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Years**
Mean rainfall (mm) for years 1998 to 2023	17.5	18.3	16.5	24.7	35.6	50.3	37.7	43.7	38.7	26.6	30.1	26.8	365.5	25

12.3 = Not quality controlled

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Figure 2 Average monthly rainfall and temperature data for Snowtown Weather Station (ref 021133).

The annual climate statistics (as contained in the Surface Water Assessment report by EMM dated July 2023, to inform the development application) are shown in Table 2.3.1 **below**.

Table 2.3.1 Rainfall and Evaporation Data

Key Annual Statistic	Rainfall (MM/Year)	Evaporation (MM/Year)
Average	410	1917
Minimum	183	1590
5th percentile	249	1803
Median	405	1899
95th percentile	576	2101
Maximum	706	2315

Source Surface Water Assessment report by EMM dated July 2023.

3 Construction Environmental Management Plan

3.1 Objective of the Construction Environmental Management Plan

The objective of the Construction Environmental Management Plan (CEMP) is to describe the potential environmental issues related to the proposed works and the measures which will be undertaken to manage or mitigate any detrimental impacts. The key environmental issues associated with construction of the solar farm are:

- air quality;
- cultural heritage;
- erosion and sedimentation;
- hazardous substances;
- noise;
- traffic;
- flora and fauna;
- weeds and pest management;
- fire prevention; and
- incident management. This CEMP provides guidance in relation to:
  - minimising environmental impacts during site works;
  - identification and implementation of measures to minimise potential impacts to
  - off-site receptors during construction; and
  - establishing and implementing practices to inform site workers regarding potential environmental impacts and agreed procedures to mitigate impacts.

3.2 Environmental Management Structure and Responsibility

The implementation of this CEMP is the responsibility of the chosen construction contractor. The construction contractor may at times delegate responsibility for individual items to its sub-contractors; however, retains overall responsibility for implementation of this CEMP and any changes should the understanding of site conditions change.

The commitment of the construction contractor toward environmental protection and management will be demonstrated by:

- the finalisation of the CEMP prior to construction;
- authorisation of the CEMP by the Project Manager prior to construction;
- the communication of the plan's intent to the workforce through induction, display on notice boards and at project meetings;
- the provision of resources to implement and maintain the CEMP; and
- the establishment of measurable objectives and regular reviews to ensure the suitability and effectiveness of the policy to operations.

3.3 Environmental Aspects

The potential environmental impacts along with mitigation strategies to minimise potential impacts are outlined **below**.

In assessing the potential off-site environmental impacts, the following should be noted:

- the site of the proposed solar farm comprises farmland which is used predominately for cropping; and
- the transmission line will transverse private land and road reserves.

The following provides the mechanism for the management of the environment during construction, having specific regard to:

- protection of native fauna;
- protection of native flora;
- pest plants;
- pest animals;
- fire prevention and emergency response on site;
- bushfire;
- erosion and sediment;
- aboriginal cultural heritage;
- hazardous substances and spill prevention;
- noise; and
- dust generation.

3.3.1 Air Quality

Air Quality	
Objective	Avoid and/or minimise air quality impacts during construction.
Legislation/Policy	*Environment Protection Act 1993.* *Environment Protection Regulations 2009.* *Environment Protection (Air Quality) Policy 2016.* Planning and Design Code (pursuant to the *Planning, Development and Infrastructure Act 2016).*
Potential Impacts	Dust during construction from: • establishment of access tracks; • excavation for pads and footings; • construction of buildings, fences and ancillary infrastructure; • storage of materials; and • construction compound(s). Dust from vehicle movement. Exhaust fumes from construction vehicles.

Air Quality	
Mitigation	Identify dust sensitive locations (residential dwellings etc) prior to construction activities occurring.
	Ensure dust generating activities are mitigated if conditions are not favourable (i.e., strong winds that would release dust off site).
	Dust controls would include the use of suppressants including water spraying as required. Water spraying would extend to access tracks, stockpiles and the sites being excavated for the construction.
	Limit bare earth exposure to that essential to the efficient and effective construction.
	Use vegetation cover, mulch covers, or other suitable methods will be adopted where possible.
	Rehabilitate or allow natural regeneration of bare areas as soon as the area is no longer needed for construction.
	Cover all loose loads for transport to and from the site.
	Maintain sealed public roads free of trafficked soil materials.
	Restrict vehicle travelling speed (<40km/h) on unsealed access tracks, within the site, where possible.
	All vehicles and equipment operated on the site will comply with regulatory emission standards.
	Minimise machinery idling times, as appropriate.

3.3.2 Cultural Heritage

Cultural Heritage	
Objective	Mitigate the risk of damage or disturbance of an unknown Aboriginal site or object of significance.
Legislation/Policy	*Native Title (South Australia) Act 1994.* *Aboriginal Heritage Act 1988.* *Heritage Act 1993.* *Heritage Places Act 1993.*
Potential Impacts	Damage to currently unknown Aboriginal sites, artefacts or archaeological features. There are currently no active native title claims or determinations or Indigenous Land Use Agreements (ILUA) for the project area.
Mitigation & Site Discovery Procedure	Prior to construction review and incorporate the relevant recommendations of the Cultural Heritage Management Plan prepared with the first nations people into the final CEMP.
	During the construction of the project, caution should be taken for all sub-surface disturbances including but not limited to roads, land clearing, construction and underground services.
	Appropriate induction and awareness training will be given to all construction personnel in regard to Aboriginal Cultural Heritage.

Cultural Heritage	

Should any archaeological occurrences be located during work on the site, the Construction Contractor must take appropriate action in accordance with the Aboriginal Heritage Act 1988. This will involve implementation of the following procedures should a potential Aboriginal site or object be identified on the site during construction (or ongoing operation):

Potential Aboriginal Cultural Heritage Identified During Construction		
A potential Aboriginal site has been identified by the work crew.	Cease all work within 50 metres of the discovery. Do not remove or touch anything from the area. Inform the site works manager. Identify whether any soil has been removed from the location and if possible have it returned.	
Site works manager to:	Photograph, with scale (pen, tape measure etc.) the discovered items and the immediate area. Record the location with GPS if possible. Secure and weatherproof the site from further disturbance. Identify any immediate threats to the site (e.g., construction activities, vandalism, water level). Consult with a specialist to determine the nature of the discovery and if there is bone whether it is human or not.	
If material discovered is <u>not</u> an Aboriginal site or object of significance	Work can continue at location.	
If Material Discovered <u>is</u> an Aboriginal Site, Object of Significance or Human Remains.		
If bone is identified as human, immediately contact SA Police Tel 13 14 44. The area will be under the control of the SAPOL until further notice.	For other cultural material the archaeologist will manage the process and consult with the Traditional Owners. The Proponent should be involved in the consultation as well.	
	Object <u>can</u> be avoided during works.	Work can continue at location with measures implemented to avoid damage to the site or objects.
	Object <u>cannot</u> be avoided during works.	Refer to the DPS-AAR Aboriginal Heritage Fact Sheet: Discovery of Aboriginal Sites and Objects. Additional requirements will apply.

3.3.3 Water Quality, Erosion and Sedimentation

Water Quality, Erosion and Sedimentation	
Objective	Minimise erosion and sediment laden stormwater from leaving the site.
Legislation/Policy	*Environment Protection Act 1993.* *Environment Protection Regulations 2009.* *Environment Protection (Water Quality) Policy 2015.* Stormwater Pollution Prevention, Code of Practice for the Building and Construction Industry. Planning and Design Code (pursuant to the *Planning, Development and Infrastructure Act 2016*).
Potential Impacts	Soil erosion can create scarring of the landscape, contaminate watercourses, lead to loss of vegetation and damage infrastructure. Contamination of surface water, including stormwater systems and public nuisance due to soil and materials on public roads.
Mitigation	Minimise the loss of vegetation.
	Utilise existing driveways/access tracks on site for movement of vehicles.
	Establish new driveways/access tracks with appropriate all-weather surface treatment for utilisation during construction.
	Grading to minimise earthworks and be consistent with the existing prevailing grade and landforms and to fall to existing drainage lines, to minimise changes to existing flow paths.
	Implement surface drainage measure to control runoff generated within the site. Existing flow paths and sheet flow conditions will be maintained to the extent practicable, with construction of diversion drains, channels and table drains to be minimised, to: • minimise soil erosion potential; and • minimise changes to flow regimes in receiving watercourses.
	Implement suitable sediment controls, such as rock rip rap where appropriate to armour earthwork batters and site drainage as needed for scour protection and to achieve stable waterways where flow concentrations cannot be avoided.
	Implement sediment fencing, hay bales filters, diversion swales and sediment basins, to minimise risk of sediment from earthworks exiting the site.
	Specific stormwater management measures for the substation area will include: • diversion of clean runoff from potentially oil-contaminated areas such as substations; • bunding of potentially oil-contaminated areas is accordance with relevant standards; and • provision of stormwater treatment device(s) to remove oil/grease, hydrocarbons and sediment from runoff prior to discharge to the downstream drainage system.
	Prepare a Soil Erosion and Drainage Management Plan (SEDMP) prior to construction with recommendations incorporated into final CEMP.
	Ensure sediment control measures are maintained regularly to ensure effective operation at all times.
	Stabilise cleared/constructed areas with suitable pasture grasses (or similar) at the earliest opportunity upon finalisation of the construction.
	Water will not be discharged from excavations unless water quality criteria are satisfied.

Water Quality, Erosion and Sedimentation	
	Prior to leaving site, any vehicles driving on the public road should have tyres, wheel arches and tailgates brushed or washed down of dirt or mud as appropriate.
	Intercept and redirect runoff on the site to protect exposed areas.
	Stormwater runoff from buildings will be captured in rainwater tanks for use on site, to minimise demand for imported water.
	Onsite substations shall incorporate bunded oil-contaminated areas and treatment devices to remove oil/grease, hydrocarbons and sediment from runoff prior to discharge to downstream drainage system.
	During operation ensure hydrocarbons from onsite substation are not discharged to stormwater system by separating clean and oil-contaminated runoff.
	All wastewater generated by the project during operations will be collected and transported offsite for disposal at a licensed facility; including firewater and any hydrocarbons captured at the substation site, to avoid potential discharge to receiving watercourses.

3.3.4 Hazardous Substances

Hazardous Substances	
Objective	Avoid and/or minimise impacts associated with the release of hazardous substances or materials.
Legislation/Policy	*Environment Protection Act 1993.* *Environment Protection Regulations 2009.* EPA Guidelines for Bunding and Spill Management. Australian Code for the Transport of Dangerous Goods by Road and Rail 7th Ed, AS1940 and AS3833. Safety Data Sheets (SDS) information specific to the substance being handled and stored. AS 1940-2017: The Storage and Handling of Flammable and Combustible Liquids. *South Australian Dangerous Substances Act 1979.* *South Australian Dangerous Substances (General) Regulation 2017.*
Potential Impacts	Contamination of the environment with hazardous substances and/or materials.
Mitigation	All hazardous materials and hydrocarbons will be appropriately transported and stored during construction in accordance with relevant guidelines and regulations, to avoid release or impact to the environment. These guidelines primarily include the Australian Code for the Transport of Dangerous Goods by Road and Rail (Edition 7.8 or as updated), AS1940 and AS3833.
	Adequately supplied spill kits will be kept within the vicinity of the worksite where such hazardous materials are used and stored.
	Appropriate persons should be contacted as soon as practicable following detection of any release or non-conformance.
	HHS storage areas are clearly labelled.
	Site inductions will clearly inform contractors and visitors of HHS storage areas.
	The storage, usage and handling of HHS will be managed stored according to AS 1940 and AS 3833.

Hazardous Substances	
	Minor Storage quantities as per AS 1940 on open land will adhere to the following: • liquid will be kept at least 1.0 metre from any boundary, workshop, dwelling or protected place, body of water, watercourse or environmentally sensitive area; • the ground around the store will be kept clear of combustible vegetation or refuse for a distance of at least 3.0 metres; and • any potential flow of spillage will be prevented from reaching a protected place, watercourse or property boundary by such means as the use of natural ground slope, or the provision of a diversion channel, kerb or bund.
	Material Safety Data Sheets (MSDS) will be required for all hazardous chemicals kept on site. Procedures for mitigating specific impacts from materials will be governed by the appropriate MSDS.
	A loss of containment of HHS will initially be controlled by bunding. Bunding and compound requirements are defined in section 5.8 of AS 1940. Bunding capacity will be the size of the largest storage vessel plus any fire water over a 20-minute period.
	Employees handling, transporting or utilising hazardous materials will be trained in emergency response procedures for spill events.

3.3.5 Noise

Noise	
Objective	Avoid and/or minimise noise and vibration emissions during construction works.
Legislation/Policy	*Environment Protection Act 1993.* *Environment Protection Regulations 2009.* *Environment Protection (Noise) Policy 2007 or Environment Protection (Commercial and Industrial Noise) Policy 2023 (after 31st October 2023).* AS2436 – 1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites". Planning and Design Code (pursuant to the *Planning, Development and Infrastructure Act 2016*).
Potential Impacts	Noise pollution leading to loss of amenity for adjoining residents. Vibration from movement of large machinery and compaction creating nuisance to adjoining residents.
Mitigation	Identify the sensitive noise receptors and plan site establishment in a manner that maximise noise attenuation.
	Construction activities to be undertaken must be compliant with requirements of *Environment Protection (Noise) Policy 2007* or Environment Protection (Commercial and Industrial Noise) Policy 2023 (after 31st October 2023).
	The adoption of all reasonable and practicable noise mitigation measures during daytime hours which may include the following: • only operating construction plant and associated activities after 7.00 am and before 7.00 pm; • construction of temporary acoustic barriers for activity in close proximity to non-associated stakeholder residences; • the fitting of broadband reversing signals to vehicles which do not leave the site; and

Noise	
	• administrative measures such as inspections, scheduling and providing training to establish a noise minimisation culture for the works.
	Plan the site establishment and traffic routes to minimise reversing alarms on plant and equipment.
	Provide an induction for all project team members for noise and vibration management prior to the commencement of works.
	Ensure all equipment is well maintained and in good working order.
	Restrict hours of work to 7.00 am to 7.00 pm Monday to Saturday, no construction on Sunday or other public holidays.
	If generators or such noisy machinery is utilised, locate this equipment as far as practical from the nearest residential premises not located on the site.
	Plant and equipment not in use to be shut down.
	Maintain complaints register and respond to any complaints received.
	The site should be planned to minimise the need for reversing of vehicles.
	All mechanical plant is to be silenced by the best practical means using current technology. Mechanical plant, including noise-suppression devices, should be maintained to the manufacturer's specifications. Internal combustion engines are to be fitted with a suitable muffler in good repair.
	Special assessment of vibration risks may be needed, such as for pile-driving or works structurally connected to sensitive premises.
	All equipment to be operated in appropriate and efficient manner.
	Simultaneous operations of noisy plant operating adjacent to sensitive receivers will be avoided.
	Where noise exceeds accepted levels and cannot be avoided, consideration will be given to applying respite periods for nearby residences.
	Any essential work during the night-time period will be inaudible at dwellings. Inaudibility is defined as not exceeding 30dB(a) outside any dwelling. This may be exceeded in the event of an emergency situation.

3.3.6 Traffic

Traffic	
Objective	Avoid and/or minimise impacts associated with construction traffic moving to and from the site on nearby sensitive receptors including residential dwellings, the townships of Redhill and Koolunga, and/or flora and fauna.
Legislation/Policy	*Road Traffic Act 1961.* *Road Traffic (Road Rules – Ancillary and Miscellaneous Provisions).* *Regulations 1999.*
Potential Impacts	Disturbance to nearby sensitive receptors including residential dwellings and/or wildlife along the construction haul route to and from site. Possible property damage through vibration impacts along haul route to and from construction site. Accelerated deterioration of local road network.

Traffic	
	Increased potential for wildlife vehicle strike on haul roads to and from site.
Mitigation	Utilise major local sealed roads for vehicles to and from the site, as practicable.
	Limit vehicle access to existing access points or those approved as part of the development application to ensure no additional clearance of road side vegetation occurs.
	The recommended access route (Option 1, as presented in the Traffic Impact Assessment report with the development application) for 26 metre B-Double vehicles is via Augusta Highway to Redhill, then onto Koolunga to access Power Station Road from the northern approach of Koolunga Road. This route is sealed until Power Station Road.
	Concurrent with the finalisation of the CEMP, a Traffic Management Plan
	be prepared to finalise the route for B-Double vehicles and Over Size and Mass vehicles, with a view of minimising impact on townships, nearby sensitive receivers and unsealed local roads.
	Minimise movement of construction vehicles to and from the site outside of the hours of 7.00 am to 7.00 pm Monday to Saturday.
	Traffic movements to occur in accordance with conditions laid out in the Traffic Management Plan.

3.3.7 Flora and Fauna

Flora and Fauna	
Objective	Avoid clearance of native vegetation and adverse impact on fauna.
Legislation/Policy	*Native Vegetation Act 1991.* *Native Vegetation Regulations 2015.* *Environment Protection and Biodiversity Conservation Act 1999.* *Natural Resources Management Act 2004.* *National Parks and Wildlife Act 1972.* Planning and Design Code (pursuant to the *Planning, Development and Infrastructure Act 2016*).
Potential Impacts	Destruction of flora and fauna.
Target	No impact (removal or disturbance) to native vegetation outside of approved clearance boundaries, namely 0.017 hectares to construct two (2) vehicle access points.
Mitigation	Limit vegetation clearing to that required for construction and safety and where possible, retain established trees and native shrub under storeys.
	All vegetation clearing or disturbance is approved and undertaken in compliance with permits and/ or site management plans.
	Any payment into the native vegetation fund is done so in accordance with the relevant assessment methodology and associated standards.
	Disturbed/exposed areas are stabilised and revegetated progressively as appropriate.
	Cease work immediately in relevant areas if any previously unknown threatened flora species are encountered.
	Vegetation clearing methods shall be conducted in a manner that encourages natural regeneration of rootstock, minimises land disturbance and maintains soil stability and line clearance.

3.3.8 Weeds and Pest Management

Weeds and Pest Management	
Objective	Avoid the introduction of new weeds (previously not known to occur in the area). Avoid the spread of declared and environmental weeds. Prevent an increase in pest animal species.
Legislation/Policy	*Native Vegetation Act 1991.* *Native Vegetation Regulations 2015.* *Environment Protection and Biodiversity Conservation Act 1999.* *Natural Resources Management Act 2004.* *National Parks and Wildlife Act 1972.*
Potential Impacts	Potential introduction and/or spread of weeds and pest plants.
Target	No increase in weed or pest animal occurrence within or adjacent the Project Area.
Mitigation	Any controlled weeds and pest plants within the existing pasture to be removed or destroyed where possible prior to construction commencing.
	Should any controlled weeds or pest plants be identified, prevent their transmission by vehicles by cleaning vehicles before exiting the site.
	Any incoming or outgoing material will be checked for pest or weed species prior to being transported to and from the subject site.
	Locate equipment and materials storage areas in locations devoid of native vegetation.
	Ensure construction compounds are kept neat and tidy at all times.
	Ensure waste bins are emptied regularly, and covered where evidence of vermin exists.
	Replacement/rehabilitation of disturbed pasture immediately following construction works where appropriate.
	Weed management practices and hygiene procedures will be undertaken in accordance with a Weed/Pathogen Management Plan to ensure that weed species are not introduced to the site or further spread within or off-site.

3.3.9 Fire Prevention and Protection

Fire Prevention and Protection	
Objective	To reduce the risk of fire and prevent damage in the event of a bushfire. To prevent or inhibit the outbreak of fire on the land; and • to prevent or inhibit the spread of fire through the land; • to protect property on the land from fire; and • to minimise the threat to human life from a fire on the land.
Legislation/Policy	*Bushfire Emergency Services Act, 2005.* Planning and Design Code (pursuant to the *Planning, Development and Infrastructure Act 2016*). Victorian Country Fire Authority – Design Guidelines and Model Requirements – Renewable Energy Facilities 2022.
Potential Impacts	Damage to equipment and danger to life.

Fire Prevention and Protection	
Mitigation	Appropriate persons should be contacted as soon as practicable following detection of a fire, as detailed in the Emergency Management Plan prepared in coordination with the CFS and Incident Management Plan.
	Vegetation management during the Fire Danger Season (FDS): • grass should be no more than 10 centimetres in height and leaf litter no more than 10-millimetres-deep for a distance of 10 metres around buildings; • a fuel reduced area of 5.0 metres width should be maintained around the perimeter of electricity compounds and substation type facilities; • there should be no long grass or deep leaf litter in areas where plant and heavy equipment will be working; and • all plant and mobile equipment should carry at least one (1) 9 Litre Water Stored Pressure fire extinguisher with a minimum rating of 3A.
	In the event of a fire, provision of water supply should be available and easily identifiable by emergency response personnel to avoid hindering fire suppression efforts. The water supply to include: • 20,000 litre tank at each entry point to the solar energy facility; • Water storage tanks installed with compliant AS 2419.1-2005: Fire hydrant installations – System design, installation and commissioning; and • Capability of refilling water tanks within 24 hours of use via 'street' connection and/or installation for refill by water carrier. All water supply locations should be marked on a site plan and be available to the CFS.
	Emergency vehicle access to incorporate: • Access gates to be provided on boundary roads; • A 4 metre wide perimeter road within the perimeter fire break; • Construction of all internal roads to a minimum of 4 metres or trafficable width with a 4 metre vertical clearance; • all internal roads to be constructed of an all-weather material capable of accommodating a vehicle of 15 tonnes; and • separation of banks of solar panels by at least 6 metres to allow for emergency vehicle access. All vehicle access points should be marked on a site plan and be available to the CFS.
	Fire breaks to be established and maintained as follows: • 10 metre fire break around control rooms, electricity compounds and substations; • the area between the fire break and the perimeter fence/vegetation screen will be maintained grass to a maximum, of 100 millimetre length during the fire danger period; and • Solar Panels will be setback from the boundary to ensure that no part is within 10 metres of the Project boundary.
	The inverters, substation and operations and maintenance areas are all provided with non-combustible surfaces along with Asset Protection Zones around them that also assist with reducing fire spread.
	Vehicle movement within the site shall have a maximum speed of 10km/h.
	An Emergency Management Plan will be prepared concurrent with the final CEMP and will include:

Fire Prevention and Protection	
	• a bushfire management plan that is established prior to commencement of construction; • exact locations of the dedicated water tank at site ; • SOP's established for management of fire risk; • the emergency contact number (readily available online and is always attended by trained staff); • key emergency contacts list and emergency contact protocols are available to the CFS, allowing for clear and timely communications to and from the CFS; • site mapping with locations of water supply, access information, routes, gates and locks; • implementing and testing bushfire response plans; • providing appropriate emergency response training and equipment to all staff and contractors; and • during the construction phase, the developer should provide periodical updates to the CFS as the project is progressively built.
	Prior to commissioning the facility, operators should offer a familiarisation visit and explanation of emergency procedures to the CFS. Information in relation to the specific hazards and fire suppression requirements of the site should be provided to the CFS during this visit. In addition, a schedule for ongoing site familiarisation to account for changing personnel, site infrastructure and hazards should be developed in conjunction with the local CFS Brigade.

3.3.10 Incident Management

Incident Management	
Objective	To ensure that there is a procedure for managing and reporting incidents should they occur.
Legislation/Policy	*Work Health and Safety Regulations, 2012.* *Work Health and Safety Act, 2012.*
Potential Impacts	Reoccurrence of incidents if not managed effectively.
Mitigation	The general procedure to identify and address incidents if they occur is: • identify incident or non-conformance; • immediately rectify if safe to do so; • inform appropriate persons, including internal and external stakeholders; • complete incident register and determine appropriate corrective actions; and • implement corrective actions.

4 CEMP Implementation

4.1 Structure and Responsibilities

Whilst environmental management is the responsibility of everyone on the Project, various team members have specific roles in relation to environmental management. This section outlines the roles and responsibilities for key environmental personnel.

4.1.1 Responsibilities

Project Manager (PM)

The PM has the following particular responsibilities under this CEMP:

- communicate clear expectation in relation to environmental behaviour and performance to the Project team;
- ensuring that the requirements of this CEMP are fully implemented;
- reviewing environmental management reports and plans prepared by the Environment Manager;
- overall coordination and responsibility of dealing with issues and concerns and ensuring a record of all environment related complaints is maintained;
- ensuring that all Site Supervisors are familiar with the CEMP and their responsibilities contained within the plan; and
- delegating authority to act in the event of an emergency and to allocate the required resources.

Environment Manager

The Environment Manager has the following responsibilities under this CEMP:

- assist with the development, implementation and monitoring of the CEMP;
- liaison with relevant agencies and authorities;
- co-ordination of specialists as required;
- arranging necessary training of personnel into Project environmental matters;
- reviewing as required construction plans and method statements to check that adequate environmental management measures are incorporated into the planning of particular construction processes;
- establishing and maintaining this CEMP in accordance with the requirements of the contract and such that it complies with all applicable environmental regulations;
- ensuring reports are prepared and submitted to relevant authorities and Project personnel as required; and
- reporting on environmental performance to identified objectives and targets.

Site Supervisors and Foremen

The Site Foremen have the following responsibilities under this CEMP:

- ensure through the continual daily surveillance of the Project works that subcontractors and all personnel onsite comply with the requirements of the CEMP, plans and environmental procedures;
- have regard to weather conditions when programming daily works activities (for example vegetation removal, excavation works etc);
- report environmental incidents (actual/potential) to the Project Manager, and Environment Manager and assist in resolution;
- participate in any internal or external environmental inspections and audits if requested; and
- carry out maintenance on environmental controls as required.

Site Engineers

Site Engineers have the following responsibilities under this CEMP:

- preparation of work type/area specific procedures, Safe Work Method Statements, Vegetation Impact Permits and other relevant documentation in close liaison with the Environment Manager;
- ensuring that Foreman, Supervisors and sub-contractors are aware of the environmental procedures and the need to effectively implement the procedures;
- supervision of workforce and sub-contractors with respect to environmental compliance;
- monitoring and maintaining the works in conformance with the environmental procedures; and
- managing environmental incidents.

Other Personnel Including Sub-Consultants and Subcontractors

Other personnel including sub-consultants and subcontractors have the following responsibilities under this CEMP:

- compliance with site induction requirements for all aspects of environmental management;
- compliance to the CEMP and all plans and procedures as they apply to their operations on the site;
- reporting all environmental incidents to the Foreman, Supervisor or Site/Project Engineer immediately; and
- following instructions issued by the Project team and supervisory personnel as they relate to environmental management and incidents.

4.2 Training, Awareness and Competence

Four (4) main forms of training will be provided on-site:

- site induction, including roles and responsibilities sheets - introduction to the project and assigned tasks regarding the CEMP;
- environmental awareness training – environmental awareness training will be tailored to the actual site and job description to allow personnel to complete assigned tasks regarding the CEMP;

- bushfire management training; and
- “toolbox” training.

Records of induction and training will be kept on a database including the topic of the training carried out, dates, names and trainer details. Inductees will be required to sign-off that they have been informed of the environmental issues and that they understand their responsibilities. The Site Environmental Manager will review the program and monitor its implementation.

4.2.1 Environmental Inductions

Adequate training and instruction will be provided to all personnel to allow them to perform their duties whilst ensuring the environmental impacts associated with the Project are minimal.

The Project Manager will ensure all subcontractor personnel attend an induction, prior to commencement of work.

There will be two (2) levels of induction. Level one will be for visitors, irregular delivery drivers and others who will remain in the company of a fully inducted Brinkworth Solar Farm Project employee. The level two induction will be required for all permanent employees and subcontractors working on the site. The level two induction will include but will not be limited to the following topics:

- the CEMP (purpose, objectives and key issues);
- legal requirements including applicable legislation, conditions of environmental licences, permits and approvals, due diligence, general environmental duty, and duty to notify and potential consequences of infringements;
- environmental policies;
- environmental management strategies and controls for areas such as erosion and sediment control, water discharge, waterway protection, clearing, fauna rescue, noise, refuelling and waste disposal;
- bushfire management plan;
- promoting awareness of significant environmental issues and personnel responsibilities (such as environmentally sensitive areas, limits of construction, identification of exclusion zones, cultural heritage issues etc);
- reporting of environmental incidents - which will include the type of events to be reported, how an event is reported and to whom the event is reported;
- emergency procedures - which will cover the procedure for an emergency and for evacuation of the site in the event of a catastrophic situation arising; and
- contingency plans – for example for ‘hydrocarbon/chemical spills’ and the ‘discovery of previously unidentified aboriginal heritage sites’. Questions pertaining to environment and heritage will be included in the site induction questionnaire to validate employees’ understanding of the induction content.

4.2.2 Environmental Awareness Training

Staff and sub-contractors working on site will be provided with environmental training to achieve a level of awareness and competence appropriate to their assigned activities.

Targeted environmental awareness training will be provided to individuals or groups of workers with a specific authority or responsibility for environmental management or those undertaking an activity with a high risk of environmental impact. This training will generally be prepared and delivered by the Site Environmental Manager. Environmental staff and project environmental specialists may also deliver specific environmental training.

4.2.3 Toolbox Training

A set of toolbox topics will be devised as training a tool for presentation at toolbox meetings to raise awareness of environmental aspects and issues associated with construction projects. Each topic consists of a five-minute information poster/presentation, and discussion session.

Toolbox training will help to ensure that relevant information is communicated to the workforce and that feedback can be provided on issues of interest or concern. Toolbox training will generally be prepared and delivered by the Site Environmental and Quality Manager, Project Engineers or Site Foreman.

Topics covered include erosion and sediment control, dust, waste management, hydrocarbons, flora/fauna, and any other Project-specific issues such as the efficient use of plant and materials; noise and vibration minimisation; protecting waterways and riparian zones; wastewater control; work methods; bushfire management; management of contaminated soil; and general site issues.

4.2.4 Hours of Work

The following hours of work will comply with those in the South Australian EPA Guidelines for Noise from Industry in Regional SA:

- Monday to Saturday 7.00 am to 7.00 pm; and
- Sunday – nil.

5 Checking and Corrective Action

A systematic monitoring and measuring process involving inspection and testing fulfils a threefold purpose to:

- ensure conformity to contractual requirements;
- ensure environmental performance complies with legislative requirements and in accordance with Project requirements; and
- provide an ongoing risk management process and early warnings of hazards.

Environmental monitoring and reporting process on this Project shall include:

- monitoring;
- inspections;
- auditing; and
- reporting.

Project team personnel including the Environment Manager, Site/Project Engineers and Foremen and Site Supervisors, are responsible for undertaking daily monitoring of the Project as well as being involved in formal environmental inspections.

The Environment Manager shall review all sustainability and environmental monitoring results, non-compliance and corrective and preventative actions as they are produced/occur.

Any results outside of relevant limits/targets shall be reported immediately to the Project Manager, who shall take appropriate action and advise appropriate personnel and authorities.

5.1 Internal Inspections/Monitoring

Environmental monitoring programs for water quality, noise, site discharges, as well as matters relating to flora and fauna and heritage, are addressed in sub plans. Additional monitoring may also be required under specific work packages. Each environmental monitoring program includes details on the proposed timing, frequency, locations and responsibility of monitoring and actioning systems so that environmental monitoring information is used to resolve identified problems effectively and quickly. This includes measures for prompt use of monitoring information by Project staff and identification of Project environmental exceedance levels and proposed corrective action and timing to address exceedances.

Further, an Environmental Inspection Checklist will be completed by the Environmental Manager for documenting weekly site inspections for the purpose of verifying compliance with the CEMP, licences, permits and approvals.

Where inspection by the Site Environmental Manager or delegate determines that measures are not effective the Project will implement corrective and preventative measures.

5.2 Control of Measuring and Testing Equipment

All inspection, measuring and testing equipment (including newly acquired test equipment) used for inspection and acceptance purposes shall be controlled, calibrated and maintained, as per the relevant manufacturer's specifications. This also includes such equipment used by sub-contractors.

Measuring equipment for inspection and product conformance purposes shall be calibrated at prescribed intervals against certified equipment having a known relationship to nationally recognised standards. Any equipment identified as having doubtful accuracy or precision shall be removed from use and calibrated. Where any inspection, measuring and test equipment is found to be out of calibration, the validity of the previous inspection results shall be assessed and documented.

5.3 Reporting

The Environment Manager is responsible for reporting on the environmental performance of the Project. All formal reports shall be approved by the Project Manager prior to distribution.

5.3.1 Weekly Environmental Reports

The Environment Manager shall record environmental inspections on the environmental inspection checklist and report any environmental observations, trends, observations, improvements, requests, corrections and upcoming events and activities verbally through the weekly construction meeting.

5.3.2 Monthly Environmental Reports

A written environment report, each month shall be compiled by the Environment Manager and included in the Project monthly reporting containing information such as:

- a status of environmental activities such as monitoring and surveillance of controls, inspections, testing and incidents associated with the work during the preceding month;
- environmental good news stories;
- complaints, infringements and penalties incurred;
- all environmental incidents;
- status of environment implementation and document preparation/approval;
- status of all non-conformances, detailing preventative actions taken to prevent reoccurrence of those incidents/non-conformances; and
- the results of environment reviews and audits (internal and external) undertaken during the preceding month.

5.4 Auditing

5.4.1 Internal Audits and Inspections

Internal audits will be completed within the first three (3) months of start-up and thereafter every six (6) months (as a minimum). An audit report register shall be maintained. Internal environmental audits shall include:

- internal audits to ensure implementation of the Project environmental processes; and
- regular surveillance during the construction phase and ensure independent three-monthly audits.

Results of the audit shall be documented and brought to the attention of the personnel having responsibility for the area audited and reported to the Project Manager within five (5) working days of finalisation of the audit. For any observations or non-compliances found, corrective actions shall be recorded in the Environmental Inspection Checklist and addressed in a timely manner.

5.4.2 External Audits and Inspections

External (independent) audits will be undertaken three (3) months from the commencement of construction and then at twelve monthly intervals. All external audits will be undertaken in accordance with ISO 19011:2003 - Guidelines for Quality and/or Environmental Management Systems Auditing.

Results from external audits are to be reviewed by the Project Manager and any necessary corrective actions assigned to ensure appropriate and timely closeout.

5.5 Incident and Non-Conformity

An incident can be defined as an unwanted event which has an adverse effect on the environment. A non-conformance can be defined as a failure to undertake a task in the required manner. This may not lead to an incident, and if this is the case may be considered a near miss.

The manner in which tasks are required be completed is detailed in various Project plans, legislation, Project quality systems, etc.

The incident register must be completed by parties involved in the incident or non-conformance within 24-hours, once immediate required mitigation actions are completed.

This process must include an investigation or review of the incident to identify any further appropriate corrective actions required. Completed incident report forms must be signed by those documenting the report as well as by the Construction or Operations Manager.

5.6 Implement Corrective Actions

Corrective actions identified in the incident investigation and review should be implemented as soon as practicable, undertaken or overseen by the responsible party as listed in the incident register.

5.7 Complaints

Complaints from any source (for example, public or government authorities) relating to the environment will be registered using a complaint report and the complaint investigated by the Environmental Manager in consultation with the Project Manager and actions will be taken to enable satisfactory closeout.

An environmental complaints register will be established and maintained by the Environmental Manager who will receive, log, track and respond to complaints within 24 hours. In the case of an emergency, potential pollution/environmental incident or non-compliance, the complaint will be responded to immediately.

The following details will be recorded in the register:

- date and time;
- type of communication (telephone, letter, meeting etc);
- name, address, contact number of complainants;
- nature of complaint;
- action taken in response including who the complaint was referred to (if not resolved immediately); and
- details of any monitoring undertaken to confirm that the complaint has been satisfactorily resolved.

5.8 Emergency Preparedness and Response

Appropriate persons should be contacted as soon as practicable following detection of an incident. This includes but is not limited to those listed in the below **table**.

Table 5.8.1 Emergency Contact Details

Contact	Phone Number
Brinkworth Solar Farm Project Supervisor	To be determined
Police	131 444 / 000
CFS	000
Ambulance	000
Wakefield Regional Council	08 8862 0800
Environment Protection Agency	08 8204 2004
Wildlife SA	TBC

5.9 Document of Records

Project records, including pertinent subcontractor Project records, shall be maintained to provide evidence of the effective operation of the environmental management system. Such records shall include, but are not limited to:

- correspondence to/from interested parties;
- permits, licenses and approvals;
- induction register and induction training records;
- environmental incidents, non-conformances and complaints;
- inspection reports, checklists, diary entries;
- monitoring results;
- cultural heritage activities;
- waste measurement and tracking records;
- internal and external inspections and audits; and
- any other record identified within the CEMP.

6 Review and Continuous Improvement

This CEMP shall be reviewed every six (6) months or in response to a major environmental incident by the Environment Manager with assistance from the project team. It shall be updated accordingly, and any changes to it shall be communicated to the project team and maintained in a document control register. If any of these changes are to impact the construction staff, they shall be informed of the relevant changes during a toolbox talk.

akaysha

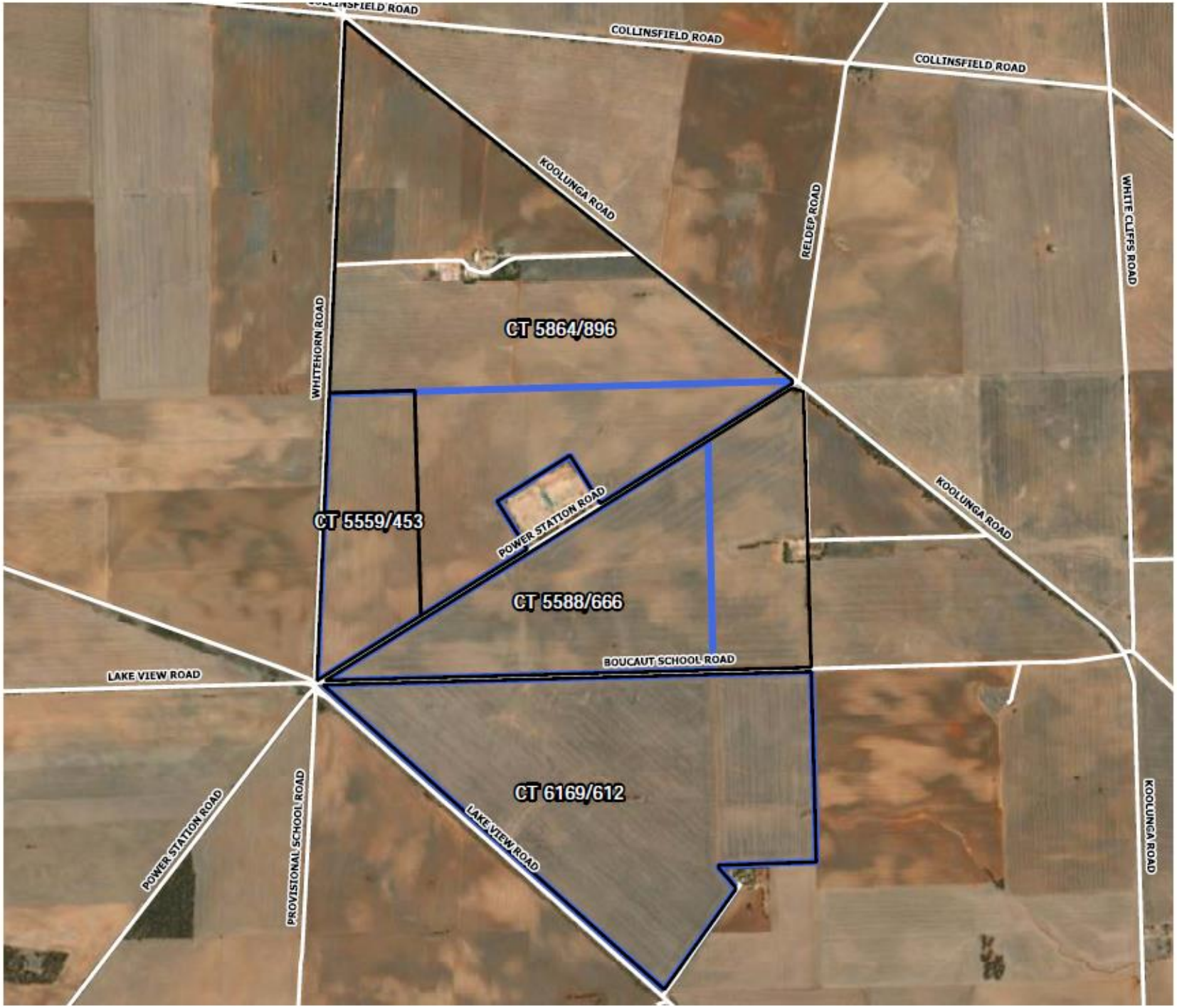
Contact:

For more information please contact us today via

1800 959 553

www.akayshaenergy.com.au

info@brinkworthsolarbess.com.au



Subject land

Subject land

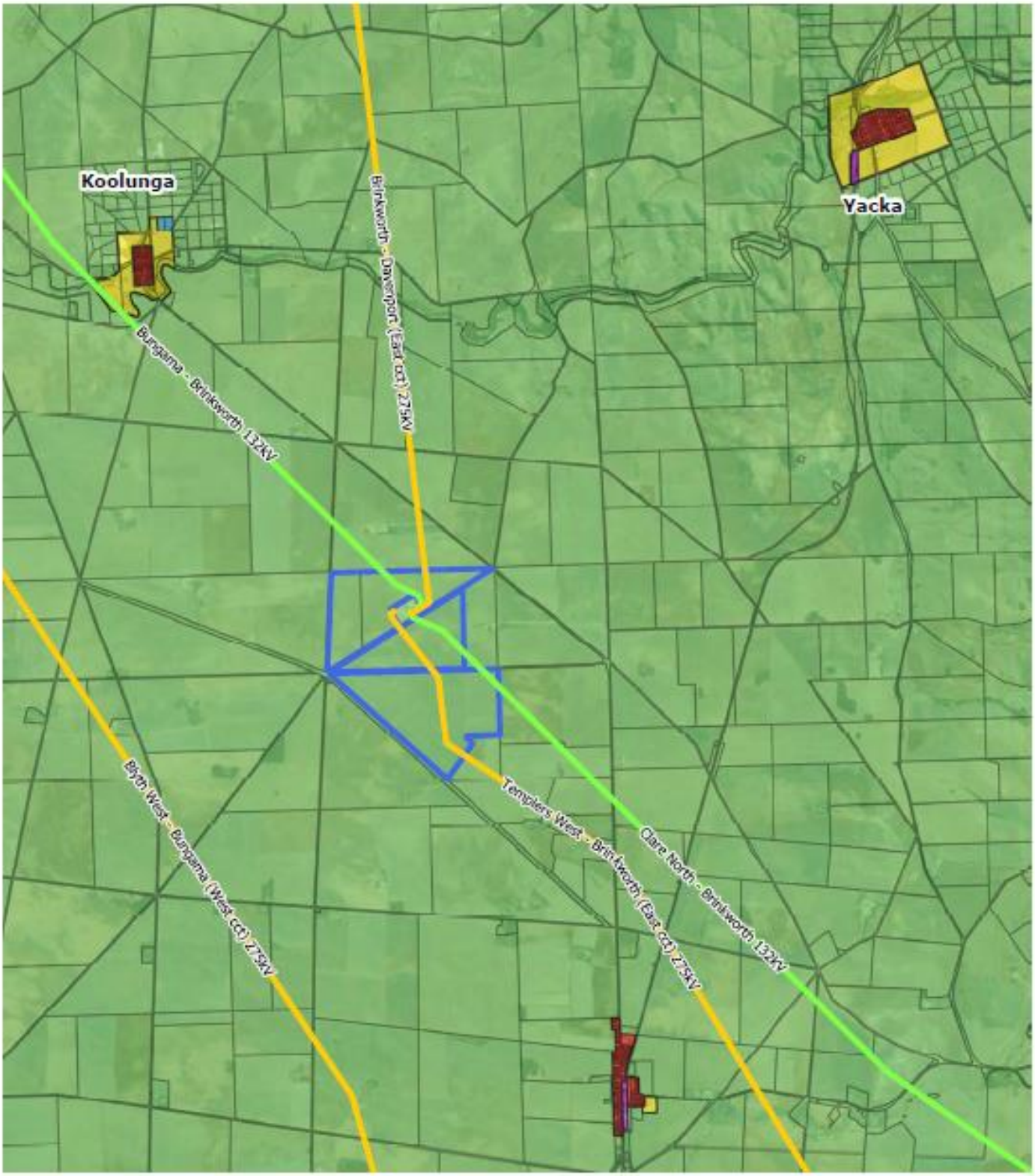
Parcels

Road

Ref: DWG 038 A.1
Author: J. Mourier
Date created: 9.10.2023
Datum: GDA20 / MGA zone 54

850 m

WIND PROSPECT



Land Use Zones

Planning and Design (P&D) Zones:

- Community Facilities
- Employment (Bulk Handling)
- Rural
- Rural Living
- Township

- Project site boundary
- Parcels
- 132 kV transmission line
- 275 kV transmission line

Ref: DWG 031 A.2
Author: J. Mourier
Date created: 4.10.2023
Datum: GDA20 / MGA zone 54

2,500 m

WIND PROSPECT

File Note 11/07/24

Lee Webb
Senior Specialist Environmental Planner, DIT
lee.webb@sa.gov.au

Hi Lee,

The native vegetation impacts relating the proposed development are assessed as a level 2 risk in the data report provided. In context the clearance is relatively minor and appears to be unavoidable to provide access to the Battery Energy Storage System site.

The proponent lodged an application directly to the Native Vegetation Council on 31/5/24. The application is yet to be processed.

Regards

Peter Farmer

Native Vegetation Officer – Assessments and Compliance
Native Vegetation Branch | Native Vegetation, Pastoral Land Management and Landscape Services Division
Department for Environment and Water

WAKEFIELD
REGIONAL COUNCIL

The Minister for Planning
GPO Box 11032
Adelaide SA 5001

26 July 2024

Development Application Referral Response- Regulation 23(2)(b)

Development Application Number	**24016679**
Applicant	**Brinkworth Solar Farm Pty Ltd**
Location	**Lot 256w Power Station Rd Brinkworth**
Proposal	**Solar Farm and Battery storage system - 209 MWp and electrical substation**

Council has reviewed the proposed development application 24016679 for the utility-scale solar farm and battery energy storage system.

Power Station Road from Koolunga Road to the existing power station entrance has only been constructed to support services vehicles and the occasional seasonal heavy vehicles. As Power Station Road is proposed for access to the sight, this section may require re-sheeting due to the increase in traffic, particularly heavy vehicles during construction.

The Wakefield Regional Council supports the proposed development subject to the following:

1. Details the road construction and re-sheeting of Power Station Road and details of the source of the incoming road base used to construct the proposed internal road network, to be provided to Council prior to commencement of construction.

Kind regards

Maxine Freeman
Planning Officer

Scotland Place | PO Box 167
Balaklava SA 5461

Ph 08 8862 0800
Fx 08 8862 1115

admin@wrc.sa.gov.au
www.wrc.sa.gov.au

Webb, Lee (DHUD)

From: DHUD:SPC Reps
Sent: Monday, 2 September 2024 10:04 AM
To: Webb, Lee (DHUD)
Subject: FW: Feedback submitted for Major Development
Attachments: Miskelly_-_Storage_Requirements_for_100-percent_Renewables_05-03-2025.pdf; 91940803-BD4E-407F-86F5-566EB14A70B4.jpeg; A371605F-8259-4C28-BAC3-A8E18AB00A88.jpeg; CBEFCB12-2C9B-403D-BB3D-65C60BB7BBBE.jpeg; 5107C1F5-F46E-4709-B46D-EA9DDBAE06D0.jpeg

OFFICIAL

Hi Lee
Please find below representation from Lynette LaBlack. This is 1 of 4 emails. I have the PDF of each and will put in Knet (if I find the folder). Won't forward them to you now since you are not here and don't want to clog your inbox, if you need them let me know and I'll forward them when you are back. Also have a spreadsheet with the representations we have received.

Regards
Edna

State Planning Commission - Representations
Planning and Land Use Services
Department for Housing and Urban Development
T 1800 752 664 • **E** spcapplications@sa.gov.au
Level 10, 83 Pirie Street, Adelaide SA 5000 • PO Box 1815, Adelaide SA 5001

From: PlanSA - Submissions <noreply@plan.sa.gov.au>
Sent: Sunday, September 1, 2024 5:15 PM
To: DHUD:SPC Reps <spcreps@sa.gov.au>
Subject: Feedback submitted for Major Development

Form Information

Site Name	PlanSA
Site Id	578867

Page Standard Name	Impact assessed and Crown development submissions
Page Standard Id	921477
Url	https://plan.sa.gov.au/have_your_say/notified_developments/state_developments/major_proje
Submission Id	1401183
Submission Time	01 Sep 2024 5:14 pm
Submission IP Address	120.18.208.149

Development Details

Applicant:	Department for Energy and Mining Brinkworth Solar Farm
Development Number:	24016679
Nature of Development:	Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Subject Land:	**Lot 256W Power Station Road, Brinkworth (SE256W in H230400 - CT 5559/453); Lot 102 Lake View Road, Brinkworth (AL102 in D27337 - CT 6169/612); 873 Koolunga Road, Koolunga (AL96 in F199935 - CT 5864/896) and 653 Koolunga Road, Koolunga (SE257 in H230400 - CT 5588/666).** Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Contact Officer:	Lee Webb
Phone Number:	(08) 7133 2379
Close Date:	04 Sep 2024

Contact Details

Name:	Lynette LaBlack
Contact number:	0432942700
Email:	lynettelablack@live.com
Postal address:	23 Eastlake Drive, Lake Albert, 2650
Affected property:	

Submission Details

I am:	other
I am - Other:	Community Environmental Save Our Surroundings Riverina & Rational Energy Network
My position is:	I oppose the development
Do you have concerns regarding the proposed development?:	I Object to the 209MW Brinkworth Solar Electricity Generating Works - Development Number: 24016679 for the following reasons:- 1.Public Health & Safety Risk - Land/Water Contaminating, Increased Toxic Fire Risk. 2.Public not informed of the serious, long term & continuous effects of these large-scale industrial developments. 3.These projects are NOT reversible as claimed by the proponent. 4.Removal of vegetation & pollution of the area which will not be able to be rectified on the retirement of the site from the proposal. 5.Lacks or shows limited consideration of the local micro-climate - creates Heat Island Effect. 6.The proposed change from rural to industrial is a destructive land use. 7.The proposal will result in fragmentation of the local landscape & limit land-use options. 8.No bond is proposed, which will lead to residual industrial waste polluting the landscape forever. 9.Likely toxic hazard not discussed in the proposal, nor any minor reference. 10.Does the proposal abide by the Commonwealth Modern Slavery Act (2018) in the construction of the panels & the mining of materials for construction. 11.Is the Development a National Security Risk, reliant on our most Hostlie Enemy, subject to the CCP's National Intelligence Law, with Chinese Inverters able to be remotely disabled? 12.Unobtainable Public Liability Insurance for Neighbour Victims. 13.Reliant on Intensive Embedded Energy, Increasing SF6 Emissions, Contaminating/Polluting Life Cycle & Massive Toxic Waste Burden. 14.No Social Licence Sought or Granted by the Public at Large or Locally.
What could be done to address your concerns?:	Abide by all the Principles of Ecologically Sustainable Development - Independently & Reputably Determine the Contamination Risks - Apply the Precautionary Principle & Reject this proposal as the Environmental Harm is too great & irreversible. Dump this Pathetic, Unreliable, Weather Dependent, Insecure, Fake Green, Energy Poverty, Industrialised Solar plan & construct Reliable, Efficient, Affordable, Secure, 24/7 Australian USC/HELE Coal Fired Power Stations & a Clean, Safe Nuclear Power future instead - NO Transmission Interconnector Nightmare needed.
Other general comments:	Intermittent, Weather Dependent, Industrialised Solar/Wind/BESS DEFY the Objectives of National Electricity Law with respect to price, quality, safety, reliability & security of supply of electricity & the reliability, safety & security of the national electricity system. *AEMO CEO Must Be Sacked For Failing To Ensure Affordable, Secure And Reliable Energy Supply - 15th Dec 2023 https://ipa.org.au/ipa-today/aemo-ceo-must-be-sacked-for-failing-to-ensure-affordable-secure-and-reliable-energy-supply Australians need affordable and reliable energy, not a regulator advocating for ideologically based outcomes that will undermine our energy security." "The current situation Australia finds itself in with record and rising energy bills, forecast blackouts, and an increasingly unreliable energy grid, are all core features of the policy of net zero emissions. It is all pain for no environmental gain," said Mr Wild.
PresentInPerson:	I wish to be heard in support of my representation

NominatedSpeaker: NREN (National Rational Energy Network) Chair Grant Piper

Supporting Documents

FilesUp: Miskelly_-_Storage_Requirements_for_100-percent_Renewables_05-03-2025.pdf, type application/pdf, 102.0 KB

FilesUp: 91940803-BD4E-407F-86F5-566EB14A70B4.jpeg, type image/jpeg, 215.4 KB

FilesUp: A371605F-8259-4C28-BAC3-A8E18AB00A88.jpeg, type image/jpeg, 5.1 MB

FilesUp: CBEFCB12-2C9B-403D-BB3D-65C60BB7BBBE.jpeg, type image/jpeg, 431.9 KB

FilesUp: 5107C1F5-F46E-4709-B46D-EA9DDBAE06D0.jpeg, type image/jpeg, 140.7 KB

Webb, Lee (DHUD)

From: DHUD:SPC Reps
Sent: Monday, 2 September 2024 12:42 PM
To: Webb, Lee (DHUD)
Subject: FW: Feedback submitted for Major Development

OFFICIAL

Hi Lee
Please find below representation from Damian Welke.

Regards

State Planning Commission - Representations
Planning and Land Use Services
Department for Housing and Urban Development
T 1800 752 664 • **E** spcapplications@sa.gov.au
Level 10, 83 Pirie Street, Adelaide SA 5000 • PO Box 1815, Adelaide SA 5001

From: PlanSA - Submissions <noreply@plan.sa.gov.au>
Sent: Monday, September 2, 2024 12:37 PM
To: DHUD:SPC Reps <spcreps@sa.gov.au>
Subject: Feedback submitted for Major Development

Form Information

Site Name	PlanSA
Site Id	578867
Page Standard Name	Impact assessed and Crown development submissions
Page Standard Id	921477
Url	https://plan.sa.gov.au/have_your_say/notified_developments/state_developments/major_proje
Submission Id	1401308

Submission 02 Sep 2024 12:37 pm
Time

Submission 3.26.195.39
IP Address

Development Details

Applicant:	Department for Energy and Mining Brinkworth Solar Farm
Development Number:	24016679
Nature of Development:	Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Subject Land:	**Lot 256W Power Station Road, Brinkworth (SE256W in H230400 - CT 5559/453); Lot 102 Lake View Road, Brinkworth (AL102 in D27337 - CT 6169/612); 873 Koolunga Road, Koolunga (AL96 in F199935 - CT 5864/896) and 653 Koolunga Road, Koolunga (SE257 in H230400 - CT 5588/666).** Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Contact Officer:	Lee Webb
Phone Number:	(08) 7133 2379
Close Date:	04 Sep 2024

Contact Details

Name:	Damian Welke
Contact number:	0459709649
Email:	Damoswelke92@outlook.com
Postal address:	1461 Lake view road
Affected property:	

Submission Details

I am:	an occupier of local property
I am - Other:	
My position is:	I oppose the development
Do you have concerns regarding the proposed development?:	The concern I have with the solar farm going up is how close it is to Lot 101. A concern with this solar farm is during summer what's going to happen is that the heat reflected from the panels is going to increase the heat of the property. Especially since there are animals on that

	property what's going to happen to there well being as it already gets hot during summer.
What could be done to address your concerns?:	Something that could be done is the solar farm could be moved 5-10km to the west out in open land and nothing but salt bush grow and no one is going to get effected by the solar farm.
Other general comments:	Have any of the Big bosses actually come out here to see where the solar farm is going up and see the effects its going to have on Lot 101, Also when this project was in planning even before when they met with the farmers did they meet with the farmer who lives on Lot 101 as him and his family will be effect the most by this solar farm as it surrounds most of the property.
PresentInPerson:	I do not wish to be heard in support of my representation
NominatedSpeaker:	

Supporting Documents

FilesUp: No file uploaded
FilesUp: No file uploaded
FilesUp: No file uploaded
FilesUp: No file uploaded
FilesUp: No file uploaded

Webb, Lee (DHUD)

From: DHUD:SPC Reps
Sent: Monday, 2 September 2024 9:57 AM
To: Webb, Lee (DHUD)
Subject: FW: Feedback submitted for Major Development

OFFICIAL

Hi Lee
Please find below representation from Sharon Welke

Regards

State Planning Commission - Representations
Planning and Land Use Services
Department for Housing and Urban Development
T 1800 752 664 • **E** spcapplications@sa.gov.au
Level 10, 83 Pirie Street, Adelaide SA 5000 • PO Box 1815, Adelaide SA 5001

The Department for Housing and Urban Development acknowledges First Nation people as the Traditional Owners of South Australian land and waters and we extend our respect to Elders past, present and emerging. We value and recognise the ongoing cultural heritage, beliefs and relationship First Nations peoples have with these lands and waters and the continuing importance of this today.

From: PlanSA - Submissions <noreply@plan.sa.gov.au>
Sent: Sunday, September 1, 2024 4:20 PM
To: DHUD:SPC Reps <spcreps@sa.gov.au>
Subject: Feedback submitted for Major Development

Form Information

Site Name	PlanSA
Site Id	578867
Page Standard Name	Impact assessed and Crown development submissions
Page Standard Id	921477
Url	https://plan.sa.gov.au/have_your_say/notified_developments/state_developments/major_proje
Submission Id	1401173

Submission 01 Sep 2024 4:19 pm
Time

Submission 3.25.59.59
IP Address

Development Details

Applicant:	Department for Energy and Mining Brinkworth Solar Farm
Development Number:	24016679
Nature of Development:	Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Subject Land:	**Lot 256W Power Station Road, Brinkworth (SE256W in H230400 - CT 5559/453); Lot 102 Lake View Road, Brinkworth (AL102 in D27337 - CT 6169/612); 873 Koolunga Road, Koolunga (AL96 in F199935 - CT 5864/896) and 653 Koolunga Road, Koolunga (SE257 in H230400 - CT 5588/666).** Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Contact Officer:	Lee Webb
Phone Number:	(08) 7133 2379
Close Date:	04 Sep 2024

Contact Details

Name:	Sharon Welke
Contact number:	0428462093
Email:	S.S.Welke63@outlook.com
Postal address:	1461 Lake View Road, BRINKWORTH SA 5464
Affected property:	

Submission Details

I am:	an owner of local property
I am - Other:	
My position is:	I oppose the development
Do you have concerns regarding the proposed development?:	What is the ongoing environmental impact to the surrounding properties directly along the boundary lines of the solar farm. What are the ongoing health issues for people living in close proximity also to the farm. Our property is right on the boundary line of proposed farm yet at no time were we informed of the proposal till it was opened for

	"Community Discussion". We have had a few discussions with people involved but still feel like we are being left in the dark. WE are affected with panels being on 2/3 of our boundary line so surrounding our actual living area though they have agreed to move the panels back from 20 metres from our front and 50 metres at the back door to approx 100mts away I wonder about on going health issues. Also we are looking at the future and retirement with the possibility of selling to move but now how much will our property be devalued. Prospective owners will not want to live with panels in their face either. Unless the company is prepare to buy us out we are going to be out substantial money and our retirement is going to not be as we have already started planning. We are already looking at down the track suing for compensation for the devaluation of our land and the money that we have lost due to the solar farm not only the company but said neighbours for leasing land.
What could be done to address your concerns?:	There is a salt bush land which is not crop worthy and no close housing approximately 6 km's from proposed site that could have been used for development. Earlier discussion could have been done to address concerns but that horse has bolted and to late to shut the gate. Make a reasonable offer to buy us out
Other general comments:	The community is not going to object I feel as they will be getting a monetary gain incentive to allow this to go ahead and in these times football cricket clubs etc will not be biting the proverbial hand when it is extended with money on it. The stress and anxiety it is creating in our house due to massive uncertainty is disruptive at times. This is then followed by the feelings of absolute defeat with the knowledge that even though we have put all this down it will more than likely be going ahead. WE live on a property that my husband has lived on his entire life with views we have grown to love but now the view you are about put before us is going to be black and shiny
PresentInPerson:	I do not wish to be heard in support of my representation
NominatedSpeaker:	

Supporting Documents

FilesUp: No file uploaded
FilesUp: No file uploaded
FilesUp: No file uploaded
FilesUp: No file uploaded
FilesUp: No file uploaded

Webb, Lee (DHUD)

From: DHUD:SPC Reps
Sent: Monday, 2 September 2024 9:51 AM
To: Webb, Lee (DHUD)
Subject: FW: Feedback submitted for Major Development

OFFICIAL

Hi Lee
Please find below representation from Steven Welke

Regards

State Planning Commission - Representations
Planning and Land Use Services
Department for Housing and Urban Development
T 1800 752 664 • **E** spcapplications@sa.gov.au
Level 10, 83 Pirie Street, Adelaide SA 5000 • PO Box 1815, Adelaide SA 5001

The Department for Housing and Urban Development acknowledges First Nation people as the Traditional Owners of South Australian land and waters and we extend our respect to Elders past, present and emerging. We value and recognise the ongoing cultural heritage, beliefs and relationship First Nations peoples have with these lands and waters and the continuing importance of this today.

From: PlanSA - Submissions <noreply@plan.sa.gov.au>
Sent: Sunday, September 1, 2024 2:56 PM
To: DHUD:SPC Reps <spcreps@sa.gov.au>
Subject: Feedback submitted for Major Development

Form Information

Site Name	PlanSA
Site Id	578867
Page Standard Name	Impact assessed and Crown development submissions
Page Standard Id	921477
Url	https://plan.sa.gov.au/have_your_say/notified_developments/state_developments/major_proje
Submission Id	1401163

Submission 01 Sep 2024 2:55 pm
Time

Submission 3.25.59.59
IP Address

Development Details

Applicant:	Department for Energy and Mining Brinkworth Solar Farm
Development Number:	24016679
Nature of Development:	Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Subject Land:	**Lot 256W Power Station Road, Brinkworth (SE256W in H230400 - CT 5559/453); Lot 102 Lake View Road, Brinkworth (AL102 in D27337 - CT 6169/612); 873 Koolunga Road, Koolunga (AL96 in F199935 - CT 5864/896) and 653 Koolunga Road, Koolunga (SE257 in H230400 - CT 5588/666).** Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Contact Officer:	Lee Webb
Phone Number:	(08) 7133 2379
Close Date:	04 Sep 2024

Contact Details

Name:	STEVEN L WELKE
Contact number:	0428840017
Email:	S.S.Welke63@outlook.com
Postal address:	1461 Lake View Road, BRINKWORTH SA 5464
Affected property:	

Submission Details

I am:	an owner of local property
I am - Other:	
My position is:	I oppose the development
Do you have concerns regarding the proposed development?:	I live right by the proposed solar farm site.::SECTION 261 HUNDRED OF BOUAUCT Lot 101 :: The panels are to be within 70 metres from our house. I have lived here for 60 years and my parents longer than that. Putting Solar panel on good cropping land, where as 6 kms due west of the sub station there is all salt bush useless land they can be built on.

	There are no houses and sheds in this area. I pointed it out to Michael Sale and they just ignored my input. The heat that will come off these panels will make our resident at least 10 degrees hotter when we get a westerly wind. The impact on the movement of air to create rain will be reduced, like to see a study done before any thing is built. The value of our property will be reduced dramatically. The owner of this land knew 12 months before we were notified. The local council has never been in contact with me.
What could be done to address your concerns?:	The BIG Bosses of this company to come over and meet with the resident who are against this proposal. Give me a figure to buy our property and use the house as a managers property. The company sends people over for community meetings who don't really under stand where the site and panel are placed. They have never gone off the bitumen road, I know this when spoken to them and their cars have no dust on them. Government members to meet with us as well. It seems that this proposal is being pushed under the radar quickly before proper studies are done.
Other general comments:	Our family is the only house in the firing line of the solar farm. The company is putting grant money out to the community's effected, the way I see it, is hush money, buy their votes. I see there are no panel going over the fence line into the Port Pirie council area. This boundary would be approximately 200 meters North from the sub station. (WHY IS THAT ?) May be put a Nuclear power station close to the major cities of Australia, as we have uranium in our back door at Roxby Downs. The principle is the same as here.
PresentInPerson:	I wish to be heard in support of my representation
NominatedSpeaker:	Steven Welke

Supporting Documents

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Webb, Lee (DHUD)

From: DHUD:SPC Reps
Sent: Monday, 2 September 2024 9:54 AM
To: Webb, Lee (DHUD)
Subject: FW: Feedback submitted for Major Development

OFFICIAL

Hi Lee
Please find Representation from Tamara Welke

Regards

State Planning Commission - Representations
Planning and Land Use Services
Department for Housing and Urban Development
T 1800 752 664 • **E** spcapplications@sa.gov.au
Level 10, 83 Pirie Street, Adelaide SA 5000 • PO Box 1815, Adelaide SA 5001

From: PlanSA - Submissions <noreply@plan.sa.gov.au>
Sent: Sunday, September 1, 2024 3:42 PM
To: DHUD:SPC Reps <spcreps@sa.gov.au>
Subject: Feedback submitted for Major Development

Form Information

Site Name	PlanSA
Site Id	578867
Page Standard Name	Impact assessed and Crown development submissions
Page Standard Id	921477
Url	https://plan.sa.gov.au/have_your_say/notified_developments/state_developments/major_proje
Submission Id	1401169

Submission 01 Sep 2024 3:41 pm
Time

Submission 3.25.59.59
IP Address

Development Details

Applicant:	Department for Energy and Mining Brinkworth Solar Farm
Development Number:	24016679
Nature of Development:	Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Subject Land:	**Lot 256W Power Station Road, Brinkworth (SE256W in H230400 - CT 5559/453); Lot 102 Lake View Road, Brinkworth (AL102 in D27337 - CT 6169/612); 873 Koolunga Road, Koolunga (AL96 in F199935 - CT 5864/896) and 653 Koolunga Road, Koolunga (SE257 in H230400 - CT 5588/666).** Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Contact Officer:	Lee Webb
Phone Number:	(08) 7133 2379
Close Date:	04 Sep 2024

Contact Details

Name:	Tamara Welke
Contact number:	0419856131
Email:	welks_93@hotmail.com
Postal address:	PO Box 83 Brinkworth
Affected property:	1461 Lake View Road Brinkworth

Submission Details

I am:	an occupier of local property
I am - Other:	
My position is:	I oppose the development
Do you have concerns regarding the proposed development?:	I do, there is a chance of long term health concerns with solar farms and as this is project plans to put the solar farm in front of my parents house and surrounding land it was not thought through very well. There is a very good chance that the solar farm will decrease the value of my

	parents property as no one wants to live next to project like the one proposed.
What could be done to address your concerns?:	This should of been thought through better before putting it into the development stage. There is land further up from the power station that would be better suited as it is not in front of anyone's house and is just scrub land so would not be a bother to anyone.
Other general comments:	With a potential decrease in land value there could be a chance of taking this to court if anyone wishes to do so. This should of been brought to the attention of my parents well before this stage as it does directly affect them and their livelihoods rather than just the owners of the land in which it will be on as it is NOT in front of their house.
PresentInPerson:	I do not wish to be heard in support of my representation
NominatedSpeaker:	

Supporting Documents

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FilesUp: No file uploaded

Webb, Lee (DHUD)

From: DHUD:SPC Reps
Sent: Monday, 2 September 2024 9:32 AM
To: Webb, Lee (DHUD)
Subject: FW: Feedback submitted for Major Development

OFFICIAL

Hello Lee
Please find below a representation from Andrew Whitehorn for DA 24016679

Kind regards
Edna

State Planning Commission - Representations
Planning and Land Use Services
Department for Housing and Urban Development
T 1800 752 664 • **E** spcapplications@sa.gov.au
Level 10, 83 Pirie Street, Adelaide SA 5000 • PO Box 1815, Adelaide SA 5001

From: PlanSA - Submissions <noreply@plan.sa.gov.au>
Sent: Friday, August 30, 2024 6:02 PM
To: DHUD:SPC Reps <spcreps@sa.gov.au>
Subject: Feedback submitted for Major Development

Form Information

Site Name	PlanSA
Site Id	578867
Page Standard Name	Impact assessed and Crown development submissions
Page Standard Id	921477
Url	https://plan.sa.gov.au/have_your_say/notified_developments/state_developments/major_proje

Submission 1400967
Id

Submission 30 Aug 2024 6:01 pm
Time

Submission 49.183.147.228
IP Address

Development Details

Applicant:	Department for Energy and Mining Brinkworth Solar Farm
Development Number:	24016679
Nature of Development:	Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Subject Land:	**Lot 256W Power Station Road, Brinkworth (SE256W in H230400 - CT 5559/453); Lot 102 Lake View Road, Brinkworth (AL102 in D27337 - CT 6169/612); 873 Koolunga Road, Koolunga (AL96 in F199935 - CT 5864/896) and 653 Koolunga Road, Koolunga (SE257 in H230400 - CT 5588/666).** Construction of a 209MW capacity solar farm, on-site substations / switchyards, an operations & maintenance compound (including staff offices and amenities), ancillary infrastructure and an overhead transmission line connection to the adjacent Brinkworth Substation.
Contact Officer:	Lee Webb
Phone Number:	(08) 7133 2379
Close Date:	04 Sep 2024

Contact Details

Name:	Andrew Whitehorn
Contact number:	0417824055
Email:	ajwhitehorn5464@gmail.com
Postal address:	P.O. Box 29 Koolunga 5454
Affected property:	1694 churches rd Brinkworth

Submission Details

I am:	an owner of local property
I am - Other:	
My position is:	I oppose the development

Do you have concerns regarding the proposed development?:	The development of the Brinkworth solar farm that's proposed I regard to be being placed in expensive farming land and a poor use of highly productive land . I believe the size of this proposal could well be placed in country that doesn't affect local communities, houses and potentially the effect of weather changes caused by such a large reflective areas of panels . The batteries I believe that are being placed are to close to dwellings and excessive noise from these batteries will be heard from neighbouring land owners . The risks of fire in our area could well be increased and with a dwindling local support of the country fire service the assets surrounding will not be able to be protected . Increased traffic in construction and completion will increase the depleting road network that is as locals will travel on afterwards.
What could be done to address your concerns?:	Firstly communication from the company has been extremely poor in regards to neighbouring land owners . The staff that were at the last town consultation I found extremely unhelpful and didn't address the concerns of the locals . In fact we felt insulted that the project that is as far in as it is for planning they could not answer the most simplest of questions . Poor form of the company .
Other general comments:	Although I do support renewable energy a proposal of such a large solar farm in our community and further more the batteries is ludicrous and should be placed in areas of no close dwellings and not in such view of the public . Our local communities will stand to have very little benefit out of this proposal with all products will be bought in from external sources and people working will be staying in towns further away . I don't believe many positions of employment would be available as the company will require specialty people for construction. These proposals in small communities of such structures will divide people within the community this will be of no concerns of the company or investors and when completed will leave and the damage will be done .
PresentInPerson:	I wish to be heard in support of my representation
NominatedSpeaker:	Andrew Whitehorn

Supporting Documents

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7

Webb, Lee (DHUD)

From: DHUD:SPC Reps
Sent: Thursday, 5 September 2024 9:30 AM
To: Webb, Lee (DHUD)
Subject: FW: Development number 24016679
Attachments: IMG_20240904_0001.pdf

OFFICIAL

Hi Lee
Please find attached representation from Fred Whitehorn for Brinkworth development.

Regards
Edna

State Planning Commission - Representations Planning and Land Use Services Department for Housing and Urban Development T 1800 752 664 • E spcapplications@sa.gov.au Level 10, 83 Pirie Street, Adelaide SA 5000 • PO Box 1815, Adelaide SA 5001

The Department for Housing and Urban Development acknowledges First Nation people as the Traditional Owners of South Australian land and waters and we extend our respect to Elders past, present and emerging. We value and recognise the ongoing cultural heritage, beliefs and relationship First Nations peoples have with these lands and waters and the continuing importance of this today.

-----Original Message-----
From: fredanne42@gmail.com <fredanne42@gmail.com>
Sent: Wednesday, September 4, 2024 2:56 PM
To: DHUD:SPC Reps <spcreps@sa.gov.au>
Subject: Development number 24016679

TO Whom it may concern

I write this submission to object to the proposed Brinkworth Solar Farm Development number 24016679.

I object to the fact that this proposal has got this far prior to any adjoining landholders or community members being made aware of the area involved 474 Hectares, I believe that is an insult to the people concerned that no real public consultation has been made available, only a very poorly advertised and convened by company representatives who really could not answer questions put to them, these meetings were held on the 27th August giving only one week for submissions.

There doesn't appear to the being any actual environmental studies done as to what effects this may have to the immediate and adjacent farming land.

There are so many questions that need answers.

What effect does this area 474 hectares of heat reflecting material have on the climate.

Rainfall, Temperature.{ We have global warming] will this have a local effect?

When this land at the end of the lifespan of this solar farm, will it still be suitable as food producing land or will it be so heavily polluted from silicon and cadmium and soil sterilant found in these products be useless for future generations?

The only environmental information available talks about native vegetation, as a third-generation occupier of adjoining land I can say without contradiction that there Is no native vegetation on the area concerned and hasn't been for the last three generations, so the environmental study provided and stated on information provided recently has no meaning whatsoever.

If this proposal is allowed to proceed without further consultation with those concerned about its long-term effect on the environment and overall advantages to our district that we live in, not the people that promote these schemes who will undoubtably make a lot of money and walk away.

I write this submission as an older resident of the area, third generation with fourth generation now in residence and wonder whether if this sort of development will put to an end to food producing in this district with changing climate. I DON'T KNOW DO YOU?

TIME FOR MORE STUDIES BEFORE ITS TO LATE

Yours Sincerely

Fred Whitehorn

0407619832

fredanne42@gmail.com

8

Webb, Lee (DHUD)

From: DHUD:SPC Reps
Sent: Thursday, 5 September 2024 9:37 AM
To: Webb, Lee (DHUD)
Subject: FW: Cease and Desist a Solar Farm Immediately. Put Brinkworth SF On Rooftops ONLY

OFFICIAL

Hi Lee
Please find below email #1 from Ali about Brinkworth development.
Regards

Edna

State Planning Commission - Representations
Planning and Land Use Services
Department for Housing and Urban Development
T 1800 752 664 • **E** spcapplications@sa.gov.au
Level 10, 83 Pirie Street, Adelaide SA 5000 • PO Box 1815, Adelaide SA 5001

From: Ali <platypus4841@gmail.com>
Sent: Wednesday, September 4, 2024 4:17 PM
To: DHUD:SPC Reps <spcreps@sa.gov.au>
Subject: Cease and Desist a Solar Farm Immediately. Put Brinkworth SF On Rooftops ONLY

Brinkworth Battery Energy Storage System (BESS) and **Solar Farm**. Ownership: Blackrock / Akaysha Energy Cease and Desist Immediately Now. Put it On Rooftops ONLY I Demsnd I Demand I Demand.

Put ALL SOLAR PANELS On ROOFTOPS ONLY and Get Them OFF Our Our Our Farmlands. Understand ? Obviously you are Not a Farmer protesting Renewables On Country On Farmlands In Wilderness In Oceans, when Renewables CAN be On ROOFTOPS ONLY and VERY LOW COST, yes, yes, yes, yes, in ways 48, yes, 48.

Harm and Loss to Environment All On Country Environment is on Your hands, you in sa.gov.au, Complicit in Net Zero SCAM Unlike any other so far offered by gov.au-multinationals-global.

https://www.afr.com/companies/energy/wild-winds-blow-up-solar-farm-profits-20240902-p5k73w

2 days ago: Almost 80 per cent of NSW **solar farm** output was turned off on Sunday to avoid losses as prices plunged due to oversupply amid plentiful rooftop **solar** and wind power.

Well Well Well. We CAN be On Rooftops ONLY with Renewables Please. Right NOW please. Or You You You in gov.au Are Complicit in Harm and Loss to Environment All On Country Environment Farmlands, communities, and of course Future Generations coming into 500 years from Now, and doing what On Country On Farmlands devastated by Money Talks, when a Lie is followed by governments worldwide, owned by hmmm ? We know now. Robert F Kennedy jnr told us yesterday. He's running for President you know. Hope he Wins. That will be a Good Choice for Life Planetary under Threat Unlike Ever before from Net Zero, the Greatest Scam So Far offered by gov.au-multinationals-global, Correct.

Solar farm owners in south-eastern states are switching off their plants to protect their profits as extreme winds, abundant rooftop solar generation and low demand from customers enjoying the warm start to spring create an oversupply of power.

Jesus Christ. How do you Get Away with it, sa.gov.au? I Demand a International Inquiry into, hmmm, Renewables for a Start, and Net Zero OF Course.

https://windprospect.com.au/solar-projects/

Brinkworth Battery Energy Storage System (BESS) and **Solar Farm**. Ownership: Blackrock / Akaysha Energy ...

Well we Know about BlackRock now. I Demand an International Inquiry Immediately Now because our government is supporting Harm and Loss to All On Country Environment, All On Country Environment, for NO reason but Profit, sadly, Yes, Sadly.

Wind Prospect respectfully acknowledges the Traditional Owners of the land on which our office and each of our projects are located. We also acknowledge and uphold their continuing relationship to the land and pay our respect to their Elders past, present and emerging.

What a Load of Crap. How Do you Get Away with it I want to know. No such thing as "Owners". No such thing.

I Demand a International Inquiry into False Statements offered on Websites - Company websites - Complicit in Harm and Loss to Environment All On Country Environment for No reason but Profit.

God Is In The Land you see. God Is.

Is. Is Is Is. Always Has Been. Will be. Will it ? How Dare You give this company Access to Australia.

Wind Prospect is an independently-owned renewable energy project developer and service provider for the global renewable energy market.

The Wind Prospect Group's current operational portfolio includes Wind Prospect Pty Ltd and its subsidiary Wind Prospect WA Pty Ltd in Australia, WP Renewables Ltd in Malta, and their associated projects & project companies described elsewhere in this website.

From initial site feasibility to stakeholder management, Wind Prospect's team of experts has supported developers, investors, funders, and owners for more than 2 decades. Wind Prospect's multidisciplinary team has unsurpassed practical experience across all core renewable energy technologies, including Onshore Wind, Solar and battery technology.

It means RUBBISH. Words words words written by someone wanting something and why Can't THEY PUT THEM ALL ON ROOFTOPS ONLY, THE SOLAR PROJECTS, ALL OF THEM !!!.

• The AGL Energy share price is trading 2.8% lower despite landing $2 billion in green funding

• New York City-based Global Infrastructure Partners have taken a 49% equity interest in AGL's Energy Transition Investment Partnership

• The deal will help provide funding for AGL's plan to develop 2.7 gigawatts of renewable energy assets

And who are they ? Is it BlackRock, who will destroy Earth, just for Money , like You

are, sa.gov.au, Complicit in Harm and Loss to Environment All On Country Environment Sacred South Australian to Antarctic Sacred.

I live on a Land named Australia facing the Biggest Threat it ever has.

I will get our Energy company changed. I Will NOT support AGL any further. We're Off Grid.

MASTERPLAN
TOWN + COUNTRY PLANNERS SINCE 1977

11 October 2024

State Commission Assessment Panel
C/- Mr Lee Webb
Senior Planning Officer
Crown & Impact Assessment – Planning and Land Use Services
Department for Housing and Urban Development
Via PlanSA Portal

Our Ref: 51011LET01

Dear Lee

DA 24016679 – Brinkworth Solar Farm Response to Representations

MasterPlan writes on behalf of Akaysha Energy to provide a written response to representations received during the public consultation of the application regarding the Brinkworth Solar Far at Lot 256W Power Station Road Brinkworth, 653 Koolunga Road Brinkworth, 873 Koolunga Road, Koolunga and Lot 102 Lakeview Road Brinkworth.

The development application is described in the documentation within DA 24016679. Public notification of the application was undertaken between 7 August – 4 September 2024.

Summary of Representations Received

During the public notification period a total of 8 representations were received, as listed below.

	Name of Representor	Address of Representor	Property of Interest	Wish to Be Heard
1	Steve Welke	S.S.Welke63@outlook.com 1461 Lake View Road, BRINKWORTH SA 5464	Section 261 Hundred of Bouauct Lot 101	Yes
2	Tamara Welke	welks_93@hotmail.com PO Box 83 Brinkworth	1461 Lake View Road Brinkworth	No
3	Sharon Welke	S.S.Welke63@outlook.com 1461 Lake View Road, BRINKWORTH SA 5464	Property on boundary of proposal	No

	Name of Representor	Address of Representor	Property of Interest	Wish to Be Heard
4	Damian Welke	Damoswelke92@outlook.com 1461 Lake View Road	Lot 101	No
5	Andrew Whitehorn	ajwhitehorn5464@gmail.com P.O. Box 29 Koolunga 5454	1694 Churches Road, Brinkworth	Yes
6	Fred Whitehorn	Fredanne42@gmail.com	Not stated	No
7	Lynette LeBlack	lynettelablack@live.com 23 Eastlake Drive, Lake Albert, 2650	Not stated	Yes, represented by Grant Piper - National Rational Energy Network Chair
8	Ali	platypus4841@gmail.com	Not stated	No

We respectfully question whether some of these representations (number 8 by "Ali" and number 6 by Fred Whitehorn), satisfy the intent of the *Planning, Development and Infrastructure (General) Regulations 2017* in relation to the level of contact detail (the name and address of the person making the representation) required to make these formal representations.

Each of the representations object to the proposed development. There are a number of similar concerns raised in the representations, including:

- Alternate siting/location
- Visual impact/amenity
- Loss of primary production land
- Heat island impact
- Government policy applying to renewable energy facilities
- Industrial land use
- Impacts of construction including traffic
- Property devaluation
- Decommissioning and disposal of materials
- Lack of consultation
- Lack of environmental assessment

Given the themes contained within the representations, these will be addressed by subject matter rather than address individual items in each representation.

It is noted that representations 7 (Lynette LeBlack) and 8 (Ali) express concerns regarding the general application of renewable energy and government policy and do not appear to be directly related to an interest in the subject land/development. There are four representations by the Welke family and two representations by the Whitehorn family, both of which are owners/occupiers of land within the locality of the proposed development.

Whilst stated differently in the representations, it is understood that the four submissions by the Welke family members all relate to the property at 1461 Lake View Road, Brinkworth (Allotment 101, Deposited Plan 27337, Hundred Boucaut, in Certificate of Title Volume 6169 Folio 611). The Welke property is illustrated in the application documents as a non-associated dwelling immediately adjacent to the south-east boundary of the site (Figure 1.2 - Sensitive Receivers plan within Volume 1 of the development application documentation and shown as **Figure 1** below) and more specifically identified as "D6" within the Environmental Noise Assessment report by Sonus (Figure 1 of this report as contained in Volume 2 of the development application documentation and shown as **Figure 2** below).

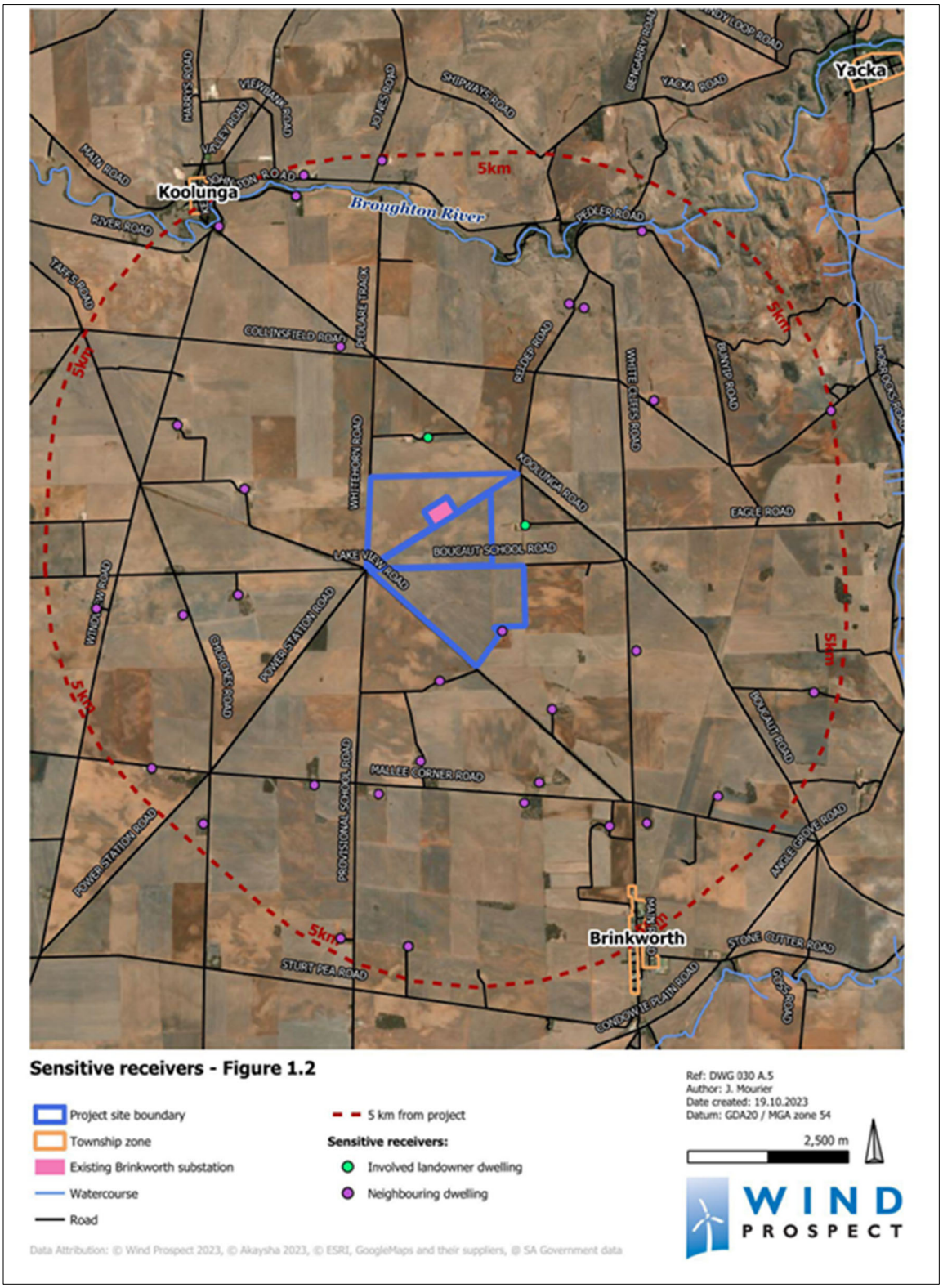


Figure 1: Sensitive Receivers Plan – source Volume 1 of development application.

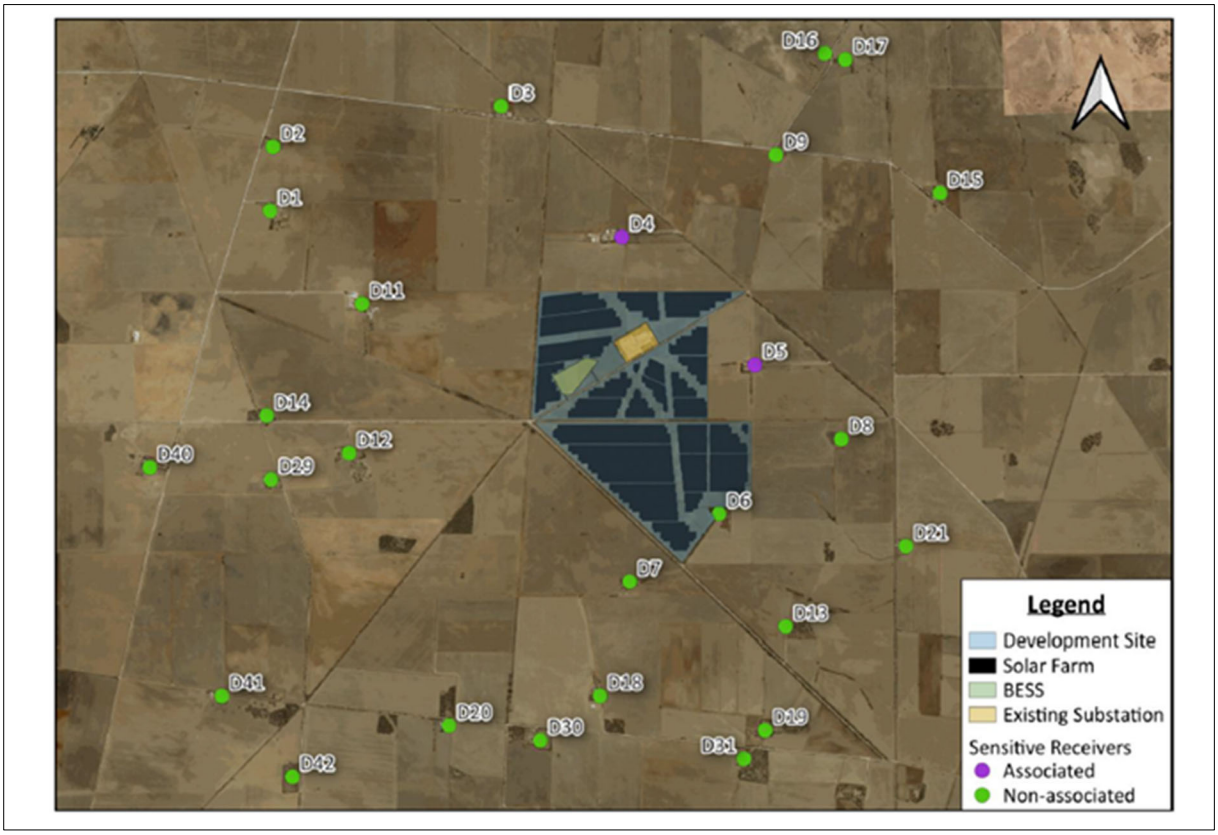


Figure 2: Image illustrating sensitive receivers from Sonus Environmental Noise Assessment

The location of the Welke property relative to the proposed development layout is illustrated in Figure 3.5 of Volume 1 of the development application documentation (as **Figure 3** below).

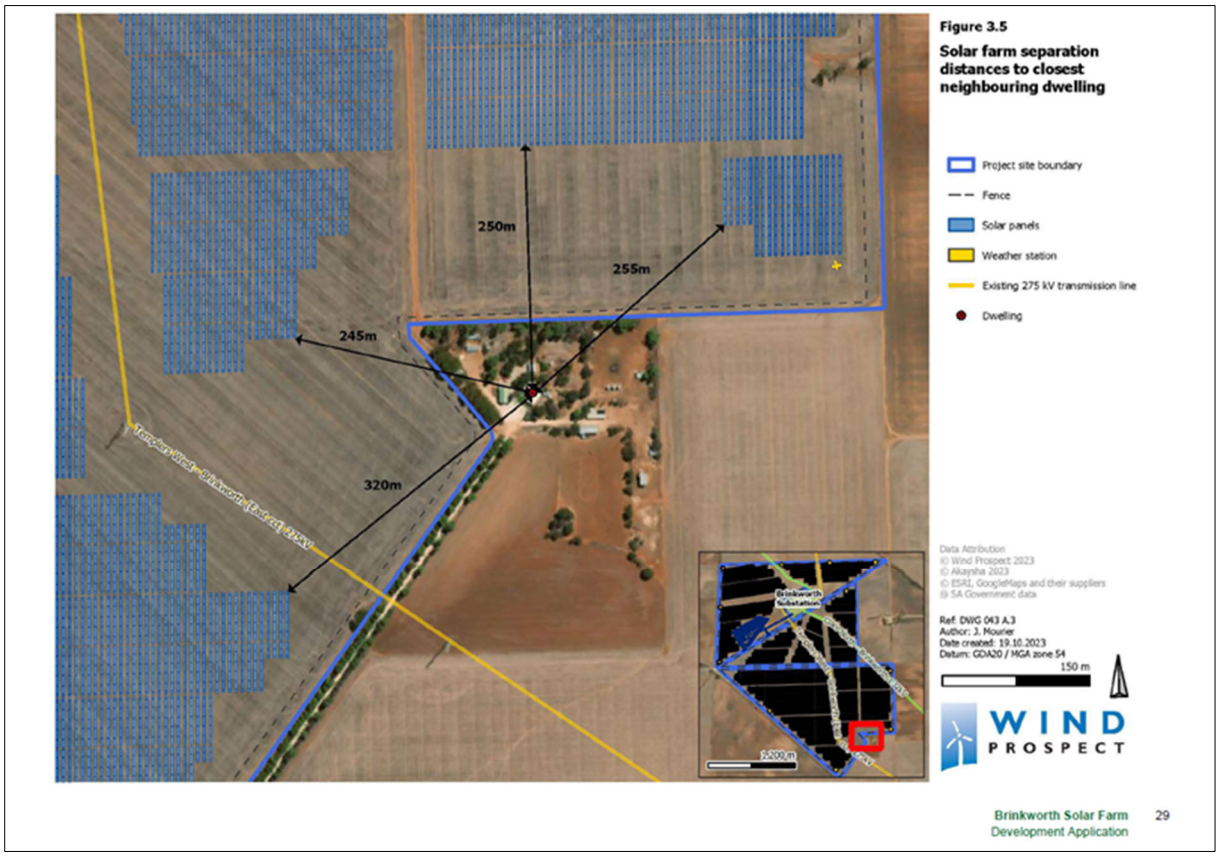


Figure 3: Location of Welke dwelling as shown in Figure 3.5 of Volume 1 of the development application

The property of Andrew Whitehorn at 1694 Churches Road, Brinkworth is to the west of the proposed development and Whitehorn Road. On the plan extracted from the Environmental Noise Assessment report by Sonus (**Figure 2** above) the dwelling on 1694 Churches Road is identified as a non-associated dwelling D11.

Design Response

In response to the concerns expressed in the representations by the Welke family, Akaysha Energy propose to relocate several solar arrays to increase the separation of the infrastructure from the dwelling at 1461 Lake View Road, Brinkworth. Figure 4 below illustrates the solar arrays that are proposed to be relocated (referenced as 'solar panels to be removed'). These solar panels have been relocated to the north of Power Station Road and result in some alteration to the siting and connection of infrastructure to the Brinkworth Substation. The BESS, which is exempt from planning approval is not proposed to be sited further north than its original location.

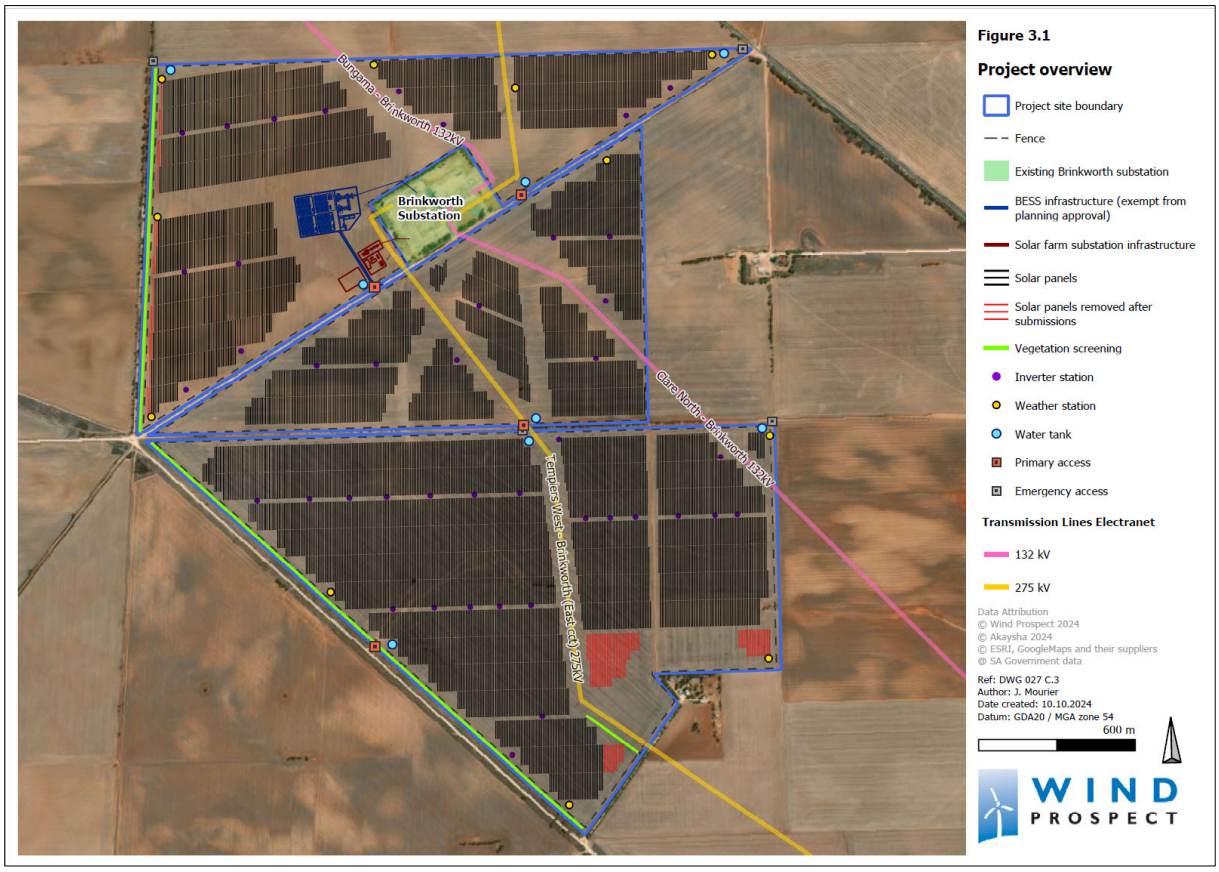


Figure 4: Amended site layout illustrating solar arrays to be removed adjacent to the Welke property boundaries

The relocation of these solar arrays results in the following in relation to the Welke property :

- A setback of 375metres to the nearest solar arrays (from the dwelling) to the south west, an increase of 55 metres
- Removal of the nearest bank of solar arrays to the west, providing a setback in excess of 400 metres (from the dwelling) to the nearest solar arrays to the west, which is a substantial increase from the 245 metres originally proposed
- Retention of a setback of 250 metres from the dwelling and 170 metres from the northern boundary, to the nearest solar arrays to the north.
- Removal of the nearest bank of solar arrays to the north east. The setback is now 370 metres to the north east corner of northern bank of solar arrays.
- Incorporation of a vegetated screen adjacent to the solar arrays to the south west between the Welke dwelling and the arrays (parallel to the existing 275kV overhead electricity line)

These setbacks are shown in **Figure 5** below.

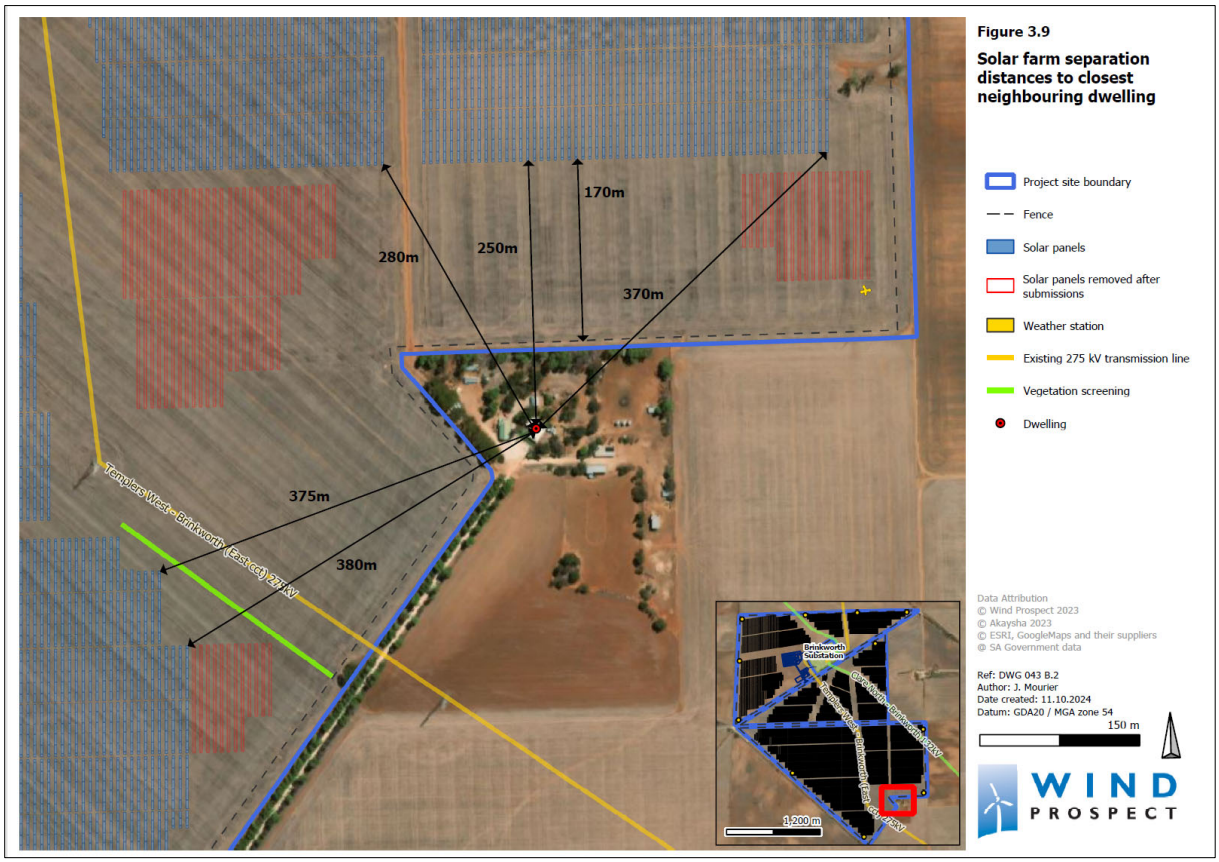


Figure 5: Proposed solar array setbacks and landscape screening adjacent to the Welke dwelling

In addition to the alteration of the location of the solar arrays, Akaysha Energy propose to incorporate a landscaped screen adjacent to the western adjacent Whitehorn Road and the northwest- southeast boundary adjacent Lakeview Road. The vegetated screen is proposed between the property boundary and proposed security fencing. Our client would accept a condition of consent to provide a detailed landscaping plan associated with this screen landscaping.

Alterations to the siting and design of the BESS (exempt) and solar farm substation and ancillary infrastructure has resulted from the altered solar arrays north of Power Station Road and further detailed design of the connections to the Electranet Substation. The alteration of siting minimises complexities of the connections with the final design still subject to Electranet approval. Alterations proposed do not introduce new elements to the development or impact the interface with sensitive receivers. The infrastructure is proposed within the same locality adjacent the Brinkworth substation, albeit in a different configuration.

Attached to this response to representations are the following plans which illustrate the relocated solar arrays, altered siting of associated infrastructure (north of Power Station Road) and the and proposed vegetated screening:

- Figure 3.1 – Project Overview DWG 027 C.3 dated 10.10.2024

- Figure 3.5 – Substation and ancillary infrastructure DWG 028 D.2 dated 11.10.2024
- Figure 3.7 – Solar Farm Overview and Vehicle Access DWG 039 B.1 dated 10.10.2024
- Figure 3.8 – Solar Farm Typical Plan DWG 042 B.1 dated 10.10.2024
- Figure 3.9 – Solar Farm Separation Distances to closest neighbouring dwelling DWG 043 B.2 dated 11.10/2024

Alternate Location

Several representations indicated that the proposed development should be located on an alternate site, including suggestions of land to the north which was not currently cropped. Whilst it is acknowledged that there would be several alternate locations for a solar farm development, there are strong locational advantages in developing the solar farm in proximity to the Brinkworth substation. The land for the development has been secured with contractual arrangements with the landowners.

Furthermore, it is not the role of the planning authority to consider other alternate locations, but rather the merits of the proposed development as presented in the development application.

Loss of Primary Production Land

It is understood that the suggestion of alternate locations is partly a result of concerns regarding the loss of productive agricultural land. This concern was expressed in several of the representations. As discussed in the development application documents, renewable energy facilities are an anticipated land use within the Rural Zone.

A balanced assessment of land uses anticipated within the Rural Zone must be undertaken by the planning authority in determining the application.

Performance Outcome (PO) 1.1 of the Rural Zone anticipates a range of primary production and value adding activities on rural land. Designated Performance Feature (DPF) 1.1 identifies renewable energy facilities as a land use that is envisaged to satisfy PO 1.1. In accordance with the rules of interpretation of the Planning and Design Code, a *"DPF provides a guide to a relevant authority as to what is generally considered to satisfy the corresponding performance outcome...".* DPF 1.1(r) clearly anticipates that a renewable energy facility satisfies PO 1.1, and by extension is considered a productive use of land.

There is potential tension between PO 1.1/DPF 1.1 and PO 9.1 of the Rural Zone. Performance Outcome 9.1 seeks to ensure that renewable energy facilities minimise fragmentation or displacement of existing primary production. The emphasis of protecting primary production land and facilitation of renewable energy within and over primary production land must be viewed in terms of the policy agenda for the zone set by the Desired Outcomes. Desired Outcome 1 of the Rural Zone anticipates both primary production and generation of energy from renewable sources as land uses to be undertaken in the Rural Zone to support the economic prosperity of South Australia.

It is therefore considered that primary production and renewable energy facilities are anticipated in the Rural Zone and by extension, the renewable energy facilities as an anticipated land use would occur on productive land.

The proposed development utilises approximately 474 hectares of land. Whilst the development would preclude this land from being utilised for primary production purposes, it is appropriately sited adjacent to the existing Brinkworth substation to efficiently generate and store electricity in a manner consistent with the Desired Outcome of the Rural Zone. Furthermore, the Project will not preclude ongoing rural land uses continuing on adjacent land or in the locality.

It appears that the intent of PO 9.1 is therefore to minimise the amount of land that is fragmented or displaced from primary production. This intent is not considered to be site or development specific, but rather a wider consideration in the locality or in the Rural Zone throughout the State. Within the locality of the subject land, there are no other developed and operational renewable energy facilities. Establishment of the Brinkworth Solar Farm does not add to a cumulative displacement of primary production land.

As stated previously, renewable energy facilities are an envisaged land use within the Rural Zone and this desired outcome supports the economic prosperity of South Australia. Utilisation of agricultural land for renewable energy facilities may result in loss of primary production, but this should be balanced against the economic prosperity achieved by renewable energy.

Industrial Land Use

The proposed development has been described in some representations as an "industrial" development. The question has been raised on other renewable energy projects in South Australia, specifically in relation to wind farm development and the Environment, Resources and Development Court has found that a wind farm is not an industrial activity (ERD Court - District Council of Grant (ERDC Number 106 of 2010, decision dated 17 June 2011). Since that decision, the definition of "industry" has been amended.

The planning authority would appreciate that "industry" is separately and specifically defined pursuant to Part 7 - Land Use Definitions of the Planning and Design Code as:

> *Means the carrying on, in the course of a trade or business, of any process (other than the generation of electricity using a renewable energy source or a process in the course of farming or mining) for, or incidental to:*
>
> *a) the making of any article, ship or vessel, or of part of any article, ship or vessel; or*
> *b) the altering, repairing, ornamenting, finishing, assembling, cleaning, washing, packing, bottling, canning or adapting for sale, or the breaking up or demolition, of any article, ship or vessel; or*
> *c) the getting, dressing or treating of materials...*

The definition of industry specifically excludes generation of electricity using a renewable energy source. Whilst some representors may perceive a solar farm to be akin to an industrial activity, it is not an "industry" in terms of land use definition.

Visual Change

Inclusion of a solar PV and associated infrastructure in a rural environment will result in some visual change. A detailed assessment of the visual impacts of the development has been undertaken and is included in the development application documentation. It is noted that the conclusion of the visual assessment was the project was predicted to have an inconsequential to very low overall impact.

The development has been designed to accord with the policies of the Rural Zone and General Development Policies - Infrastructure and Renewable Energy Facilities of the Planning and Design Code, to minimise the visual impacts in accord with the policies as follows:

- Setback a minimum of 30 metres from the boundary of adjoining land.
- Setback approximately 5.0 kilometres from the Township Zones of Brinkworth and Koolunga, which is in excess of the guiding 2.0 kilometres.
- Is not within 2.0 kilometres of any rural living, settlement or neighbourhood zones.
- Is not within 500 metres of any conservation area.

Amendments now included in response to the representations further increase the setbacks and additional landscape screening to further mitigate the visual impact of the development to the nearest sensitive receivers.

Heat Island Effect - Change in Local Climatic Conditions

Several representations expressed concern that the proposed solar farm would result in alterations to local climatic conditions, particularly an increase in temperature on the site and adjacent boundaries. This impact is often referred to as the "heat island effect".

Interpretation of the "heat island effect" was examined in detail by the Victoria Planning Panels in July 2018 in regard to the "*Greater Shepparton Solar Energy Facility Planning Permit Applications 2017-162, 2017-274, 2017-301 and 2017-344".* This assessment sought and received evidence from Dr Barron-Gafford (via a statement of expert evidence) in relation to the interpretation of the 2016 study[1] , and the potential impacts of the solar farms proposed within the Shepparton Council area of Victoria. The following discussions and conclusions from the Victoria Planning Panel report provides a summary of the potential heat island effect:

[1] Barron-Gafford G, Minor R, Allen N, Cronin A, Brooks A, Pavao-Zuckerman M, The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures (Barron-Gafford et al (2016))"

"Referring to his own research in Barron-Gafford et al (2016), Dr Barron-Gafford stated in his evidence:

> *Ultimately, we found that air temperatures within a PV solar farm are higher than those in nearby natural settings, and we referred to this as the PVHI effect (Figure 2). We found the PVHI effect to be much greater within the solar farm at night, with the greatest impacts being within the spring and summer months. Additionally, we found that presence of a PVHI effect to be much less significant during the day, and that the effects were least prominent in the winter and fall, regardless of time of day" (page 35).*

"Mr Guthrie and Dr Barron-Gafford each stated that these temperatures dissipate quickly with height above the solar panels as the thermal energy radiates back towards the atmosphere. Fthenakis and Yu (2013) states:

> *These simulations show a profound cooling effect with increasing height from the ground. It is shown that temperatures on the back surface of solar panels ambient temperature, but the air above the arrays.*

There were conflicting temperature dissipation results between Barron-Gafford et al (2016) and Fthenakis and Yu (2013), with the former showing results that any spatial extent of the PVHI has completely dissipated at 30 metres" (page 36).

<u>"Within the solar array perimeter:</u>

The Panel accepts expert evidence of Mr Guthrie and the expert evidence of Dr Barron-Gafford and the expert conference statement regarding the scientific consensus that solar arrays will affect air and soil temperatures within the solar array perimeter. Air temperature within the perimeter of a solar array is expected to increase three to four degrees Celsius compared to outside the solar array.

However, the temperature quickly reduces with height and can be managed. Decreasing heat buildup will be important to the operator of the solar arrays - as solar output reduces, the solar panel temperature increases. Compared to outside of the solar array, soil temperatures within the perimeter of a solar array are cooler during the day due to shading by the panels and warmer at night due to energy being trapped below the panels.

While there are only several studies related to the spatial extent of the PVHI, they are sufficient to understand the degree of temperature variation resulting from the technology proposed in the four permit applications.

Outside the solar array perimeter:

The Panel gave considerable weight to Dr Barron-Gafford's evidence and it accepts the results of the Barron-Gafford study related to the extent of any PVHI effect which states:

> *... that the PVHI was indistinguishable from air temperatures over native vegetation when measured at a distance of 30 m from the edge of the PV array. This pattern held true for both daytime and night-time conditions. Because the PV panels themselves trap the energy from diffuse sunlight that was able to reach the ground underneath them, air temperatures remain elevated within a PV array. As you leave this "overstory" of PV panels, energy is able to radiate back towards the atmosphere, as it does in a natural setting ,and the PVHI quickly dissipates.*

The temperature variation shown in Fthenakis and Yu (2013) for the first 100 metres either side of the edge of the solar array is broadly consistent with those observed by Dr Barron- Gafford in Figure 4 of his evidence statement. The Panel was not presented with any credible evidence to oppose the findings of Fthenakis and Yu (2013) which states:

> *Analyses of 18 months of detailed data showed that in most days, the solar array was completely cooled at night, and thus, it is unlikely that a heat island effect could occur.*

There is scientific consensus that a 'heat island effect' is unlikely to occur, therefore the precautionary principle does not apply for any of the proposed four solar energy facilities. This is supported by expert consensus that a serious or irreversible effect will not occur. Council's proposed generic 50-metre setback is therefore not required to address temperature, is considered excessive, and is not based on any evidence. As outlined in Mr Harriott's explanation, Mr Guthrie's recommended 25-metre setback "to protect against heat impacts on adjoining landowners".

The Panel considers that a 30-metre setback should be applied from the external edge of a solar array to the closest adjoining property boundary, which is broadly consistent with the science and Mr Guthrie's original advice to Council. To minimise the land impacted by the 30-metre setback, the Panel considers existing road reservations, irrigation channels and existing vegetation can be included within the 30-metre setback. Later chapters consider how and where this should apply for each solar energy facility.

The Panel acknowledges the angst that the potential for temperature increases beyond the subject land areas had on surrounding residents and farm operators. In many instances, research referred to in submissions and at the Hearing, appeared to be not clearly understood, misrepresented and in some cases, unreliable. For example, Barron-Gafford et al (2016) stated that the temperature would increase by three to four degrees Celsius within the solar array; not beyond.

Surrounding farm operators should be comforted that the so-called 'heat island' effect was not a threat and will not adversely impact surrounding farm operations.

Conclusions:

The Panel concludes:

- *While limited, there is sufficient scientific evidence to determine that no proposed solar energy facility will increase temperature beyond 30 metres of a solar array.*
- *The precautionary principle therefore does not apply, and Council's proposed generic 50-metre setback is not required to address temperature.*
- *Any temperature increase within the solar array will be marginal, however, any solar array should be separated 30 metres from any neighbouring property boundary" (pages 37 to 39).*

It is understood that the findings of the Victoria Planning Panel informed the planning policy that is now contained in the Planning and Design Code (Infrastructure and Renewable Energy Facilities - PO 9.3 and DTS/DPF 9.3), particularly the setback distances from boundaries of adjoining land. Based on the evidence and conclusions of the Victoria Planning Panel and the compliance with the policies of the Planning and Design Code, it is not considered that the proposed development will have an adverse impact due to a rise in air temperatures on the adjoining primary production land.

Government Policy Applying to Renewable Energy Facilities

Several comments included in some of the representations related to issues of Government policy relating to renewable energy, climate change and the energy market. It is not proposed to address these matters in this response as it is considered that these are wider policy matters that are outside of the scope of the consideration of this development application and more appropriately debated in other forums. The proposed development should be considered within the context of the current strategic policy framework for renewable energy in South Australia and the relevant policies of the Planning and Design Code.

Impacts of Construction Including Traffic

One adjoining land owner expressed concern that the development would have an adverse impact on local roads during the construction period and post commissioning. A detailed Traffic Impact Assessment (TIA) for the development was undertaken by Empirical Traffic Management and formed part of the development application documentation. The TIA described the alteration to traffic volumes resulting from the project in the following four phases:

> *...civil works phase, construction phase, commissioning phase and site operation. The majority the increased traffic volumes will occur during the construction phase, in the order of up to 400 vehicles per day with large components such as transformers, switch rooms and control rooms potentially needing to be transported to site via Over Size/Over Mass (OSOM) routes and vehicles. Outside of the peak periods during the civil and construction phase, traffic movements are anticipated to reduce to in the order of 150 vehicles per day during the operation period of the site.*

The findings of the TIA indicate that:

> *Based on the projected impacts of the Project on traffic volumes, it is estimated that vehicular movements during peak construction periods will be in the order of 400 vehicles per day. This estimate would not anticipate that the Project will result in any detrimental impacts to the safety or function of the surrounding road network where unsealed roads can carry up to 500 vehicles per day.*

In addition to the TIA, it is anticipated that the planning authority would require a Traffic Management Plan be prepared as a condition of development authorisation. The Traffic Management Plan would be prepared in consultation with the Council and Commissioner of Highways and address matters such as finalisation of route to/from the site, a risk assessment for involved roads, identification of upgrades required to roads and a management schedule for the construction stage of the development to minimise impact on road users. Based on the assessment and findings of the TIA and the assessment to be undertaken as part of the TMP, it is considered that the proposed development would have minimal impact on local road users during construction and would not result in the condition of local roads being deteriorated.

Decommissioning and Disposal of Materials

Comments were included in the representations regarding the decommissioning of the project and removal of materials.

We understand that solar panels are primarily made of glass, aluminium, copper and other common materials. Solar projects use steel racks to position panels, electric cabling and a small number of inverters to deliver power to the grid. All of this equipment is safe and contains the same materials found in household appliances. The project will use solar panels that meet the Australian and New Zealand Standard (61730:2021) Photovoltaic (PV) modules - Design qualification and type approval, which covers the design and performance requirements for PV modules, including their safety and durability under various environmental conditions. These standards are designed to ensure that solar panels and installations are safe, reliable, and efficient, contributing to the overall effectiveness of solar energy systems in Australia. At the end of the life of the project, materials would be removed and recycled.

It is anticipated that the planning authority would require a Draft and Final Decommissioning and Rehabilitation Plan(s) be prepared as a condition of development authorisation. These plans would provide details on methodology to be engaged in decommissioning and rehabilitation of the subject land.

Lack of Consultation

Several of the representations were critical of the proponents of the development in relation to consultation with the community. Our client is disappointed to hear that the comments regarding engagement with the community, as Akaysha Energy, through Wind Prospect have actively sought input from a wide range of stakeholders including landowners, neighbours, Wakefield Regional Council, State and Federal Government agencies, Traditional Owner groups, and other interested parties in preparing the development application.

Stakeholders were engaged through various communication methods, such as project newsletters sent to the entire district post code (in April and September 2023 and in April 2024), drop-in information sessions (May and October 2023 and August 2024), a project website, in-person meetings, phone calls, and email correspondence, as well as maintaining a stakeholder engagement database.

Our client considers that the engagement undertaken with the community has been genuine, however respects the comments made in representations.

Lack of Environmental Assessment

Some representations included comments that the proposal lacks environmental assessment. As outlined in Volume 1 of the application documents and included in Volume 2, there has been a range of environmental assessments undertaken to inform the proposed development. To date during the processing of the development application, our client has not been requested to provide additional information by the planning authority or any referral agency. It is therefore considered that the development application is appropriately informed in terms of technical assessments, including those considered necessary for assessment of the development by the planning authority.

Property Devaluation

Concerns were expressed in the submissions by the Welke family that the proposed development would have a negative impact on the value of their property. Impacts of development on property values is frequently raised in relation to renewable energy developments. We note that it is a well-established planning principle that depreciation of land values as a result of a proposed development is not a relevant planning consideration.

The ERD Court has had occasion to consider this issue in the numerous cases, including the following:

- *Meyer and Northern Areas Council & Broughton Hills [1998] SAERDC 471*, where it was concluded in the judgement that:

  "The development plans applicable to the regions and districts of South Australia do not refer to land values except in the most oblique and inferential way here and there and the demonstration of any link, if it is possible, could only be made by very specialised evidence from a range of experts including planners, valuers, land economists and the like."

- *St Raphael's School v Unley City Council [1995] EDLR 113*, where it was stated:

  "Fear of, and even actual, reductions in property value are rarely relevant in deciding a development application."

We therefore submit that this issue raised by the representors is not a valid consideration of the matter for the planning authority.

Summary

The opinions expressed in the representations are acknowledged, however it is considered that the concerns raised are adequately and appropriately addressed in the development application. In addition, the amendments now proposed to increase setbacks and introduce screen landscaping are incorporated to minimise the perceived visual impact of the solar farm on the immediately adjacent land owners.

It remains our opinion that the site of the development is appropriate for a renewable energy facility and has substantial planning merit, including:

- The development is of significant benefit via the generation of sustainable and stable electricity.
- The development will benefit the state by providing storage of renewable energy for distribution into the national electricity grid at peak periods.
- Renewable energy facilities are an envisaged land use within the Rural Zone.
- The site of the development is not located within a designated area of landscape character.
- The development is unlikely to adversely affect safety of water or air transport.
- The development incorporates suitable and adequate separation from townships and boundaries, including those of non-involved dwellings or other sensitive receivers.
- The development will be designed to be compliant with EPA noise criteria for sensitive receivers.

- Suitable access can be provided in a safe and efficient manner for the construction period and operation of the renewable energy facility.
- The development does not impact on cultural heritage.
- The development can be designed to suitably manage potential impacts such as traffic movements, dust, noise and vibration during the construction phase, as outlined in the draft Construction Management Plan which accompanies the application.

A balanced assessment of the relevant policies concludes that the proposed renewable energy facility is a suitable form of development within the Rural Zone of the Planning and Design Code and warrants the granting of development authorisation.

Closure

Representatives of Akaysha Energy would like the opportunity to attend the State Commission Assessment Panel meeting to respond to the matters raised in the representations. It would be appreciated if you could advise, at the earliest opportunity, the date and time for consideration of this development application.

In the intervening period, should you require any additional information or clarification, please do not hesitate to contact the undersigned by email juliej@masterplan.com.au or by phone 0413 832 616.

Yours sincerely

Julie Jansen RPIA(Fellow), Accredited Level 1 Planner
MasterPlan SA Pty Ltd

Attached: Plans as Detailed
cc. Mr Michael Sale, Wind Prospect
Mr Duwayno Robertson, Akaysha Energy

Figure 3.1

Project overview

- Project site boundary
- Fence
- Existing Brinkworth substation
- BESS infrastructure (exempt from planning approval)
- Solar farm substation infrastructure
- Solar panels
- Solar panels removed after submissions
- Vegetation screening
- Inverter station
- Weather station
- Water tank
- Primary access
- Emergency access

Transmission Lines Electranet

- 132 kV
- 275 kV

Ref: DWG 027 C.3
Author: J. Mourier
Date created: 10.10.2024
Datum: GDA20 / MGA zone 54

600 m

WIND PROSPECT

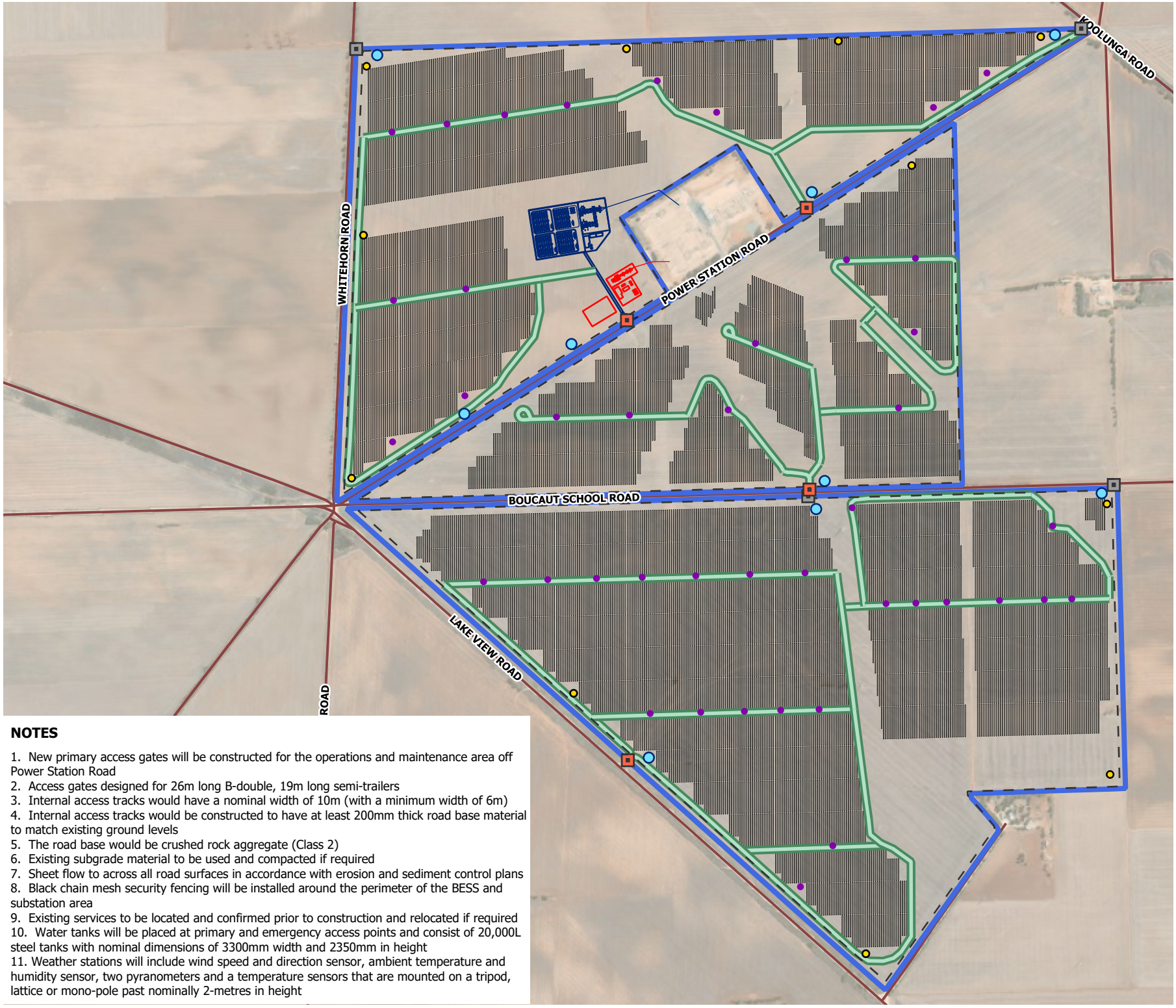


Figure 3.7

Solar farm overview and vehicle access

- Project site boundary
- Public road
- Fence
- Primary access
- Emergency access
- Water tank
- Weather station
- Inverter station
- Internal access track
- Solar panels
- Solar farm substation and ancillary infrastructure
- BESS infrastructure (exempt from planning approval)

NOTES

1. New primary access gates will be constructed for the operations and maintenance area off Power Station Road
2. Access gates designed for 26m long B-double, 19m long semi-trailers
3. Internal access tracks would have a nominal width of 10m (with a minimum width of 6m)
4. Internal access tracks would be constructed to have at least 200mm thick road base material to match existing ground levels
5. The road base would be crushed rock aggregate (Class 2)
6. Existing subgrade material to be used and compacted if required
7. Sheet flow to across all road surfaces in accordance with erosion and sediment control plans
8. Black chain mesh security fencing will be installed around the perimeter of the BESS and substation area
9. Existing services to be located and confirmed prior to construction and relocated if required
10. Water tanks will be placed at primary and emergency access points and consist of 20,000L steel tanks with nominal dimensions of 3300mm width and 2350mm in height
11. Weather stations will include wind speed and direction sensor, ambient temperature and humidity sensor, two pyranometers and a temperature sensors that are mounted on a tripod, lattice or mono-pole past nominally 2-metres in height

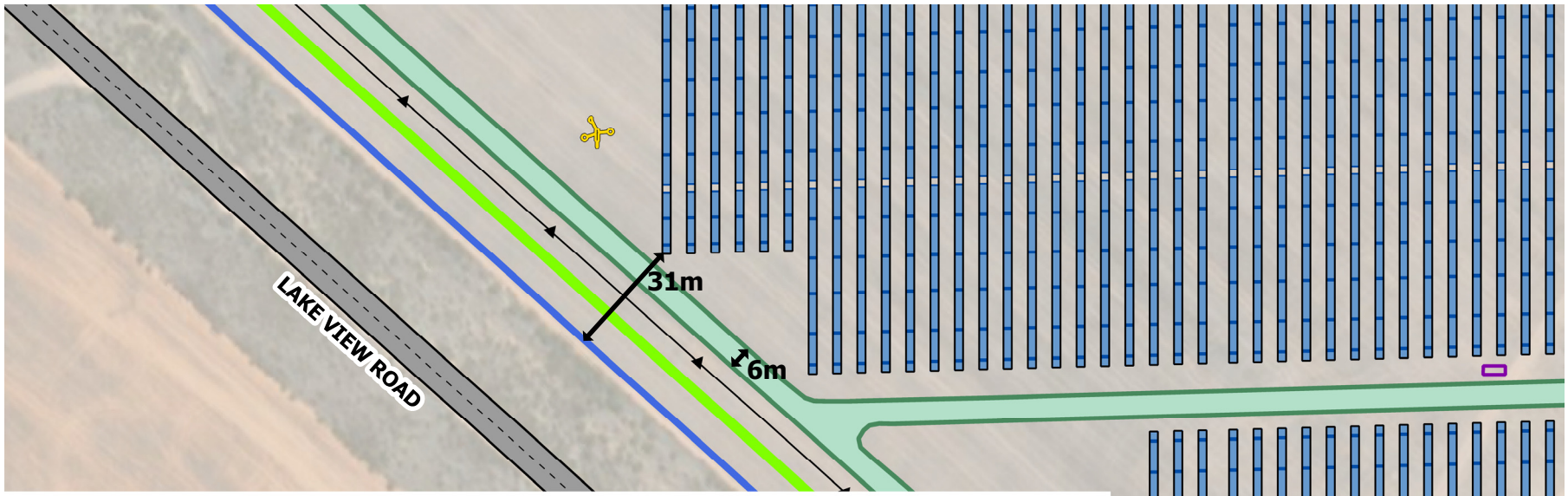
Ref: DWG 039 B.1
Author: J. Mourier
Date created: 10.10.2024
Datum: GDA20 / MGA zone 54

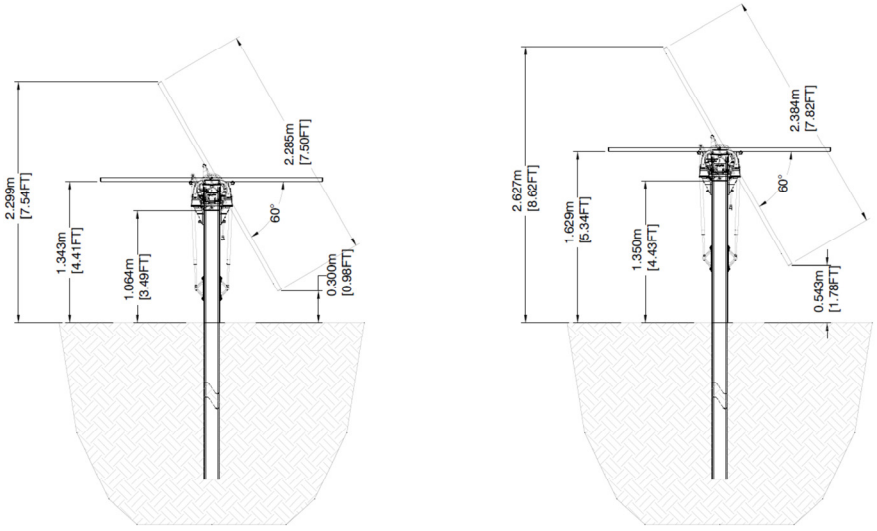
600 m

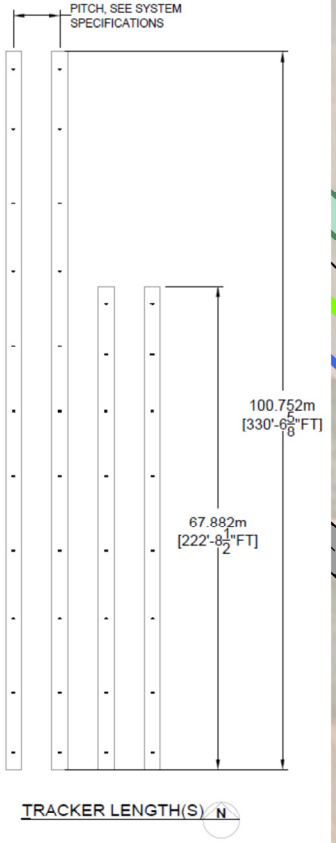
WIND PROSPECT

Figure 3.8

Solar farm typical plan







NOTES

1. Solar PV module capacity 570W
2. 28 solar modules per string on 13,120 strings
3. Trackers to have a maximum pier height of 1.5m
4. Compaction of the solar field driven post foundation shall be in conformance with the geotechnical report recommendations.
5. Internal access tracks would be constructed to have at least 200mm thick road base material to match existing ground levels
6. The road base would be crushed rock aggregate (Class 2)
7. 11 weather stations to include wind speed and direction sensor, ambient temperature and humidity sensor, two pyranometers and a temperature sensors that are mounted on a tripod, lattice or mono-pole past nominally 2-metres in height
8. Water tanks will be placed at primary and emergency access points and consist of 20,000L steel tanks with nominal dimensions of 3300mm width and 2350mm in height
9. Setback distances are greater than 30m from the closest point of solar panels to the property boundary

- Project site boundary
- Public road
- Access gate
- Inverter station
- Weather station
- Internal road
- Solar panels
- Water tank
- Fence
- Vegetation screening

Ref: DWG 042 B.1
Author: J. Mourier
Date created: 10.10.2024
Datum: GDA20 / MGA zone 54

60.0 m

WIND PROSPECT

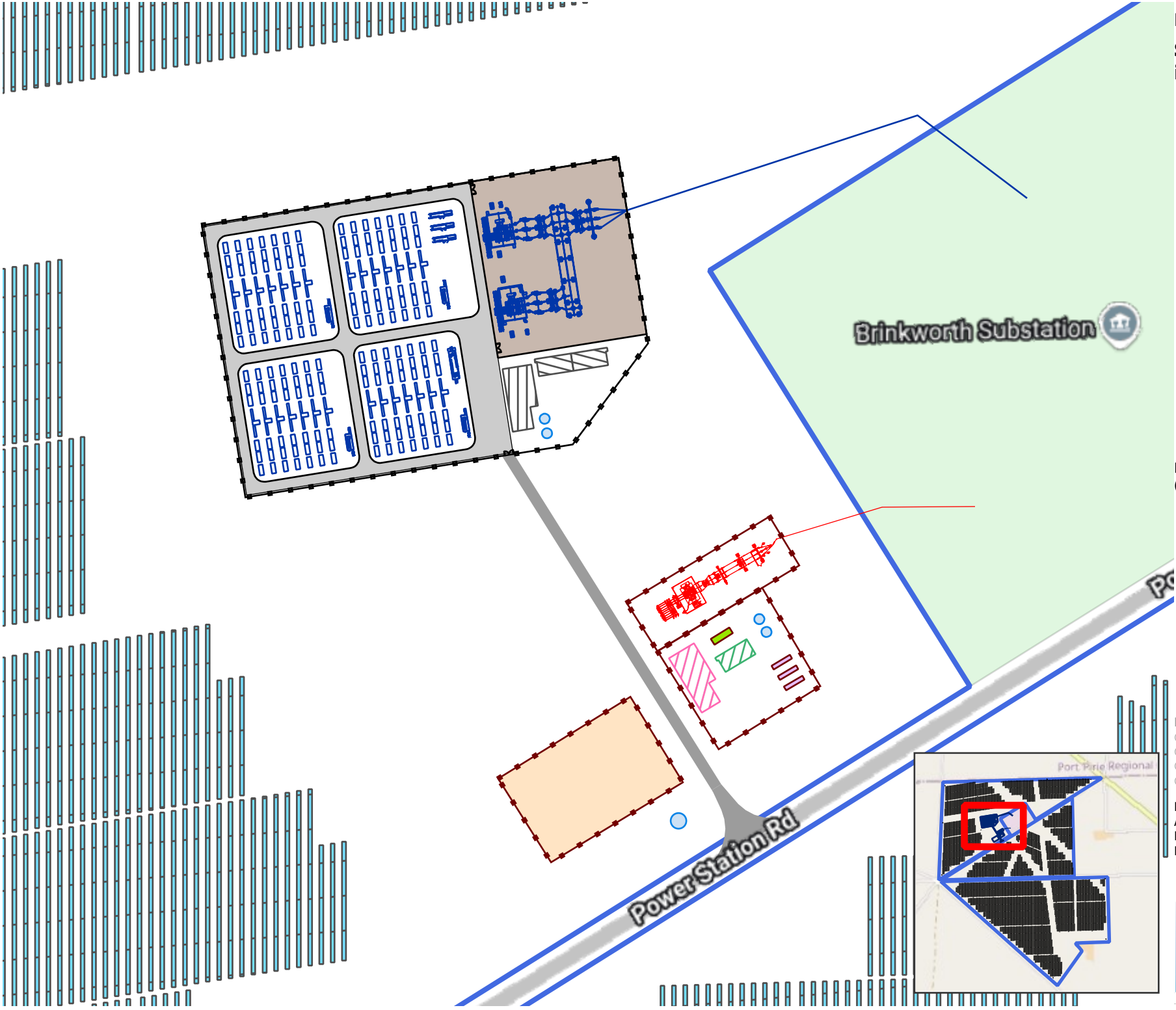


Figure 3.5

Substation and ancillary infrastructure

- Project site boundary
- Solar farm substation
- Solar panels
- Solar farm O&M building
- Solar farm on-site parking
- Water Tanks
- Fence
- Solar farm temporary laydown area
- Solar farm substation control building
- Solar farm storage containers

BESS infrastructure (exempt from planning approval)

- BESS components: battery enclosures, MV transformers, substation, switchgear feeders, Power Conversion Systems
- BESS O&M building
- BESS on-site parking
- Fence
- Exterior access road
- Interior access road

Ref: DWG 028 D.2
Author: J. Mourier
Date created: 11.10.2024
Datum: GDA20 / MGA zone 54

100 m

WIND PROSPECT

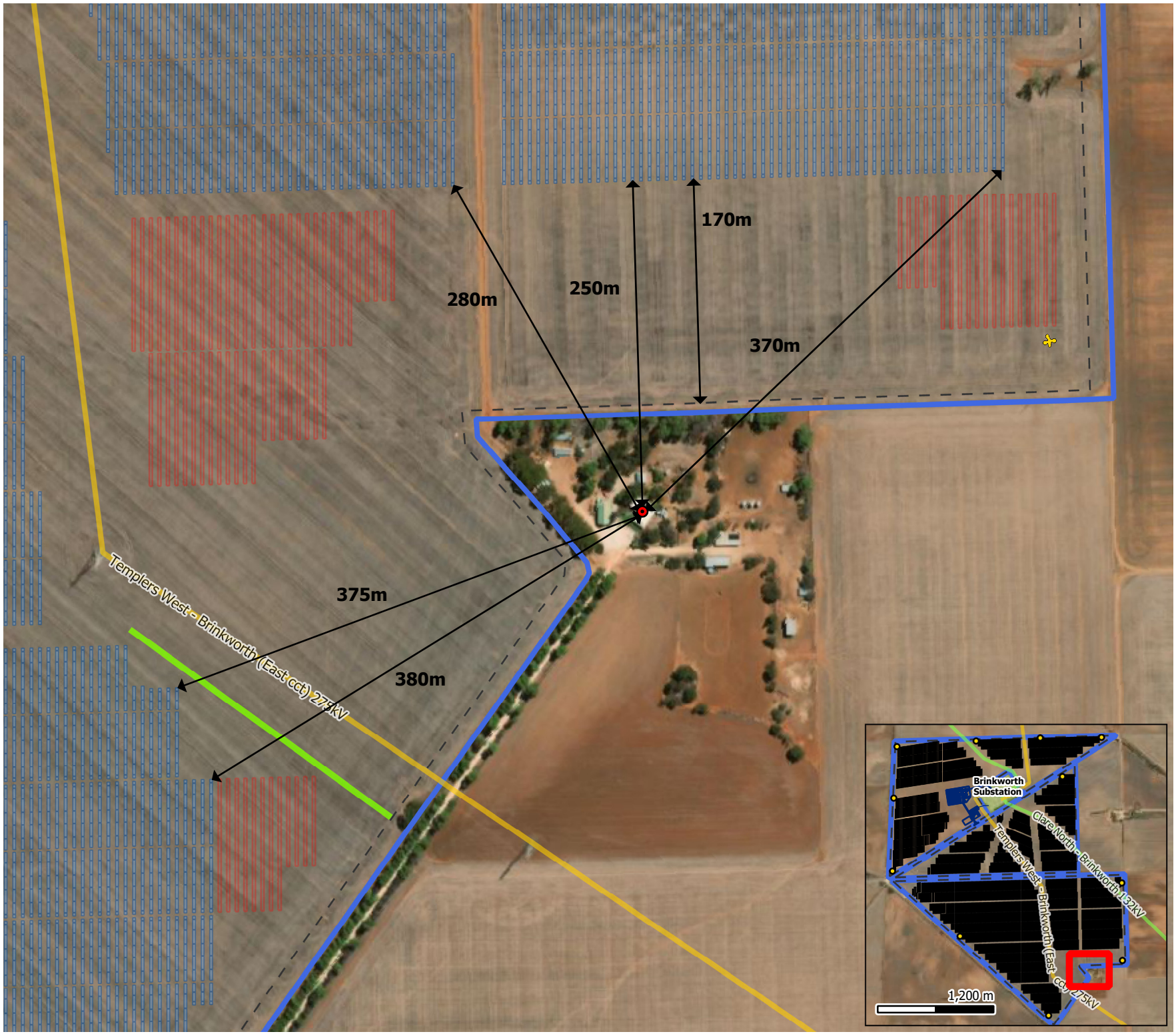


Figure 3.9

Solar farm separation distances to closest neighbouring dwelling

- Project site boundary
- Fence
- Solar panels
- Solar panels removed after submissions
- Weather station
- Existing 275 kV transmission line
- Vegetation screening
- Dwelling

Ref: DWG 043 B.2
Author: J. Mourier
Date created: 11.10.2024
Datum: GDA20 / MGA zone 54

150 m

WIND PROSPECT