Appendix G. Preliminary Traffic Management Plan

Tailem Bend Solar Project Stage 2 (TB2SP)

Equis Energy (Australia)

Preliminary Traffic Management Plan

IW168800-0000-CT-RPT-0001 | 1

15 December 2017

Tailem Bend Solar Project Stage 2 (TB2SP)

Project No:	IW168800
Document Title:	Preliminary Traffic Management Plan
Document No.:	IW168800-0000-CT-RPT-0001
Revision:	1
Date:	15 December 2017
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Cover Photo: View of the proposed project site with the existing Tailem Bend substation shown on the left.

Document history and status

Revision	Date	Description	By	Review	Approved
A	24/11/2017	Draft for Equis review	J Haigh	W Coller	A Horan
0	11/12/2017	Final - Updated following Equis review	J Haigh	W Coller	L Daddow
1	15/12/2017	Final – Editorial and formatting updates	A Horan	A Horan	L Dadddow

Contents

Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
ARTC	Australian Rail Track Corporation
Council	Coorong District Council
DPTI	Department of Transport and Infrastructure
EMP	Environmental Management Plan
Equis	Equis Energy (Australia)
MW_{AC}	Megawatts Alternating Current
NHVR	National Heavy Vehicle Regulator
OSOM	Oversized and Overmass
TBSP	Tailem Bend Solar Project Stage 1
TB2SP	Tailem Bend Solar Project Stage 2
TMP	Traffic Management Plan

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs Group (Australia) Pty Ltd (Jacobs) is to prepare a preliminary traffic management plan for Equis Energy (Australia) (here after referred to as Equis) in accordance with the scope of services set out in the contract between Jacobs and Equis. That scope of services, as described in this report, was developed with Equis.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by Equis and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

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1. Introduction

This Preliminary Traffic Management Plan has been prepared by Jacobs on behalf of Equis Energy (Australia) Pty Ltd (Equis) to inform and support a Development Application for Stage 2 of their proposed solar power station at Tailem Bend, South Australia.

Equis intends to develop the Tailem Bend Solar Project Stage 2 (TB2SP) south-east of Tailem Bend and directly north of the Stage 1 site. The TB2SP is proposed to be developed on a property (the subject site) commonly known as Allotment 100 and 101 Substation Road, Tailem Bend and accessed from Substation Road. The subject site is bound by:

- Substation Road to the south;
- The Tailem Bend - Pinaroo railway line to the north (disused); and
- Private property to the east and west.

The Mallee Highway runs east-west, approximately 1.7 km south of the nearest point of the subject site. The Dukes Highway runs north-south and is also approximately 1 km south of the nearest point of the subject site. An overview of the local road network is presented in Figure 1.1.

The TB2SP will have a capacity of up to 90MW_{AC} and will include: solar panels; inverter stations; provision for a future battery storage facility; a control room and site office; access tracks for maintenance vehicles; compound areas; and connection into the facility substation. The solar panels will be mounted on single-axis tracking structures.

Equis will own and operate the TB2SP and will install metering within the facility substation on the south side of Substation Road (separate Development Approval 571/V004/16) to measure the electricity output from the solar plant.

The aim of this Preliminary Traffic Management Plan (TMP) is to:

- Manage the safety of all road users associated with the TB2SP during construction and operation;
- Minimise the risk of damage to road infrastructure during construction of the TB2SP;
- Identify likely vehicle access arrangements during the construction phase;
- Identify likely vehicle access arrangements during the operational phase; and
- Address the potential concerns of residents utilising vehicle access routes.

This TMP identifies traffic management measures and strategies to address traffic safety and access issues inherent with using oversized vehicles and general daily construction and operational traffic.

1.1 Scope of work

The routes within this TMP include roads under the care and maintenance of both the Department of Planning Transport and Infrastructure (DPTI) and Coorong District Council (Council). The internal roads and access tracks within the subject site are not addressed in this TMP. The internal roads will be covered by the project safety plan.

This report contains the following:

- A consolidated TMP for access routes to the subject site for heavy and oversized construction traffic and light vehicles;
- Construction vehicle access routes;
- General measures to minimise impacts associated with traffic movements during construction; and
- Maintenance and inspection strategies to minimise impacts to existing road conditions.

This TMP does not identify infrastructure upgrades required to facilitate vehicular access to the subject site. It is anticipated that any infrastructure upgrades will be determined by Equis (or its contractor) prior to construction in conjunction with DPTI and Council. It is not expected that any infrastructure upgrades outside of the project access will be required.

1.2 Background Information

The following documents and standards have been used in the development of this TMP:

- DPTI (2015): Traffic Volumes;
- AS 1742: Manual of uniform traffic control devices;
- AustRoads (2009): Guide to Road Design;
- DPTI (2017a): RAVnet – South Australian Heavy Vehicle Access Network;
- DTEI (2011): Restricted Vehicle Access Framework;
- DTEI (2008): Code of Practice for the Transport of Oversize and Overmass Indivisible Loads and Vehicles;
- Coorong District Council (2017): Coorong District Council Development Plan (General and Transportation and Access sections);
- MetroCount (2017): Traffic data for Substation Road provided by Coorong District Council in November 2017.

In addition, estimated construction vehicles movements (heavy and light vehicles) were provided by Equis in November 2017.

Local Road Network

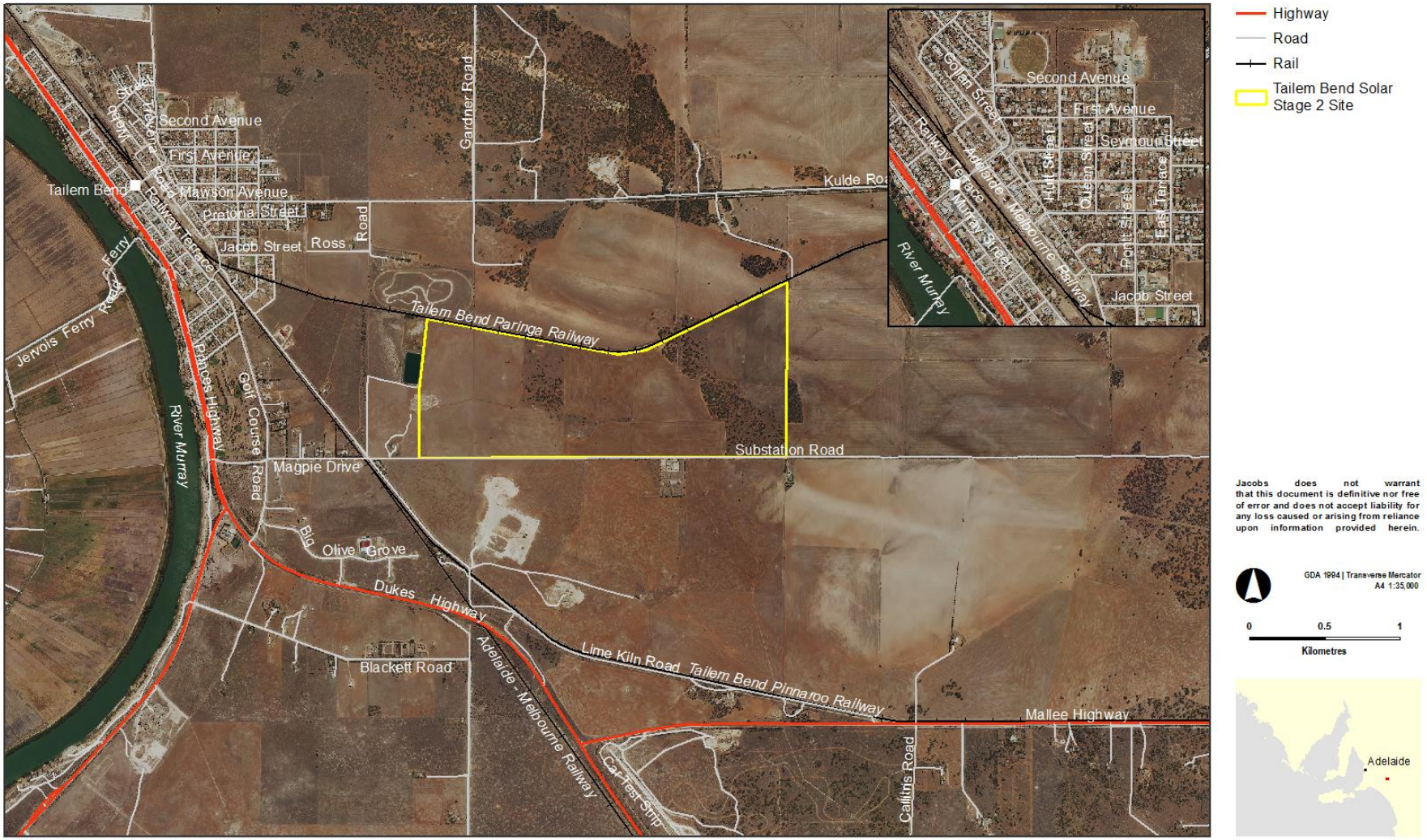

Figure 1.1: Local Road Network

2. Traffic conditions

2.1 Existing traffic volumes

Traffic counts are available for the DPTI roads in the area and are presented in Table 2.1. The traffic data is publically available data extracted from the DPTI website[1] in November 2017.

Table 2.1: DPTI Road Traffic Volumes

Road Section	AADT[1] Estimate	Commercial Vehicles
Dukes Highway (Mallee Highway to Princes Highway)	5000	1500 (30%)
Dukes Highway (McIntosh Way to Mallee Highway	4200	1500 (35.5%)
Princes Highway (Dukes Highway to South Eastern Freeway)	8000	1650 (20.5%)
Princes Highway (Dukes Highway to Langhorne Creek Road	1900	280 (14.5%)
Mallee Highway (Old Dukes Highway to Dukes Highway)	950	230 (24%)

[1]Average Annual Daily Traffic

A Council traffic count was undertaken in June 2017 for Substation Road and Lime Kiln Road. Unfortunately, due to an equipment failure the data was unavailable for the Lime Kiln Road count. The volumes from the Substation Road count are presented in Table 2.2. This information was provided by Coorong District Council based on a MetroCount survey undertaken between 16 May and 22 June 2017.

Table 2.2: Council Road Traffic Volumes

Road Section	Daily Estimate	Peak Hour
Substation Road	24 vehicles	6 vehicles (max PM peak volume)

2.2 Heavy vehicles routes

Mallee Highway, Dukes Highway and Princes Highway are all gazetted heavy vehicle routes (DPTI, November 2017). A summary of the vehicle types gazetted on each of these roads is presented in Table 2.3.

Table 2.3: Gazetted Heavy Vehicle Routes

Vehicle Type	Mallee Highway	Dukes Highway	Princes Highway
26m B Double	✓	✓	✓
23m Vehicle Carrier	✓	✓	✓
25m Vehicle Carrier	-	✓	✓
Rigid Truck and Dog (23m)	✓	✓	✓
25m, 59.5t Low Loader	✓	✓	✓
6 Axle Crane (Day Travel)	✓	✓	✓
PBS Level 2A Vehicles	✓	✓	✓
PBS Level 2B Vehicles	-	✓	-

[1] DPTI (2015) https://dpti.sa.gov.au/traffic_volumes

2.3 Construction vehicle requirements

The types of vehicles that will be used during construction are described in the following sections. These comprise light vehicles, heavy construction vehicles and oversized vehicles. A construction traffic estimate for the TB2SP is provided in Section 2.3.4.

During construction, adequate temporary parking shall be provided adjacent to the construction site office within the boundary of the project site. Once operational, car parking spaces will be provided for operational and maintenance staff. No parking on DPTI or Council roads will be required as there is sufficient space within the subject site for construction vehicle parking and marshalling.

2.3.1 Light vehicles

Light vehicles will be used daily to transport personnel and equipment to the subject site. Light vehicles will have a minimal impact on the roads compared to the heavy construction traffic. As such it is proposed that this type of vehicle can use a greater selection of roads and access routes compared to heavy vehicles.

Light vehicles will travel along the designated heavy vehicle routes, where practical to minimise the disruption on other roads. When travelling from the subject site to the Tailem Bend township, light vehicles will travel on the available public roads, primarily Lime Kiln Road.

2.3.2 Oversize vehicles

Oversized and overmass (OSOM) vehicles (which exceed the mass and dimension limits for general access vehicles) will be used to transport the major components of the TB2SP, including the inverters. All contractors that use oversized vehicles shall consult with, and obtain a permit from the National Heavy Vehicle Regulator (NHVR) prior to the commencement of transportation and will provide escort vehicles in accordance with legal and DPTI requirements.

Any oversized and overmass vehicles shall have appropriate permits (NHVR) and abide by the requirements of both the NHVR and DPTI.

2.3.3 Heavy construction vehicles

Heavy construction vehicles (exceeding 4.50 tonnes Gross Vehicle Mass) that will travel on the transport routes include:

- Earth moving equipment;
- Trucks to deliver materials such as cabling, building materials, electrical equipment, etc; and
- Trucks delivering aggregate, sand, cement and water.

Heavy construction vehicles that use public roads (DPTI or Council) need to be road registered otherwise they shall be required to be transported using an appropriate road registered transporter (i.e. by low loader). They may also need to source appropriate permits from the NHVR if the proposed route is not gazetted for their use.

2.3.4 Estimated construction traffic volumes

A high level estimate of material quantities and number of loads to be transported to the subject site has been completed by Equis. While total material volumes will be large, given the scale of the site, it is considered unlikely that daily or peak hourly volumes of generated traffic will exceed any relevant traffic capacity thresholds. The primary impacts of the TB2SP will be on pavement wear and road condition.

A summary of the estimated number of vehicle movements that are expected to take place during the construction period is shown in Table 2.4. The estimated construction traffic volumes have been provided by Equis, for a construction period of 12 months, with deliveries of equipment commencing in August 2018. Table 2.4 includes the total construction impact on Substation Road based on the current proposed combined construction programs for TBSP & TB2SP. It assumes that 50% of the TBSP heavy vehicle traffic and 90% of

the light vehicle traffic will use Substation Road and the remainder will use the alternative Lime Kiln Road access point (this is considered a conservative assumption). The majority of TBSP vehicles using Substation Road will be light vehicles and shorter heavy vehicles as the main laydown area for larger vehicles is located off Lime Kiln Road. The TB2SP will use Substation Road as the only route for solar component delivery and light vehicles.

It should be noted that depending on the construction methodology of the contractor, and later detailed design, construction traffic volumes may vary from the estimates.

Table 2.4: Estimated Construction Traffic (Substation Road)

		2018								2019			
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
TBSP (Substation + Lime Kiln Road)	Trucks	175	240	247	329	346	398	377	37	50			
	Light Vehicles	350	480	480	480	480	480	480	300	200			
TB2SP	Trucks				162	221	230	306	321	370	350	35	46
	Light Vehicles				325	446	446	446	446	446	446	280	186
Total (Substation Road)	Trucks	88	120	124	**327**	**394**	**429**	**495**	**340**	**395**	**350**	**35**	**46**
	Light Vehicles	315	432	432	757	878	878	878	716	626	446	280	186
Daily (Substation Road)	Trucks	4	6	6	16	20	21	25	17	20	18	2	2
	Light Vehicles	16	22	22	38	44	44	44	36	31	22	14	9
	Total	20	28	28	**54**	**64**	**65**	**69**	**53**	**51**	**40**	**16**	**12**

Note: This number represents the vehicles travelling to the subject site; therefore, the total number of trips generated (in/out of the subject site) will be double what is shown in the table.

2.4 Operational vehicle requirements

2.4.1 Vehicles types

The types of vehicles that will be used during TB2SP operation comprise of light vehicles for staff and periodic maintenance. From the Substation Road access, a compacted hardstand area will be used for vehicle parking. As such, no parking or areas for marshalling on DPTI or Council roads will be required during formal operation of the project.

2.4.2 Estimated operational traffic volumes

The TB2SP is designed to operate with minimal workforce requirements. Staffing on site will typically be up to 1 to 3 persons, who will either perform routine maintenance and repairs or be part of the sites administration. Staff presence will generally be between the hours of 9am to 5pm Monday to Friday, and on occasions when required outside of those times. It is anticipated that the panels will be cleaned on a minimal basis, as required depending on the soiling conditions of the panels and the annual rainfall. Consequently, once operational the traffic generated by that part of the proposed development will be negligible.

3. Access routes

As previously highlighted, OSOM vehicles will be used to transport the major components of the TB2SP including the inverters. These major components are most likely to be sourced from Adelaide and are anticipated to access the site from the Mallee Highway or the Dukes Highway. The majority of construction traffic (i.e. light vehicles and trucks) are anticipated to access the site from Murray Bridge or Adelaide via the Princes Highway

A TMP route map depicting access arrangements for construction traffic accessing the subject site from the Mallee Highway (Mallee Highway Access) is shown in Figure 3.1. The figure also shows a secondary access off Dukes Highway that could be utilised by vehicles less than 11m in length. The Mallee Highway Access is proposed to be the principal point of access to the subject site, with the Dukes Highway access identified as an alternative route if and when required. The access routes have been selected to minimise construction traffic passing through the Tailem Bend town centre. The selected access routes are capable of handling the construction vehicles (e.g. length, mass, turning circles) and are also clear of vegetation or overhead constraints.

The two access routes have been inspected by Joe Haigh of Jacobs on 7 November 2017 and their condition is documented in the following sections. A route assessment will be carried out on both routes prior to construction when the dimensions of the largest delivery vehicle are known.

Light vehicles may access Tailem Bend via alternate routes for day to day access for additional services within the township (e.g. food and beverage, or minor service providers).

Note that a dilapidation report was undertaken for Substation Road in April 2017 (contained in Appendix A), however this road has since been resheeted (in June 2017). Jacobs understand that this resheeting work was for the entire 2.8km length of Substation Road and consisted of 40mm Crushed Rubble, Class 2. This resheeting work was evident on the site inspection undertaken for this report in November 2017. This recent road condition will be considered by Equis as the baseline road condition preconstruction.

Site Access / Construction Route

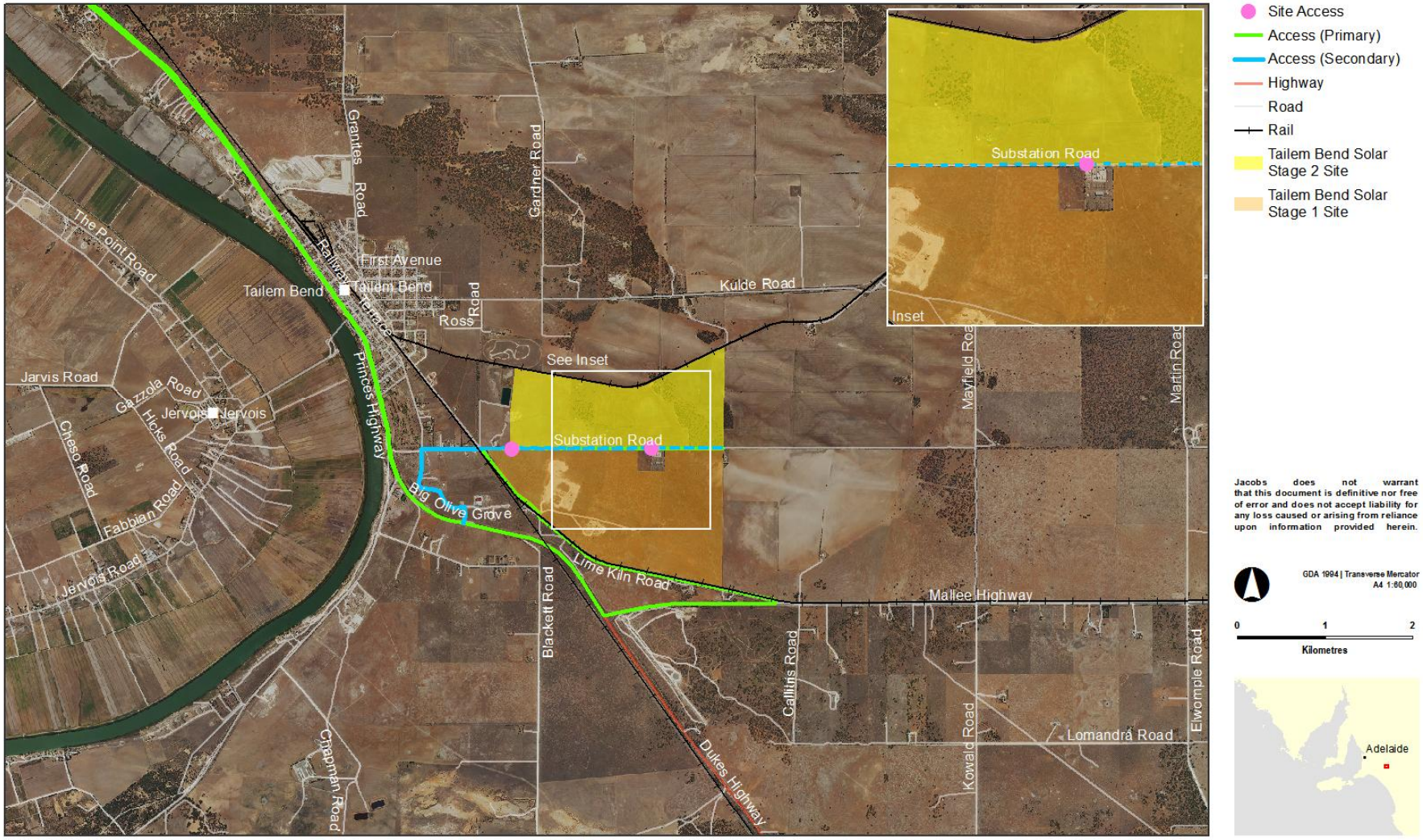

Figure 3.1: Site Access / Construction Access

3.1 Mallee Highway access (primary)

Construction traffic accessing the site from Murray Bridge and Adelaide would access the Mallee Highway from the Dukes Highway, south of Tailem Bend. From the Mallee Highway, traffic will turn left onto Lime Kiln Road and then turn right into Substation Road. Access to the subject site will be via an access point off Substation Road. A summary of the roads proposed to be utilised by the TB2SP for access from Mallee Highway are presented in Table 3.1.

Table 3.1: Summary of Primary Access Route off Mallee Highway

Name	Description	Photo
Mallee Highway	Major highway providing accessibility between Adelaide and Sydney. At the intersection with Lime Kiln Road, it consists of a sealed single carriageway, with one lane in each direction. A sealed apron is present on the northern side of the Highway for access to/from Lime Kiln Road. Clear line of sight in both directions and no identified overhead or vegetation constraints relevant to vehicle movements on access route.	
Lime Kiln Road	Sealed single carriageway, with one lane in each direction. A passive (give way southbound, stop northbound) railway level crossing is located adjacent to the access of the existing non-operational quarry (refer adjacent photo). No identified overhead or vegetation constraints relevant to vehicle movements on access route.	

Name	Description	Photo
Substation Road	Unsealed local road. Sealed apron at intersection with Lime Kiln Road (refer photo). An overhead electrical service exists at the intersection with Lime Kiln Road and runs along the southern side of Substation Road. There is evidence of recent vegetation trimming along Substation Road (refer photo 2).	 
Substation Road Access Point 1 to the TB2SP	Proposed access point from Substation Road (approximate location west of the existing substation). This access point will be upgraded as part of the site development to the Australian Road Research Board (ARRB) Unsealed Roads Standards (as agreed with the Coorong District Council). This will include widening, relocated fencing and any required pavement widening for the proposed OSOM vehicles.	
Substation Road Access Point 2 to the TB2SP	Proposed access point from Substation Road (approximate location east of the existing substation). Service protection of the adjacent gas main may be required at this location. This will be developed as part of the site access during detailed design. The site access will be designed to ARRB Unsealed Roads Standards (as agreed with the Coorong District Council).	

3.2 Dukes Highway access (secondary)

Traffic accessing the subject site from Murray Bridge and Adelaide could utilise a secondary access from the Princes Highway to the Dukes Highway and the following roads to access the subject site:

- Dukes Highway;
- Toscani Road;
- Big Olive Grove;

- Golf Course Road;
- Magpie Road; and
- Substation Road.

Access to Magpie Road is restricted to vehicles under 11m. As such, any vehicles over this length approaching from the Dukes Highway will continue to the Mallee Highway and access the site via the Mallee Highway access route.

A summary of the roads proposed to be utilised by the TB2SP for access from Dukes Highway are presented in Table 3.2.

Table 3.2: Summary of Secondary Access Route off Dukes Highway

Name	Description	Photo
Dukes Highway	Major highway providing accessibility between Adelaide and Melbourne. At the intersection with Tuscany Road, it consists of a sealed carriageway, with one lane in each direction, and slip-lanes for traffic accessing the industrial trade park from both directions. Clear line of sight in both directions and no identified overhead or vegetation constraints relevant to vehicle movements on access route.	
Tuscany Road / Big Olive Grove / Golf Course Road	Sealed single carriageway, with one lane in each direction. Roads form part of the Tailem Bend Agri-Industrial Trade Park. No identified overhead or vegetation constraints relevant to vehicle movements on access route.	
Magpie Road	Sealed single carriageway, with one lane in each direction. No identified overhead or vegetation constraints relevant to vehicle movements on access route. Access is restricted to vehicles under 11m length.	

Name	Description	Photo
Magpie Road / Lime Kiln Road	There is an active control railway level crossing on Magpie Road just west of the intersection with Lime Kiln Road and Substation Road. As this crossing has a boom gate no other protection is proposed. Vehicles will need to be mindful of the short separation between the railway line and Lime Kiln Road and avoid queuing over the rail line. An overhead electrical service is location at the intersection of Magpie Road and Lime Kiln Road.	
Substation Road	Unsealed local road. Sealed apron at intersection with Lime Kiln Road (refer photo). An overhead electrical service exists at the intersection with Lime Kiln Road and runs along the southern side of Substation Road. There is evidence of recent vegetation trimming along Substation Road (refer photo 2).	 
Substation Road Access Point 1 to the TB2SP	Proposed access point from Substation Road (approximate location west of the existing substation). This access point will be upgraded as part of the site development to the ARRB Unsealed Roads Standards (as agreed with the Coorong District Council). This will include widening, relocated fencing and any required pavement widening for the proposed OSOM vehicles.	

Name	Description	Photo
Substation Road Access Point 2 to the TB2SP	Proposed access point from Substation Road (approximate location east of the existing substation). Service protection of the adjacent gas main may be required at this location. This will be developed as part of the site access during detailed design. The site access will be designed to ARRB Unsealed Roads Standards (as agreed with the Coorong District Council).	

4. Traffic management

This section sets out the traffic management for both construction and operational traffic.

4.1 DPTI / Council involvement

Regular communications shall be held prior to the commencement of construction until the end of the construction period, between representatives of DPTI, Council and Equis (and/or contractor).

This communication shall include the following traffic management and maintenance items:

- Permitting requirements (if applicable);
- Planned DPTI / Council maintenance activities;
- Road safety and signage including 'way-finding' signs and any temporary traffic control or speed restrictions;
- Delivery schedule for OSOM items; and
- Any other particular issues that may arise during construction.

4.2 Traffic requirements

The requirements detailed within this TMP and in particular this section will form part of the site induction for all personnel working at the subject site to ensure that important safety information, and any regulatory or permitting requirements, are communicated and strictly adhered to.

4.2.1 Driving

Driving to the existing road conditions shall apply at all times and vehicles shall be followed at a safe distance in accordance with Australian Road Rules and guidelines.

Overtaking is not encouraged on the transportation routes for construction vehicles. If a driver is in a situation where they are required to overtake a vehicle then it is the driver's responsibility to ensure it is safe to do so and will not put any passengers, drivers or other road users at risk. Caution shall be used when operating around school buses (if applicable) and stationary vehicles. Prior to the commencement of construction, Equis (or contractor) will contact Link SA and/or the local schools to determine the current routes utilised by school buses, and schedule vehicle movements to avoid conflict where practicable.

Exhaust brakes, or air brakes shall not be utilised by OSOM vehicles on local roads within the proposed access routes (i.e. the Council owned roads).

Drivers on the site shall be fit for work and abide by their licensing requirements and any additional requirements provided at the site induction, including project specific drug, alcohol and fatigue policies.

Any vehicle accident or collision, including collisions with animals, involving project traffic shall be reported to Equis as well as to the police in accordance with the road rules.

4.2.2 Construction site access

OSOM vehicle access to the subject site will only occur via the nominated access routes.

Construction activities and deliveries to the subject site are expected to occur in daylight hours, typically between 7 a.m. and 7 p.m. Monday to Friday.

4.2.3 Weather

Adverse weather conditions can affect the condition of unsealed roads; this could include storms, prolonged wet weather conditions and strong winds. Equis shall inspect the road condition of unsealed roads following adverse weather events. Any issues shall be reported to Council and a log of occurrences shall be maintained including photos and any remediation.

In consultation with the Council, Equis will either restrict construction movements or recommend that the road be closed if unsafe road conditions result due to severe weather conditions.

4.2.4 Speed

Through site inductions, all personnel shall be made aware that the posted speed limit is the maximum speed for safe driving in ideal circumstances. This speed should be adjusted where conditions dictate. The safe operating speeds for oversized and over mass vehicles should be adhered to at all times as dictated by the vehicle type operating manual, or any speed limiting regulations.

During times of increased heavy and oversized vehicle movements, discussions will take place between Equis, DPTI and Council during the regular communications to determine whether any temporary speed restrictions should be implemented.

4.2.5 Communications

Equis and all contractors shall ensure that clear communication protocols are in place for communication between drivers (heavy and light vehicles). This protocol shall be described as part of the site induction.

Equis and their contractors shall communicate any proposed changes to traffic management practices to DPTI and/or Council at the regular meetings.

4.2.6 Way-finding signage

Signage shall be provided where necessary to direct construction traffic along the approved transport routes to access the subject site entry. The specific location of any way-finding signage will be determined prior to construction in accordance with safety and regulatory requirements. Locations of the signage are to be provided by Equis or the contractor and discussed with DPTI and Council if any changes occur. These temporary 'way-finding' signs shall be installed in accordance with DPTI standards[2]. It will be the responsibility of Equis and/or the contractor to ensure the signage is maintained and fit for purpose during the construction phase of the project.

4.2.7 Road delineation

Guide posts are used to delineate the edge of the road formation, particularly where horizontal and vertical curves are present. No new guideposts are proposed to be installed as part of this Traffic Management Plan as the proposed route is fairly straight with guideposts and signage around existing intersections.

4.2.8 Overhead utilities

Although no overhead constraints have been identified, a follow up survey of overhead services will be undertaken prior to the first movements of OSOM vehicles. The operators of these vehicles shall survey the routes to be used and obtain relevant permits from the utility companies where required, including (but not limited to):

- SA Power Networks;
- ElectraNet;

[2] DPTI (2017b) https://www.dpti.sa.gov.au/standards/tass

- Optus; and
- Telstra.

4.2.9 Dust suppression

Dust suppression shall be applied to unsealed roads where considered necessary (i.e. during an increase in construction vehicle numbers or after a prolonged period with no rain). This may be done using water, or an appropriate dust suppressant subject to the site specific nature of the road surface. In some cases, a reduction in speed may also be an appropriate dust control measure. This will be covered in the construction Environmental Management Plan (EMP).

4.2.10 Railway crossings

Construction traffic will be required to cross the disused Tailem Bend - Pinaroo railway line on Lime Kiln Road. This was a previous seasonal grain transport route which is now disused. The railway crossing is passive, controlled only with give way and stop signage. The railway line is managed by Genesee and Wyoming Australia Pty Ltd.

Equis will engage with Genesee and Wyoming prior to the commencement of construction to determine if there are any unscheduled train movements. A point of contact with Genesee and Wyoming will be established to identify any unscheduled train movements during the construction period. As unscheduled train movements are still possible, the use of this rail crossing is considered a risk and will be communicated to all staff and contractors using the site during the induction process.

The secondary access route identified crosses the main ARTC rail line on Magpie Drive as well as the Tailem Bend – Pinaroo railway line. This is an active crossing with approximately 12 trains per day up to 1800m in length. Equis will engage with ARTC prior to the commencement of construction to determine the train movement schedule and undertake regular consultation to identify any unscheduled movements or changes to the schedule. As unscheduled train movements are still possible, the use of this rail crossing is considered a risk due to potential queuing over the crossing and will be communicated to all staff and contractors using the site during the induction process.

4.3 Infrastructure maintenance

Equis acknowledges that there will be additional wear and tear on the access routes (Lime Kiln Road and Substation Road) due to construction traffic associated with the TB2SP. This impact will be managed through the use of pre and post construction condition audits.

At the completion of the construction period Equis propose to reasonably rehabilitate the Coorong Council roads that are used by Project vehicles within the primary access route (i.e. Lime Kiln Road and Substation Road) to a condition no worse than prior to the commencement of works. This level is to be agreed between Equis and Council prior to the beginning of the construction works. A record of the pre-construction condition shall be made for reference post construction.

Council should acknowledge that whilst construction traffic may be adding to the deterioration of roads, Equis cannot be held responsible for all damage as the roads are also used by heavy vehicles and other non-TBSP and non-TB2SP related traffic.

To support this process, an audit of road conditions along the nominated access routes will be undertaken prior to the commencement of construction of TBSP & TB2SP. The condition audit will occur following the completion of any road upgrades (if required). A post construction condition audit will be undertaken to determine any remedial action required to repair roads within the nominated access route degraded as a result of TBSP & TB2SP related construction traffic. The roads considered to be part of the audit are limited to Lime Kiln Road and Substation Road.

When work is being undertaken on the council roads, traffic management signage should be in place according with DPTI standards[3] and to AS1742.3 where no DPTI standard is available.

A level of inspections on the condition of the access routes is outlined in Section 5, along with a proposed maintenance intervention levels.

[3] https://www.dpti.sa.gov.au/standards/tass

5. Road maintenance intervention levels

The maintenance intervention levels and maintenance requirements for the TB2SP are shown in Table 5.1. The level of inspection proposed for the transport route is shown in Table 5.2. Any changes to these levels shall be agreed to between Equis, DPTI and Council during the regular communications.

Table 5.1: TB2SP Road Maintenance Intervention Levels

Item No.	Defect	Intervention Level	Maintenance Requirement	Repair Timeline
1.0 Signs and Delineation				
1.1	'Way-finding' signage to be visible and legible.	Dirty signage (sign to be clearly legible from 150m at night with low beams)	Clean signs	1 week
		Missing or damaged signs	Repair or replace signs	1 week
1.2	Delineation as necessary to enhance safety.	Damaged guideposts where damage is due to construction traffic	Replace/fix guideposts	2 weeks
2.0 Unsealed Road Pavement				
2.1	Wheel rutting	Wheel ruts at a depth of 80mm	The application of gravel or crushed rock to the wearing surface to strengthen and reshape the surface and/or; Light formation grading	2 weeks
		Wheel ruts at a depth of 150mm	Gravel/material supply – heavy formation grading	1 weeks
2.2	Potholes	Potholes to a depth of 80mm or greater than 300mm diameter	The application of gravel or crushed rock to the wearing surface to strengthen and reshape the surface	2 weeks 1 week when on light vehicle trafficable areas.
2.3	General pavement defects (Windrows or materials, scour channels, corrugation, course surface material, loose material)	Safe travelling speed is reduced to ≤ 80% of the posted speed	Light formation grading or; Remove and replace formation material or; Formation resheeting (50 to 100mm depth)	2 weeks
3.0 Sealed Road Pavement				
3.1	Loose Material	Loose material (i.e. road base from unsealed roads) deposited onto sealed sections of road	Removal of loose material from sealed roads.	1 week

Table 5.2: Levels of Inspection

Type of Inspection	Level of Inspection
Weekly Inspections	A weekly inspection by the site superintendent to record current visual condition of the access route.
Passive Inspections	Passive visual inspection of the route by site personnel, with any issues being reported to the site superintendent daily
During/After heavy rain event	Inspecting the road condition to check if: • Work is required (i.e. intervention level) or; • A temporary closure or speed restriction should be recommended to the Council / DPTI
Prior to OSOM deliveries	General road condition inspection including clearances and sight distances (may be incorporated in weekly inspection)
Pre and Final inspection & handover to Council	Overall inspection at the start and completion of the construction period to agree the final level of remediation of the route with a Council / DPTI representative

6. References

Austroads 2009, *AustRoads Guide to Road Design Set (Parts 1-8),* 21 December 2009.

Coorong District Council 2017, *Coorong District Council Development Plan*, URL: http://www.dpti.sa.gov.au/__data/assets/pdf_file/0011/250013/The_Coorong_District_Council_Development_Plan.pdf

Department of Planning, Transport and Infrastructure 2015, *Traffic Volumes,* September 2015, Online, URL: https://dpti.sa.gov.au/traffic_volumes.

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Department for Transport, Energy and Infrastructure 2008, *Code of Practice for the Transport of Oversize and Overmass Indivisible Loads and Vehicles,* May 2008, Online, URL: https://www.nhvr.gov.au/files/t072-sa-code-of-practice-transport-of-indivisible-items.pdf

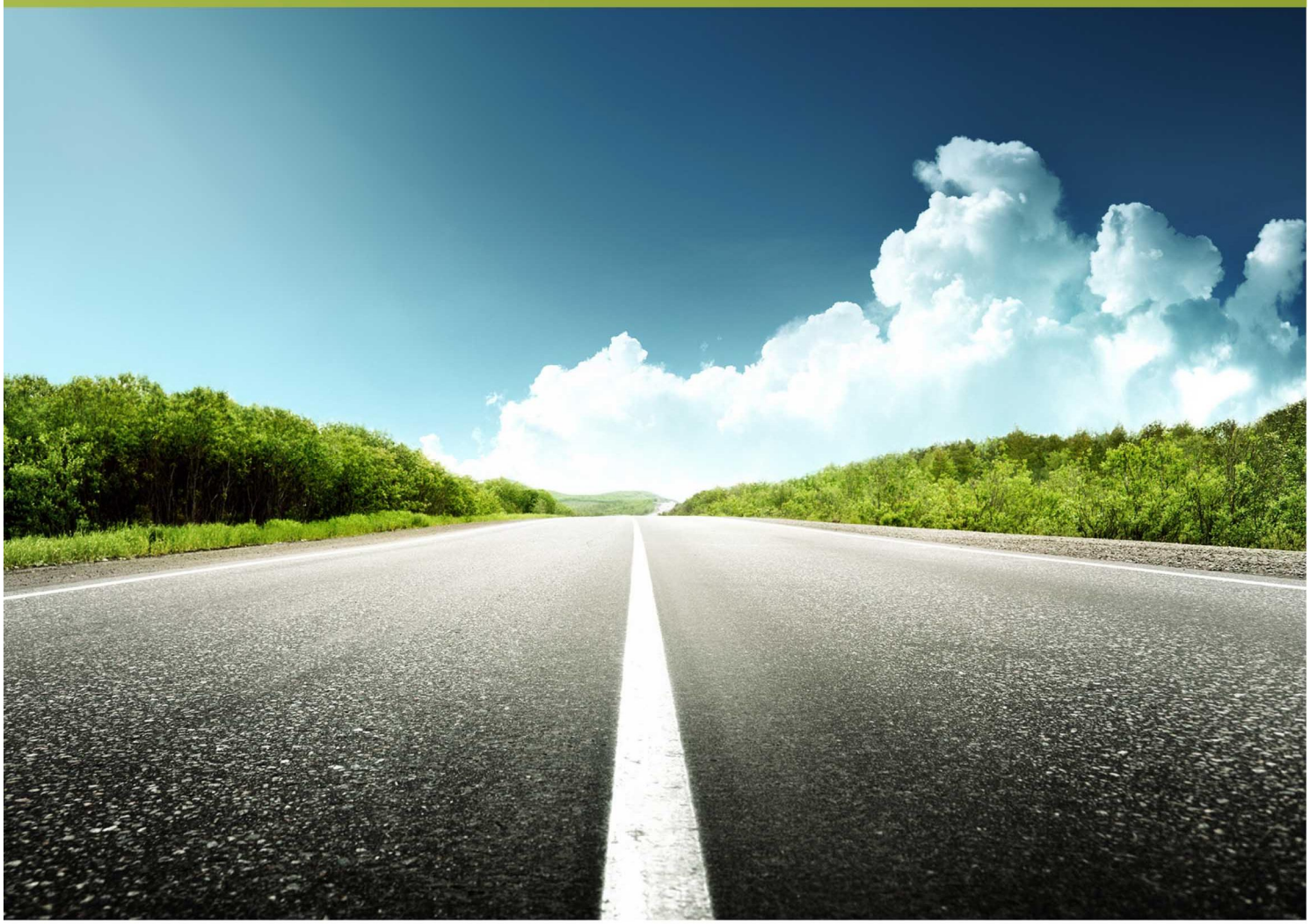
Department for Transport, Energy and Infrastructure 2011, *South Australian Heavy Vehicle Access Framework*, Version 2.1, October 2011, Online, URL: https://www.sa.gov.au/__data/assets/pdf_file/0004/44356/Heavy_Vehicle_Access_Framework_-_Revised_October_2011.pdf

MetroCount 2017, *Traffic data for Substation Road,* provided by Coorong District Council in November 2017.

Standards Australia, *AS 1742 SET-2014: Manual of Uniform Traffic Control Devices (Parts 1 – 15).*

Appendix A. Substation Road Dilapidation Report

REPORT



AQUENTA
A Jacobs Company

DILAPIDATION REPORT FOR SUBSTATION ROAD

April 2017

DOCUMENT TITLE: **DILAPIDATION REPORT FOR SUBSTATION ROAD**

PROJECT REFERENCE: **517023**

PURPOSE OF ISSUE: **Dilapidation Report**

Correspondence:

Aquenta Consulting Pty Ltd
14 Ebenezer Place
Adelaide SA 5000

Tel + 61 8 8231 3330
adelaide@aquenta.com.au

ISSUE	DESCRIPTION OF AMENDMENT	AUTHOR	CHECKED	APPROVED	DATE
0	Dilapidation Report	MW	RM	RM	21/3/2017
1	Dilapidation Report	MW	RM	RM	21/3/2017
2	Dilapidation Report	MW	RM	RM	22/3/2017
3	Final Dilapidation Report	MW	RM	RM	05/04/2017

Previous issues of this document shall
be destroyed or marked SUPERSEDED.

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FIGURES AND TABLES

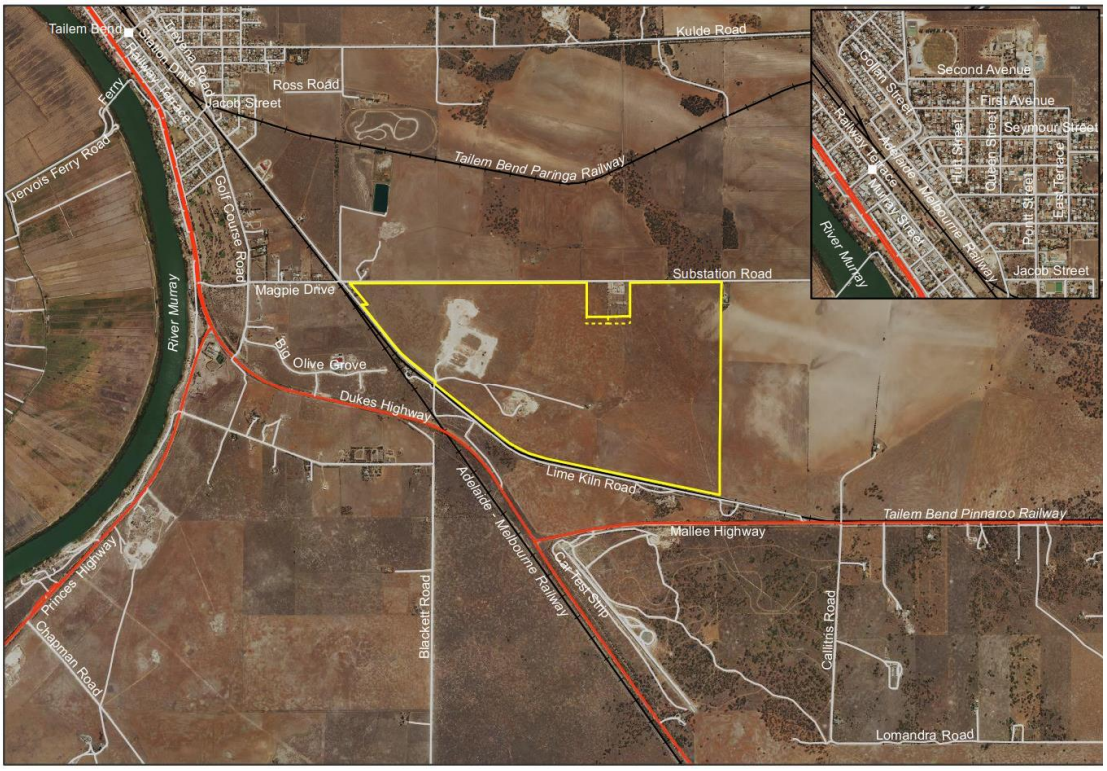
Figure 1 List of Appendices

APPENDIX	DESCRIPTION
A	Report Conditions
B	Photographs from site visit on 17 March 2017

1 Executive Summary

1.1 SCOPE OF REPORT

Aquenta Consulting / Jacobs have been engaged by Snowy Hydro Limited to undertake a dilapidation report for Substation Road at Tailem Bend. This is an unsealed section of road approximately 2.8km long, which is expected to become used for an access road during construction, thus this report serves as a record of this roads condition prior to its future use. The details below summarise the details of the road and the date of assessment:



Site Address: Substation Road, Tailem Bend

Property Owner: Public Road

Inspection/Report For: Mr Ian Smith

Date/Time of inspection: 17 March 2017; from 7am to 2pm

Attending inspection: Mr Rocky Mazzone (Aquenta); Mr Nishael Naidoo (Aquenta)

Weather conditions: Fine

1.2 EXISTING CONDITIONS

A list of all defects and existing conditions noted at the visit are included in the Schedule of Defects along with the list of relevant photos. The photos are provided in Appendix B of the report

Along with the condition of Substation Road, we have also taken photos of some peripheral items which may be subject to damage, for instance, if a vehicle swerves off the road. These items are further explained below:

Trees/shrubs: a number of trees/shrubs line the road, these could be damaged by vehicles, but conversely they could cause damage with overhanging limb or restrict visibility.

Stobie poles / overhead lines: being a road to a substation, there is some electrical infrastructure along this road. We have taken pictures of typical items, but also some specific items, such as an overhead wire which could be struck by tall vehicles or loads.

Fences: We have provided some pictures of typical fencing and the condition of these to both the Northern and Southern side of Substation Road, plus there is also pictures of the substation fencing. The fencing varies in types, heights and condition.

1.3 SITE ACCESS

Access to the road on the day was provided by: N/A, road accessible by public generally.

1.4 REPORT CONDITIONS

For a list of qualifications regarding this report, please refer to Appendix A:

1.5 DOCUMENTS REVIEWED

This Report is based on the following information provided:

- Jacobs, Preliminary Traffic Management Plan as an insight into the Tailem Bend Solar Project.

1.6 LIMITATIONS OF REPORT

The report contains the following limitations:

- Review limited to Substation road only, no review of Lime Kiln Road or western boundary of site.

1.7 ABBREVIATIONS

The following abbreviations are used in the table below

CH: Chainage

CTQR: Cement Treated Quarry Rubble

u.n.o.: unless noted otherwise

2 Existing Conditions Survey

2.1 SCHEDULE OF DEFECTS

Table 1 Schedule of Defects

PHOTO NO.	CH	PHOTO LOCATION AND / OR DIRECTION	COMMENT
IMG_2603	0.0	Reference Point: T-Junction of Lime Kiln Road & Substation Road	Shows the extent of seal at the junction of Lime Kiln Road (fully sealed) & Substation Road (unsealed road)
IMG_2606	19.3		Shows pits/pot hole formation in road surface. Also visible are loose stones on the surface, which are likely to be flicked by vehicles or may become lodged in tyres and dispersed elsewhere
IMG_2607	26.1	No. 6 Substation Road	Photo shows pits, undulations, and uneven surface finish leading into the property at the junction of Lime Kiln and Substation Road (adjacent Stobie Pole no. 41827)
IMG-2608	60.5		This photo illustrates that the road currently has patches of solidified surface CTQR which have become exposed. These are warn smooth as they are above the general road surface. These may cause 'noise' from vehicles as they travel over these lumps. Pits have formed adjacent these, where the wheels drop after coming off the solidified sections
IMG_2609	78	Train crossing sign	Vehicle detector loops
IMG_2610	96.1	Centre of road	Solidified CTQR which has had the weaker surface surrounding it wear away, forming pits
IMG_2611	113.2	Centre of road	Various pot holes have formed in the road outside the driveway to private property
IMG_2612	150	Looking back toward Lime Kiln Road	Typical section of road
IMG_2613	163	Over approximately 8m section	Shows pits/pot hole formation in road surface. Also visible are loose stones on the surface, which are likely to be flicked by vehicles or may become lodged in tyres and dispersed elsewhere
IMG_2615	200 to 230	Over 30m section	Close up photo showing exposed rock surface which given a "vibrating" effect when driving over

IMG_2617	240	Road elevation	This side view photo how the road rises and falls just over a relatively short section of road
IMG_2618	252	Over 10m section	The uneven wearing of the surface is visible here with harder surface areas remaining and looser areas becoming pitted
IMG_2619	300 to 320	Over 20m section	This section of road has large clumping of materials, some of which are becoming loose on the surface. Smaller pebbles/stones have been flicked off to the sides (or can be collected in truck tyres and taken off the road altogether)
IMG_2620	320		Visible here are the solidified components of the CTQR road, which are harder than the surrounding materials and have subsequently been exposed
IMG_2621	350		Visible here are the solidified components of the CTQR road, which are harder than the surrounding materials and have subsequently been exposed
IMG_2622	350 to 445		This section of road has extensive exposed solidified CTQR / rock surface which has a very noticeable “vibrating” effect on vehicles when driving over
IMG_2623	600	Over 155m section	This section of road also has exposed solidified CTQR / rock surface which has a noticeable “vibrating” effect on vehicles when driving over, but this is not quite as severe as the previous section of road
IMG_2624	630 to 640		The uneven wearing of the surface is visible here with harder surface areas remaining and looser areas becoming pitted. There are several potholes which have formed here
IMG_2625	630 to 670	Over 40m section	The uneven wearing of the surface is visible here with harder surface areas remaining and looser areas becoming pitted. There are several potholes which have formed here
IMG_2626	670 to 1000	Over 330m section	The uneven wearing of the surface is visible here with harder surface areas remaining and looser areas becoming pitted. There are several depressions which have formed here
IMG_2627	1075		In this photo a number of trees/bushes are shown close to the road edge. These could be damaged by passing traffic (particularly when vehicles approaching each other from opposite directions)
IMG_2628	1090		Shows pits/pot hole formation in road surface. Also visible are loose stones on the surface, which are likely to be flicked by vehicles or may become lodged in tyres and dispersed elsewhere

IMG_2629	1110 to 1140	Over 30m section	Shows pits/pot hole formation in road surface. Also visible are loose stones on the surface, which are likely to be flicked by vehicles or may become lodged in tyres and dispersed elsewhere
IMG_2630	1200		The uneven wearing of the surface is visible here with harder surface areas remaining and looser areas becoming pitted.
IMG_2631	1270		Appears to be a shallow/unformed swale formed along the side of the road, this may be due to a requirement to drain and/or dissipate any rainwater runoff
IMG_2632	1390		The uneven wearing of the surface is visible here with harder surface areas remaining and looser areas becoming pitted. There are several potholes which have formed here
IMG_2633	1400 to 1410	Over 10m section	Shows pits/pot hole formation in road surface. Also visible are loose stones on the surface, which are likely to be flicked by vehicles or may become lodged in tyres and dispersed elsewhere
IMG_2634	1440 to 1460	Over 20m section	Appears to be a shallow/unformed swale formed along the Northern side of the road, to allow runoff to drain and/or dissipate
IMG_2635	1485		The uneven wearing of the surface is visible here with harder surface areas remaining and looser areas becoming pitted. There are several potholes which have formed here
IMG_2636	1615		Visible here are the solidified components of the CTQR road, which are harder than the surrounding materials and have subsequently been exposed
IMG_2637	1620	Looking toward substation	In this photo a number of trees/bushes are shown close to the road edge. These could be damaged by passing traffic (particularly when vehicles approaching each other from opposite directions
IMG_2638	1706		Shows pits/pot hole formation in road surface. Also visible are loose stones on the surface, which are likely to be flicked by vehicles or may become lodged in tyres and dispersed elsewhere
IMG_2639	1812		Shows pits/pot hole formation in road surface. Also visible are loose stones on the surface, which are likely to be flicked by vehicles or may become lodged in tyres and dispersed elsewhere
IMG_2640	1824		The uneven wearing of the surface is visible here with harder surface areas remaining and looser areas becoming pitted. There are several potholes which have formed here.
IMG_2641	1850		Visible here are the solidified components of the CTQR road, which are harder than the surrounding materials and have subsequently been exposed

IMG_2642	1860		The uneven wearing of the surface is visible here with harder surface areas remaining and looser areas becoming pitted. There are several potholes which have formed here.
IMG_2643	1917	Property adjacent to substation	Photo shows uneven unsealed access track into property next to the substation
IMG_2644	1943		Visible here are the solidified components of the CTQR road, which are harder that the surrounding materials and have subsequently been exposed
IMG_2645	1960		Driveway into substation (1st location). Visible dip in the road, will act as drainage channel in rainy periods
IMG_2646	1960	Substation	Driveway into substation (1st location). Visible dip in the road, will act as drainage channel in rainy periods
IMG_2647	1980	Adjacent Substation	Tree adjacent entry to substation
IMG_2648	2000		Visible here are the solidified components of the CTQR road, along with what appears to be some localised pockets of rock, both of which are harder that the surrounding materials and have subsequently been exposed
IMG_2649	2030		Visible here are the solidified components of the CTQR road, along with what appears to be some localised pockets of rock, both of which are harder that the surrounding materials and have subsequently been exposed
IMG_2650	2030	Substation	Driveway into substation (2nd location). Visible dip in the road, will act as drainage channel in rainy periods
IMG_2651	2040	Adjacent Substation	Road verge tapers off the side of the road into what appears to be an area that will be subjected to ponding during wet weather (between road & substation)
IMG_2652	2082	Substation	Driveway into substation (3rd location). Some localised potholes forming (see foreground)
IMG_2653	2097	Centre of photo	Large dip / channel visible in the road. Will act as channel during periods of rain
IMG_2654	2112		Visible here are the solidified components of the CTQR road, which are harder that the surrounding materials and have subsequently been exposed
IMG_2655	2246		Visible here are the solidified components of the CTQR road, which are harder that the surrounding materials and have subsequently been exposed

IMG_2656	2325 to 2355	Over 30m section	Visible here are the solidified components of the CTQR road, which are harder that the surrounding materials and have subsequently been exposed
IMG_2657	2425		Shows a dip in the road at entrance gates to private property
IMG_2658	2565	Looking back toward substation	Shows a typical section of the Substation Road (u.n.o.)
IMG_2659	2637		Visible here are the solidified components of the CTQR road, along with what appears to be pockets of localised rock, both of which are harder that the surrounding materials and have subsequently been exposed
IMG_2660	2679		Visible here are the solidified components of the CTQR, along with what appears to be pockets of localised rock, both of which are harder that the surrounding materials and have subsequently been exposed
IMG_2661	2760		Shows access track to private property (unsurfaced) to the left and end of Substation Road into private property to the right
IMG_2662	2760		Shows access track to private property (unsurfaced) to the left and end of Substation Road into private property to the right
IMG_2663	2760	To private property	Shows access track to private property (unsurfaced)
IMG_2664	2760	Through to substation	Typical fence line condition/features on the Northern side of Substation Road
IMG_2665	2760	Through to substation	Typical fence line condition/features on the Southern side of Substation Road
IMG_2666	0	Through to substation	Typical fence line condition/features on the Northern side of Substation Road
IMG_2667	0	Through to substation	Typical fence line condition/features on the Southern side of Substation Road
IMG_2668	0	Through to substation	Typical road surface condition (u.n.o.)
IMG_2669			Photo of condition of a typical /power/stobie pole (u.n.o.)
IMG_2670			This photo shows the typical condition / features of Substation Road along its Northern edges
IMG_2671			This photo shows the typical condition / features of Substation Road along its Southern edges
IMG_2672			Photo shows a typical overhead power crossing

Appendix A: Report Conditions

We note that if this road is expected to be used for access that the road will be subject to:

- Heavy vehicles and equipment which will likely exacerbate the deterioration of the road
- During wet weather periods, the road may become softer / waterlogged which can lead to deterioration and rutting from heavy vehicle traffic passing over
- During dry periods dust from this unsealed road will drift over the private properties & substation as vehicles traverse the area.
- Road edges may become vulnerable to damage as large/wide vehicles pass each other and as such may need larger areas for passing.
- Possible impedance to private property access.

Appendix B: Photographs from Site Visit on 17 March 2017

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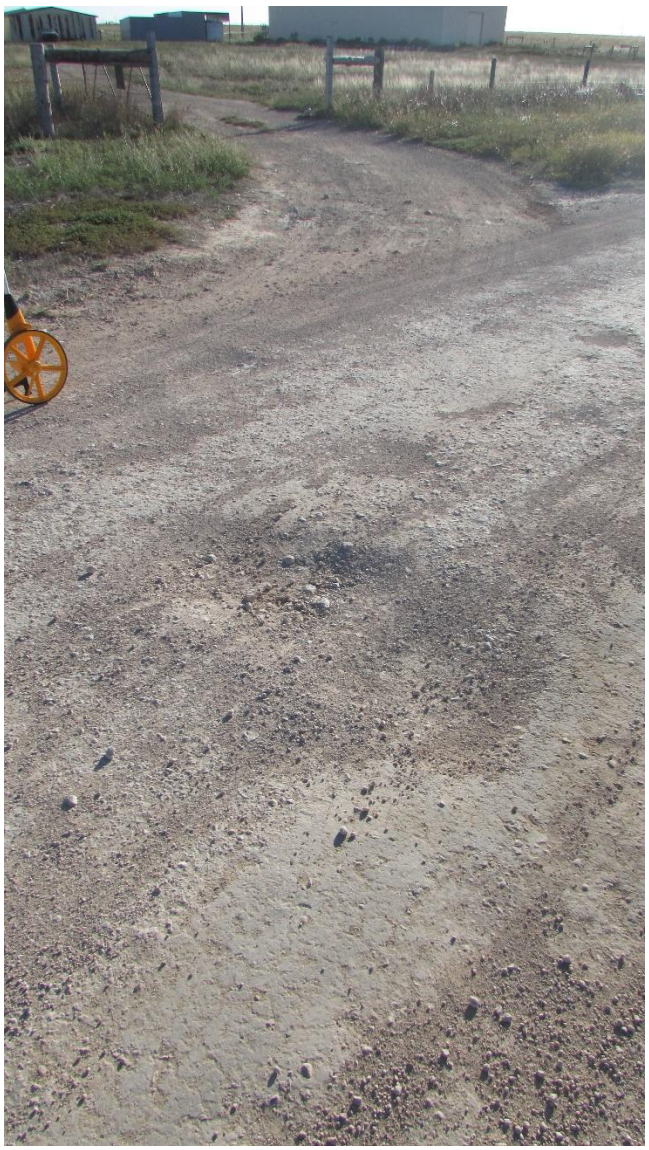

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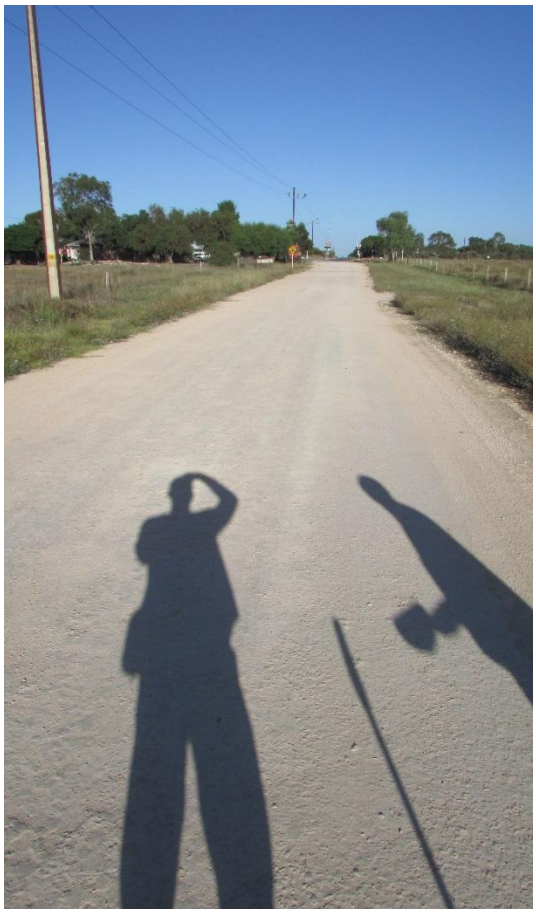

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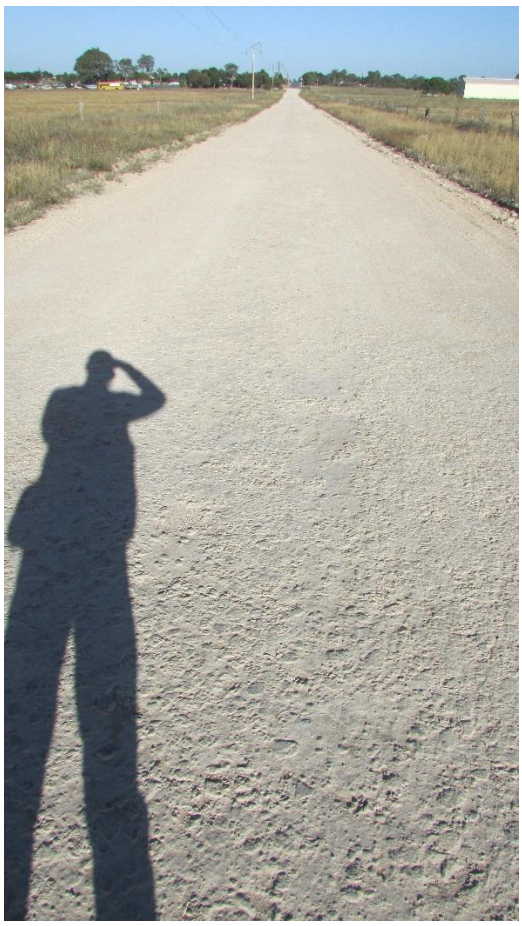

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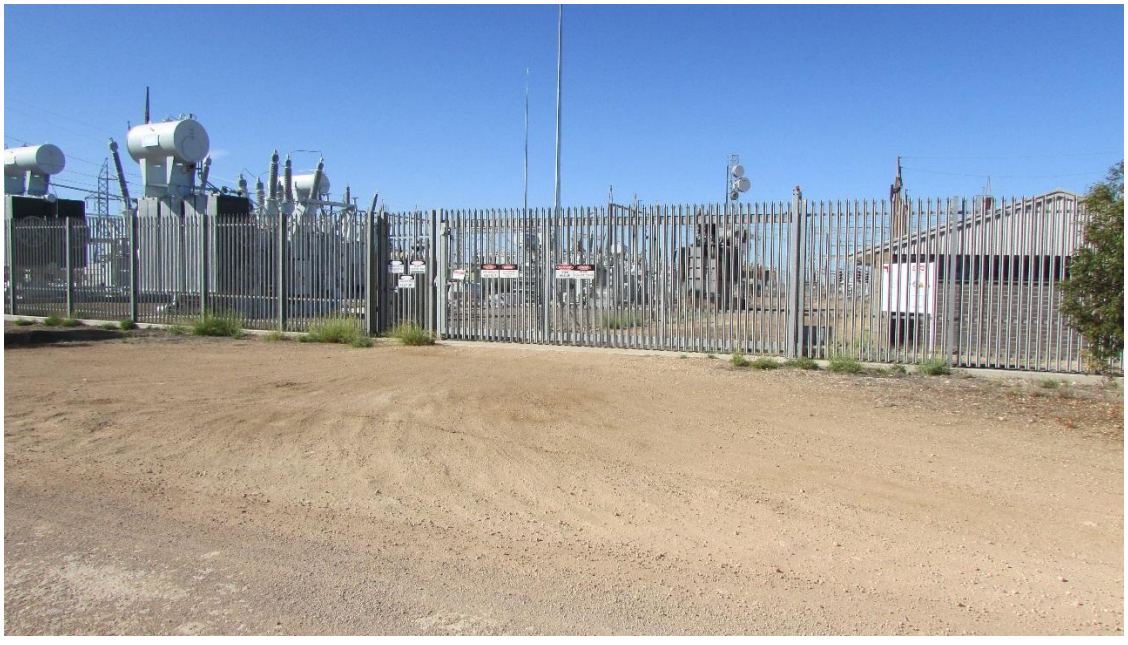

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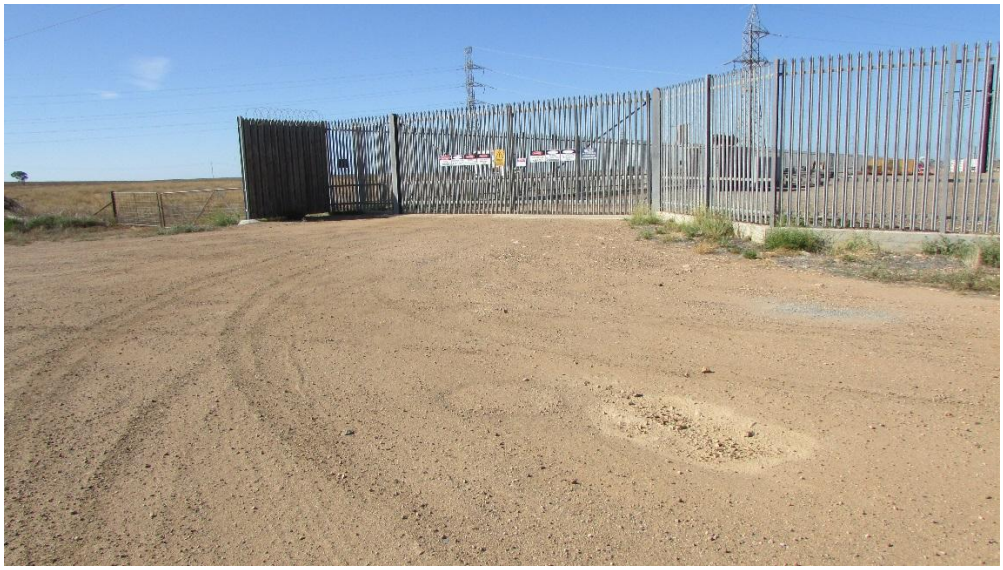

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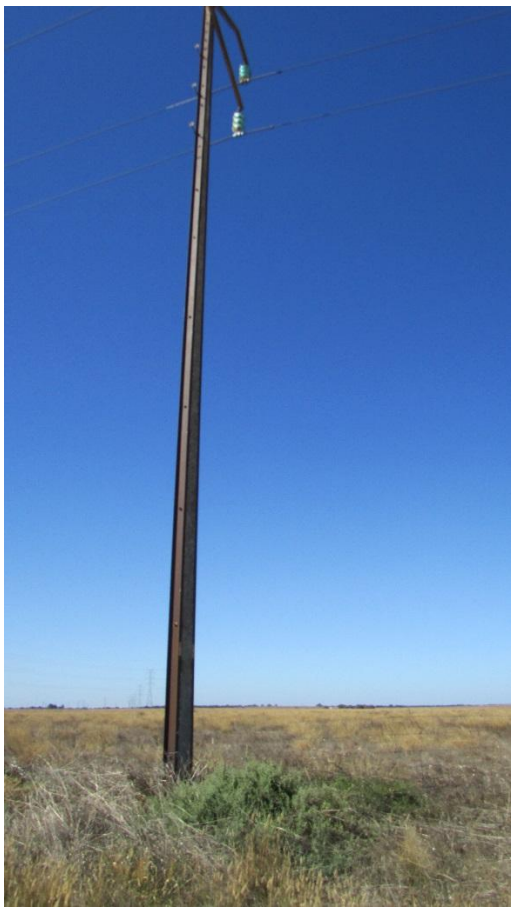

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IMG_2672

14 March 2018

Laura Kerber
Planning and Development
Department of Planning, Transport and Infrastructure
GPO Box 1815
Adelaide 5000
AUSTRALIA

Dear Ms. Kerber,

Subject: **DA 571/V001/18: Tailem Bend Solar Project Stage Two – Updated Landscape Character and Visual Impact Assessment Report**

Equis Energy (Australia) Pty Ltd (Equis Energy) submitted a Development Application for the Tailem Bend Solar Project Stage 2 (TB2SP) on the 22nd December 2017, under section 49 of the *Development Act 1993* (SA). Consequently, on the 21st February Equis Energy submitted amended documents relevant to the Development Application (Development Number 571/V001/18) due to additional technology and corresponding sufficient availability within the market.

Since the submission of the amendment to the Development Application for TB2SP, new information has become available regarding the Coorong Council wastewater treatment pond batter heights which are located adjacent the subject site. The wastewater ponds were found to provide screening from the proposed solar panels for some sensitive receivers. The assumption had been made that the pond batter heights were 3.5-4 metres AHD based on previous information from the Council, however a survey has found that the southern wastewater pond height is lower which reduces the capacity of this landscape element to conceal the proposed solar panels. Based on the new information the LCVIA has been updated.

It is our understanding that discussions regarding the changes to the LCVIA have been previously highlighted to DPTI. Equis Energy submits the updated LCVIA which more accurately reflects the potential visual impact. However, the overarching impact to residents is not significantly altered by the updated information.

This amended report should be referred to as a summary of the landscape and visual impact to replace Section 6.1.3 and Section 7.2 of the Development Application and replace Appendix F of the Development Application.

Should you have any queries regarding the altered LCVIA for the Tailem Bend Solar Project Stage 2 Development Application, please do not hesitate to contact me via the detail below or Duncan Mortimer on; duncan.mortimer@equisenergy.com or 0417 997 099.

Yours sincerely,

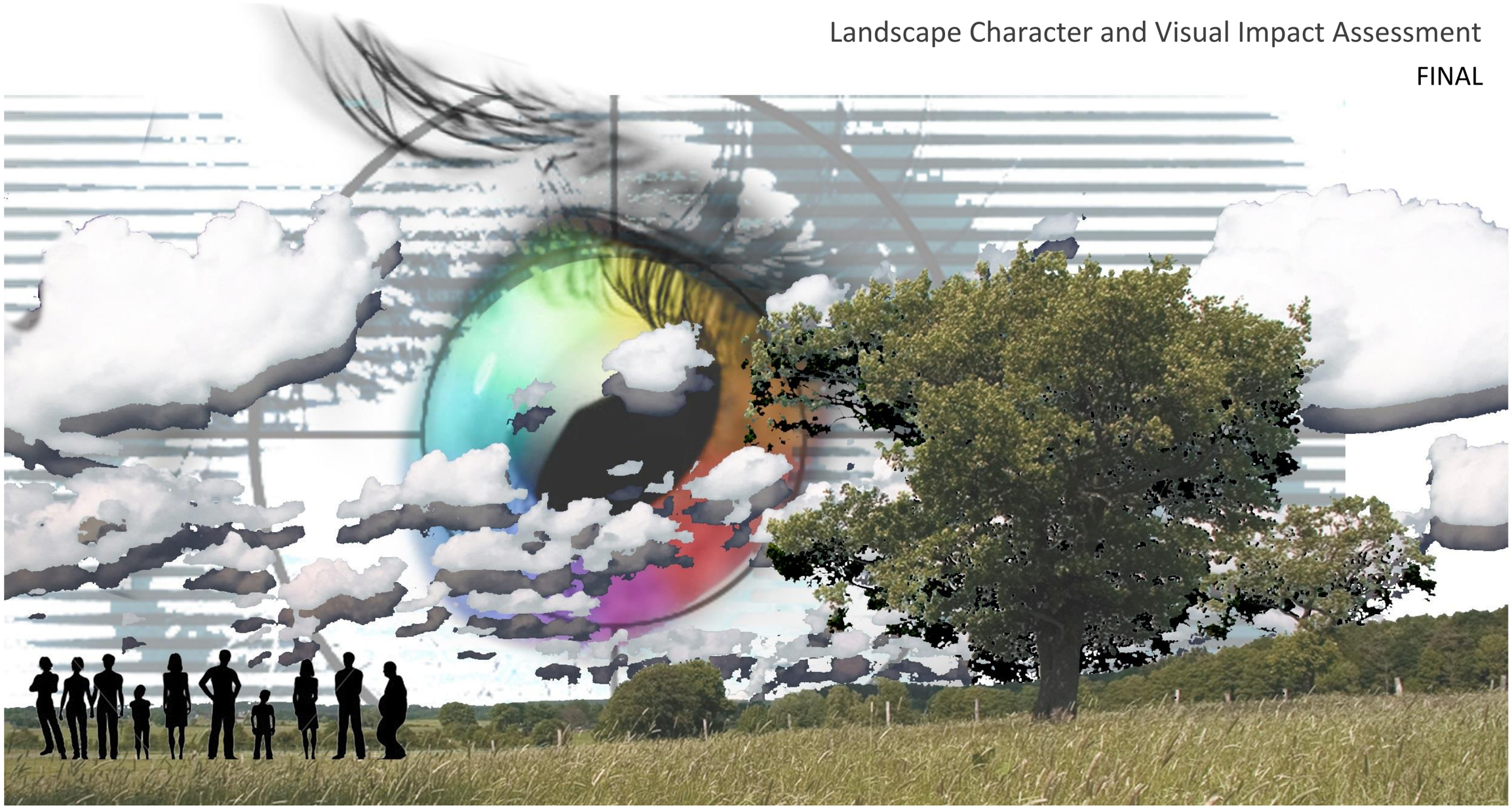
Nangia

Anil Nangia
Managing Director

TAILEM BEND SOLAR PROJECT STAGE 2

Landscape Character and Visual Impact Assessment

FINAL



Hemisphere Design (Aust) Pty Ltd

Contents

About the author

Stuart Heseltine (SH), Registered Landscape Architect, Principal Hemisphere Design.

Stuart is acknowledged as one of South Australia's leading practitioners 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 and Victoria which includes main road, high street and highway projects, the Adelaide Desalination Plant EIA, the Roseworthy Development Feasibility Study, the Palmer, Allendale and Barn Hill Windfarm Developments, numerous infrastructure developments undertaken by ElectraNet SA and visual assessment exercises pertaining to Development Applications lodged in a 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).

Document Control and Distribution Copies						
# No.	**Date Issued**	**Author**	**Approved**	**Date**	**Type**	**Issued**
N/A	6/12/17	SH	SH	6/12/17	Draft	Jacobs & Equis Energy
Revision A	19/12/17	SH	SH	19/12/17	Final	Jacobs & Equis Energy
Revision B	01/02/18	SH	SH	01/02/18	Draft Amendment Document	Jacobs & Equis Energy
Revision C	12/02/18	SH	SH	12/02/18	Final	Jacobs & Equis Energy
Revision D	13/03/18	SH	SH	13/03/18	Final	Jacobs & Equis Energy

1. Introduction

1.1 The Tailem Bend Solar Project Stage 2

This assessment has been prepared to support a Development Application for the Tailem Bend Solar Project Stage 2 (TB2SP) and provides an overview of the existing landscape character and visual amenity of the proposed location, the sensitivity of the landscape to change, and the degree of visual impact as a result of the proposed development. Where relevant this report refers to and incorporates the outcomes of the analysis exercise conducted for the adjacent and approved Tailem Bend Solar Project Stage 1 (TBSP).

The delivery of the TB2SP has the potential to result in further change to the existing landscape character and visual amenity of the landscape beyond what is been envisaged in the delivery of the TBSP project. Like TBSP the proposed TB2SP location is highly disturbed by historical agricultural activity and represents further additional visual alteration to the landscape. The degree of likely visual impact of the TB2SP is discussed and, where relevant and appropriate, mitigation measures that would minimise the degree of visual impact are identified.

The degree of likely impact was determined based on an on-site analysis of viewpoints from both publicly accessible areas and locations within residential properties. This impact assessment includes photomontages which, where relevant substantiate the findings of the on- site analysis.

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.

The TB2SP will have a capacity of up to 100MW. The project will include solar panels, inverter stations, provision for a future battery storage facility, a control room and site office, access tracks for maintenance vehicles, compound areas and connection into the facility substation on the southern side of Substation Road.

The solar panels will be 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.

Inverter stations will have a typical maximum height of 3 metres above ground and habitable buildings including; a single storey dual administration and controls building with a maximum height of six meters. Lightning protection will be established for at least every third or fourth inverter. The lightning protection units are thin tubular structures up to 8 m in height that are not expected to be easily discernible outside the boundary of the project site.

1.2 Project Area

The TB2SP is situated immediately north of the TBSP site, located approximately 1.5 km south-east of Tailem-Bend and 90 km south-east of Adelaide.

The subject site is predominantly cleared due to historical clearing on the land, which has been utilised for cropping and pasture. Scattered patches of remnant native vegetation comprising approximately 22 hectares and approximately 53 scattered remnant individual trees are present on the site. The design of the TB2SP has avoided native vegetation where possible, however clearance of some native vegetation will be required including approximately 46 scattered remnant native trees and 1.3 hectares of small patches. The site is bound by Substation Road (south), the disused Tailem Bend – Loxton Railway (north) and private properties to the east and west with connection to Lime Kiln Road provided via Substation Road to the west.

The subject site landform follows the contextual topography, rising gently from an approximate height of 27 m AHD[1] on the western boundary to an approximate height of 38 m AHD on the eastern boundary. From the western boundary, and at a distance of approximately 0.4 kilometres off the western boundary, the rising land crests at an approximate height of 31 m AHD. This crest (referred to herein as Crest A), creates a subtle, north south undulating ridge line which at a mid-point attains an approximate maximum height of 31 m AHD falling away to an approximate height of 27 m AHD to the northern site boundary and to an approximate height of 26 m AHD to the southern site boundary. Beyond the Crest A ridge line the land dips away to two shallow depressions before rising to a second north - south sloping crest (referred to herein as Crest B), and ridge line which attains an approximate height of 32 m AHD at the northern site boundary, falling away to an approximate height of 26 m AHD on the southern site boundary. Crest B is located approximately 1.5 kilometres off the western boundary. A third shallow depression lies east of the Crest B ridge line, beyond the Crest B ridge line the site continues to rise over land covered with mature native trees to the eastern site boundary.

Two rectangular shaped wastewater treatment ponds are located adjacent to the north-western boundary of the site.

[1] All approximate levels determined from Google Earth

<u>The Northern Wastewater Treatment Pond</u>

Engineering drawings used for the construction of the northern wastewater treatment pond received from Coorong District Council indicate that the graded batters of the pond rise to a height of approximately 4.5 m AHD. The relative height of the western batter largely precludes views into the flatter north western corner of the site from the locations immediately west of the site. (Refer HD_U007_AD01 _ Sheet3 – page 13).

<u>The Southern Wastewater Treatment Pond</u>

A recently conducted engineering line and level survey has ascertained that the relative heights of the batters enclosing the southern wastewater treatment pond are an average of 0.8 m AHD on the eastern and northern edges and an average of 1.8m AHD and 1.9 m AHD on the western and southern edges. These average heights are below the previously estimated 3.5 m AHD batter heights used in a previous version (Revision C) of this assessment. Where relevant the visual impact on sensitive receptors has been reassessed in consideration of this information and photomontage imagery adjusted accordingly.

In preparing this assessment a 'worst case scenario' has been presented when considering the likely role the wastewater treatment pond batters will play in mitigating the visual impact of PV panels located on land to the east of the of the western boundary and in particular where rows of PV panels are installed along the rising land to the Crest A ridgeline.

The surrounding land use is predominantly agricultural, with scattered rural dwellings. In addition to the two council wastewater treatment ponds there are overhead ElectraNet transmission lines across the eastern end of the subject site and the disused railway to the north. An existing ElectraNet substation is located adjacent to the southern boundary of the subject site, at which the network connection would be made via a new facility substation (forming part of the Stage 1 project). Within proximity to the subject site is a visually prominent telecommunications tower beyond which the upper portion of the Tailem Bend water tower can be identified on the horizon.

1.3 Assumptions

A number of assumptions have been made which are:

- That the development of the solar farm will not require any new transmission power lines, transmission towers or similar infrastructure beyond the existing 132KV transmission line which crosses the site. However during the detail design phase it may be determined that existing single – wire earth return (SWER) power lines carried on 8 m high poles which provide power to local homes may need to be replaced, upgraded or relocated to the site boundary.

- That security fencing will be erected on all perimeters. That the fencing is likely to be of a height of approximately 1.8 m and be of a post and panel construction which allows a high degree of visual permeability; and

- Grades and levels within the development site are likely to be altered (e.g. the filling of gullies and low points) to facilitate the installation of PV panels, construction of internal access paths and construction of associated infrastructure.

2. Assessment Methodology

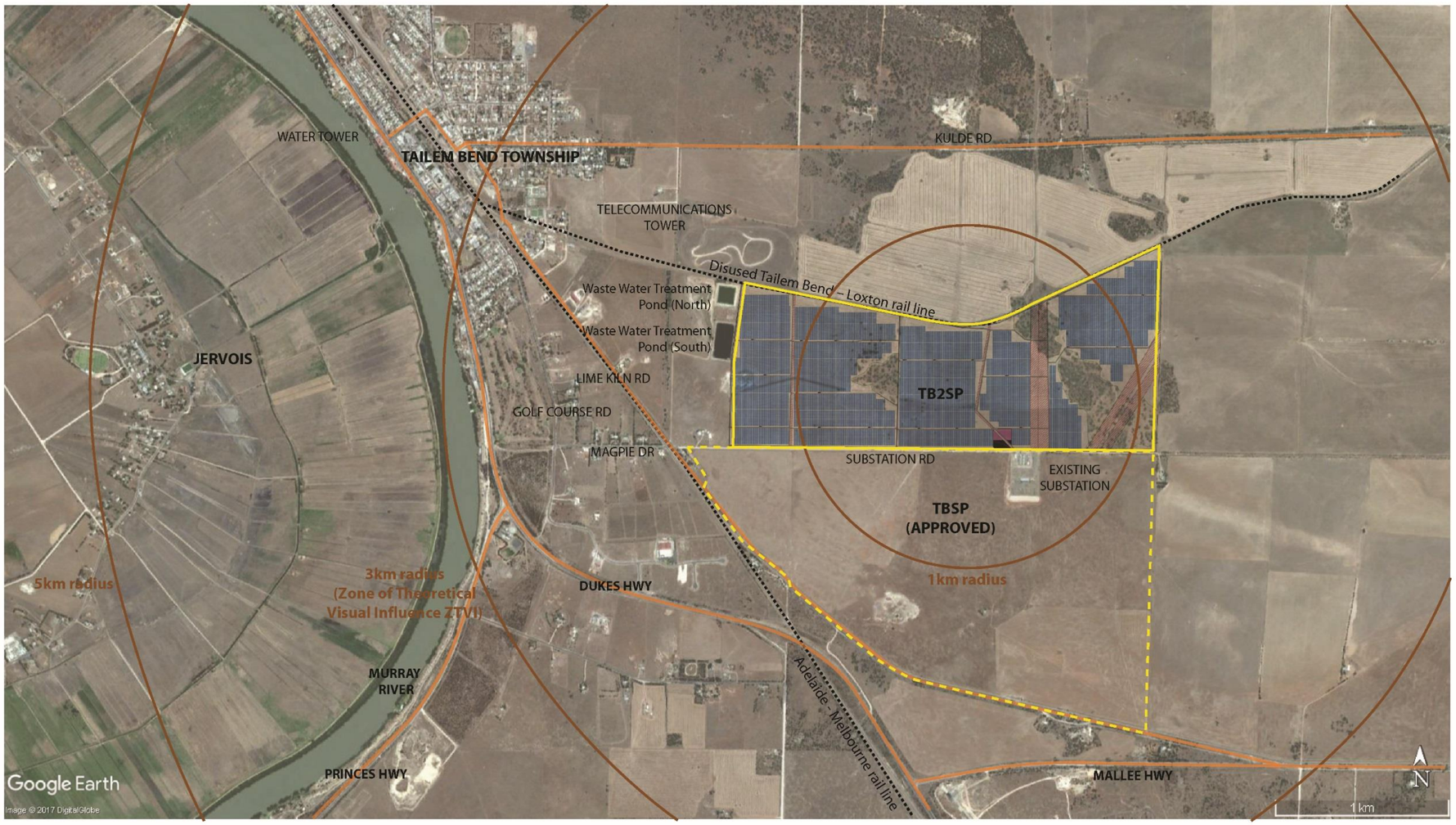
2.1 Desktop Study

A desktop evaluation was undertaken to identify the nature of the regional topography and consequently likely viewpoints from which the development may be apparent. This evaluation identified a suitable study area for on - site assessment.

This study area, the 'Zone of Theoretical Visual Influence' (ZTVI) was defined based on the assumption that modification to the contextual landscape as a result of the development could be discernible to the naked eye from within this defined area. Given that the maximum height of the PV panels associated with the development is 4.5 meters, a distance of up to a 5 km radius from the development was adopted as the furthest extent of the ZTVI.

The subsequent on - site assessment revealed that within a predominately planar, and subtly undulating landscape the assumed ZTVI distance of 5 km was generous for a solar farm development. Consequently, a distance defined by 3 km radius from the centre of the development was adopted as the furthest extent of the ZTVI. (Refer HD_U007_AD01 _ Sheet 1 – page 6)

Photo: Substation Road view north east – east to TB2SP site



LEGEND

TB2SP

Rail line

N

0 1.0km

TITLE	LANDSCAPE CONTEXT PLAN			
PROJECT	TAILEM BEND SOLAR PROJECT STAGE TWO			
DWG NO HD_U007_AD01	SCALE -	SHEET NO 1	REVISION -	
DRAWN SW	CHECKED SRH	DATE 11/17		

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2.2 Site Visit and Photography

A series of site visits were undertaken on the 6th, 8th and 23rd of November 2017.

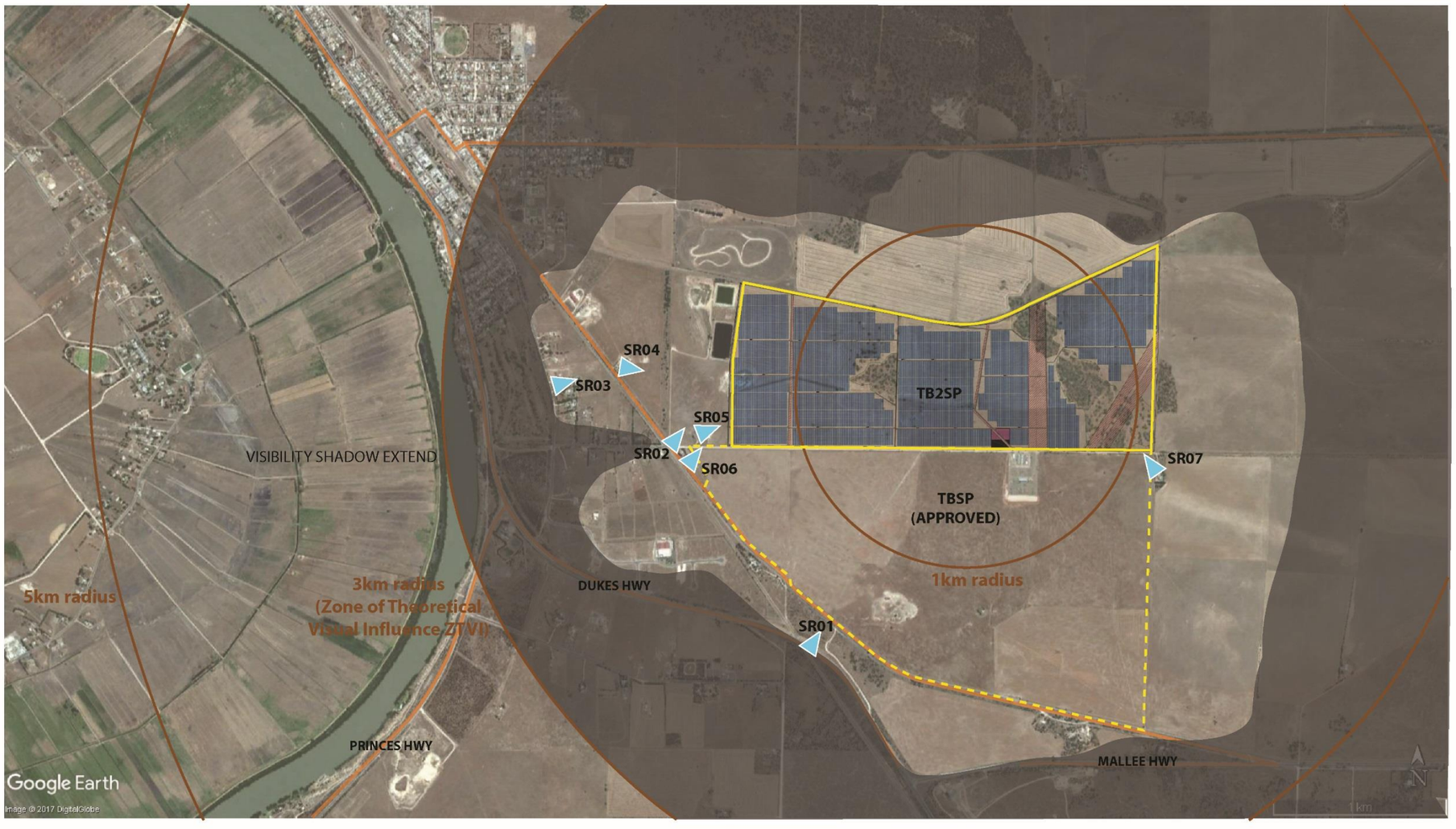
On each visit, photographs were taken at selected viewpoints to underpin the landscape character and visual impact assessment. Photographs have been taken using a Nikon 35mm Single Lens Reflex (SLR) camera with an approximate lens setting of 43mm.

Where appropriate, panoramas have been presented at certain viewpoints to simulate the wider horizontal field of view that a person typically experiences, as opposed to what is represented in a single photograph. The selected panoramas have been used to prepare photomontages which, where relevant substantiate the findings of the on- site analysis. It should be noted that these photomontages have not been survey rectified.

The ZTVI was assessed and 'truthed' on-site, where further consideration was given to the presence of other intervening elements, e.g. vegetation, local topography and built form that may obscure views to the solar farm, providing a conservative indication of the visibility of the solar farm.

In concluding the on-site assessment, the visibility or lack thereof of the solar farm from within the ZTVI has been represented through the identification of a 'visibility shadow' diagram (Refer HD_U007_AD01 _ Sheet 4 - page 8). This diagram identifies areas within the ZTVI where it is predicted that the proposed development will not be visible because there are a combination of ridgelines and specific blocks of vegetation between the viewer and the proposal that potentially blocks all views. Through the on-site assessment it was determined that generally, areas beyond the ZTVI and 'visibility shadow' are likely to be too far away from the proposed site to offer discernible views of the solar farm.

Photo: View to TB2SP from telecommunications tower



LEGEND

Visibility shadow

TB2SP site boundary

SR01 Sensitive Receptor

N

0 1.0km

TITLE VISIBILITY SHADOW MAP

PROJECT TAILEM BEND SOLAR PROJECT STAGE TWO

DWG NO	SCALE	SHEET NO	REVISION
HD_U007_AD01	-	4	-

DRAWN	CHECKED	DATE
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2.3 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).[2]

2.3.1 Landscape Assessment

Landscape assessment, in contrast to visual assessment, deals with the fabric, character and quality of the countryside. 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 quality.

The landscape character assessment has encompassed both the wider contextual landscape and the locality, which is visually more difficult to define and within which the proposed development is located.

This characterisation process establishes a 'baseline' upon which judgments about the potential effects of the proposed development can be made. I apply the following guiding definitions to determine my 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; and
- **No scenic quality:** Areas with 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.

[2] Landscape Institute and Institute of Environmental Management and Assessment. *Guidelines for Landscape and Visual Impact Assessment*, Third edition, 2013.

2.3.2 Landscape Sensitivity

Further, the characterisation process includes consideration of the current landscape character and the ability of the landscape to absorb the visual change associated with the proposed infrastructure. This is categorised as either high, medium, low or negligible, where for example, 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 factors used to determine the landscape sensitivity include:

- Pattern and scale of the landscape;
- Existing land use;
- Visual enclosure and openness of views;
- Scope for mitigation which would be in character with the existing landscape; and
- Value of the modified or natural visual landscape and 'sense of place'.

In general landscape sensitivity:

- Decreases when the viewing time is infrequent and becomes shorter; however, repetitive viewing even if of a short duration will increase sensitivity;
- Decreases as distance from the viewer to the development increases;
- Varies depending on the activity of the viewer, for example a resident within the confines of their dwelling at rest as compared to a rural hiker;
- Increases where a view is enjoyed and highly valued by the immediate community;
- Increases where a view is seen by many viewers;
- Increases if the view is seen from residences; and
- Increases if the visual landscape plays a part in tourist or recreational activities.

In total, 18 locations or waypoints have been visited to determine both the landscape character of the contextual landscape and the more immediate study area, the locality. The locality is broadly contained within a three-kilometre (i.e. the extent of the ZTVI and the 'visibility shadow') radius from the TB2SP site.

(Refer HD_U007_AD01 _ Sheet 2 – page 12)

Photo: Existing vegetation at TB2SP site to be retained.

2.3.3 Sense of Place

The term ‘sense of place’ is used in urban and rural studies in relation to place-making and most importantly the ‘place attachment’ of communities to their environment or homeland. The term sense of place is used in many ways, however for the purpose of landscape evaluation I use the following definition sourced from the Geography Dictionary; accordingly sense of place is:

“Either the intrinsic character of a place, or the meaning people give to it, but, more often, a mixture of both.”[3]

“A sense of place is a unique collection of qualities and characteristics – visual, cultural, social, and environmental – that provide meaning to a location. Sense of place is what makes one city or town different from another, but sense of place is also what makes our physical surroundings worth caring about.”[4]

Therefore, in my opinion and in keeping with best practice guidelines for visual assessment, a landscape character assessment must go beyond merely describing land form and use but should also attempt to recognise and give consideration to the ‘sense of place’ and the values inherent in ‘place attachment’.

Whilst ‘place attachment’ is not an amenity and character value that can be easily quantified or measured, I believe it is important to do so given the significance it plays and especially so in this particular situation.

In my experience, ‘place attachment’ is the complex synergy of any number of relevant sensory and emotive qualities, which shape how individuals and communities perceive and connect to the landscape. Place attachment is generally expressed as a positive association with the locality. Through their frequent interaction (both passive and active) with a place, locals can be profoundly stimulated in a positive way by these cumulative influences. Their attachment to the ‘place’ is because of the way it makes them feel.

The place attachment value, in conjunction with the appreciation of the contextual landscape assists in defining sense of place and landscape character for a given locality.

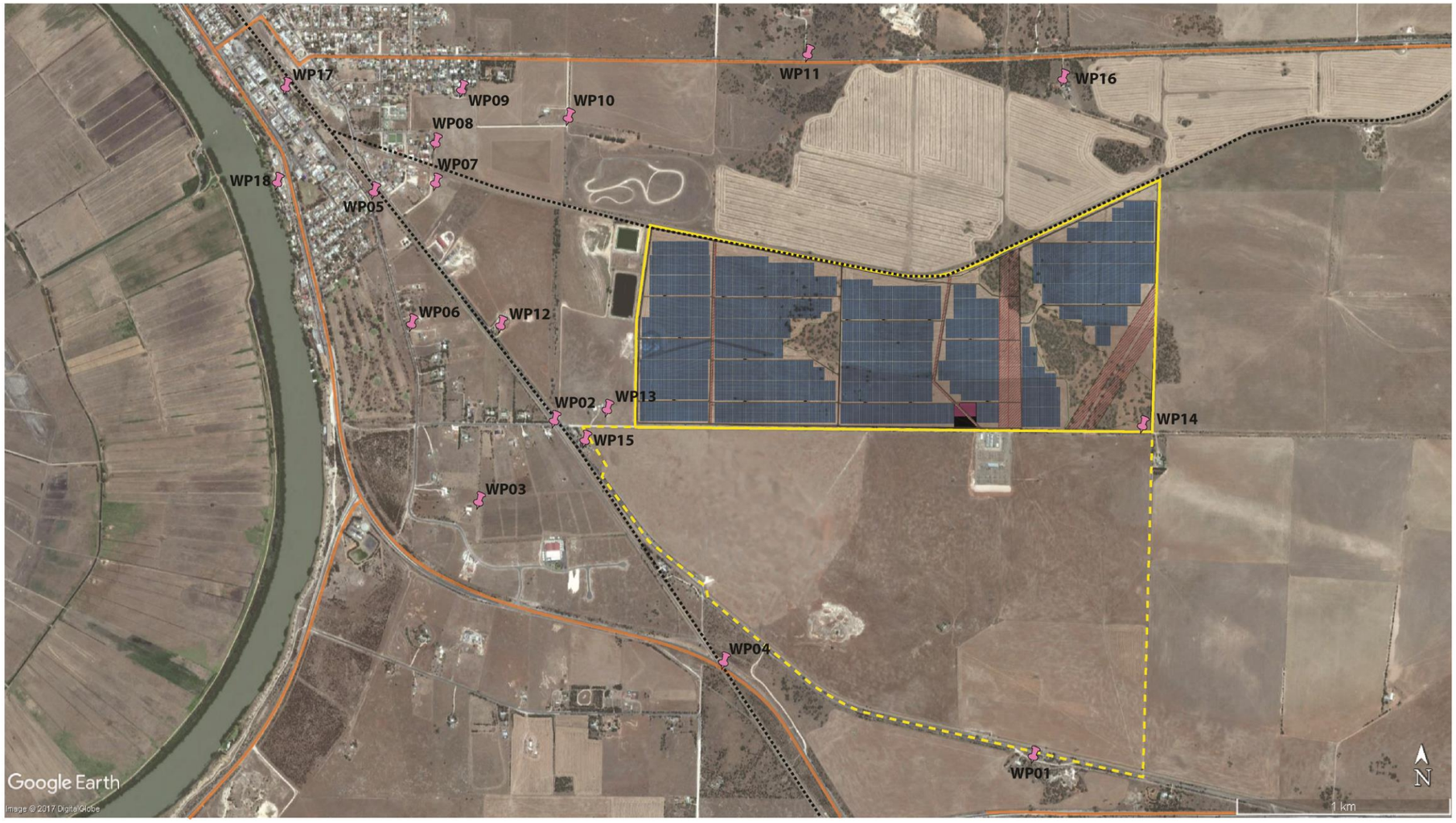
Understanding and applying weighted consideration to a community’s intimate relationship with their contextual surroundings is paramount and in my opinion, and the opinion of others, the defining feature of landscape.

“Landscape is about the relationship between people and place. It provides the setting for our day-to-day lives. The term does not mean just special or designated landscapes and it does not only apply to the countryside. Landscape can mean a small patch of urban wasteland as much as a mountain range and an urban park as much as an expanse of lowland plain. It results from the way that different components of our environment - both natural (the influences of geology, soils, climate, flora and fauna) and cultural (the historical and current impact of land use, settlement, enclosure and other human interventions) - interact together and are perceived by us. People’s perceptions turn land into the concept of landscape.”[5]

[3] Buntin, S.B., Terrain.org and the Online Nexus of Literature and environment. Virtual Sense of Place. 2009. http://www.terrain.org/ecomedia/q1/definitions.htm

[4] McMahon, E.T., UrbanLand The Magazine of the Urban Land Institute. The Distinctive City. 4 April 2012. http://www.urbanland.uli.org/development-business/the-distinctive-city

[5] Swanwick, C and Land Use Consultants (2002) in Landscape Institute and Institute of Environmental Management and Assessment. Guidelines for Landscape and Visual Impact Assessment, Third edition, 2013, p. 394



LEGEND

WP01 Waypoint location

TB2SP

Rail line

0 1.0km

TITLE	WAYPOINT LOCATIONS			
PROJECT	TAILEM BEND SOLAR PROJECT STAGE TWO			
DWG NO	SCALE	SHEET NO	REVISION	
HD_U007_AD01	-	2	-	
DRAWN	CHECKED	DATE		
SW	SRH	11/17		

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3. Landscape Character and Visual Impact Assessment

3.1 Landscape Character of the Locality

The characterisation of the locality and area contained within the ZTVI has identified three distinct landscape character units. (Refer HD_U007 _AD01 _ Sheet 3 – page 14)

3.1.1 The Township of Tailem Bend

This character unit broadly comprises of the built form of the Tailem Bend township which is located to the north of the TB2SP and within the defined 'visibility shadow' (Refer HD_U007 _AD01 _ Sheet 4 – page 18), consequently views from the township to the TB2SP site are precluded.

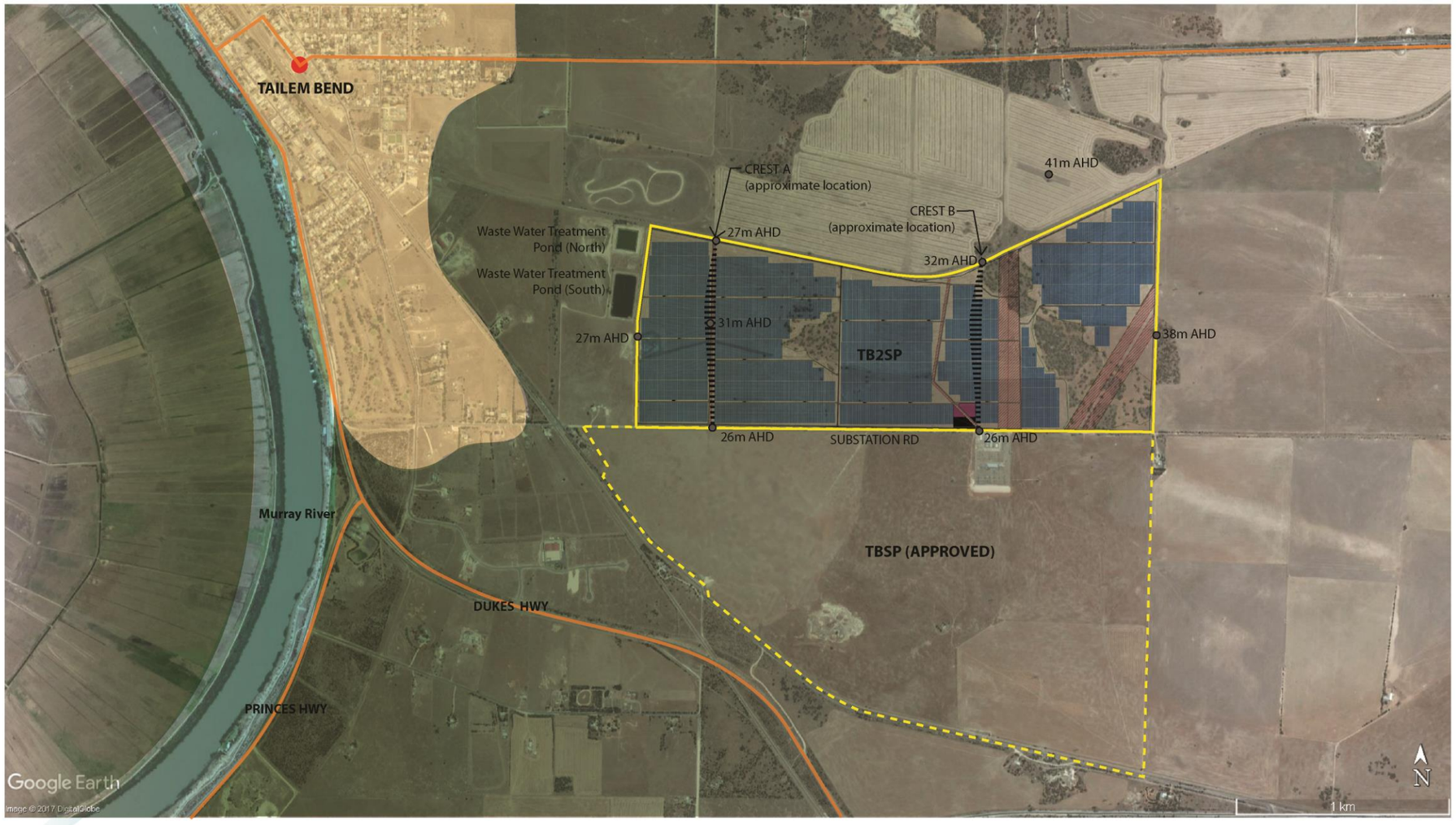
A pioneering settlement typical of several townships in rural South-East Australia, the historic charm of the once vibrant rail industry on which the commercial prosperity of the town was founded is still evident and resonates through the high street and town centre. It is a locality where the communities sense of pride is both obvious and celebrated through both the presence of poignant memorials, historical interpretive signs and whimsical animal statues.

As an experienced Landscape Architect, I can say that whilst the diversity of attractive sensory qualities can be experienced within this landscape character unit, it may be limited. It is my opinion that that the 'place attachment' value in this landscape character unit would likely be one of relative significance.

Therefore, it is my opinion that the sense of place and landscape character of the Tailem Bend township is one of a **low to moderate scenic quality** and has a **moderate sensitivity to change**.

Photo: Tailem Bend township- Railway Terrace

Photo: Tailem Bend township- Railway Terrace



LEGEND

- Rural township
- Murray River riparian corridor
- Expansive eastern plains
- TB2SP site boundary
- Crest

N

0 1.0km

TITLE	LANDSCAPE CHARACTER UNITS			
PROJECT	TAILEM BEND SOLAR PROJECT STAGE TWO			
DWG NO HD_U007_AD01	SCALE -	SHEET NO 3	REVISION -	
DRAWN SW	CHECKED SRH	DATE 11/17		

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3.1.2 The Meandering Murray River Riparian Corridor

Almost anonymous to the traveller passing though Tailem Bend, the Murray River announces its presence in a somewhat laconic fashion when the traveller pauses at one of a number of elevated vantage points off the Dukes Highway. The Murray River corridor lies beyond the project 'visibility shadow' and as such the TB2SP project will not impact on the character or amenity of this treasured asset.

The river expanse is flanked either side by swathes of water's edge plantings which appear as a lush 'billowing' like blanket of vegetation softening the river's edge against the more visually acute pastural fields to the west. The meandering, sinuous corridor draws the eye of the observer north to the distant hills which envelope Mount Barker.

A valued, treasured, visual and recreational amenity, the sense of place and landscape character of the Murray River riparian corridor is of a **moderate to high scenic quality** and has a **moderate sensitivity to change**

Photo: Murray River lookout point.

3.1.3 The Expansive Eastern Plains

A visually simple landscape comprising of a mostly flat, planar landform of expansive open pastural and cropping fields. Elevations range from 10 to 100 m AHD as the landscape slopes towards the coast and Murray River to the west. A landscape of monotonous vistas where the general absence of significant boundary plantings and the occasional only scattered groups of mature native trees clustered around the few scattered rural dwellings in the locality allows the eye to sweep across the landform in a fleeting moment.

The collection of angular and 'mechanical' infrastructure elements of the existing substation, corridors of transmission towers, catenary of overhead wires and a singular telecommunications tower momentarily captures the eye of the observer from numerous locations within the character unit. Notwithstanding, the vastness of the landscape instils a sense of remoteness where occasional sheep appear to be the primary occupants.

It is a landscape of both sealed and unsealed straight roads which appear endless, bounded by post and wire fencing. It is a landscape infrequently visited by the tourist, however the imminent opening of the Tailem Bend Motorsport Park may see an increase in patronage of the township and outskirts of town via the eastern plains landscape.

The elevated Dukes Highway railway overpass, affords unrestricted panoramic views across the eastern plains landscape which contains both the approved TBSP and proposed TB2SP project sites. These views and views to the horizon are dominated by the silhouetted, incongruous mechanical forms of the electricity substation and its associated infrastructure.

The expansive eastern plains are a simple landscape that offers little visual appeal nor visual amenity.

It is my opinion that the landscape of the locality is of a **low scenic quality** and has a **low sensitivity to change**.

Photo: View to TBSP and TB2SP from elevated Dukes Highway.

3.2 Likely Visual Impact of the Proposed Development

Of the 18 locations or waypoints visited the evaluation has identified:

(i) Seven locations comprising of waypoints WP02, 04, 06, 12-15 which are 'Sensitive Receptors' SR01 - 07, which comprise of:

- six residential dwellings within a three-kilometre radius of the solar project (within the ZTVI);
- an elevated vantage point on the Dukes Highway overpass south of Tailem Bend;

These are locations from where it is considered the proposed solar project development is likely to be wholly or partially visible and in some instances prominent.

(ii) Four locations comprising of waypoints WP01, 03, 10, 16 from which partial views of varying magnitude only of TB2SP are likely.

These locations are representative of many similar locations from within the ZTVI from which other similar views could be obtained. However, they are considered of low or no sensitivity due to their remoteness as a location, E.g. an unsealed road used infrequently and by local traffic only, where the number of affected viewers would be negligible.

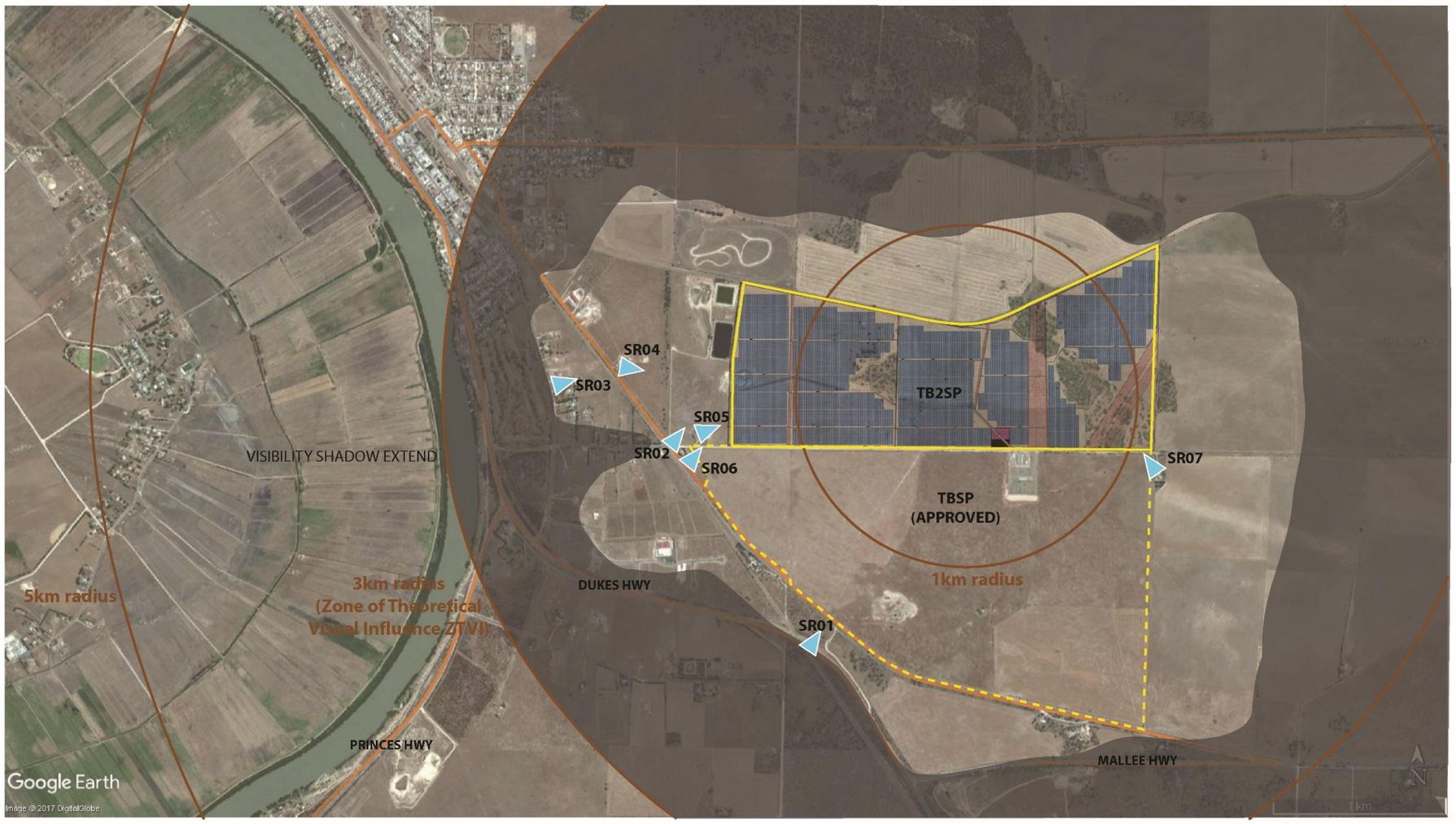
(iii) Seven locations comprising of waypoints WP05, 07 - 09, 11 and 17 - 18 from which views of TB2SP will be concealed through a combination of both landform and vegetation screening.

My assessment of the likely visual impact of the proposed TB2SP has been confined to the seven 'Sensitive Receptors'. (Refer HD_U007_AD01 _ Sheet 4 – page 18).

With each assessment, reference is made to the description of the relevant prevailing landscape character unit.

For each 'Sensitive Receptor' the likely visual impact of the proposed development is described considering factors which may include:

- 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 the proposed development;
- 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 proposed development;
- The duration and nature of the effect (temporary, permanent, intermittent); and
- The numbers and types of viewers affected.



LEGEND

Visibility shadow

TB2SP site boundary

SR01 Sensitive Receptor

N

0 1.0km

TITLE	VISIBILITY SHADOW MAP		
PROJECT	TAILEM BEND SOLAR PROJECT STAGE TWO		
DWG NO HD_U007_AD01	SCALE -	SHEET NO 4	REVISION -
DRAWN SW	CHECKED SRH	DATE 11/17	

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3.3 General Solar Farm Development Considerations

Photovoltaic panels are designed to absorb sunlight and convert it to electricity. Minimising the light reflected from the panels is a goal of panel design, manufacture and installation.

The dark, non-reflective nature of a solar array is generally considered to help minimise their visual contrast with the surrounding landscape, where at a distance they will appear similar to the belts of boundary plantings of native evergreen trees. Their horizontal scale is consistent with the large paddocks in the eastern plains character unit.

The solar plant will be low in profile, comprising of panels which when fully tilted at 60^{o} does not exceed 4.5 metres in height. In theory the solar farm should be visible in the fore and mid-ground when viewed from locations to the immediate west and south of the site. However, it is apparent that subtle changes in undulation across the site and wider contextual landscape coupled with the presence of existing vegetation scattered throughout the area is likely to screen part or the entire solar project from many locations within these immediate areas.

For viewers who are more than three kilometres away from the TB2SP the reduction in apparent size of the solar project brought about by distance will mean that it is likely to be insignificant in height and therefore concealed within the view.

The likely potential visual impact of glare due to reflection from the solar farm PV panels and associated infrastructure is not assessed in this study.

3.4 Construction Phase

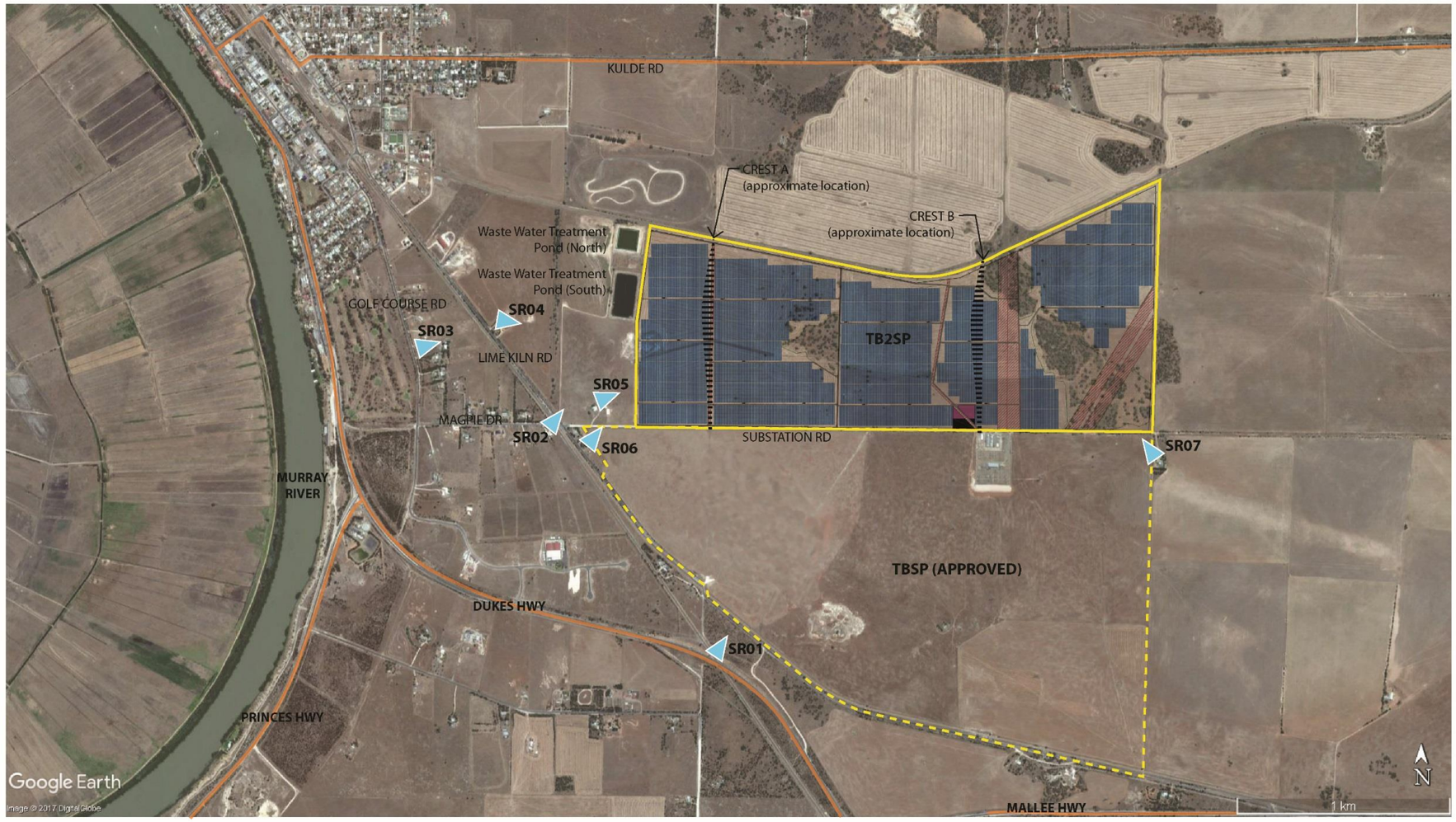
During the construction phase, the change to visual amenity within the locality will occur because of earthworks, construction of additional ancillary infrastructure and an overall increase in the number of people and vehicles. The changing visual environment and activity during construction will be temporary, therefore is not considered in detail within the visual impact assessment.

3.5 Likely Visual Impact at the Identified 'Sensitive Receptors'

The following criteria were applied to describe the likely visual impact of the proposed development at each 'Sensitive Receptor':

- **Substantial adverse impact** – where the scheme would cause a significant deterioration in the existing view;
- **Moderate adverse impact** – where the scheme would cause a noticeable deterioration in the existing view;
- **Slight adverse impact** – where the scheme would cause a barely perceptible deterioration in the existing view;
- **Slight beneficial impact** – where the scheme would cause a barely perceptible improvement in the existing view;
- **Moderate beneficial impact** – where the scheme would cause a noticeable improvement in the existing view;
- **Substantial beneficial impact** – where the scheme would cause a significant improvement in the existing view; and
- **No change** - No discernible deterioration or improvement in the existing view.

(Refer HDU007_AD01_Sheet 5 – page 20)



LEGEND

SR01 Sensitive Receptor

TB2SP site boundary

Crest

0 1.0km

TITLE **SENSITIVE RECEPTORS**

PROJECT **TAILEM BEND SOLAR PROJECT STAGE 2**

DWG NO	SCALE	SHEET NO	REVISION
HD_U007_AD01	-	5	-

DRAWN	CHECKED	DATE
SW	SRH	11/17

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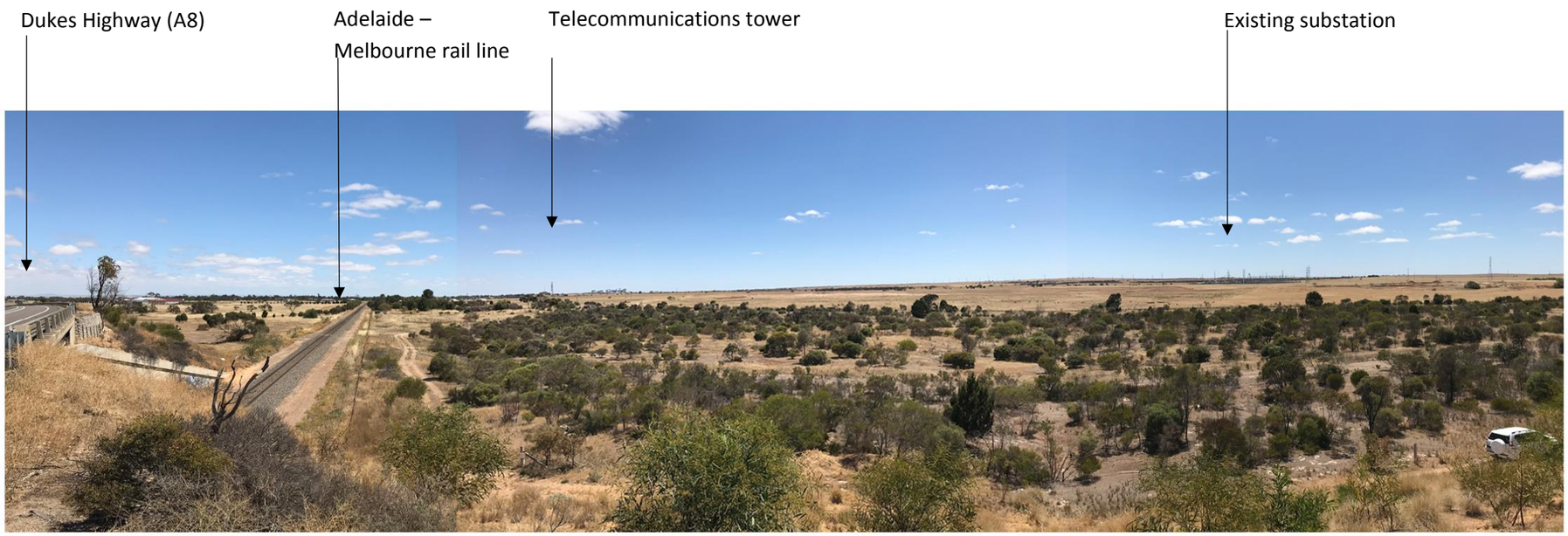
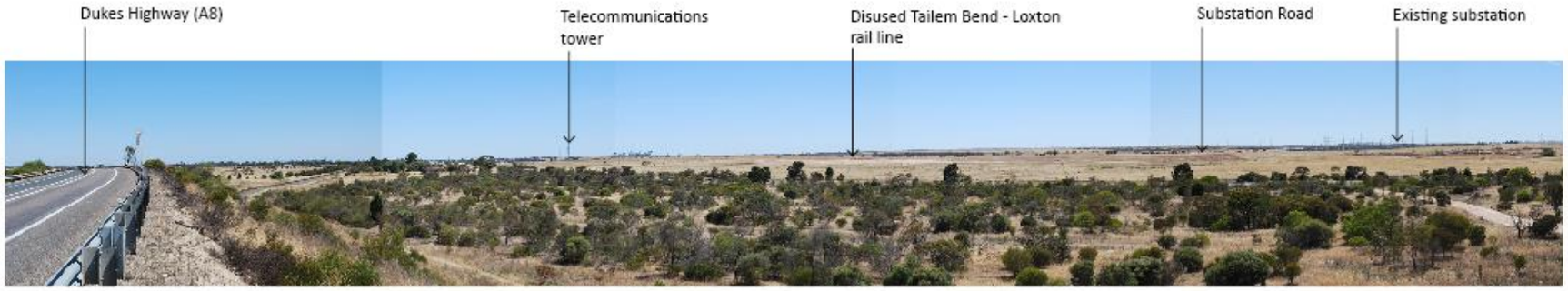
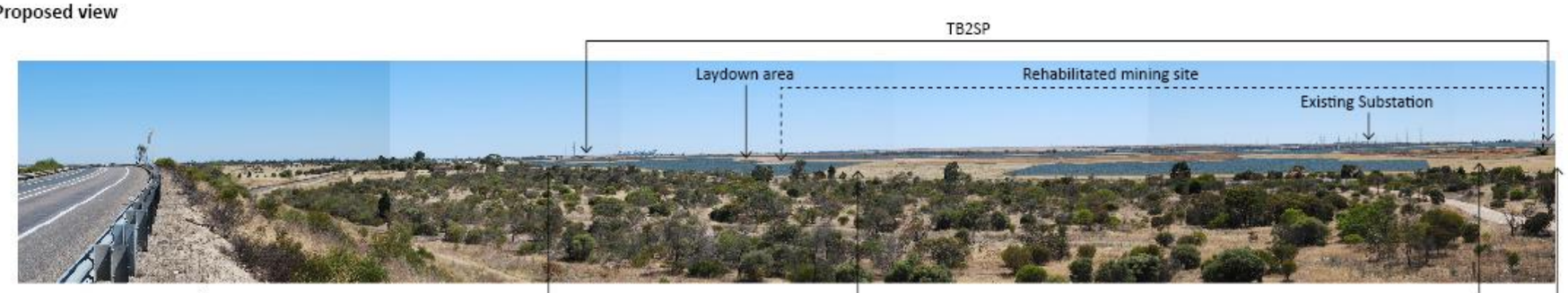
Landscape and Visual Impact Assessment: Sensitive Receptor SR #01	
	
Location	Elevated location on the Dukes Highway (A8); a north - south dual lane carriageway with a 110 kph speed limit. The location where both TB2SP and the approved TBSP will appear as a singular feature within the contextual landscape.
View direction	Panoramic view north east – east – south east.
Landscape and setting	*'Expansive eastern plains'* - Character Unit 2; a landscape of **low scenic quality.** When searching for visual stimulation the eye of the travelling observer is drawn over a foreground of sparse and unimaginative native shrub and ground cover plantings to the wider, planar landscape of cropping fields. The visually ad-hoc arrangement of electricity substation infrastructure and the extensive presence of transmission towers with a catenary of overhead cables offers only a fleeting moment of visual interest. The eye of the observer quickly slips away into the distance where the lack of 'tracery' over the expansive horizon delivers a sharp juxtaposition between landform and skyline. A monumentally underwhelming panorama of limited visual merit.
Distance from Project Site(s)	1 km.
Visual exposure at receptor	**Low for** TB2SP, **Moderate to High** for both TB2SP and TBSP.

	From this elevated vantage point the homogenous and prostate arrangement of the PV panels of both TB2SP and TBSP will appear as an enveloping and folding 'blue hue', 'cloaking' the planar landform. The vast array of PV panels will sit below the horizon without penetrating the skyline. Together, both solar projects will deliver an infrastructure statement which will be of visual interest to the many thousands of travelling tourists who cross into South Australia each year. Along the fringes of both projects the disposition of PV panels will appear to merge into nearby existing copses of trees and shrubs, visually integrating both developments into the contextual surroundings. The expanse of PV panels will positively transform the panoramic view, redefining the visual 'Gateway' into Tailem Bend and the state of South Australia. In a contextual landscape which is largely repetitive and uniformly uninspiring, TB2SP in conjunction with the approved TBSP will deliver a visual statement that reinforces the States commitment to pioneering renewable energy.
Predicted visual impact	**Slightly Beneficial Impact** - As a singular development. **Moderately Beneficial Impact** in conjunction with the approved TBSP. The cumulative visual impact that will be delivered through the introduction of two new, notable and visually significant land use activities adjacent one of South Australia's primary tourism routes connecting South Australia to the eastern Australian states will be positively overwhelming.
Mitigation	None required.

Existing view



Proposed view



PV panels represented at 60 ° tilt.

Photomontage Representation for Sensitive Receptor SR01
Location: Dukes Highway
View north - east - south east
Date: November 2017
Revision A

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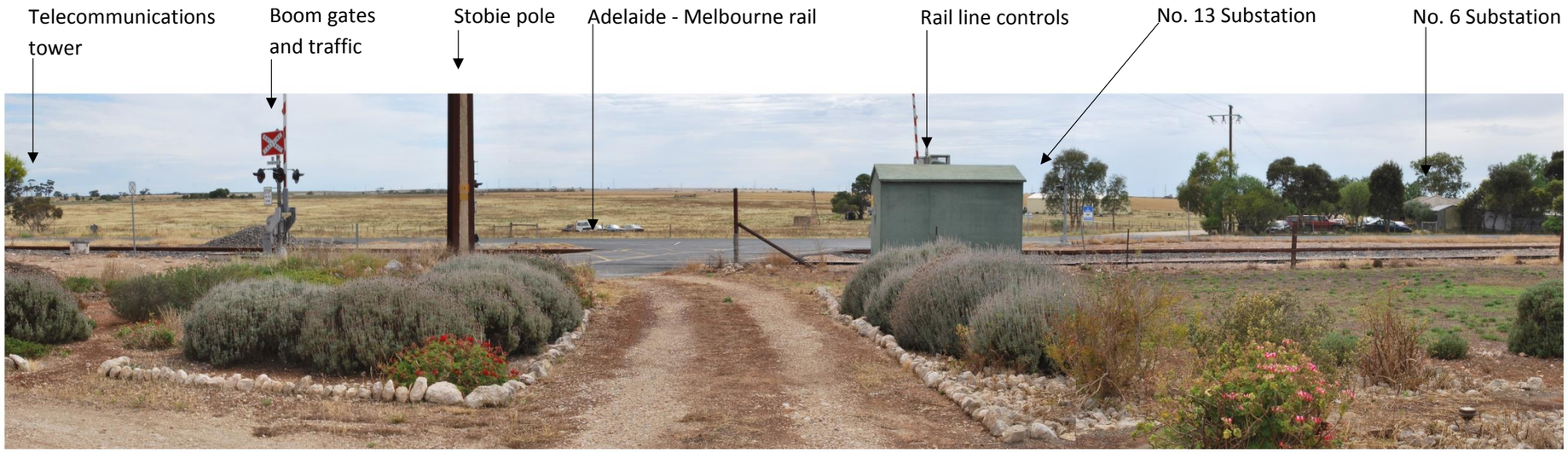
Landscape and Visual Impact Assessment: Sensitive Receptor SR #02	
	
Location	No. 60 Magpie Drive. The property lies due west of the TB2SP site at the intersection with Lime Kiln Road, adjacent to the Adelaide – Melbourne railway line.
View Direction	East – north east.
Landscape and setting	*'Expansive eastern plains'* - Character Unit 2; a landscape of **low scenic quality.** The eye of the observer is drawn beyond the immediate foreground of Lime Kiln Road and the signalised intersection comprising of traffic lights, boom gates and a controls hut to the wider, planar landscape of cropping fields. The visually ad-hoc arrangement of rail infrastructure, large stobies and overhead cables and distant transmission towers diminish the quality of the view afforded to the residents of no. 60 Magpie Drive and to other residents and travellers within the immediate vicinity.
Distance from Project Site(s)	0.5 km.
Visual exposure at receptor	**Low to Moderate** The slightly elevated and eastern orientation of the dwelling will afford an easterly directed north - south panorama across the TB2SP site. However, the depth and the extent of PV panels which can be viewed from this aspect will be largely contained to views of PV panels within less than a quarter only of the TB2SP site from the site western boundary. From the western boundary the TB2SP site gently rises in an easterly direction to the north – south orientated toward the Crest A ridgeline which conceals views of the PV panels lying on flatter land immediately east.

	The PV panels located on the land which rises to the Crest A ridgeline will appear as an intermittent, thin 'slither' only. To the north west, the PV panels located on the land rising to the Crest A ridgeline will be mostly concealed behind the batters of the northern wastewater treatment ponds however the uppermost section of the row(s) of PV panels which run north - south along the Crest A ridgeline will protrude above the batters of both wastewater treatment ponds. The thin grey 'pencil line' appearance of the uppermost section of the PV panels will be barely discernible against the horizon. To the south west the PV panels will be obscured by the foreground dwellings and the mature trees of numbers 6 and 13 Substation Road. Distant views to the horizon remain largely unaltered.
Predicted visual impact	**Slightly Adverse Impact** only for TB2SP. In conjunction with the limited views of TBSP to the south east, which are largely concealed by the foreground dwellings and mature trees of numbers 6 and 13 Substation Road, the likely cumulative impact will be **Slightly** to **Moderately Adverse**.
Mitigation	The visual impact of PV panels and on-site infrastructure can be mitigated through the introduction of screen planting along the western boundary of TB2SP or on the line of sight within the property boundary. Planting smaller native trees and low maintenance shrubs which attain a height of at least 2 - 3 meters would likely ensure that, if desired, a visual buffer could be quickly established. However, discussions with the landowners have confirmed that at this point in time visual mitigation is not required.

Existing view

Proposed view

PV panels represented at 60 ° tilt.

Photomontage Representation for Sensitive Receptor SR02
Location: No. 60 Magpie Drive
View east - north east
Viewpoint at 21m AHD
Date: March 2018 Revision B

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Landscape and Visual Impact Assessment: Sensitive Receptor SR #03	
	
Location	No. 43 Golf Course Road - small to medium sized dwelling on modest sized allotment located on slightly higher ground than land to the immediate east. The dwelling has been elevated and orientated west affording panoramic views to the distant horizon.
View direction	North – north east.
Landscape and setting	*'Expansive eastern plains'* - Character Unit 2; a landscape of **low scenic quality.** Fore and mid - ground views reveal a landscape of undulating cropped fields bounded by roadside tree and shrub planting and the occasional collection of trees and shrubs which define field and property boundaries. The panorama is dominated by views of the distant transmission towers juxtaposed against the skyline. In a planar landscape where the eye of the observer traces over the undulating landscape searching for visual stimulation a single stand of mature eucalypts which appear as an 'incidental' copse of canopies 'silhouetting' the skyline offers limited interest.
Distance from Project Site(s)	1.0 km.
Visual exposure at receptor	**Low.** The slightly elevated distant view north - east to the TB2SP PV panels installed on flatter land immediately within the north western site boundary will be precluded by the batters of the northern wastewater treatment pond. The land within the project site rises from the western boundary in an easterly direction to the north - south Crest A ridgeline. The uppermost portion of the row(s) of PV panels installed on the higher mid-point of the Crest A ridgeline will, at a distance of 1 kilometre from the project site appear above the batters of both wastewater treatment ponds as a faint and barely detectable linear addition to the horizon. Casting the eye to east and south east, the contiguous evergreen canopies of the mid-ground tree planting will afford intermittent, glimpsed views only of the array of PV panels located within the site on the land which rises east to the Crest A ridgeline. The PV panels will appear as a thin

	almost indiscernible dark line running in north - south direction, similar in appearance to the linear bands of mid – ground darker vegetation which also traverses the view. The distant transmission towers and existing substation infrastructure dominate the view across the horizon. The telecommunications tower to the west remains the prominent visual element within the panorama. Distant views of the procession of transmission towers are incongruous and visually dominant.
Predicted visual impact	**TB2SP -** from a slightly elevated viewpoint **- Slightly Adverse Impact**. The cumulative impact when considered in conjunction with **TBSP - Slightly Adverse Impact.** This is also considered to be the predicted visual impact that is likely to be experienced at the adjacent No. 39 Golf Course Road.
Mitigation	None required, recent tree and shrub planting on the property's eastern boundary will create a satisfactory visual screen once established.

Existing view

Proposed view

PV panels represented at 60 ° tilt.

Photomontage Representation for Sensitive Receptor SR03
Location: 43 Golf Course Road
View north - north east
Viewpoint at 26m AHD
Date: March 2018 Revision B

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Landscape and Visual Impact Assessment: Sensitive Receptor SR #04	
	
Location	No. 105 Lime Kiln Road. A large property typical of the locality, comprising of a residential dwelling with domestic sheds, carport and external buildings, the western property boundary includes a large atrium for fruit growing. A pleasing domestic setting with an abundance of exotic small trees, shrubs and ground cover with irrigated lawn.
View direction	North east – east – south east.
Landscape and setting	*'Expansive eastern plains'* – Character Unit 2. A landscape of **low scenic quality.** A foreground of undulating 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. A planar landscape where the eye of the observer traces over the undulating landscape and earth bunds of the nearby wastewater treatment ponds searching for visual interest, concluding the search somewhat unrewarded at the distant horizon.
Distance from Project Site(s)	0.6 km.
Visual exposure at receptor	**Low.** Views north east – east to TB2SP will be largely precluded by the batters of the northern wastewater treatment pond and the canopies of an intermittent group of trees which currently conceals views of the infrastructure associated with the existing substation which lies beyond. The uppermost section of the row(s) of PV panels which run north - south along the Crest A ridgeline will protrude above the batters of both wastewater treatment ponds. However, the thin grey 'pencil line' appearance of the PV panels, broken by the foreground of intermittent tree planting, will be barely discernible against the horizon.

	To the immediate south of the wastewater treatment ponds the PV panels within the western most portion of the site will appear as a more pronounced, darker and thicker line which sits below the horizon. The southern extent of TB2SP PV panels will meet the northern boundary of TBSP, as such the extent of PV panels stretching south west will appear as a continuous, singular dark line traversing the contextual landscape. The transmission towers will remain the most visually conspicuous features in the contextual landscape.
Predicted visual impact	TB2SP - **No Change to Slightly Adverse Impact**. The cumulative impact when considered in conjunction with TBSP – **Slightly Adverse**.
Mitigation	None required.

Existing view

Proposed view

PV panels represented at 60 ° tilt.

Photomontage Representation for Sensitive Receptor SR04
Location: No. 105 Lime Kiln Road
View looking north - east - south east
Date: March 2018 Revision B

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Landscape and Visual Impact Assessment - Sensitive Receptor SR #05	
	
Location	No. 13 Substation Road. Substation Road is an unsealed road which carries occasional local traffic only.
View Direction	East – north east - north.
Landscape and setting	*'Expansive eastern plains'* Character unit *2; a* landscape of **low scenic amenity**. The expansive eastern panorama is like other sensitive receptors where the eye of the observer traces over the undulating landscape and batters of the nearby wastewater treatment ponds in search of visual stimulation before settling on the distant horizon. As a singular vertical element in the contextual landscape the telecommunications tower to the north is a notable and obvious focal point.
Distance from project site	0.15 km.
Visual exposure at receptor	**Low to Moderate**. Views north east from the northern aspect of the dwelling of the PV panels installed on flatter land within the north - western corner of the site will be largely precluded by the batters of the distant northern wastewater treatment pond. However, the uppermost portion of the row(s) of PV panels installed on land rising east along the higher aspects of the Crest A ridgeline will emerge from behind the batters of both wastewater treatment ponds. South of the ponds the PV panels within the western most portion of the site will begin to emerge from behind the pond batters and appear as a thin almost indiscernible grey line only. The eye of the observer is drawn south to the immediate foreground which falls in both a southern and western direction. The rows of PV panels located on the land which rises east to the Crest A ridgeline widen, appearing deeper and 'wedge' like drawing the eye to the horizon. Whilst the visual extent of PV panels within TB2SP to the east is confined to the land that rises to the north - south Crest A ridgeline the relative height of the crest extinguishes views of the PV panels on the flatter land immediately beyond. However, the uppermost portion of the rows of PV panels installed along

	the Crest B ridgeline further east will appear as a faint contiguous extension of the PV panels in the foreground, touching but not punctuating the eastern horizon. The southern extent of PV panels is concealed behind a collection of large steel sheds on the properties eastern boundary.
Predicted visual impact	For TB2SP **- Slightly Adverse Impact**. The cumulative impact when considered in conjunction with TBSP – **Slightly Adverse to Moderately Adverse** where the expanse of PV panels over TBSP will be more apparent at the property entrance off Substation Road.
Mitigation	None Required – formally. The landowner of SR#05 has asked Equis to consider the planting of screening vegetation along the eastern boundary of SR#05. Equis is currently preparing a proposed planting plan, identifying native vegetation local to the region with an approximate height of 2-3m, that are low maintenance and would be suitable for the property, for discussion and agreement with the landowner. Ongoing consultation with the landowner of SR#05 will continue throughout the development of the project.

Existing view

Proposed view

PV panels represented at 60 ° tilt.

Photomontage Representation for Sensitive Receptor SR05
Location: No. 13 Substation Road
View east - north east - north
Viewpoint at 20m AHD
Date: March 2018 Revision B

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Landscape and Visual Impact Assessment – Sensitive Receptor SR#06	
	
Location	No. 6 Substation Road. The property lies at the intersection of Lime Kiln Road with Substation Road; positioned to the south of the unsealed Substation Road which carries occasional local traffic only.
View direction	East – north east - north.
Landscape and setting	*'Expansive eastern plains'* Character unit 2; a landscape of **low scenic amenity**. The expansive eastern panorama is like Sensitive Receptor SR #06 where the eye of the observer traces over the undulating landscape in search of visual interest, concluding the search somewhat unrewarded at the distant horizon. It is a view where collectively, the foreground of stobie poles, mid – ground of prominent towers and the catenary of wires of the existing substation and a distant horizon of transmission towers are notable and incongruous features within the contextual landscape.
Distance from project site	0.3 km
Visual exposure at receptor	**Moderate.** PV panels installed within the flatter north western corner of the TB2SP site will be concealed behind the distant batters of the northern wastewater treatment pond and the built form of No. 13 Substation Road. However, the uppermost section of PV panels installed on rising land along the Crest A ridgeline will emerge from above the batters of both wastewater treatment ponds appearing as an almost imperceptible thin linear form. The more 'ribbon like' appearance of PV panels in the south-western corner of the site will be visually prominent. The extent and depth of view of PV panels to the east is largely confined to land within the site that rises from the western boundary of the site to the Crest A ridgeline located 0.4 km beyond the western site boundary. However, the uppermost portion of the rows of PV panels installed along the Crest B ridgeline further east will appear as a faint contiguous extension of the PV panels in the foreground, touching but not punctuating the eastern horizon. At this sensitive receptor boundary fencing is likely to appear more obvious and obtrusive than at other sensitive receptors.

Predicted visual impact	**Moderately Adverse Impact** – TB2SP. The cumulative impact when considered in conjunction with TBSP – **Moderately to Substantially Adverse.** Particularly where the visually expansive array of PV panels and boundary security fencing over both the TB2SP and TBSP sites will be broken only by the east - west alignment of Substation Road.
Mitigation	Boundary screening along the western boundary of TB2SP or on the line of sight within the SR#06 property boundary will assist in mitigating the visual impact of the PV panels and security fencing. The use of native trees and shrub species with low maintenance requirements is recommended to establish a quick growing impenetrable visual buffer. Planting evergreen native shrubs which attain a height of at least 2 - 3 meters along the first 40 meters of the western boundary of TB2SP from Substation Road or approximately 12 - 15 meters of screening on the line of sight within the SR#06 property boundary will achieve the recommended mitigation outcomes for TB2SP (and deliver visual mitigation benefits for the approved TBSP). Preliminary discussions with the property owner have revealed that the owner does not consider visual mitigation necessary.

Existing view

Proposed view

PV panels represented at 60 ° tilt.

Photomontage Representation for Sensitive Receptor SR06
Location: No. 6 Substation Road
View north - north east
Viewpoint at 21m AHD
Date: March 2018
Revision C

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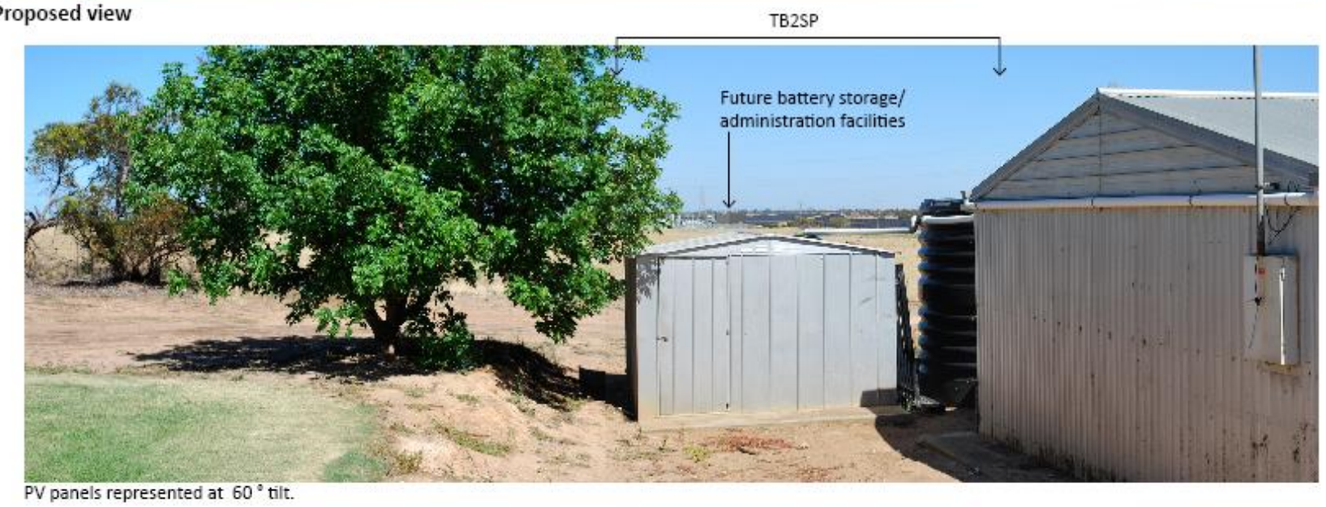
Landscape and Visual Impact Assessment - Sensitive Receptor SR #07	
	
Location	No. 278 Substation Road. Substation Road is an unsealed road carrying occasional local traffic only. A large allotment comprising of a residential dwelling, domestic scale sheds and external buildings and attractively landscaped amenity and outdoor recreational areas. The dwelling is centred within the property with vehicular access along Substation Road. The northern aspect of the dwelling is landscaped with small trees and mature large shrubs.
View Direction	North west to north.
Landscape and setting	*'Expansive eastern plains'*- Character Unit 2. Views to the west are restricted to the immediate foreground of undulating cropped fields as a nearby north-south crest precludes views further west over the wider expanse of the approved TBSP site. Views to the north beyond Substation Road are largely restricted by roadside tree and shrub plantings along Substation Road and the expansive copse of vegetation within the TB2SP site. To the north-west skyline is dominated by transmission towers and overhead wires which are juxtaposed against the distant hills behind the Tailem Bend township. On clear days the upper section of the Tailem Bend water tower is visible from the dwellings outdoor amenity and dining area which are located on the western aspect of the dwelling.
Distance from project site	0.14 km.
Visual exposure at receptor	**Low**. To the north intermittent glimpsed views only of less than 10% of the proposed design layout for TB2SP site will be obtained through the roadside tree canopies located along Substation Road.

	From the outdoor amenity and dining area views to the west - north west will include the distant PV panels, which will be largely concealed by the two domestic sheds erected on the western property boundary. A glimpsed view only will be obtained of a small area of PV panels located from a mid-point within the site to the northern boundary, west of the retained copse of mature trees and shrubs. The linear appearance of these PV panels over undulating land will create a differential colour contrast to the surrounding cropped fields. However, the linear form of the collection of PV panels will be similar in colour and appearance to the darker foreground and mid-ground of the roadside tree and shrub canopies. The transmission towers will remain the most visually conspicuous features in the contextual landscape.
Predicted visual impact	Views north to north west from within the property – **No Change to Slightly Adverse Impact.** The cumulative impact when considered in conjunction with TBSP - **No Change to Slightly Adverse Impact**.
Mitigation	None required.

Existing view

Proposed view



PV panels represented at 60 ° tilt.

Photomontage Representation for Sensitive Receptor SR07
Location: No. 278 Substation Road
View north west - north
Date: November 2017
Revision A

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4. Post construction management and mitigation measures

Consideration should be given to the visual mitigation measures recommended at each 'Sensitive Receptor' on completion of construction works.

It is considered unnecessary to screen views from adjacent roads within the locality, these roads are for local traffic only and the volume and frequency of traffic movement is low.

It is recommended that where desirable, visual mitigation is undertaken on an individual site basis and should comprise of screen planting using indigenous and native vegetation.

Photo: Substation Road view east – TB2SP on left, TBSP on right

5. Development Plan Considerations

The Coorong District Council Development Plan[6] establishes that the land within which TB2SP is located is zoned as Urban Employment.

Given this, the following Development Plan Urban Employment Zone Objective is relevant to this study:

Objective 9: Development that contributes to the desired character of the zone.

It is considered that the expansion of the approved solar project and associated battery storage through the proposed TB2SP is envisaged as part of the desired character of the zone.

The following Development Plan Urban Employment Zone Principles of Development Control are relevant to this study;

Form and Character 9: Development should not be undertaken unless it is consistent with the desired character for the zone.

Expansion of the approved solar project and associated battery storage through the proposed TB2SP is envisaged as part of the desired character of the zone.

Form and Character 10: Buildings should be set back in accordance with the following parameters:

- *Building heights of 6 metres – 8 metres from primary road frontage and 3 metres from secondary road frontage.*
- *Building heights greater than 6 metres - 10 metres from primary road frontage and 3 metres from secondary road frontage.*

Form and Character 11: Structures should have a maximum height of 10 metres, exclusive of any external plant and equipment such as flues, chimney stacks or aerials.

The solar modules and buildings of TB2SP (including battery modules) will not exceed 10 metres.

[6] Development Plan, Coorong District Council Consolidated – 21 November 2017

Other relevant provisions of the Coorong Council Development Plan include a broad range of policy items of relevance to the design and appearance of the TB2SP. In particular, the Development Plan provides that infrastructure development should:

- Be sited and designed to blend with the natural features of the landscape;
- Be of a high architectural standard;
- Protect areas of scenic or conservation significance from undue damage;
- Cause minimal damage to the natural landform; and
- Screen and orientate infrastructure away from public view, tourist and scenic routes.

The TB2SP development satisfies these relevant provisions.

Whilst the cumulative visual impact of both TBSP and TB2SP from the elevated section of Dukes Highway south of Tailem Bend places new infrastructure in a location which can be viewed by tourists and the general public alike, it is my opinion that as two new notable and visually significant land use activities both TB2SP and TBSP will deliver a **moderately beneficial impact** within the contextual landscape.

6. Summary and recommendations

The introduction of the TB2SP will alter the character and visual qualities of the locality and wider contextual landscape. In particular, the cumulative visual impact of both TB2SP and TBSP will be notable when observed from the elevated section of Dukes Highway south of Tailem Bend.

It has been demonstrated that, where necessary and desired, all likely visual impacts on the identified residential Sensitive Receptors can be managed through visual mitigation introduced through vegetative screening.

The sense of place and place attachment values of neither Tailem Bend nor the Murray River will not be detrimentally affected by the TB2SP development.

It is my opinion that the solar project will introduce a new infrastructure element of an acceptable design standard that, from the identified elevated vantage point on Dukes Highway will evoke curiosity, becoming a prominent 'incidental' infrastructure feature of merit and a best practice example of progressive renewable energy delivery.

It is my opinion that within a locality and character unit of **low scenic quality** the visual impact that is likely to be experienced by the introduction of TB2SP will range between;

- **negligible to slightly adverse only** on five residential Sensitive Receptors
- **moderately adverse on** one residential Sensitive Receptor.

The TB2SP will have a **moderately beneficial visual impact** from the elevated sensitive receptor at Dukes Highway.

The likely cumulative visual impact of TB2SP and TBSP will vary from **Negligible** to **Moderately – Substantially Adverse** (at one only sensitive receptor - SR #06).

With the application of the recommended mitigation measures both the singular and cumulative visual impacts can, where desirable, be largely ameliorated.

21 February 2018

Laura Kerber
Planning and Development
Department of Planning, Transport and Infrastructure
GPO Box 1815
Adelaide 5000
AUSTRALIA

Dear Ms Kerber,

Subject: Tailem Bend Solar Project Stage 2 – Amendment to Development Application

Equis Energy (Australia) Pty Ltd (Equis Energy) submitted a Development Application for the Tailem Bend Solar Project Stage 2 (TB2SP) on the 21st of December 2017, under section 49 of the *Development Act 1993 (SA).*

The TB2SP Development Application and subsequent project construction is based on the potential for movements within the market, including purchase power and the availability of changing technology. Within recent weeks additional technology has become available within the market. Given this, we propose to alter the current Development Application to allow for the consideration of these new opportunities and of the updated technology. This letter describes the proposed changes to the project and details the resultant technical alterations to the Development Application and Appendices.

Overview of Amendment – Technology and Capacity

The technology of single-axis tracking is to remain as originally proposed. However, the number of modules per tracking structure may increase from 1 row to 2 rows in portrait (see Figure 1). The final determination of the technology will be dependent on availability, market power and realistic commercial testing during final detailed design. This additional allowance will further provide an increase in overall height from 3m to 4.5m from ground level. An updated tracker design is provided as Appendix A.

The variation to the technology of the proposed TB2SP may also provide an additional 10MW_{AC} increase to the generation capacity of the solar project; increasing the potential of the site from up to 90MW_{AC} to up to 100MW_{AC} capacity. This increase of 10MW_{AC} will arise if the project is developed with the 2 rows in portrait technology. This will provide Equis Energy with the ability to deliver increased support to the SA power market should the technology improve further prior to construction. The Department of Premier and Cabinet (DPC) has amended the Crown Sponsorship letter to reflect this change, attached as Appendix B.

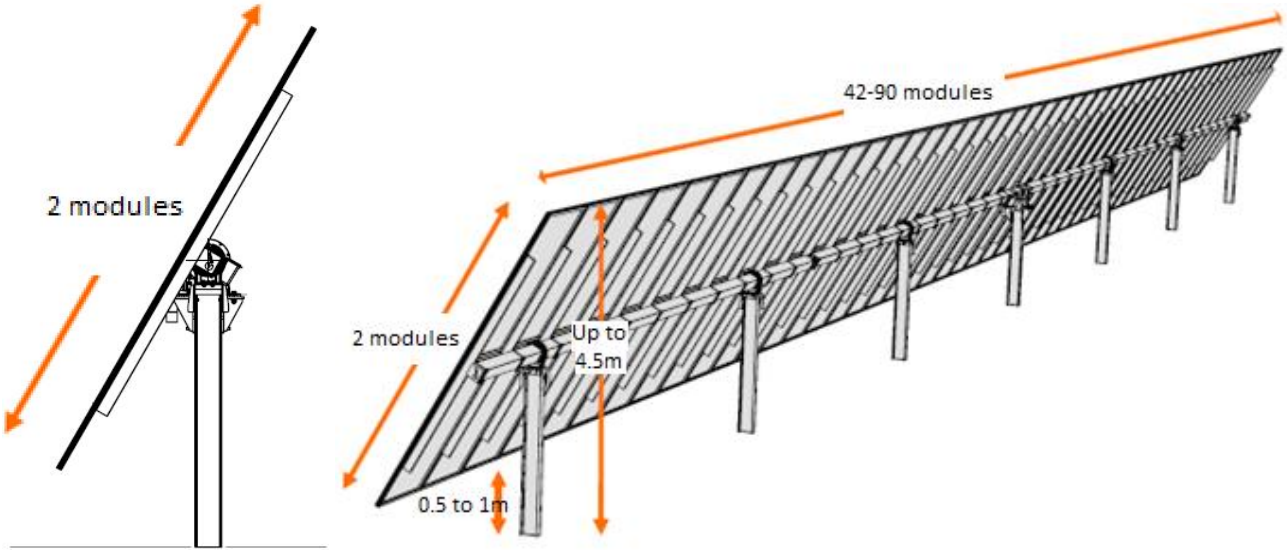


Figure 1 Schematic showing proposed solar module technology

Effect of Requested Variance on Development Application and Appendices

The increase in overall height of the modules will change the visual amenity of the landscape. However, this is limited to certain times of the day; early morning and late afternoon, as the modules track the sun from east to west. To assess the visual change for sensitive receivers associated with the increase in panel height, the Landscape and Visual Impact Assessment completed for TB2SP has been updated to account for the increase in height of the panels.

The proposed change in technology is not expected to alter other environmental aspects presented in the Development Application. In particular, the potential variation in technology is not anticipated to change the area coverage of solar panels or general layout of the proposed development. Therefore, there will be no additional impact on native vegetation on the subject site.

Appendix C presents a detailed comparison of resultant changes to the Development Application and Appendices based on the Table of Contents of the Development Application. The revised Landscape Character and Visual Amenity Report is attached as Appendix D.

Relevance & Benefit

The proposed variation in technology delivers several benefits to the project and the overall electricity supply to South Australians, including:

1. The new tracker technology has recently become available to allow 2 rows of modules per single-axis tracker structure. This provides additional area for further panels because the rows are shorter, and improves the use of the available developable area of the site;

2. Improved use of the developable area of the site increases the capacity of the project which also increase the electricity generated from the site. The installed capacity of the project would increase by 1-2% with the change in module structure;

3. The capital cost of construction would be reduced by exchanging the modules from 1 row to 2 rows in portrait. The double-row tracker requires fewer foundations which reduces the overall construction costs of the project, creating a more competitive price of power generated by the project; and

4. The overall safety of the site is improved as the double-row tracker leads to larger spacing between the rows of modules. This provides improved access for construction and maintenance activities.

Summary and closure

It is with these considerations in mind, we seek to amend the Development Application submitted on the 21st December 2017 to allow for the variation in module structures from 1-row in portrait to 2-rows in portrait and potential change to increase the generation capacity to up to 100MW_{AC}. We request an update to the Development Application to allow for the consideration of these technical variations so that further investigation of this updated technology can occur should it be considered commercially viable. This slight change to the allowances and characteristics of the development and subsequent application will allow for a safer and more efficient project.

Should you have any queries regarding the proposed changes to the Tailem Bend Solar Project Stage 2 Development Application, please do not hesitate to contact me via the detail below or Duncan Mortimer on; duncan.mortimer@equisenergy.com or 0417 997 099.

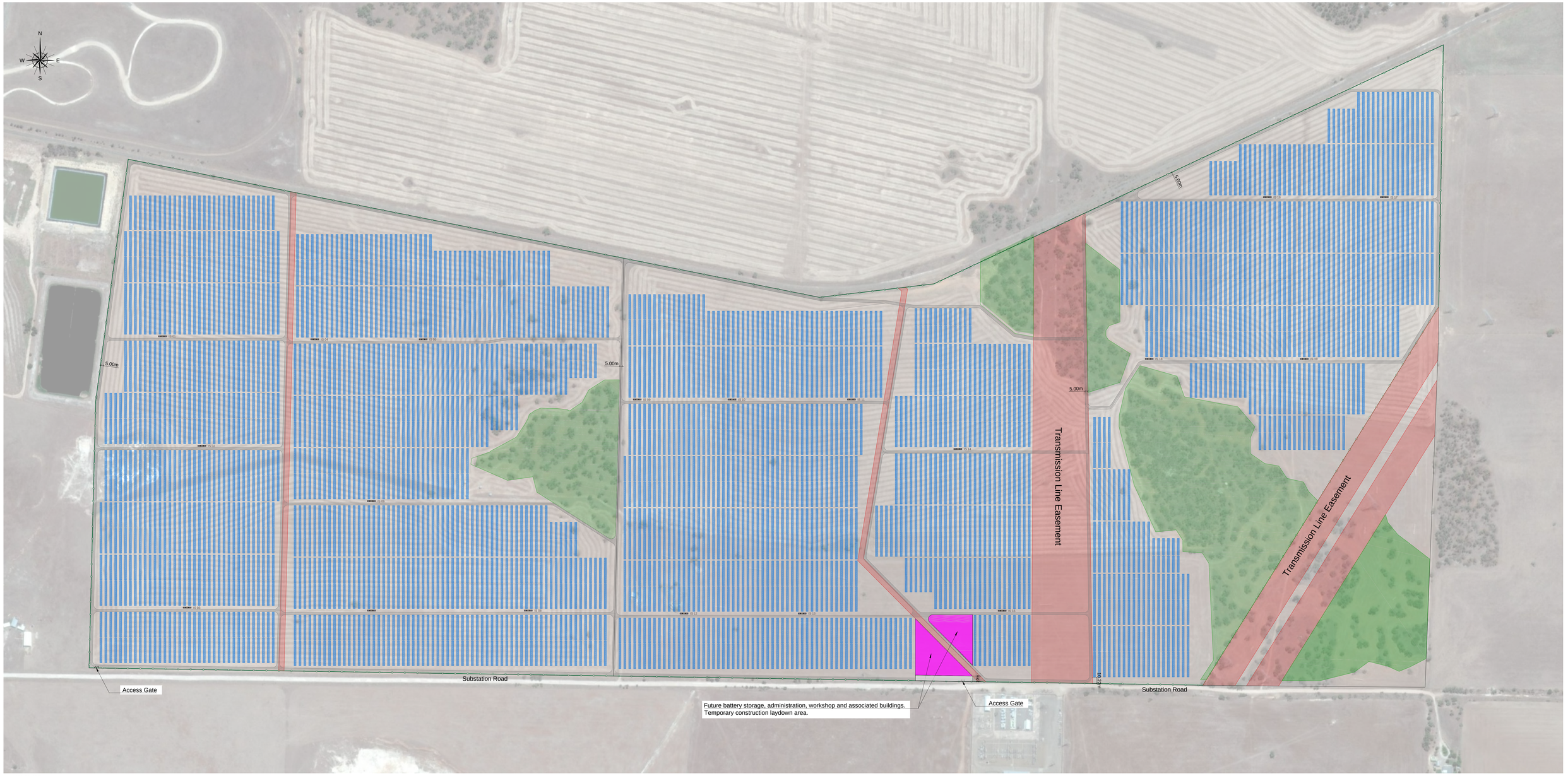
Yours sincerely,

Anil Nangia
Managing Director
Equis Energy (Australia)
Email: anil.nangia@equisenergy.com
Mobile: 0417 612 926

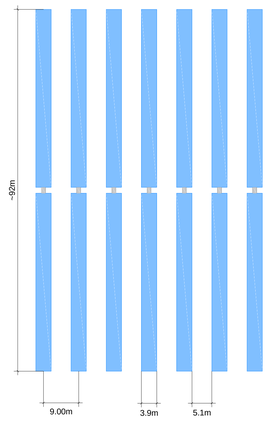
Attachments:

Appendix A	Updated Solar Module Design
Appendix B	Updated Section 49 Endorsement
Appendix C	Detailed description of resultant changes to the Development Application and Appendices
Appendix D	Updated Landscape Character and Visual Impact Report

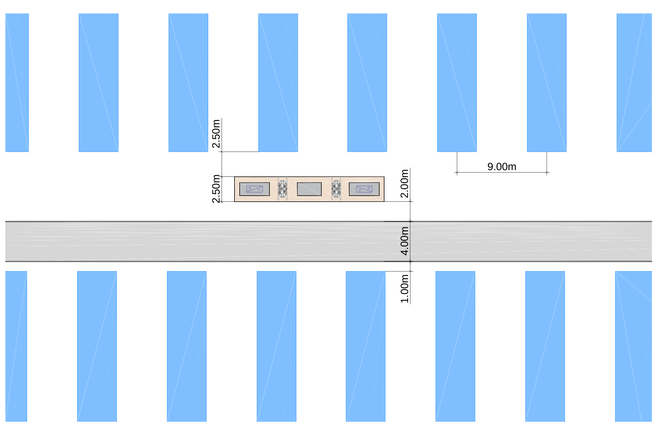
Appendix A. Updated Solar Module Design and Indicative Project Layout



SCALE 1:2500

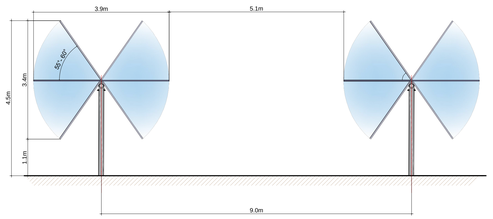


TRACKER DIMESIONS - TOP VIEW
SCALE NTS



LAYOUT DETAIL 1.1 - TOP VIEW
SCALE NTS

Tracker Detail
2V90: 2 racks with 2x45 Modules in Portrait / 2V60: 2 racks with 2x30 Modules in Portrait
180 Modules per row (63 kWp) / 120 Modules per row (42 kWp)
6 strings per tracker / 4 strings per tracker
Tilt: from -60° to +60°



TRACKER DIMENSIONS - LATERAL VIEW
SCALE NTS

PROJECT: TAILEM BEND 2 PROJECT	
COORDINATES	35.2678° S 139.4822° E
SITE AREA	209 ha
FENCE AREA	195.08 ha
PV AREA	142.28 ha
BASIS FOR PLAN	GOOGLE EARTH
MODULE	
MODULE	Trina Tallmax Plus TSM-DD14A(II)-350
MODULE POWER	350 Wp
MODULE DIMENSIONS	1956 x 992 mm
NUMBER OF MODULES	285,120
STRING LENGTH	30 (9504 strings)
ARRAY LAYOUT	
MOUNTING SYSTEM	2V90 / 2V60
MODULE ORIENTATION	Tilt ±60
ROW TO ROW CLEARANCE	5.08 m
PITCH	9.00 m
POWER PER ARRAY	63 / 42 kWp
NUMBER OF ARRAYS	1468 / 174 (~1584)
TOTAL DC POWER	**99.79 MWp**
INVERTER	
INVERTER	Schneider 1500V 2000kVA
STATION	19 × PVBox (4000kVA)
AC POWER @ 25 °C	**38 × 2000kW = 76 MVA**
DC / AC RATIO	131%

REVISION LIST

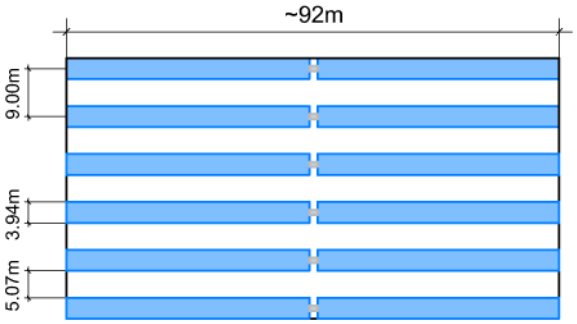
NO.	DATE	ISSUED FOR	DRAWN	REVIEWED	APPROVED	COMMENTS
005	25/01/2018	APPROVAL	PRX	TUK	JMV	MODULE AREA UPDATED AND DC POWER INCREASED TO 96.77MWp
004						Module Configuration with Flexibility
003						MODULE AREA UPDATED AND DC POWER INCREASED TO 98.87MWp
002	29/08/2017	APPROVAL	PRX	TUK	JMV	MODULE AREA UPDATED AND DC POWER INCREASED TO 96.77MWp
001	25/08/2017	APPROVAL	PRX	TUK	JMV	MODULE AREA UPDATED
000	02/03/2017	APPROVAL	PRX	TUK	JMV	FIRST ISSUE

EQUIS
Level 16, 200 Mary Street, Brisbane
Queensland QLD 4000
Australia

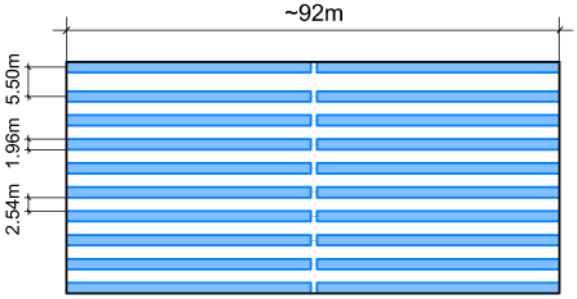
DATE	25/01/2018
SCALE	1:2500
STATUS	Preliminary
REV.	005
PROJECT NUMBER	008 AUS TAB2
PROJECT	TAILEM BEND 2
PROJECT LOCATION	35.27° S 139.48° E AUSTRALIA
DRAWING TITLE	Module Layout
DRAWING NUMBER	0100
SHEET	1

A0 - (1189 x 841)mm

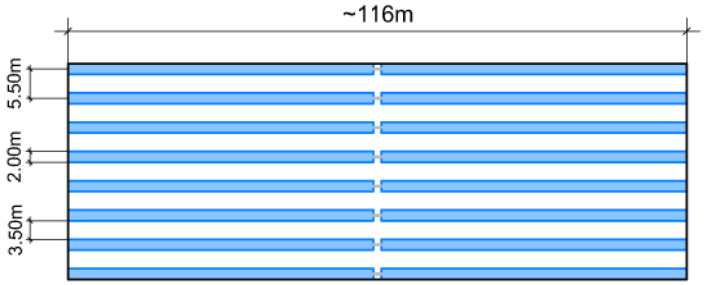
Preliminary Design of Lateral Plan View



2V90 Portrait
3-6 Strings per row, 90-180 Modules

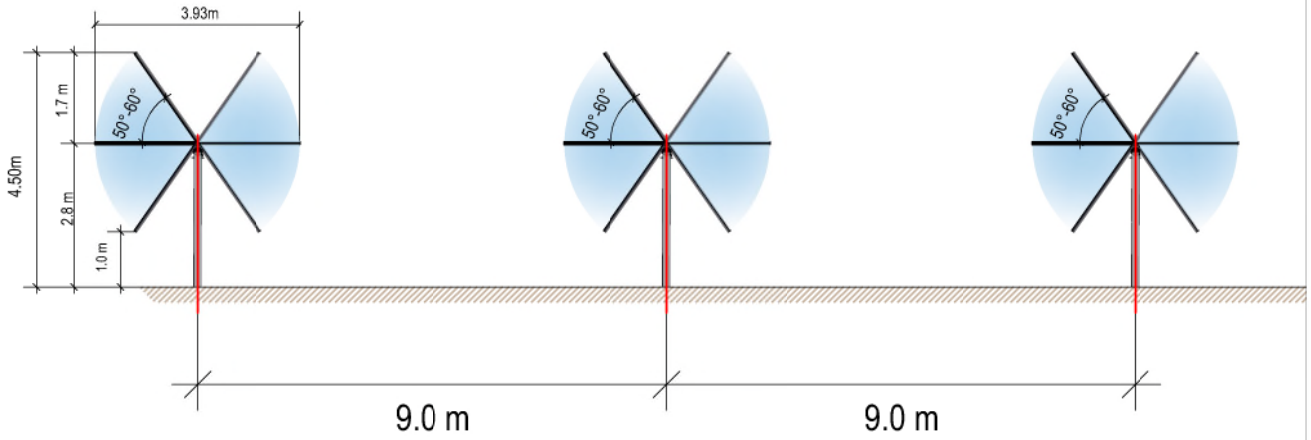


1V90 Portrait
3 Strings per row, 90 Modules

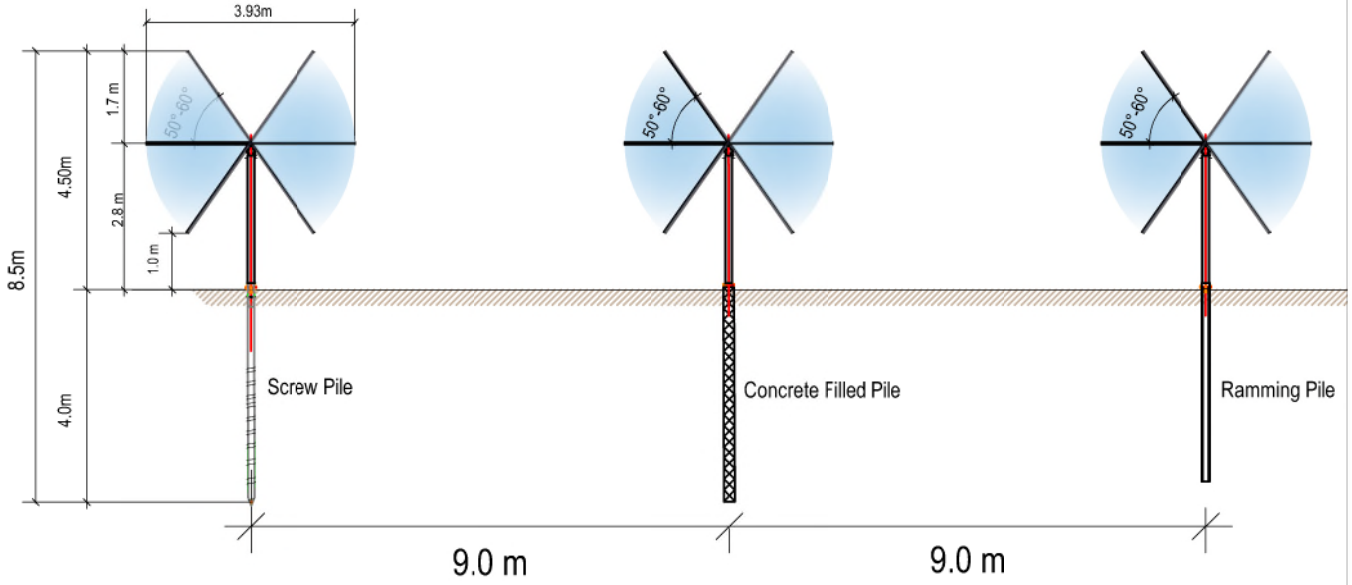


2V30 Landscape
2-4 Strings per row, 60-120 Modules

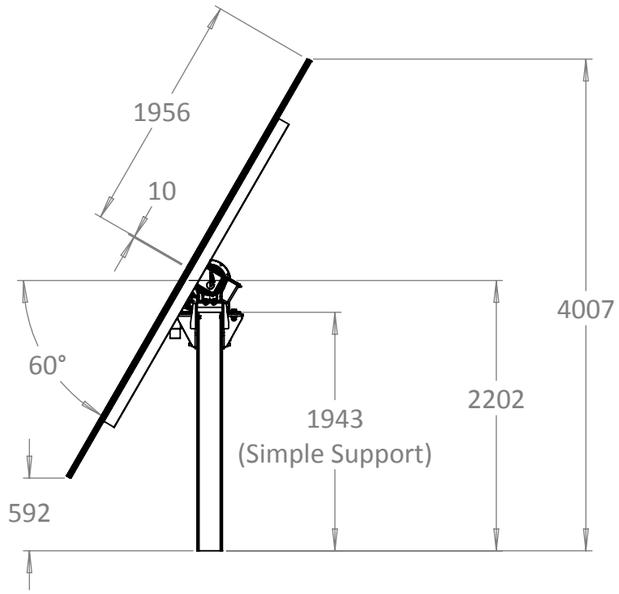
Updated 1-Axis Tracker Design



Updated 1-Axis Tracker Design with Types of Mounting Foundation

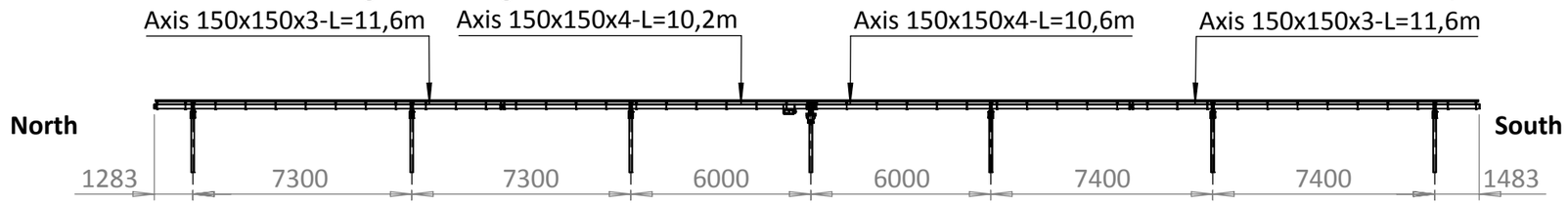


Jinko JKM 315PP-72 PV Module

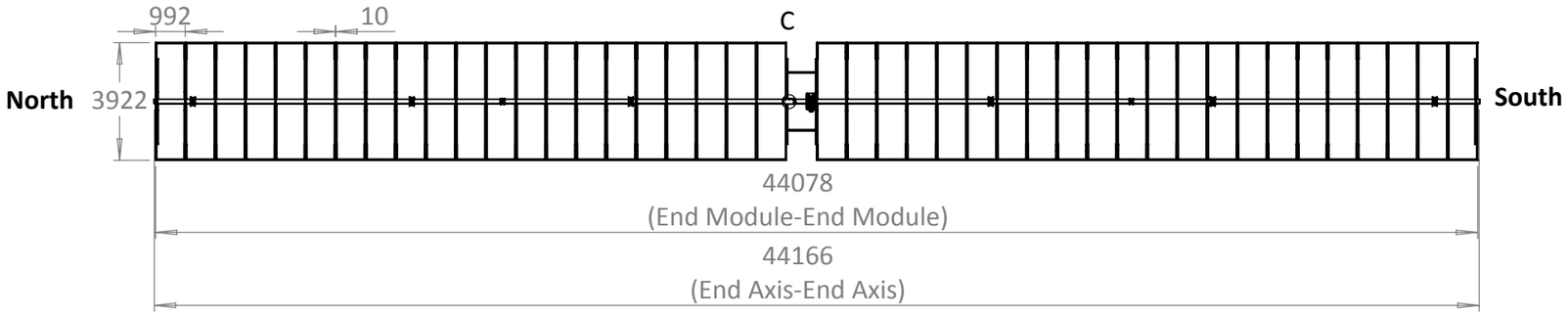


Tracker at 60 degrees tilt angle

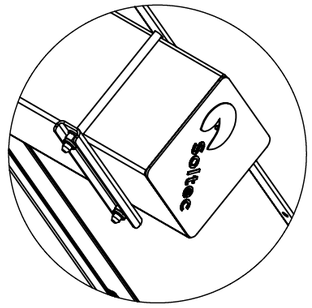
SF7 Tracker 2x43,5



Tracker at horizontal tilt angle

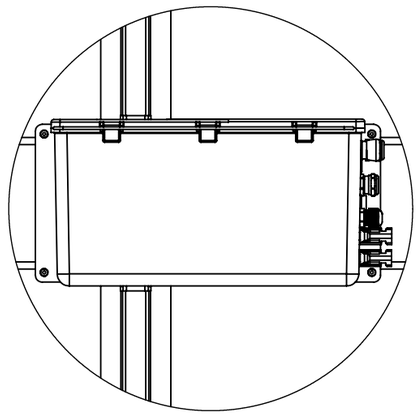


Plastic Cover



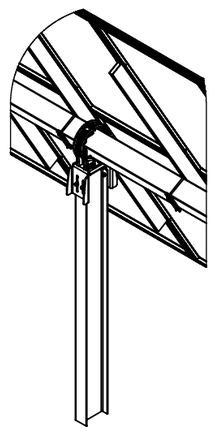
DETAIL D
SCALE 1 : 7

Electronic Box



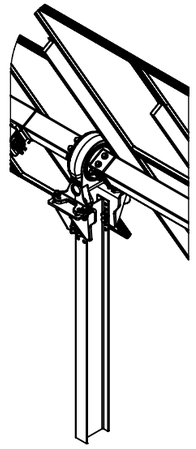
DETAIL C
SCALE 1 : 7

Simple Support

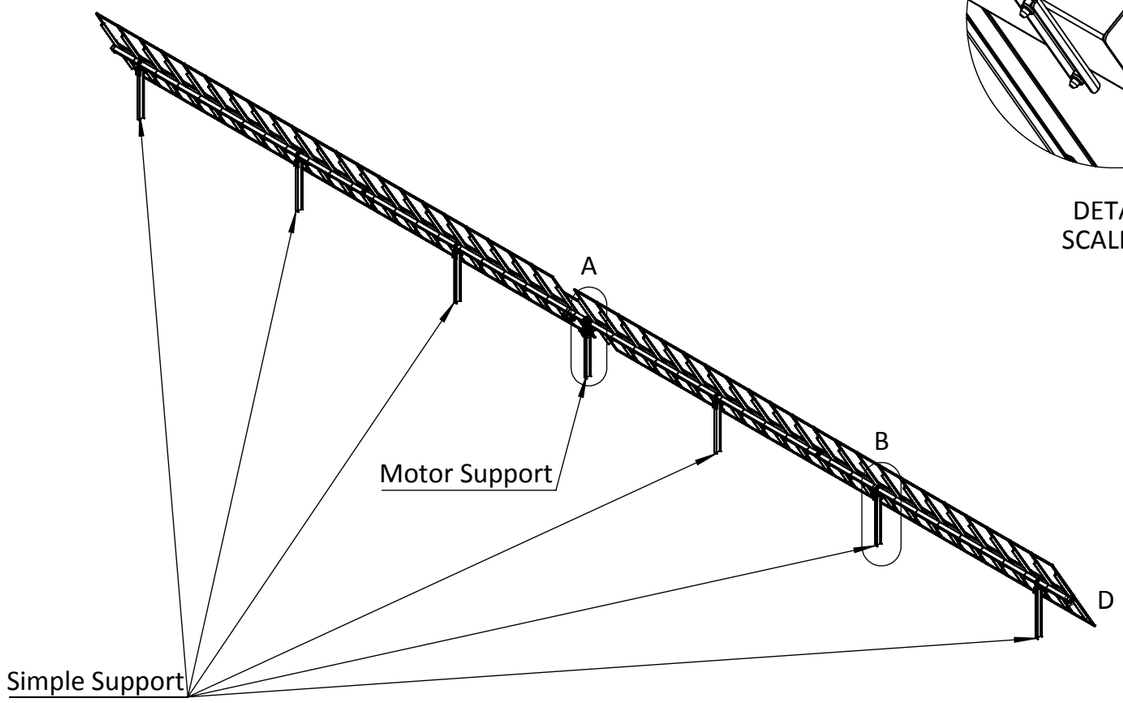


DETAIL B
SCALE 1 : 40

Motor Support



DETAIL A
SCALE 1 : 40



-	-	-	-
-	-	-	-
-	-	-	-
Rev.	Description	Signee	Date

MANUFACTURING GENERAL NOTES	APPLY
DIMENSIONAL & GEOMETRICAL GENERAL TOLERANCES WITHOUT INDIVIDUAL TOLERANCE INDICATION, BASED ON **ISO 2768-mK**.	X
WELDING GENERAL TOLERANCES BASED ON **ISO 13920** & WELDING SYMBOLS IN ACCORDANCE WITH **ISO 2553**.	-
SURFACE FINISH SIMBOLS IN ACCORDANCE WITH **ISO 1302-ISO/R 468**.	-

*EXCEPT INDICATION DIMENSIONS IN **MM** & WEIGHTS IN **KG**.*

	Name	Date
Created	JCM	30/08/17
Checked	JCM	06/09/17
Appr.		

Soltec

Material: Según LDM	Lyfecycle: Pre-Production
Weight (kg): -	Description: SF7 2x43,5 Tracker Jinko JKM 315PP-72
Finish: -	Dwg. no. SF7-25
Drawing method:	Rev. D01
Scale 1:500	Page 1 of 1 A3

Appendix B. Updated Section 49 Endorsement

Government of South Australia
Department of the Premier and Cabinet

B135341

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Adelaide SA 5001
DX 56201
Tel 08 8226 3500
Fax 08 8226 3535
www.dpc.sa.gov.au

24 January 2018

Mr Duncan Mortimer
General Manager Development and Community
Equis Energy (Australia) Pty Ltd

Email: duncan.mortimer@equisenergy.com

Dear Mr Mortimer

CROWN SPONSORSHIP VARIATION FOR THE STAGE 2 TAILEM BEND SOLAR PROJECT

Thank you for your letter of 19 January 2018 seeking a variation to the existing Crown sponsorship of Equis' planned Stage 2 Tailem Bend Solar Project (Project).

The Stage 2 Project was provided with Crown sponsorship on 7 November 2017, noting it has the potential to benefit South Australia and can be considered public infrastructure. The original Crown sponsorship covered the construction of up to 90 MW of solar PV generation.

Since Crown sponsorship for the Stage 2 Project was granted, I am aware that Equis has undertaken further internal work on the proposal and that you are now seeking to integrate an additional 10MW of solar PV capacity. This will bring the total solar capacity of the Stage 2 Project up to 100MW.

I have considered your request for a variation to the existing Crown sponsorship of the Stage 2 project to accommodate this increased capacity. I note that it will lead to further benefits to South Australia and is unlikely to result in any adverse consequences. I therefore approve your request for a variation to the current Crown sponsorship of your Stage 2 Project.

It is the responsibility of Equis to prepare all documentation as required by section 49 of the Act. All costs in the preparation of the development application, lodgement and any other subsequent action in relation to this application are the responsibility of Equis.

The Department of the Premier and Cabinet makes no representations or gives no warranties in relation to the outcome of the development application or time that it takes to secure a planning outcome. It is Equis' responsibility to obtain all other statutory

approvals, licences, connection agreements and permits from relevant authorities, manage community expectations and to fund the project. The State Government makes no commitment to purchase any product or service related to the project.

This approved variation to your existing Crown sponsorship of the Stage 2 Project does not impact its current date of expiry. Accordingly, a development application under this Crown sponsorship variation must continue to be lodged with the State Planning Commission on or prior to 3 November 2018. If this is not achieved by that time, my support under Section 49(2)(c) of the *Development Act 1993* for Equis' Stage 2 Project will lapse.

If you have any questions regarding the preparation of the material to support this section 49 variation application, please contact Mr Mark Jackson on (08) 8429 5082 or via email mark.jackson@sa.gov.au.

Yours sincerely

Dr Don Russell
CHIEF EXECUTIVE

Appendix C. Summary of Resultant Changes to the Development Application and Appendices

The below table provides a comparison of resultant changes to the Development Plan and Appendices based on the Table of Contents of the Development Application, originally lodged on the 21st of December 2017. Sections of the Development Application and Appendices which have been significantly altered by the proposed change in technology and capacity have been updated in full as referenced within this table.

Development Application Section Reference	Summary Resultant Change to Development Application
Executive Summary	This section of the Development Application references 90MW$_{AC}$ capacity, which has changed to allow for up to 100MW$_{AC}$ capacity.
Key Environmental Considerations	No change.
1. Introduction	This section of the Development Application references 90MW$_{AC}$ capacity, which has changed to allow for up to 100MW$_{AC}$ capacity.
2. The Applicant – Equis Energy (Australia)	No change.
3. Statutory Requirements	No change.
3.1 Approval Process	No change.
3.1.1 Public Notification	No change.
3.1.2 Statutory Referrals	No change.
3.2 Additional Approvals	No change.
3.3 Strategic Alignment	This section of the Development Application references 90MW$_{AC}$ capacity, which has changed to allow for up to 100MW$_{AC}$ capacity.
3.3.1 Alignment with National Policy Objectives	No change.
3.3.2 Alignment with State Policy Objectives	No change.
4. Subject Site and Project Locality	No change.
5. Description of the Development	This section of the Development Application references 90MW$_{AC}$ capacity, which has changed to allow for up to 100MW$_{AC}$ capacity. The spacing between the solar panels has changed from approximately 4.5 metres between installation centres to a maximum (worst case) of 9 metres spacing between installation centres.
5.1 Proposed Layout and Key Components	No Change.
5.1.1 Summary Components	No Change.
5.1.2 Solar Technology	No Change.
5.1.2.1 Single-axis Tracking Solar Panels	The maximum height of the modules has changed from 3 to up

Development Application Section Reference	Summary Resultant Change to Development Application
	to a maximum height of 4.5 metres above ground level. The spacing between the solar panels has changed from approximately 4.5 metres between installation centres to a maximum (worst case) of 9.5 metres spacing between installation centres. The indicative design details shown in Figure 5-2 and Figure 5-3 have changed. The updated design details are presented in Appendix A of this letter.
5.1.2.2 Module Footings	No Change.
5.1.3 Inverter Stations	No Change.
5.1.4 Connections	No Change.
5.1.5 Administration/Controls and Laydown Compound Area	No Change.
5.1.5.1 Administration and Controls Building	No Change.
5.1.5.2 Car Parking	No Change.
5.1.5.3 Amenities	No Change.
5.1.5.4 Battery Storage	No Change.
5.1.6 Fencing and Security	No Change.
5.1.7 Lighting	No Change.
5.1.8 Drainage Works, including Stormwater Management	No Change.
5.1.9 Site Access and Internal Access Roads	No Change.
5.1.10 Lightning Protection	No Change.
5.1.11 Landscaping	No Change.
5.1.12 Final Project Layout	This section of the Development Application references 90MW_{AC} capacity, which has changed to allow for up to 100MW_{AC} capacity.
5.2 Construction Phase	No Change.
5.2.1 Construction Programme	No Change.
5.2.2 Construction Workforce	No Change.
5.2.3 Temporary Construction Facilities	No Change.
5.2.4 Utilities	No Change.
5.2.5 Vehicle Movements	No Change.
5.2.6 Waste Management	No Change.
5.3 Operational Phase	No Change.
5.3.1 Operating Workforce	No Change.
5.3.2 Utilities	No Change.

Development Application Section Reference	Summary Resultant Change to Development Application
5.3.3 Stormwater Management	No Change.
6. Environmental Assessment	No Change.
6.1 Visual Amenity	The Landscape Character and Visual Impact Assessment Report has been updated, but the methodology used has not changed.
6.1.1 Existing Environment	No change
6.1.2 Sensitive Receptors	The potential sensitive receptors were reviewed as part of the update to the Landscape Character and Visual Impact Assessment Report and were found to be unchanged. However, further consultation meetings have occurred with landholders on 20 and 21 February 2018. Discussions with landholders regarding potential screening at selected locations is ongoing.
6.1.3 Impact Assessment	The increase in overall height of the modules will result in minor changes to the level of visual impact experienced at sensitive receptors. The revised visual amenity impact assessment summary is presented as C.1 below.
6.2 Traffic	No change.
6.2.1 Existing Environment	No change.
6.2.2 Sensitive Receptors	No change.
6.2.3 Impact Assessment	No change.
6.3 Aviation	No change.
6.4 Cultural and Historic Heritage	No change.
6.4.1 Existing Environment	No change.
6.4.2 Sensitive Receptors	No change.
6.4.3 Impact Assessment	No change.
6.5 Flora and Fauna	No change.
6.5.1 Existing Environment	No change.
6.5.2 Impact Assessment	No change.
6.6 Air Quality	No change.
6.6.1 Construction Air Quality	No change.
6.6.2 Operation Air Quality	No change.
6.7 Noise	No change.
6.8 Site Contamination	No change.
7. Development Plan Assessment	No change.
7.1 Renewable Energy Facilities	No change.
7.2 Visual	No change.
7.3 Traffic and Transport	No change.

Development Application Section Reference	Summary Resultant Change to Development Application
7.4 Heritage	No change.
7.5 Flora and Fauna	No change.
7.6 Air Quality	No change.
7.7 Noise	No change.
7.8 Bushfire	No change.
7.9 Site Contamination	No change.
7.10 Water and Flooding	No change.
7.11 Landslip	No change.
7.12 Acid Sulfate Soils	No change.
7.13 Chemical Storage and Handling	No change.
7.14 Orderly and Economic Development	No change.
7.15 Urban Employment Zone	No change.
8. Environmental Management	No change.
8.1 Construction	No change.
8.2 Operation	No change.
8.3 Repowering / Decommissioning	No change.
8.3.1 Repowering	No change.
8.3.2 Decommissioning	No change.
9. Conclusions	No change.
10. References	No change.
Appendix A Section 49 Endorsement	An updated Section 49 Endorsement letter which reflects the increase in maximum capacity to allow for up to 100MW$_{AC}$ is attached as Appendix B to this letter.
Appendix B Letter of Support	No change.
Appendix C Certificates of Title	No change.
Appendix D Proposed Development Indicative Layout and Preliminary Design Drawings	The updated indicative layout and preliminary design drawings are provided as Appendix A of this letter. There has been no change to the overall proposed disturbance footprint.
Appendix E Indicative Infrastructure and Design Details	No change.
E.1 Indicative PV Module data sheets	No change.
E.2 Indicative Single-Axis Tracker Data Sheets	An updated single-axis tracking data sheet is presented as C.2 below for information.
E.3 Indicative Inverter data sheets	No change.
E.4 Indicative Battery data sheets	No change.
Appendix F Landscape and Visual Impact	A revised Landscape Character and Visual Impact

Development Application Section Reference	Summary Resultant Change to Development Application
Assessment	assessment report is attached as Appendix D to this letter.
Appendix G Preliminary Traffic Management Plan	No change.
Appendix H Vegetation Assessment	No change.
Appendix I Relevant Development Plan Policy	No change.

C.1 Revised Section 6.1.3 – Visual Amenity: Impact Assessment

During the construction phase, the change to visual amenity within the study area will occur as a result of earthworks, construction of project and ancillary infrastructure as well as an overall increase in the number of people and vehicles within the subject area. The changing visual environment and activity during construction will be temporary, therefore was not considered in detail in the visual assessment.

The solar project will be low in profile, comprising of panels which when fully tilted at 60º does not exceed a maximum height of 4.5 metres. In theory the solar project should be visible in the fore and mid-ground when viewed from locations to the immediate west and south of the site. However, it is apparent that subtle changes in undulation across the site and wider contextual landscape coupled with the presence of existing vegetation scattered throughout the area is likely to screen part or the entire solar project from many locations within these immediate areas.

For viewers more than three kilometres away from the subject site, the reduction in apparent size of the development as a result of distance will mean that it is likely to be insignificant in height and concealed within the view. In particular, the sense of place and place attachment values of Tailem Bend and Murray Bridge will not be detrimentally affected by the project.

Within a locality of low scenic quality, the impact likely to be experienced at the sensitive receptors will range between:

- Slight beneficial impact from the elevated sensitive receptor on the Dukes Highway (SR01). When considered in conjunction with the TBSP, the impact improved to moderate beneficial impact;
- No change, no change to slightly adverse or slightly adverse impact at five residential receptors for TB2SP. When considered in conjunction with TBSP, the impact at two residential receptors (SR03 and SR07) remained the same (no change to slightly adverse) and the impact at three residential receptors (SR02, SR04 and SR05) increased, with the most notable cumulative effects experienced at SR02 and SR05 (slight to moderately adverse impact); and
- Moderate adverse impact at one residential receptor (SR06). When considered in conjunction with TBSP, the impact increased to moderate to substantial adverse impact.

Visual mitigation via vegetative screening was recommended for two sensitive receptors (SR02 and SR06), although discussions with landowners at these locations have revealed that the owners did not consider visual mitigation necessary at the time of LCVIA reporting. Although the predicted visual impact for SR02 and SR05 is considered similar for the property as a whole, mitigation is not recommended for SR05 as the substantive view of the panels is not from the dwelling (but from the back of the shed). This can be compared with SR02 where the main view of the solar panels is from the front of the dwelling. The recommended mitigations are as follows:

- SR02: The visual impact of PV panels and on-site infrastructure can be mitigated through the introduction of screen planting along the western boundary of TB2SP or on the line of sight within the property boundary of SR02. The use of native trees and shrub species with low maintenance requirements would likely ensure that, if desired, a visual buffer could be quickly established; and

- SR06: Boundary screening along and outside the western boundary of TB2SP or on the line of sight within the SR06 property boundary will assist in mitigating the visual impact of the PV panels and security fencing. The use of native trees and shrub species with low maintenance requirements is recommended to establish a quick growing visual buffer. Planting evergreen native shrubs which attain a height of at least 2 m along the first 40 m of the western boundary of TBSP from Substation Road or approximately 12 - 15 m of screening on the line of sight within the SR06 property boundary will achieve the recommended mitigation outcomes for TB2SP (and deliver visual mitigation benefits for the approved TBSP).

Based on these measures, all likely visual impacts on sensitive receptors can be appropriately mitigated if considered required by the landholders.

C.2 Updated Indicative Single-Axis Tracker Data Sheet

An updated technical datasheet for the proposed single-axis tracking technology is attached overleaf.


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SF7
One Track
Zero Gap
The latest generation of the horizontal single-axis tracker
UL LISTED
[PV SOLAR TRACKER]
E476688
SGS
SGS
SGS

TECHNICAL DATASHEET

SF7
Single-Axis Tracker

MAIN FEATURES

Tracking System	Horizontal Single-Axis with independent rows
Tracking Range	120° +
Drive System	Enclosed Slewing Drive, DC Motor
Power Supply	Self-Powered PV Series
	Optional: AC/DC Universal Input
Tracking Algorithm	Astronomical with TeamTrack Backtracking
Communication	
Wireless	Hybrid Radio + RS-485 Cable
Optional: Wire	RS-485 Full Wired
Wind Resistance	Per Local Codes
Land Use Features	
Independent Rows	YES
Slope North-South	17%
Slope East-West	Unlimited
Ground Coverage Ratio	Configurable. Typical range: 28-50%
Foundation	Driven Pile | Ground Screw | Concrete
Temperature Range	
Standard	- 4°F to +131°F | -20°C to +55°C
Extended	-40°F to +131°F | -40°C to +55°C
Availability	>99%
Modules	Standard: 72 cells | Optional: 60 Cells; Crystalline, Thin Film (Solar Frontier, First Solar and others); Bifacial

MODULE CONFIGURATIONS

1000V	Length	Height	Width
2x38	38.1 m (124' 12")	3.95 m (12' 12")	3.92 m (12' 12")
2x40	40.1 m (131' 7")		

1500V	Length	Height	Width
2x42	42.1 m (138' 12")	3.95 m (12' 12")	3.92 m (12' 10")
2x43.5	44.1 m (144' 8")		
2x45	45.1 m (147' 12")		

SERVICES

Tracker Advisory Services	Tracker Turnkey Contracting
Technical Support	Commissioning
Pull Out Test	Maintenance

MAINTENANCE ADVANTAGES

- Self-lubricating Bearings
- Face to Face Cleaning Mode
- 2x Wider Aisles

WARRANTY

Structure	10 years (extendable)
Motor	5 years (extendable)
Electronics	5 years (extendable)

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TÜVRheinland CERTIFIED IEC 62817 www.tuv.com ID 0007000000

UL LISTED [PV SOLAR TRACKER] E476688

DNV GL Technology Review available
Bankability report
WIND TUNNEL TESTED

Soltec

Appendix I. Relevant Development Plan Policy

Renewable Energy Facilities

OBJECTIVES

1) Development of renewable energy facilities that benefit the environment, the community and the state

2) The development of renewable energy facilities, such as wind farms and ancillary development, in areas that provide the opportunity to harvest natural resources for the efficient generation of electricity

3) Location, siting, design and operation of renewable energy facilities to avoid or minimise adverse impacts on the natural environment and other land uses

PRINCIPLES OF DEVELOPMENT CONTROL

1) Renewable energy facilities including wind farms and ancillary development, should be:

a) Located in areas that maximize efficient generation and supply of electricity; and

b) Designed and sited so as not to impact on the safety of water or air transport and the operation of ports, airfields and designated landing strips

Design and Appearance

OBJECTIVES

1) Development of a high architectural standard that responds to and reinforces positive aspects of the local environment and built form.
2) Roads, open spaces, buildings and land uses laid out and linked so that they are easy to understand and navigate

PRINCIPLES OF DEVELOPMENT CONTROL

1) The design of a building may be of a contemporary nature and exhibit an innovative style provided the overall form is sympathetic to the scale of development in the locality and with the context of its setting with regard to shape, size, materials and colour.
2) Buildings should be designed and sited to avoid creating extensive areas of uninterrupted walling facing areas exposed to public view.
3) Buildings should be setback at least 1 metre from a Community Wastewater Management Scheme junction, connection or main.
4) Buildings should be designed to reduce their visual bulk and provide visual interest through design elements such as:
    a) articulation
    b) colour and detailing
    c) small vertical and horizontal components
    d) design and placing of windows
    e) variations to facades.

5) Where a building is sited on or close to a side boundary, the side boundary wall should be sited and limited in length and height to minimise:
   a) the visual impact of the building as viewed from adjoining properties
   b) overshadowing of adjoining properties and allow adequate sun light to neighbouring buildings.
6) Transportable buildings and buildings which are elevated on stumps, posts, piers, columns or the like should have their suspended footings enclosed around the perimeter of the building with brickwork or timber, and the use of verandas, pergolas and other suitable architectural detailing to give the appearance of a permanent structure.
7) The external walls and roofs of buildings visible from public roads or adjoining properties should:
   a) not incorporate highly reflective materials which will result in glare
   b) if using sheet metal, be pre-colour treated
   c) be of a finish which matches new condition, either through re-cladding or painting.
8) Structures located on the roofs of buildings to house plant and equipment should form an integral part of the building design in relation to external finishes, shaping and colours.
9) Building design should emphasise pedestrian entry points to provide perceptible and direct access from public street frontages and vehicle parking areas.
10) Development should provide clearly recognisable links to adjoining areas and facilities.
11) Buildings, landscaping, paving and signage should have a coordinated appearance that maintains and enhances the visual attractiveness of the locality.
12) Buildings (other than ancillary buildings or group dwellings) should be designed so that their main façade faces the primary street frontage of the land on which they are situated.
14) Development should be designed and sited so that outdoor storage, loading and service areas are screened from public view by an appropriate combination of built form, solid fencing and/or landscaping.
15) Outdoor lighting should not result in light spillage on adjacent land.
17) The setback of buildings from public roads should:
   a) be similar to, or compatible with, setbacks of buildings on adjoining land and other buildings in the locality
   b) contribute positively to the streetscape character of the locality
   c) not result in or contribute to a detrimental impact upon the function, appearance or character of the locality.

Siting and Visibility

OBJECTIVES

1) Protection of scenically attractive areas, particularly natural, rural and coastal landscapes.

PRINCIPLES OF DEVELOPMENT CONTROL

1) Development should be sited and designed to minimise its visual impact on:
   a) the natural, rural or heritage character of the area
   b) areas of high visual or scenic value, particularly rural and coastal areas
   c) views from the coast, near-shore waters, public reserves, tourist routes and walking trails.
2) Buildings should be sited in unobtrusive locations and, in particular, should:

a) be grouped together

b) where possible be located in such a way as to be screened by existing vegetation when viewed from public roads.

3) Buildings outside of urban areas and in undulating landscapes should be sited in unobtrusive locations and in particular should be:

a) sited below the ridgeline

b) sited within valleys or behind spurs

c) sited in such a way as to not be visible against the skyline when viewed from public roads

d) set well back from public roads, particularly when the allotment is on the high side of the road.

4) Buildings and structures should be designed to minimise their visual impact in the landscape, in particular:

a) the profile of buildings should be low and the rooflines should complement the natural form of the land

b) the mass of buildings should be minimised by variations in wall and roof lines and by floor plans which complement the contours of the land

c) large eaves, verandas and pergolas should be incorporated into designs so as to create shadowed areas that reduce the bulky appearance of buildings.

5) The nature of external surface materials of buildings should not detract from the visual character and amenity of the landscape.

6) The number of buildings and structures on land outside of urban areas should be limited to that necessary for the efficient management of the land.

7) Development should be screened through the establishment of landscaping using locally indigenous plant species:

a) around buildings and earthworks to provide a visual screen as well as shade in summer, and protection from prevailing winds

b) along allotment boundaries to provide permanent screening of buildings and structures when viewed from adjoining properties and public roads

c) along the verges of new roads and access tracks to provide screening and minimise erosion.

Transportation and Access

OBJECTIVES

1) A comprehensive, integrated, affordable and efficient air, rail, sea, road, cycle and pedestrian transport system that will:

a) provide equitable access to a range of public and private transport services for all people

b) ensure a high level of safety

c) effectively support the economic development of the State

d) have minimal negative environmental and social impacts

e) maintain options for the introduction of suitable new transport technologies.

2) Development that:

a) provides safe and efficient movement for all motorised and non-motorised transport modes

b) ensures access for vehicles including emergency services, public infrastructure maintenance and commercial vehicles

c) provides off street parking

d) is appropriately located so that it supports and makes best use of existing transport facilities and networks.

3) A road hierarchy that promotes safe and efficient transportation in an integrated manner throughout the State.

4) Provision of safe, pleasant, accessible, integrated and permeable pedestrian and cycling networks.

5) Safe and convenient freight movement throughout the State.

PRINCIPLES OF DEVELOPMENT CONTROL

1) Land uses arranged to support the efficient provision of sustainable transport networks and encourage their use.

2) Development should be integrated with existing transport networks, particularly major rail and road corridors as shown on Location Maps and Overlay Maps - Transport, and designed to minimise its potential impact on the functional performance of the transport networks.

3) Transport corridors should be sited and designed so as to not unreasonably interfere with the health and amenity of adjacent sensitive land uses.

4) Roads should be sited and designed to blend with the landscape and be in sympathy with the terrain.

8) Development should provide safe and convenient access for all anticipated modes of transport including cycling, walking, public and community transport, and motor vehicles.

11) Development should discourage commercial and industrial vehicle movements through residential streets and adjacent other sensitive land uses such as schools.

12) Industrial/commercial vehicle movements should be separated from passenger vehicle car-parking areas.

13) Development should make sufficient provision on site for the loading, unloading and turning of all traffic likely to be generated.

17) New developments should give priority to and not compromise existing designated bicycle routes.

22) Development should have direct access from an all weather public road.

23) Development should be provided with safe and convenient access which:

a) avoids unreasonable interference with the flow of traffic on adjoining roads

b) accommodates the type and volume of traffic likely to be generated by the development or land use and minimises induced traffic through over-provision

c) is sited and designed to minimise any adverse impacts on the occupants of and visitors to neighbouring properties.

24) Development should not restrict access to publicly owned land.

25) The number of vehicle access points onto arterial roads shown on Overlay Maps - Transport should be minimised, and where possible access points should be:

a) limited to local roads

b) shared between developments.

28) Driveways, access tracks and parking areas should be designed and constructed to:

a) follow the natural contours of the land

b) minimise excavation and/or fill

c) minimise the potential for erosion from runoff

d) avoid the removal of existing vegetation

e) be consistent with Australian Standard AS 2890 Parking facilities.

29) Development should be sited and designed to provide convenient access for people with a disability.

31) Development should provide off-street vehicle parking and specifically marked disabled car parking places to meet anticipated demand in accordance with Table CooD/1 - Off Street Vehicle Parking Requirements.

32) Development should be consistent with Australian Standard AS 2890 Parking facilities.

33) Vehicle parking areas should be sited and designed in a manner that will:

a) facilitate safe and convenient pedestrian linkages to the development and areas of significant activity or interest in the vicinity of the development

b) include safe pedestrian and bicycle linkages that complement the overall pedestrian and cycling network

c) not inhibit safe and convenient traffic circulation

d) result in minimal conflict between customer and service vehicles

e) avoid the necessity to use public roads when moving from one part of a parking area to another

f) minimise the number of vehicle access points to public roads

g) avoid the necessity for backing onto public roads

h) where reasonably possible, provide the opportunity for shared use of car parking and integration of car parking areas with adjoining development to reduce the total extent of vehicle parking areas and the requirement for access points

i) not dominate the character and appearance of a centre when viewed from public roads and spaces

j) provide landscaping that will shade and enhance the appearance of the vehicle parking areas.

34) Vehicle parking areas should be designed to reduce opportunities for crime by:

a) maximising the potential for passive surveillance by ensuring they can be overlooked from nearby buildings and roads

b) incorporating walls and landscaping that do not obscure vehicles or provide potential hiding places

c) being appropriately lit

d) having clearly visible walkways.

36) Parking areas that are likely to be used during non daylight hours should provide floodlit entrance and exit points and site lighting directed and shaded in a manner that will not cause nuisance to adjacent properties or users of the car park.

37) Parking areas should be sealed or paved in order to minimise dust and mud nuisance.

38) To assist with stormwater detention and reduce heat loads in summer, vehicle parking areas should include soft (living) landscaping.

39) Parking areas should be line-marked to indicate parking bays, movement aisles and direction of traffic flow

Energy Efficiency

OBJECTIVES

1) Development designed and sited to conserve energy, and minimise waste.

2) Development that provides for on-site power generation including photovoltaic cells and wind power.

PRINCIPLES OF DEVELOPMENT CONTROL

1) Development should provide for efficient solar access to buildings and open space all year around

2) Buildings should be site and designed:

a) To ensure adequate natural light and winter sunlight is available to main activity areas of adjacent buildings

b) So that open spaces associated with the main activity areas face north for exposure to winter sun

ON-SITE ENERGY GENERATION

3) Development should facilities the efficient use of photovoltaic cells and solar hot water systems by:

a) Taking into account overshadowing from neighbouring buildings

b) Designing roof orientation and pitches to maximise exposure to direct sunlight

4) Public infrastructure, including lighting and telephones, should be designed to generate and use renewable energy

Hazards

OBJECTIVES

1) Maintenance of the natural environment and systems by limiting development in areas susceptible to natural hazard risk.
2) Development located away from areas that are vulnerable to, and cannot be adequately and effectively protected from the risk of natural hazards.
4) Development located and designed to minimise the risks to safety and property from flooding.
5) Development located to minimise the threat and impact of bushfires on life and property.
6) Expansion of existing non-rural uses directed away from areas of high bushfire risk.
7) The environmental values and ecological health of receiving waterways and marine environments protected from the release of acid water resulting from the disturbance of acid sulphate soils.
8) Protection of human health and the environment wherever site contamination has been identified or suspected to have occurred.
9) Appropriate assessment and remediation of site contamination to ensure land is suitable for the proposed use and provides a safe and healthy living and working environment.
10) Minimisation of harm to life, property and the environment through appropriate location of development and appropriate storage, containment and handling of hazardous materials.

PRINCIPLES OF DEVELOPMENT CONTROL

1) Development should be excluded from areas that are vulnerable to, and cannot be adequately and effectively protected from, the risk of hazards.
3) There should not be any significant interference with natural processes in order to reduce the exposure of development to the risk of natural hazards.
4) Development should not occur on land where the risk of flooding is likely to be harmful to safety or damage property.

5) Development should not be undertaken in areas liable to inundation by tidal, drainage or flood waters unless the development can achieve all of the following:
   a) it is developed with a public stormwater system capable of catering for a 1-in-100 year average return interval flood event
   b) buildings are designed and constructed to prevent the entry of floodwaters in a 1-in-100 year average return interval flood event.
6) Development, including earthworks associated with development, should not do any of the following:
   a) impede the flow of floodwaters through the land or other surrounding land
   b) increase the potential hazard risk to public safety of persons during a flood event
   c) aggravate the potential for erosion or siltation or lead to the destruction of vegetation during a flood
   d) cause any adverse effect on the floodway function
   e) increase the risk of flooding of other land
   f) obstruct a watercourse.
7) Buildings and structures should be located away from areas that pose an unacceptable bushfire risk as a result of one or more of the following:
   a) vegetation cover comprising trees and/or shrubs
   b) poor access
   c) rugged terrain
   d) inability to provide an adequate building protection zone
   e) inability to provide an adequate supply of water for fire fighting purposes.
8) Buildings and structures should be designed and configured to reduce the impact of bushfire through designs that reduce the potential for trapping burning debris against the building or structure, or between the ground and building floor level in the case of transportable buildings.
9) Habitable buildings should have a dedicated water supply comprising a minimum of 22 500 litres available at all times for fire fighting which is located adjacent to the building or in another convenient location on the allotment accessible to fire fighting vehicles.
11) Buildings and structures should be designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against the building or structure, or between the ground and building floor level in the case of transportable buildings.
18) Development and activities, including excavation and filling of land, that may lead to the disturbance of potential or actual acid sulfate soils should be avoided unless such disturbances are managed in a way that effectively avoids the potential for harm or damage to any of the following:
   a) the marine and estuarine environment
   b) natural water bodies and wetlands
   c) agricultural or aquaculture activities
   d) buildings, structures and infrastructure
   e) public health.
19) Development, including primary production, aquaculture activities and infrastructure, should not proceed unless it can be demonstrated that the risk of releasing acid water resulting from the disturbance of acid sulfate soils is minimal.

20) Development, including land division, should not occur where site contamination has occurred unless the site has been assessed and remediated as necessary to ensure that it is suitable and safe for the proposed use.

21) Hazardous materials should be stored and contained in a manner that minimises the risk to public health and safety and the potential for water, land or air contamination.

22) Development that involves the storage and handling of hazardous materials should ensure that these are contained in designated areas that are secure, readily accessible to emergency vehicles, impervious, protected from rain and stormwater intrusion and other measures necessary to prevent:

    a) discharge of polluted water from the site

    b) contamination of land

    c) airborne migration of pollutants

    d) potential interface impacts with sensitive land uses.

23) Development, including associated cut and fill activities, should not lead to an increased danger from land surface instability or to the potential of landslip occurring on the site or on surrounding land.

24) Development on steep slopes should promote the retention and replanting of vegetation as a means of stabilising and reducing the possibility of surface movement or disturbance.

25) Development in areas susceptible to landslip should:

    a) incorporate split level designs to minimise cutting into the slope

    b) ensure that cut and fill and heights of faces are minimised

    c) ensure cut and fill is supported with engineered retaining walls or are battered to appropriate grades

    d) control any erosion that will increase the gradient of the slope and decrease stability

    e) ensure the siting and operation of an effluent drainage field does not contribute to landslip

    f) provide drainage measures to ensure surface stability is not compromised

    g) ensure natural drainage lines are not obstructed.

Heritage Places

OBJECTIVES

1) The conservation of State and local heritage places.

2) The continued use, or adaptive re-use of State and local heritage places that supports the conservation of their cultural significance.

3) Conservation of the setting of State and local heritage places.

PRINCIPLES OF DEVELOPMENT CONTROL

1) A heritage place spatially located on Overlay Maps - Heritage and more specifically identified in Table Cood/4 - State Heritage Places should not be demolished, destroyed or removed, in total or in part, unless either of the following apply:

    h) that portion of the place to be demolished, destroyed or removed is excluded from the extent of the places identified in the table

    i) the structural condition of the place represents an unacceptable risk to public or private safety.

5) New buildings should not be placed or erected between the front street boundary and the façade of existing State or local heritage places.

6) Development that materially affects the context within which the heritage place is situated should be compatible with the heritage place. It is not necessary to replicate historic detailing, however design elements that should be compatible include, but are not limited to:
   a) scale and bulk
   b) width of frontage
   c) boundary setback patterns
   d) proportion and composition of design elements such as rooflines, openings, fencing and landscaping
   e) colour and texture of external materials.

Infrastructure

OBJECTIVES

1) Infrastructure provided in an economical and environmentally sensitive manner.
2) Infrastructure, including social infrastructure, provided in advance of need.
3) Suitable land for infrastructure identified and set aside in advance of need.
4) The visual impact of infrastructure facilities minimised.
5) The efficient and cost-effective use of existing infrastructure.

PRINCIPLES OF DEVELOPMENT CONTROL

1) Development should not occur without the provision of adequate utilities and services, including:
   a) electricity supply
   b) water supply
   c) drainage and stormwater systems
   d) waste disposal
   e) effluent disposal systems
   f) formed all-weather public roads
   g) telecommunications services
   h) social infrastructure, community services and facilities
   i) gas services.
2) Development should only occur only where it provides, or has access to, relevant easements for the supply of infrastructure.
4) Development should not take place until adequate and coordinated drainage of the land is assured.
8) Electricity infrastructure should be designed and located to minimise its visual and environmental impacts.
10) Utilities and services, including access roads and tracks, should be sited on areas already cleared of native vegetation. If this is not possible, their siting should cause minimal interference or disturbance to existing native vegetation and biodiversity.
11) Utility buildings and structures should be grouped with non-residential development where possible.
12) Development in proximity to infrastructure facilities should be sited and be of a scale to ensure adequate separation to protect people and property.

Interface Between Land Uses

OBJECTIVES

1) Development located and designed to minimise adverse impact and conflict between land uses.
2) Protect community health and amenity from adverse impacts of development.
3) Protect desired land uses from the encroachment of incompatible development.

PRINCIPLES OF DEVELOPMENT CONTROL

1) Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following:
    a) the emission of effluent, odour, smoke, fumes, dust or other airborne pollutants
    b) noise
    c) vibration
    d) electrical interference
    e) light spill
    f) glare
    g) hours of operation
    h) traffic impacts.
2) Development should be sited and designed to minimise negative impacts on existing and potential future land uses desired in the locality.
5) Sensitive uses likely to conflict with the continuation of lawfully existing developments and land uses desired for the zone should be designed to minimise negative impacts.
7) Development that emits noise (other than music noise) should include noise attenuation measures that achieve the relevant Environment Protection (Noise) Policy criteria when assessed at the nearest existing noise sensitive premises.
8) Development with the potential to emit significant noise (e.g. industry) should incorporate noise attenuation measures that prevent noise from causing unreasonable interference with the amenity of noise sensitive premises.
11) Development with the potential to emit harmful or nuisance-generating air pollution should incorporate air pollution control measures to prevent harm to human health or unreasonable interference with the amenity of sensitive uses within the locality.
16) Development that is adjacent to land used for primary production (within either the zone or adjacent zones) should include appropriate setbacks and vegetative plantings designed to minimise the potential impacts of chemical spray drift and other impacts associated with primary production.

Landscaping, Fences and Walls

OBJECTIVES

1) The amenity of land and development enhanced with appropriate planting and other landscaping works, using locally indigenous plant species where possible.
2) Functional fences and walls that enhance the attractiveness of development.

PRINCIPLES OF DEVELOPMENT CONTROL

1) Development should incorporate open space and landscaping and minimise hard paved surfaces in order to:
   a) complement built form and reduce the visual impact of larger buildings (eg taller and broader plantings against taller and bulkier building components)
   b) enhance the appearance of road frontages
   c) screen service yards, loading areas and outdoor storage areas
   d) minimise maintenance and watering requirements
   e) enhance and define outdoor spaces, including car parking areas
   f) maximise shade and shelter
   g) assist in climate control within and around buildings
   h) minimise heat absorption and reflection
   i) maintain privacy
   j) maximise stormwater re-use
   k) complement existing vegetation, including native vegetation
   l) contribute to the viability of ecosystems and species
   m) promote water and biodiversity conservation.
2) Landscaping should:
   a) include the planting of locally indigenous species where appropriate
   b) be oriented towards the street frontage
   c) result in the appropriate clearance from powerlines and other infrastructure being maintained.
3) Landscaping should not:
   a) unreasonably restrict solar access to adjoining development
   b) cause damage to buildings, paths and other landscaping from root invasion, soil disturbance or plant overcrowding
   c) introduce pest plants
   d) increase the risk of bushfire
   e) remove opportunities for passive surveillance
   f) increase leaf fall in watercourses
   g) increase the risk of weed invasion.
4) Fences and walls, including retaining walls, should:
   a) not result in damage to neighbouring trees
   b) be compatible with the associated development and with existing predominant, attractive fences and walls in the locality
   c) enable some visibility of buildings from and to the street to enhance safety and allow casual surveillance
   d) incorporate articulation or other detailing where there is a large expanse of wall facing the street
   e) assist in highlighting building entrances

f) be sited and limited in height, to ensure adequate sight lines for motorists and pedestrians especially on corner sites

g) in the case of side and rear boundaries, be of sufficient height to maintain privacy and/or security without adversely affecting the visual amenity or access to sunlight of adjoining land

h) be constructed of non-flammable materials.

5) Fencing should be open in form to allow cross ventilation and access to sunlight.

Natural Resources

OBJECTIVES

1) Retention, protection and restoration of the natural resources and environment.
2) Protection of the quality and quantity of South Australia's surface waters, including inland, marine and estuarine and underground waters.
3) The ecologically sustainable use of natural resources including water resources, including marine waters, ground water, surface water and watercourses.
4) Natural hydrological systems and environmental flows reinstated, and maintained and enhanced.
5) Development consistent with the principles of water sensitive design.
6) Development sited and designed to:
   a) protect natural ecological systems
   b) achieve the sustainable use of water
   c) protect water quality, including receiving waters
   d) reduce runoff and peak flows and prevent the risk of downstream flooding
   e) minimise demand on reticulated water supplies
   f) maximise the harvest and use of stormwater
   g) protect stormwater from pollution sources.
7) Storage and use of stormwater which avoids adverse impact on public health and safety.
8) Native flora, fauna and ecosystems protected, retained, conserved and restored.
9) Restoration, expansion and linking of existing native vegetation to facilitate habitat corridors for ease of movement of fauna.
10) Minimal disturbance and modification of the natural landform.
11) Protection of:
   a) wetland habitats in designated Ramsar Wetland Areas
   b) the migratory wading and shore bird species' habitats of The Coorong and Lower Lakes area
   c) the physical, chemical and biological quality of soil resources
   d) areas prone to erosion or other land degradation processes from inappropriate development
   e) the scenic qualities of natural and rural landscapes.

PRINCIPLES OF DEVELOPMENT CONTROL

1) Development should be undertaken with minimum impact on the natural environment, including air and water quality, land, soil, biodiversity, and scenically attractive areas.

2) Development should ensure that South Australia's natural assets, such as biodiversity, water and soil, are protected and enhanced.
3) Development should not significantly obstruct or adversely affect sensitive ecological areas such as creeks, wetlands, estuaries and significant seagrass and mangrove communities.
4) Development should be appropriate to land capability and the protection and conservation of water resources and biodiversity.
5) Development should not be undertaken on land where a detrimental impact on water quality and biodiversity values of The Coorong, River Murray and Lower Lakes will occur.
6) Development should be designed to maximise conservation, minimise consumption and encourage re-use of water resources.
7) Development should not take place if it results in unsustainable use of surface or underground water resources.
8) Development should be sited and designed to:
    a) capture and re-use stormwater, where practical
    b) minimise surface water runoff
    c) prevent soil erosion and water pollution
    d) protect and enhance natural water flows
    e) protect water quality by providing adequate separation distances from watercourses and other water bodies
    f) not contribute to an increase in salinity levels
    g) avoid the water logging of soil or the release of toxic elements
    h) maintain natural hydrological systems and not adversely affect:
        i) the quantity and quality of groundwater
        ii) the depth and directional flow of groundwater
        iii) the quality and function of natural springs.
9) Water discharged from a development site should:
    a) be of a physical, chemical and biological condition equivalent to or better than its pre-developed state
    b) not exceed the rate of discharge from the site as it existed in pre-development conditions.
10) Development should include stormwater management systems to protect it from damage during a minimum of a 1-in-100 year average return interval flood.
11) Development should have adequate provision to control any stormwater over-flow runoff from the site and should be sited and designed to improve the quality of stormwater and minimise pollutant transfer to receiving waters.
12) Development should include stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.
14) Development should include stormwater management systems to minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system.
16) Development likely to result in significant risk of export of litter, oil or grease should include stormwater management systems designed to achieve the following gross pollutant outcomes:

a) 90 per cent reduction of litter/gross pollutants compared to untreated stormwater runoff.

b) No visible oil/grease for flows up to the 1-in-3 month average return interval flood peak flow.

17) Stormwater management systems should preserve natural drainage systems, including the associated environmental flows.

18) Stormwater management systems should:

a) maximise the potential for stormwater harvesting and re-use, either on-site or as close as practicable to the source

b) utilise, but not be limited to, one or more of the following harvesting methods:

i) the collection of roof water in tanks

ii) the discharge to open space, landscaping or garden areas, including strips adjacent to car parks

iii) the incorporation of detention and retention facilities

iv) aquifer recharge.

19) Where it is not practicable to detain or dispose of stormwater on site, only clean stormwater runoff should enter the public stormwater drainage system.

21) Development should ensure watercourses and their beds, banks, wetlands and floodplains are not damaged or modified and are retained in their natural state, except where modification is required for essential access or maintenance purposes.

22) No development should occur where its proximity to a swamp or wetland will damage or interfere with the hydrology or water regime of the swamp or wetland.

29) Development should comply with the current Environment Protection (Water Quality) Policy.

31) Development should retain existing areas of native vegetation and where possible contribute to revegetation using locally indigenous plant species.

32) Development should be designed and sited to minimise the loss and disturbance of native flora and fauna, including riparian, riverine and marine animals and plants, and their breeding grounds and habitats.

33) Native vegetation should be conserved and its conservation value and function not compromised by development if the native vegetation does any of the following:

a) provides an important habitat for wildlife or shade and shelter for livestock

b) has a high plant species diversity or includes rare, vulnerable or endangered plant species or plant associations and communities

c) provides an important seed bank for locally indigenous vegetation

d) has high amenity value and/or significantly contributes to the landscape quality of an area, including the screening of buildings and unsightly views

e) has high value as a remnant of vegetation associations characteristic of a district or region prior to extensive clearance for agriculture

f) is growing in, or is characteristically associated with a wetland environment.

34) Native vegetation should not be cleared if such clearing is likely to lead to, cause or exacerbate any of the following:

a) erosion or sediment within water catchments

b) decreased soil stability

c) soil or land slip

d) deterioration in the quality of water in a watercourse or surface water runoff

e) a local or regional salinity problem

f) the occurrence or intensity of local or regional flooding.

35) Development that proposes the clearance of native vegetation should address or consider the implications that removing the native vegetation will have on the following:

a) provision for linkages and wildlife corridors between significant areas of native vegetation

b) erosion along watercourses and the filtering of suspended solids and nutrients from runoff

c) the amenity of the locality

d) bushfire safety

e) the net loss of native vegetation and other biodiversity.

36) Where native vegetation is to be removed, it should be replaced in a suitable location on the site with locally indigenous vegetation to ensure that there is not a net loss of native vegetation and biodiversity.

37) Development should be located and occur in a manner which:

a) does not increase the potential for, or result in, the spread of pest plants, or the spread of any non-indigenous plants into areas of native vegetation or a conservation zone

b) avoids the degradation of remnant native vegetation by any other means including as a result of spray drift, compaction of soil, modification of surface water flows, pollution to groundwater or surface water or change to groundwater levels

c) incorporates a separation distance and/or buffer area to protect wildlife habitats and other features of nature conservation significance.

38) Development should promote the long-term conservation of vegetation by:

a) avoiding substantial structures, excavations, and filling of land in close proximity to the trunk of trees and beneath their canopies

b) minimising impervious surfaces beneath the canopies of trees

c) taking other effective and reasonable precautions to protect both vegetation and the integrity of structures and essential services.

44) Development should not have an adverse impact on the natural, physical, chemical or biological quality and characteristics of soil resources.

45) Development should be designed and sited to prevent erosion.

46) Development should take place in a manner that will minimise alteration to the existing landform.

47) Development should minimise the loss of soil from a site through soil erosion or siltation during the construction phase of any development and following the commencement of an activity.

Orderly and Sustainable Development

OBJECTIVES

1) Orderly and economical development that creates a safe, convenient and pleasant environment in which to live.

2) Development occurring in an orderly sequence and in a compact form to enable the efficient provision of public services and facilities.

3) Development that does not jeopardise the continuance of adjoining authorised land uses.

4) Development that does not prejudice the achievement of the provisions of the Development Plan.

PRINCIPLES OF DEVELOPMENT CONTROL

1) Development should not prejudice the development of a zone for its intended purpose.
2) Land outside of townships and settlements should primarily be used for primary production and conservation purposes.
3) The economic base of the region should be expanded in a sustainable manner.
7) Where development is expected to impact upon the existing infrastructure network (including the transport network), development should demonstrate how the undue effect will be addressed.

Urban Employment Zone

OBJECTIVES

1) A mixed use employment zone that accommodates a range of solar generation and related infrastructure and industrial land uses together with other related employment and business activities that generate wealth and employment for the State.
6) A high standard of development which promotes distinctive building, landscape and streetscape design, with high visual and environmental amenity, particularly along arterial roads and the boundaries of adjoining zones.
7) Development that promotes business clusters that provide a range of economic and environmental benefits.
9) Development that contributes to the desired character of the zone.

DESIRED CHARACTER

A large solar farm and diesel-fired power station are proposed within the zone, taking advantage of the strategic nature of the land in proximity to existing ElectraNet substation and electricity distribution networks, the accessibility of the location, the suitable climatic conditions, the generally flat nature of the land and the ability for interface buffers. The zone will allow for the expansion of a solar farm along with associated battery storage facilities, substations and interrelated energy infrastructure development.

The zone also provides for an intermodal facility that will capitalise on a strategic location taking advantage of its close proximity to the Adelaide - Melbourne rail freight route and the significant transport corridors along the Dukes, Mallee and Princes Highways. Due to its connections to road and railway transport, the area is particularly suited to transport related and logistics businesses, including the warehousing of goods for distribution.

The intermodal rail freight terminal facilities may include marshalling yards, railway workshops and locomotive maintenance activities, covered loading and unloading areas, and warehousing for the storage and handling of shipping containers and goods, along with road based freight logistics, industry, warehousing and distribution. Administrative offices will be accessed separately from the transit area to minimise the interface between visitor and office traffic with heavy vehicles. Overnight accommodation, including food preparation facilities to cater for train crews between shifts, is also envisaged. This area will service movement of freight from throughout the State and interstate and will allow operations on a 24 hour, 7 day per week basis.

Other employment generating activities requiring large site areas may also be established in the zone. However, development in the form of motorsport industry and commercial support activities (i.e. vehicle repairs/servicing, tyre sales, fuelling, car and motor bike storage/warehousing, electronics, mechanical, design and manufacture) will occur in the industry precinct in the adjacent Motorsport Park Zone. Similarly, commercial activities including a petrol filling station/service station complex, fuel depot, shop(s), car wash and motor vehicle/motor bike and associated parts sales will also occur in the Motorsport Park Zone.

Development within the zone will generally be in accordance with Concept Plan Map CooD/13 – Urban Employment Zone. Allotments that adjoin the boundary of another zone where more sensitive land uses are anticipated will be large enough to accommodate design features and siting arrangements that limit impact on the adjoining zone. The form of development within the zone shall be of a type, design and siting to minimise the effect of dust and shadow impact on a solar farm.

Development within proximity to the Former Lime Kilns (a designated place of archaeological significance on Allotment 2 FP 106340 (CT 5171/427) Lime Kiln Road, Tailem Bend - shown on Overlay Map CooD/52 - Heritage) will include appropriate buffers to ensure the heritage values of this State Heritage Place are not compromised.

Buildings will provide a variation in materials, facade treatments and setbacks rather than appearing as large uniform buildings with blank façades. Outdoor storage areas will also be screened with fencing/structures of varied materials that limit potential for vandalism.

Landscaping will be carefully integrated with built form, ensuring that vegetation is sustainable, drought tolerant, locally indigenous and matched to the scale of development, while also providing a comfortable, pleasant and attractive environment. Car parking areas will include trees to provide shade and enhance visual amenity. The appearance of outdoor storage areas will also be enhanced through landscaping. Landscaping will be carefully designed to minimise opportunity for crime by ensuring passive/active surveillance and minimising places of entrapment.

Land within the northern periphery of the zone, in proximity to the railway line, may be subject to localised drainage issues. Any development in this area will require investigation by consulting engineers as part of the design phase of a development proposal.

Water Sensitive Urban Design systems, including the harvest, treatment, storage and reuse of stormwater, will be integrated throughout the area at the neighbourhood, street, site and building level. Harvested stormwater will improve the aesthetic and functional value of open spaces, including public access ways and greenways.

PRINCIPLES OF DEVELOPMENT CONTROL

1) The following forms of development, or combination thereof, are envisaged in the zone:
    - bulk handling and storage facility
    - electricity substation
    - energy generation infrastructure
    - industry (other than motorsport industry and support activities and special industry)
    - intermodal rail freight facility
    - office where ancillary to a listed envisaged use
    - temporary/overnight workers' accommodation where ancillary to a listed envisaged use
    - prescribed mains
    - public service depot
    - railway rolling stock servicing facility
    - road transport terminal
    - service trade premises
    - service industry
    - solar farm, battery storage and ancillary development and infrastructure

- store (other than motorsport industry and support activities)
- warehouse (other than motorsport industry and support activities).

4) Development should be in accordance with Concept Plan Map CooD/13 - Urban Employment Zone.

5) Development should not impede the operation of established land uses through encroachment, over development of sites or noise/emissions or any other harmful or nuisance-creating impact.

6) Buildings, structures and landscaping should not be located within 30 metres of a ground mounted solar photovoltaic panel in order to prevent undue shadow impact on the performance of the panel.

9) Development should not be undertaken unless it is consistent with the desired character for the zone.

10) Buildings should be set back in accordance with the following parameters:

Building Height (metres)	Minimum setback from the primary road frontage (metres)	Minimum setback from the secondary road frontage
6 metres	8	3
Greater than 6 metres	10	3

11) Structures should have a maximum height of 10 metres, exclusive of any external plant and equipment such as flues, chimney stacks or aerials.

15) The hours of operation of an activity should not detract from the amenity of any living area.

17) Buildings should not occupy more than 50 percent of the total area of the site upon which they are located, unless it can be demonstrated that stormwater can be harvested, treated, stored and reused on the site of the development to minimise impacts on external stormwater infrastructure.

19) For non-labour intensive industries, the rates in Table CooD/1 – Off Street Vehicle Parking Requirements can be varied having regard to the expected maximum staff and visitor levels.

Appendix H. Vegetation Assessment

Tailem Bend Solar Project - Stage 2

Equis Energy (Australia) Pty Ltd

Ecological Assessment Report

IW133300-0000-NE-EAR Rev 4

19/12/2017

Document history and status

Revision	Date	Description	By	Review	Approved
A	18/08/2017	Draft Report for Technical Review	R. Barratt	Z. Bull	L. Daddow
0	21/08/2017	Draft Report for Client Review	R. Barratt	L. Daddow	L. Daddow
1	13/10/2017	Final Report for Equis	R. Barratt	L. Daddow	-
2	16/11/2017	Final Report updated	R. Barratt	Z. Bull	-
3	14/12/2017	Revised Final Report for Equis	R. Barratt	A Horan/Z Bull	L. Daddow
4	19/12/2017	Minor editorial updates	R. Barratt	L Daddow	L. Daddow

Tailem Bend Solar Project - Stage 2

Project No:	IW133300
Document Title:	Ecological Assessment Report – TB2SP
Revision:	Rev 4 (Final)
Date:	19/12/2017
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Contents

Acronyms and Abbreviations

AC	Alternating Current
BCM	Bushland Condition Monitoring
BDBSA	Biological Database of South Australia
DEWNR	Department of Environment, Water and Natural Resources
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Equis	Equis Energy (Australia)
MNES	Matters of National Environmental Significance
MDBSA	Murray Darling Basin South Australia
MW	Megawatt
MWAC	Megawatts Alternating Current
NPW Act	*National Parks and Wildlife Act 1972*
NRM Act	*Natural Resources Management Act 2004*
NV Act	*Native Vegetation Act 1991*
NVC	Native Vegetation Council
NVMU	Native Vegetation Management Unit
TB2SP	Tailem Bend Solar Project Stage 2
TEC	Threatened Ecological Communities
TSSC	Threatened Species Scientific Committee

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs was to provide details regarding vegetation present and clearance required for the proposed solar project at Tailem Bend, South Australia, in accordance with the scope of services set out in the contract between Jacobs and the client, Equis Energy (Australia) Pty Ltd (Equis). That scope of services, as described in this report, was developed by Jacobs.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and / or from other sources (e.g. DEWNR). Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, Equis, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and Equis. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1. Introduction

Stage 2 of the Tailem Bend Solar Project (TB2SP) is proposed to be developed by Equis Energy (Australia) Pty Ltd (Equis) with a generation capacity of up to 90 MWAC at Tailem Bend, South Australia. This site is private land and directly north of the Stage 1 site. The TB2SP is designed to be battery ready, creating a combined generation and storage facility project that prepares for the future electricity needs of South Australians.

Jacobs has undertaken the following tasks:

- Desktop Study including:
  - Review of *Environment Protection and Biodiversity and Conservation Act 1999* Protected Matters database search results and high level assessment of likelihood of occurrence for listed and threatened flora and fauna species and Threatened Ecological Communities (TECs);
  - Review of the Biological Database of South Australia (BDBSA) search extract within 5 km of the site for threatened flora, fauna and ecological community results;
- Field Survey to map and describe native and exotic vegetation present on or adjacent to the proposed construction footprint; and
- Collation of findings into an Ecological Assessment Report.

The purpose of this report is to support a Development Application and Native Vegetation Clearance Application and to inform the design process (e.g. location of solar arrays and other infrastructure). The report also provides a description and maps vegetation, assessment of habitat value and discussion of the potential vegetation clearance with respect to approval required under:

- *Native Vegetation Act 1991* and *Native Vegetation Act Regulations 2017; and*
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The project site is located 2 km south-east of Tailem Bend and 90 km south-east of Adelaide, in the Hundred of Seymour.

The project area site overview is shown on Figure 1-1 below.

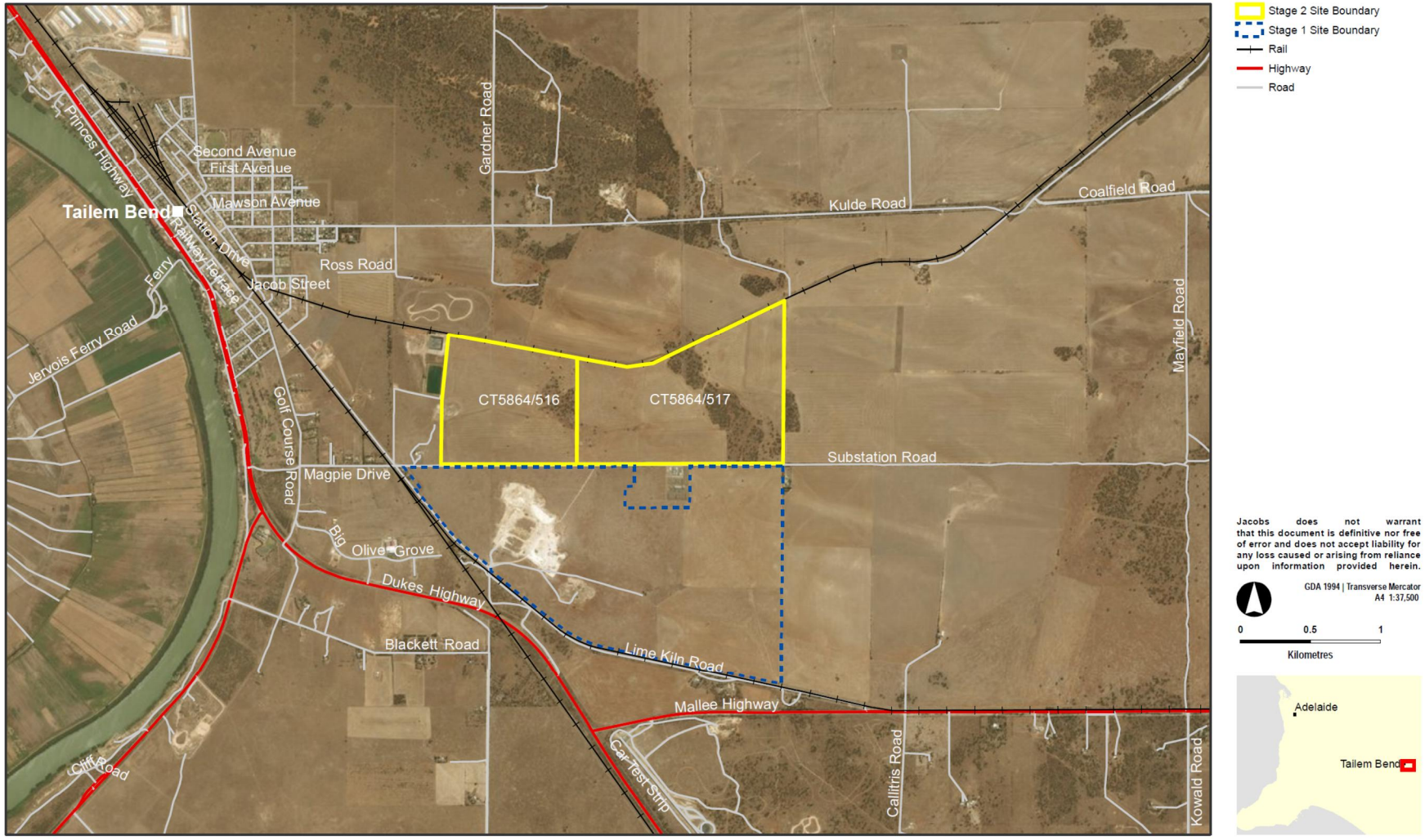

Figure 1-1 TB2SP: Project Site Overview

2. Legislation

An overview of the key legislation and policy relevant to the assessment of potential terrestrial ecology impacts associated with the proposed development is provided below.

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as matters of national environmental significance (MNES). Under the environmental provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of National Environmental Significance are identified as 'controlled actions' and cannot be undertaken without referral to the Department of the Environment for consideration and approval under the EPBC Act.

The nine matters of national environmental significance identified in the EPBC Act are:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (listed under the Ramsar Convention);
- Threatened species and ecological communities;
- Migratory species as listed under international agreements;
- Commonwealth marine areas;
- The Great Barrier Reef Marine Park;
- Nuclear actions (including uranium mining); and
- A water resource, in relation to coal seam gas development and large coal mining development.

2.2 South Australian Legislation

2.2.1 National Parks and Wildlife Act 1972

The *National Parks and Wildlife Act 1972* (NPW Act) allows for the protection of habitat and wildlife through the establishment of parks and reserves (both on land and in State waters) and provides for the use of wildlife through a system of permits allowing certain actions, i.e. keeping, selling, trading, harvesting, farming, hunting and the destruction of native species.

The NPW Act assigns species to state conservation categories; Endangered (Schedule 7), Vulnerable (Schedule 8), and Rare (Schedule 9).

2.2.2 Native Vegetation Act 1991

The *Native Vegetation Act 1991* (NV Act) outlines incentives and assistance to land owners relative to the enhancement of native vegetation and acts to control the clearance of native vegetation. The NV Act Regulations, specifically Regulation 5(1)(d) provides for the clearance of native vegetation for public infrastructure subject to approval by the Native Vegetation Council. It is considered that these provisions apply to this project and they area are discussed further in Section 7.

2.2.3 Natural Resources Management Act 2004

The *Natural Resources Management Act 2004* (NRM Act) is to assist in the achievement of ecologically sustainable development in the State by establishing an integrated scheme to promote the use and management of natural resources that recognises and protects the intrinsic values of natural resources. The NRM Act combines critical elements of the now repealed Animal and Plant Control (Agricultural Protection and Other Purposes) Act 1986, the Soil Conservation and Land Care Act 1989 and the Water Resources Act 1997.

It further legislates for designated control requirements for a series of 'Declared' plants (as specific to each region or statewide), which effectively:

- Bans the sale of Declared weeds;
- Controls the movement of Declared weeds;
- Requires landowners / managers to destroy or control infestations of Declared weeds; and
- Requires further notification of authorities when an infestation is detected.

2.3 South Australian policies and plans

The South Australian government follows guidelines relating to the conservation of native habitats, communities and species via the implementation of a range of policies including the following:

2.3.1 No Species Loss - A Nature Conservation Strategy for South Australia 2007-2017 (DEH, 2007)

The 'No Species Loss' Strategy provides a State wide nature conservation strategy aimed at setting objectives and targets for the conservation and management of Sate biodiversity assets while also providing guidelines on how targets can be met.

2.3.2 Guidelines for the Management of Roadside Vegetation

The guidelines discuss specific issues regarding the management of roadside vegetation. Some issues, such as road construction, will be of direct relevance to local government; while others, such as boundary fencing, may be of concern to adjoining landholders. Another category within the guideline refers to power lines and other services, which relates to government agencies and service providers (Native Vegetation Council, 2012).

The guidelines generally involve three options for assessment:

- Works that may be undertaken without reference to the Native Vegetation Council or Native Vegetation and Biodiversity Management Unit;
- Works requiring at least consultation with and endorsement by the Native Vegetation and Biodiversity Management Unit; and
- Works that require the consent of the Native Vegetation Council (NVC), by means of a clearance application or application to clear under one of the *Native Vegetation Regulations 2017*.

3. EPBC Act Protected Matters Summary

Table 3-1 and Table 3-2 below provide the results of an updated EPBC Protected Matters database search of the study area. The table presents the likelihood of occurrence of Protected Matters identified within the database based on updated Biological Database of South Australia records (within 5 km), knowledge of the site and knowledge of the species. The summary excludes fish species which came up in the search due to proximity of the site to the Murray River.

Table 3-1 Likelihood of occurrence of Matters of National Environmental Significance (MNES)

Type of MNES	Name	Commonwealth Status	Likelihood of occurrence
Wetland of International Importance	The Coorong, and lakes Alexandrina and Albert Wetland	Within 10 km of Ramsar	N/A the site is 12 km from the NE most edge of this wetland.
Listed Threatened Ecological Community (TEC)	Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	This community does not occur at the site or nearby
Listed TEC	Iron-grass Natural Temperate Grassland of South Australia	Critically Endangered	Not present. Whilst BDBSA TEC data suggest the community occurs across the site (see Section 4). The site visit (Section 5) identified only small isolated patches of mallee over Iron-grass (Area A) that did not meet the TEC criteria. All remnant vegetation has been heavily degraded by on-going livestock grazing and weed infestation.
Listed TEC	River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea	Approval Disallowed	N/A - the western most boundary of the site is 1.2 km east of the River Murray Protection Area
Other Matter Protected by the EPBC Act	Commonwealth Land - Australian National Railways Commission		A railway corridor adjoins the northern boundary of the survey area. The rail line is not on Commonwealth Land.

Table 3-2 Likelihood of occurrence of EPBC listed Threatened and / or migratory species

Species	Common Name	Commonwealth Status	Likelihood
Apus pacificus	Fork-tailed Swift	Migratory Marine	Possible as overfly visitor. No historic BDBSA records, but wide ranging aerial species.
Ardea alba	Great Egret, White Egret	Migratory Wetland	Unlikely. 3 BDBSA records (2002, 2005). No preferred habitat within site, but possible if land is inundated.
Ardea ibis	Cattle Egret	Migratory Wetland	Possible. 2 BDBSA records (1982, 1985). Will use pasture habitat, however such habitat is not core habitat or preferred breeding habitat.
Botaurus poiciloptilus	Australasian Bittern	Endangered	Unlikely. One historic record within 5 km. Preferred habitat does not occur with the site.
Caladenia macroclavia	Large-club Spider-orchid	Endangered	Unlikely. No preferred habitat.
Caladenia tensa	Greencomb Spider-orchid, Rigid Spider-orchid	Endangered	Unlikely. No preferred habitat.

Species	Common Name	Commonwealth Status	Likelihood
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Migratory Wetland	Unlikely. No BDBSA records within 5 km. No preferred habitat within the site.
Grantiella picta	Painted Honeyeater	Vulnerable	Unlikely. No BDBSA records within 5 km. Limited habitat within site. Roadside vegetation may provide habitat for occasional visitor.
Lathamus discolor	Swift Parrot	Endangered	Unlikely. No BDBSA records within 5 km. Limited habitat within site.
Leipoa ocellata	Malleefowl	Vulnerable and Migratory	Unlikely. 3 historic BDBSA records within 5 km. No Mallee habitat within site. Fragmented patches of Mallee occur within the region. May occur as occasional visitor passing through site, however unlikely.
Litoria raniformis	Growling Grass Frog, (also referred to as Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog)	Vulnerable	Unlikely. 5 historic BDBSA records within 5 km. No preferred habitat within the site. SA population along River Murray known to have suffered serious decline.
Merops ornatus	Rainbow Bee-eater	Migratory Terrestrial	Possible as overfly visitor. Regularly recorded,In the region and conspicuus species. Limited preferred nesting habitat within and adjacent site, (i.e. nests in mud banks).
Motacilla cinerea	Grey Wagtail	Migratory Terrestrial	Unlikely. No BDBSA records within 5 km. Has global distribution. No preferred habitat within site.
Motacilla flava	Yellow Wagtail	Migratory Terrestrial	Unlikely. No BDBSA records within 5 km. Has global distribution. No preferred habitat within site.
Myiagra cyanoleuca	Satin Flycatcher	Migratory Terrestrial	Unlikely. 1 BDBSA records within 5 km. No preferred habitat within the site.
Nyctophilus corbeni	Corben's Long-eared Bat, South-eastern Long-eared Bat	Vulnerable	Unlikely. No BDBSA records within 5 km. Limited habitat within and adjacent site.
Pandion haliaetus	Osprey	Migratory Wetland	Unlikely. No BDBSA records within 5 km. No preferred roosting or feeding habitat within site.
Pedionomus torquatus	Plains-wanderer	Critically Endangered	Unlikely. No BDBSA records within 5 km.
Pterostylis arenicola	Sandhill Greenhood Orchid	Vulnerable	Unlikely. No preferred habitat within the site.
Rostratula australis	Australian Painted Snipe	Endangered	Unlikely. No BDBSA records within 5 km.
Thelymitra epipactoides	Metallic Sun-orchid	Endangered	Unlikely. No preferred habitat within site.
Tringa nebularia	Common Greenshank, Greenshank	Migratory Wetland	Unlikely. 2 records within 5 km, but no preferred wetland habitat within the site.

4. BDBSA summary

Biological Database of South Australia (BDBSA) records were obtained for the site with a 5 km buffer to allow for the paucity of records within the actual site. There are no records for nationally or state threatened flora or fauna within the study area. Several threatened flora and fauna have been recorded within 5 km of the site and these are summarised in Table 4-1. The last column defines whether these species were observed during the site survey or are likely to occur.

Table 4-1 BDBSA summary of threatened species recorded within 5 km of the site

Species	Common Name	EPBC Act	NPW Act	Likelihood of occurrence
Fauna				
Anhinga novaehollandiae	Australasian Darter	-	Rare	Unlikely. Record from River Murray wetlands to west. No suitable habitat on the site.
Corcorax melanorhamphos	White-winged Chough		Rare	Possible. Preferred mallee vegetation present, however remnant patches are small, degraded and fragmented. Not observed or heard during field survey.
Microeca fascinans SA: ssp	Jacky Winter	-	Rare	Possible. Preferred dense mallee vegetation present (Area B), however remnant patches are small, degraded and fragmented. Not observed or heard during field survey.
Northiella haematogaster	Bluebonnet	-	Rare	Possible. Old growth mallee with large tree hollows (Areas C and D and some several large scattered trees) provides potential nesting habitat.
Petroica phoenicea	Flame Robin		Vulnerable	Possible. Preferred mallee woodland present however remnant patches are small, degraded and fragmented. Not observed or heard during field survey.
Flora				
Crassula sieberiana	Sieber's Crassula	-	-	Unlikely. No suitable rocky habitat present. Not observed during survey.
Thelymitra epipactoides	Metallic Sun-orchid	Endangered	Endangered	Unlikely. No suitable habitat present. Not observed during survey.
Juncus prismatocarpus	Branching Rush	-	Vulnerable	Unlikely. No suitable damp run-on habitat present.
Prasophyllum constrictum	Tawny Leek-orchid		Rare	Unlikely. Preferred mallee habitat present. However degraded understorey. Not recorded during field survey.
Lythrum salicaria	Purple Loosestrife		Rare	Unlikely. No suitable damp run-on habitat present.

NPW Act – *National Parks and Wildlife Act 1972,* State legislation which protects flora and fauna.

5. Methodology

A Jacobs field team of a senior ecologist and field assistant conducted a foot and vehicle survey of the project site and surrounds on 8 August 2017 in order to:

- Map and describe native vegetation on and adjacent to the project area, including descriptions of disturbance levels and condition;
- Identify any threatened species and/or ecosystems or important wildlife habitat present at the site;
- Review the vegetation communities present in relation to the Principles of Clearance (Schedule 1) and exemption 5(1)(d) of the *Native Vegetation Act 1991*; and
- Review ecological values present at the site in relation to the provisions of the EPBC Act.

The surveyed area included the project area as defined in Figure 1-1 and included adjoining roadside and rail reserve vegetation. The field survey gathered information in order to map and describe native and exotic vegetation communities present within the project footprint.

6. Results

6.1 Overview

The proposed project site consists of cleared land that has been utilised for cropping and pasture with scattered patches of remnant native vegetation comprising approximately 22 hectares and approximately 53 scattered remnant individual trees. Two blocks of remnant vegetation have been classified and mapped into five areas based on features including size and distribution of patches, overstorey species composition, vegetation condition and overstorey age structure. These native vegetation blocks (Block A and Bock B) have been labelled as A1, A2, A3 and B1, B2 (based on naming convention for Bushland Assessments (NVMU 2017)) and are shown on Figure 1-1, together with the location of individual scattered native trees and planted vegetation.

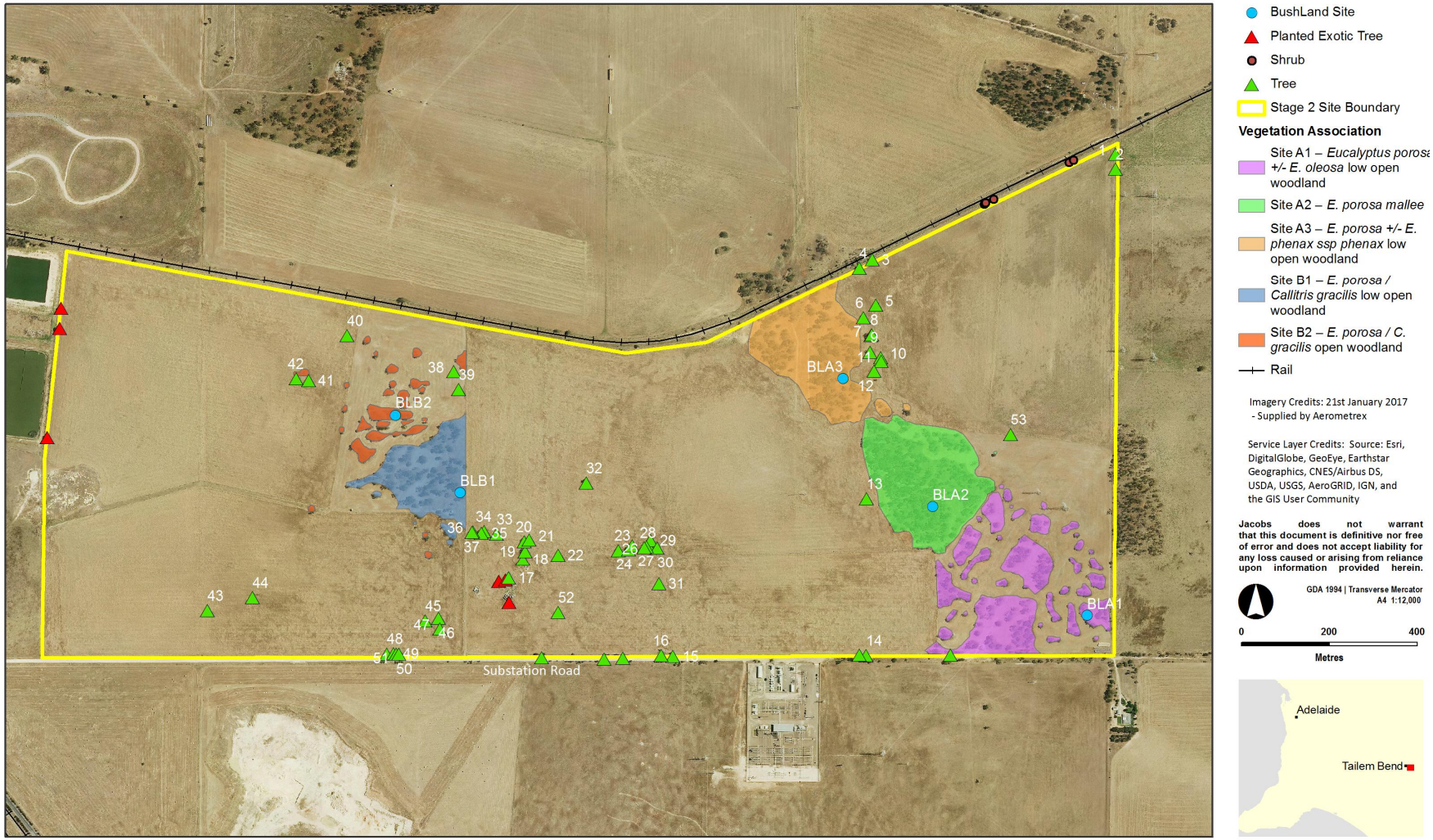

Figure 6-1 TB2SP: Vegetation

6.2 Cleared Land

The project area is dominated by historically cleared land that has been utilised for cropping and pasture, with the majority under crop at the time of the field survey. These areas are comprised of exotic grasses (including crop species) and herbs including common agricultural weed species (Figure 6-3). In addition, a large proportion of the roadside adjoining the project area perimeter, including most of the southern boundary (Substation Road) and the rail reserve adjoining the northern boundary have also been cleared and are dominated by exotic grasses and herbs.

Figure 6-2 View of southern boundary along Substation Road showing cleared paddocks and predominantly cleared roadside.

6.3 Remnant Native Vegetation Patches

6.3.1 Block A (site 1)

Vegetation Association: *Eucalyptus porosa* +/- *E. oleosa* low open woodland over tussock grassland (5.7 ha approx.)

This site is located in the south east corner of the surveyed area and is comprised of small patches of *Eucalyptus porosa* (Mallee Box) tall mallee over a sparse Chenopod shrub understorey. This community is representative of Murray Darling Basin South Australia (MDBSA) Bushland Condition Monitoring (BCM) 9.1: *Woodlands with an open grassy understorey* (Croft, Pedlar and Milne 2009).

The patches are isolated from each other by areas of cropped land and vary in size ranging from one or two trees to several larger areas including a patch of approximately 1.5 ha adjoining the southern boundary.

Mallee Box dominates the overstorey with scattered individual *E. oleosa* (Red Mallee) and *E. phenax ssp phenax* (White Mallee) and is old regrowth with multi-stemmed habit. The patchy open understorey includes *Enchylaena tomentosa* (Ruby Saltbush) the woody forb *Vittadinia cuneata* (Fuzzy New Holland Daisy). Scattered clumps of *Dianella brevicaulis* (Short-stem Flax-lily) and *Lomandra effusa* (Scented Mat-rush) are

present in the larger patches and the herb *Senecio pinnatifolius var pinnatifolius* (Daisy) together with native grass species *Austrostipa spp.* (Speargrass) and *Rytidosperma caespitosum* (Common Wallaby Grass) are common understorey species (Figure 6-3).

African Boxthorn (*Lycium ferocissimum*) bushes are common in the patches while Bridal Creeper (*Asparagus asparagoides*) was recorded in a small number of locations. Galenia (*Galenia sulcata*), a perennial mat plant is widespread in all patches together with agricultural weeds including Indian Hedge Mustard (*Sisymbrium orientale*) and Horehound (*Marrubium vulgare*) (Figure 6-3).

All the patches are accessible to livestock and have been grazed more or less continuously for more than a century. Palatable species including *Einadia nutans* (Climbing Saltbush) and *Austrostipa elegantissima* (Elegant Spear-grass) were present in very low numbers and always growing under protection indicative of on-going grazing pressure.

Bushland Site BLA1 has been installed to represent vegetation in site A1.

Figure 6-3 Site A1: isolated patches of mixed Mallee low open woodland over native grass understorey

6.3.2 Block A (site 2)

Vegetation Association: *Eucalyptus porosa* mallee over Chenopod low open shrubland and tussock grassland (Area 6.2 approx.)

Site A2 is a single patch of *Eucalyptus porosa* low mallee located on a low rise located in the central eastern portion of the survey area. The shallow sandy loam soil over sheet limestone is reflected in the stunted whipstick characteristic of the mallee overstorey and the lack of species diversity in the understorey. The mid-storey is dominated by *Enchylaena tomentosa* with *Senecio pinnatifolius var pinnatifolius* and *Austrostipa spp.* (Speargrass) common in the understorey (Figure 6-4).

This community is representative of MDBSA BCM 6.1: *Open Mallee with mid-dense shrub and tussock understorey on limestone soils.*

Scattered infestations of African Boxthorn and Bridal Creeper were recorded in this patch and no tree hollows were noted.

Bushland Site BLA2 has been installed to represent vegetation in site A2.

Figure 6-4 Site A2: Whipstick *Eucalyptus porosa* (Mallee Box) dominates with *Enchylaena tomentosa* (Ruby Saltbush) dominating the understorey

6.3.3 Block A (site 3)

Vegetation Association: *Eucalyptus porosa* +/- *E. phenax ssp phenax* low open woodland over Chenopod low open shrubland and tussock grassland (5.6 ha).

Site A3 is a single large patch located near the northern central boundary of the survey area. This patch is comprised of old growth *Eucalyptus porosa* with scattered individual *E. phenax ssp phenax* and *Melaleuca lanceolata* (Dryland Teatree). The understorey is dominated by *Enchylaena tomentosa* with scattered patches of *Pimelea stricta* (Erect Rice Flower) and *Lepidosperma laterale* and *Lomandra micrantha ssp micrantha* (Small-flowered Mat-rush) (Figure 6-5). Mallee trees are often single trunk trees indicative of old growth and small and medium tree hollows are present in most trees

This community is representative of MDBSA BCM 9.1: *Woodlands with an open grassy understorey* (Croft, Pedlar and Milne 2009).

Bushland Site BLA3 has been installed to represent vegetation in Site A3.

Figure 6-5 Site A3: Older growth *Eucalyptus porosa* (Mallee Box) with African boxthorn

6.3.4 Block B (site 1)

Vegetation Association: *Eucalyptus porosa* / *Callitris gracilis* low open woodland over Chenopod low open shrubland and tussock grassland.

Site B1 is located on a low sandy rise in the central portion of the survey area and is comprised of a single larger remnant patch (3.4 Ha) of older growth *Eucalyptus porosa* with *Callitris gracilis* (White Cypress Pine) surrounded by cropping land. The understorey is dominated *by Enchylaena tomentosa* and *Austrostipa spp.* (Speargrass) with the introduced perennial mat plant Galenia (*Galenia sulcata*) and African Boxthorn common (Figure 6-6). The Mallee trees are comparatively tall (approximately 8m) in this area and often single-trunk with small and medium hollows recorded.

This community is representative of MDBSA (Murray Darling Basin South Australia) BCM 9.1: *Woodlands with an open grassy understorey* (Croft, Pedlar and Milne 2009).

Bushland Site BLB1 has been installed to represent vegetation in Site B1.

Figure 6-6 Site B1: Older growth *Eucalyptus porosa* with *Enchylaena tomentosa* understorey

6.3.5 Block B (site 2)

Vegetation Association: *Eucalyptus porosa* +/- *Callitris gracilis* low open woodland over Chenopod low open shrubland and tussock grassland.

This site consists of numerous small patches of open woodland vegetation separated by cropping land located adjacent to site B1 near the north western boundary of the block. The patches are comprised of older growth *Eucalyptus porosa* with *Callitris gracilis* (White Cypress Pine). The understorey is dominated *by Enchylaena tomentosa* and *Austrostipa spp.* (Speargrass) with the introduced perennial mat plant Galenia (*Galenia sulcata*) and African Boxthorn common (Figure 6-7).

This community is representative of MDBSA (Murray Darling Basin South Australia) BCM 9.1: *Woodlands with an open grassy understorey* (Croft, Pedlar and Milne 2009).

Bushland Site BLA2 has been installed to represent vegetation in Site B2.

Figure 6-7 Site B2: Older growth *Eucalyptus porosa* with *Enchylaena tomentosa* understorey

6.4 Scattered Native Trees

As identified on Figure 6-1, approximately 53 scattered native trees are present within the cropped paddocks, along fence lines with *Eucalyptus porosa* the dominant species together with a small number of *Callitris gracilis* and other mallee species (Figure 6-8). In addition, a small number of native scattered trees have been recorded along roadsides or the rail reserve adjoining the survey area.

A list of scattered trees recorded is provided in Appendix 2 attached.

Figure 6-8 Numerous scattered native trees are found within cropped paddocks

6.5 Planted Exotic and Non-indigenous Native Trees

A small number of planted exotic or self-sown non-indigenous natives are present particularly in the vicinity of a farm house ruin near in the central portion of the survey area. Species include Pepper Tree (*Schinus molle*) and Athel Pine (*Tamarisk microphylla*) and *Acacia saligna* (farmyard wattle) (Figure 6-9).

Figure 6-9 Pepper Tree (*Schinus molle*) one of several planted exotic trees near a farmhouse ruin in the central portion of the survey area

7. Discussion

7.1 Disturbance Levels and Vegetation Condition

In general, disturbance levels within the remnant vegetation within the study area have been high. Past vegetation clearance has reduced vegetation communities to small patches surrounded by land that has been cropped and grazed continuously for many decades. On-going moderate grazing pressure from livestock and, to a lesser extent in recent years, rabbits, has impacted the understorey where less palatable and more resilient species dominate. Less palatable species typically present in mallee box communities are either absent or confined to scattered individuals growing in a protected location.

Infestations of African Boxthorn (Declared under the NRM Act and a Weed of National Significance) are common throughout the remnant vegetation patches and often present under scattered paddock trees and scattered small infestations of Bridal Creeper (Declared) were also recorded.

Bushland assessments representative of each of the five remnant vegetation areas (the location of the sites are identified on Figure 6-1), together with information collected on scattered trees and general observations have been used to assess vegetation condition. Information regarding the condition of each remnant vegetation area is summarised in Table 7-1 below. The flora species list for each site is provided in Appendix A.

The bushland assessments will need to be consolidated in a form required for a Native Vegetation Clearance application (if applicable).

Table 7-1 Native vegetation patch condition

Remnant Block / Site	Bushland Site	Vegetation Community	MDBSA BCM Community	Native Species Richness	Comments	Unit Biodiversity Score[1]	Total Biodiversity Score[1]	Condition
A1	*BLA1*	*Eucalyptus porosa +/- E phenax ssp phenax low open woodland*	9.1	23 (recorded across numerous small patches)	· Aggregation of many small remnant patches · Moderate grazing impact · Understorey dominated by exotic species and biomass · Good mix of native species across all patches · Widespread invasive weed infestations · Older regrowth mallee with no tree hollows	55.84	318.30	Moderate
A2	*BLA2*	*Eucalyptus porosa* mallee	6.1	8	· Larger continuous patch · Whipstick mallee formation with no tree hollows · Good cover of native shrubs and grasses in understorey	39.97	247.80	Moderate
A3	*BLA3*	*Eucalyptus porosa low +/- E phenax ssp phenax low* open woodland	9.1	18	· Larger continuous patch Moderate grazing impact · Understorey dominated by exotic species and biomass · Old growth single stem mallee with small and medium-sized hollows	53.76	301.6	Moderate
B1	*BLB1*	*Eucalyptus porosa / Callitris gracilis low* open woodland	9.1	4	· Single larger patch · Understorey dominated by exotic species and biomass · Old growth single stem mallee with small and medium-sized hollows	32.8	111.51	Poor
B2	*BLB2*	*Eucalyptus porosa / Callitris gracilis* open woodland	9.1	4	· Numerous small patches separated by cropping land · Understorey dominated by exotic species and biomass · Old growth single stem mallee with small and medium-sized hollows	32.8	42.6	Poor

[1]Data outputs from Bushland Assessment Sheets

7.2 Threatened Species and Threatened Ecological Communities (TEC)

The EPBC search indicated that Iron-grass Natural Temperate Grassland, nationally listed as Critically Endangered under the EPBC Act, may be present on the site. *Lomadra effusa* (Scented mat-rush), one of the key species for this TEC is present in the understorey in several patches of mixed mallee in the south east of the survey area (Site A1) (Figure 7-1). Patches at this site were assessed to determine whether they met the criteria for the TEC (as per conservation advice (TSSC 2008)), however the patches **did not** meet the TEC criteria, primarily based on the sparse coverage of *Lomandra* clumps and the low species richness of native grasses and broad-leaf herbaceous species. Whilst these patches did not meet Class A and Class B of the listed TEC, they meet criteria for Class C. The conservation advice stipulates that Class C is **not** considered part of the EPBC listed TEC, but is *indicative of patches that are degraded and could be rehabilitated to become the listed ecological community*.

No State or Commonwealth threatened flora or fauna species or plant communities were recorded during the survey and it is considered that they are unlikely to be present given the highly modified and degraded condition of the vegetation communities present within the surveyed area.

Figure 7-1 Site A1: *Lomandra effusa* (scented mat-rush) is present in the understory of some of the larger patches

7.3 Clearance of Native Vegetation

Preliminary design plans for this project indicate that clearance of native vegetation including removal of a number of scattered trees and parts of the remnant patches will be required. The final clearance footprint will depend on the final layout for infrastructure.

The provisions of the NV Act provide for the clearance of native vegetation either by application to the NVC for consent to clear or under exemptions contained in the *Native Vegetation Regulations 2017*.

It is considered that vegetation clearance required for this project falls under the provisions of Section 5 of the NV Act which provide for the clearance of native vegetation under Regulation 12(34) of the *Native Vegetation Regulations 2017* as described below:

7.3.1 Exemption 12 (34) Clearance incidental to the construction of infrastructure in the public interest

Regulation 12 (34) permits clearance of vegetation for the construction or expansion of a building or infrastructure that the Minister for Sustainability, Environment and Conservation considers to be in the public interest.

Approval to clear native vegetation under the provisions of exemption 5(1)(d) must be obtained from the NVC prior to construction. The NVC Exemption Guidelines (NVC, 2017) indicate the following broad provisions apply to clearance of native vegetation under exemption 12 (34):

- the clearance is incidental to the construction or expansion of a building or infrastructure and the Minister has, by instrument in writing, declared that he or she is satisfied that the clearance is in the public interest; or
- the clearance is required in connection with the provision of infrastructure or services to a building or proposed building, or to any place; and
- any development authorisation required by or under the *Development Act 1993* has been obtained; and
- the Council is satisfied (on the basis of information provided to the Council by the person seeking the benefit of this paragraph and such other information as the Council thinks fit) that, after taking into account the need to preserve biological diversity and the nature and purposes of any proposed building or infrastructure that is yet to be constructed, the proposed site of the building or infrastructure is the most suitable that is available; and
- the Council is satisfied (on the basis of information provided to the Council by the person seeking the benefit of this paragraph and such other information as the Council thinks fit) that:
    - there is no other practicable alternative that would involve no clearance or the clearance of less vegetation;
    - or the clearance of vegetation that is less significant or (if relevant);
    - the clearance of vegetation that has been degraded to a greater extent than the vegetation proposed to be cleared; and
- an approved Vegetation Management Plan is provided; and
- a Significant Environmental Benefit (SEB) offset applies to vegetation clearance under this exemption.

7.4 Justification for application of Exemption 12 (34)

The provisions of exemption 12 (34) are considered to apply for TB2SP as:

- The project is considered to be in the public interest as it supports the delivery of renewable energy to consumers in South Australia and the broader national electricity market, and provides for additional capacity and competition between generators in the South Australia market. Reflecting the public interest,

the project is likely to be deemed ‘public infrastructure’ by the Department of Premier and Cabinet pursuant to Section 49 of the *Development Act 1993*;

- The clearance required is in connection with the provision of electricity infrastructure;
- The project is in the early design phase, however infrastructure will be positioned to minimise vegetation clearance and clearance of scattered trees rather than continuous patches of remnant vegetation; and
- A SEB in the form of a land set aside or monetary payment is required.

8. Summary

The desktop study and field survey confirmed the presence of native vegetation within the project area including scattered patches of remnant native vegetation comprising approximately 22 hectares and approximately 53 scattered remnant individual trees.

Remnant vegetation has been highly fragmented from past vegetation clearance and considered to be in moderate to poor condition as a result of on-going high total grazing pressure and weed invasion. Older growth mallee found in Sites A3, B1 and B2 includes trees will small and medium sized tree hollows that provide nesting habitat for a range of bird and bat species. Larger remnant patches in site A1 include *Lomandra effusa* (Scented Mat-rush) in the understorey and while do not fit the criteria for inclusion as Iron-grass Natural Temperate Grassland TEC (Classes A and B), they fit the criteria for Class C (not classified as TEC) indicating they may be amenable to rehabilitation. Clearance of these patches has largely been avoided in the preliminary design. Retention and potentially rehabilitation of these patches could be included in the SEB and vegetation management plan required as part of the vegetation clearance approval process through consultation with the NVC.

The preliminary design for this project has sought to minimise vegetation clearance, by positioning solar arrays and other infrastructure predominantly on cleared land and where clearance of native vegetation is required, it consists largely of scattered individual trees and smaller isolated patches assessed to be in poor condition (reflected in the comparatively low Total Biodiversity Scores, and the vegetation condition presented in the graph). Larger remnant patches (including sites A2, A3 and B1) are proposed to be retained and it is considered that these measures meet the requirements of Exemption 5(1)(d) of the Native Vegetation Act.

The field survey determined that no flora and fauna species or Threatened Ecological Community listed under the EPBC Act is likely to be present or significantly impacted by this project and a referral under the provisions of the act is not required.

9. References

Australian Weeds Committee (2012) Weeds of National Significance, http://www.weeds.org.au/WoNS/ (Accessed online April 2016).

Croft SJ, Pedler JA & Milne T (2009) Bushland condition monitoring manual: Murray Darling Basin, South Australia. Nature Conservation Society of South Australia.

Government of South Australia (2017a) Native Vegetation Guide for applications to clear under the Act or Regulations, Native Vegetation Council / Natural Resources (DEWNR) Government of South Australia.

Government of South Australia (2017b) Policy for a Significant Environmental Benefit under the Native Vegetation Act 1991 and the Native Vegetation Regulations 2017 (SEB Policy).

Native Vegetation Management Unit (NVMU) (2017) Bushland Assessment Manual, NVMU, Department of Environment, Water and Natural Resources Government of South Australia.

Threatened Species Scientific Committee (TSSC) (2008) http://www.environment.gov.au/biodiversity/threatened/communities/pubs/l-effusa.pdf

Appendix A. Flora species observed during field visit

Species	Common Name	Block A1	Block A2	Block A3	Block B
Acacia pycnantha	Golden Wattle	x			
*Asparagus asparagoides f. asparagoides**	Bridal Creeper	x	x	x	
*Asphodelus fistulosus**	Onion Weed	x			
Austrostipa elegantissima	Elegant Spear-grass	x	x		
Austrostipa sp.	Spear-grass	x	x	x	x
Billardiera cymosa ssp. cymosa	Sweet Apple-berry	x		x	
Brachyscome ciliaris var. lanuginosa	Woolly Variable Daisy	x			
Brassica tournefortii	Wild Turnip			x	
Bromus sp.	Brome	x			
Callitris gracilis	White Cypress Pine				x
Carrichtera annua	Ward's Weed	x	x	x	
Clematis microphylla	Old Man's Beard	x			
Chrysocephalum sp.	Everlasting			x	
Convolvulus remotus	Grassy Bindweed	x			
Dianella brevicaulis	Short-stem Flax-lily	x			
Einadia nutans ssp.	Climbing Saltbush	x	x		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	x	x	x	x
Enneapogon nigricans	Black-head Grass			x	
Eucalyptus gracilis	Yorrell	x			
Eucalyptus oleosa ssp. oleosa	Red Mallee	x			
Eucalyptus phenax ssp. phenax	White Mallee	x		x	
Eucalyptus porosa	Mallee Box	x	x	x	
*Galenia secunda**	Galenia	x	x	x	x
Gomphocarpus fruticosus	Narrow-leaf Cotton-bush	x			
Goodenia pinnatifida	Cut-leaf Goodenia	x			
*Hypochaeris sp.**	Cat's Ear		x		
Lepidosperma laterale	Tall Sword-sedge			x	
Lomandra effusa	Scented Mat-rush	x			
Lomandra micrantha ssp micrantha	Small-flower Mat-rush			x	
*Lycium ferocissimum**	African Boxthorn	x	x	x	x
Maireana brevifolia	Short-leaf Bluebush	x		x	
*Marrubium vulgare**	Horehound	x			
*Medicago minima var. minima**	Little Medic	x	x	x	
Melaleuca lanceolata	Dryland Tea-tree			x	
*Mesembryanthemum crystallinum**	Common Ice-plant	x			x
*Parietaria debilis**	Smooth Nettle				
Pimelea stricta	Erect Rice-flower			x	

Species	Common Name	Block A1	Block A2	Block A3	Block B
Ptolotis spathulatus	Pussy Tails			x	
*Reichardia tingitana**	False Sow-thistle	x	x		
Rytidosperma caespitosa	Common Wallaby Grass	x	x	x	x
Senecio pinnatifolius var. pinnatifolius	Groundsel	x	x	x	
*Sisymbrium sp.**	Wild Mustard	x	x	x	
*Sonchus oleraceus**	Common Sow-thistle	x	x		
Vittadinia sulcata	Furrow-leaf New Holland Daisy	x		x	
Wurmbea dioica ssp. dioica	Early Nancy			x	

'*' = exotic species

Appendix B. Scattered Tree Details

Tree Number	Species	Position	Within Preliminary Design Footprint
1	*Eucalyptus incrassata*	Inside property fence adjacent railway	No
2	*Eucalyptus incrassata*	Inside property fence adjacent railway	No
3	*Eucalyptus porosa*	Inside property fence adjacent railway	No
4	*Eucalyptus porosa*	Inside property fence adjacent railway	No
5	*Eucalyptus porosa*	In paddock	Yes
6	*Eucalyptus porosa*	In paddock	Yes
7	*Eucalyptus porosa*	In paddock	Yes
8	*Eucalyptus porosa*	In paddock	Yes
9	*Eucalyptus porosa*	In paddock	Yes
10	*Eucalyptus porosa*	In paddock	Yes
11	*Eucalyptus porosa*	In paddock	Yes
12	*Eucalyptus porosa*	In paddock	Yes
13	*Eucalyptus porosa*	In paddock	Yes
14	*Eucalyptus porosa*	Substation Road roadside vegetation	No
15	*Eucalyptus porosa*	Substation Road roadside vegetation	No
16	*Eucalyptus porosa*	Substation Road roadside vegetation	No
17	*Eucalyptus porosa*	In paddock	Yes
18	*Eucalyptus porosa*	In paddock	Yes
19	*Eucalyptus porosa*	In paddock	Yes
20	*Eucalyptus porosa*	In paddock	Yes
21	*Eucalyptus porosa*	In paddock	Yes
22	*Eucalyptus porosa*	In paddock	Yes
23	*Eucalyptus porosa*	In paddock	Yes
24	*Eucalyptus porosa*	In paddock	Yes
25	*Eucalyptus porosa*	In paddock	Yes
26	*Eucalyptus porosa*	In paddock	Yes
27	*Eucalyptus porosa*	In paddock	Yes
28	*Eucalyptus porosa*	In paddock	Yes
29	*Eucalyptus porosa*	In paddock	Yes
30	*Eucalyptus porosa*	In paddock	Yes
31	*Eucalyptus porosa*	In paddock	Yes
32	*Eucalyptus porosa*	In paddock	Yes
33	*Eucalyptus porosa*	In paddock	Yes
34	*Eucalyptus porosa*	In paddock	Yes
35	*Eucalyptus porosa*	In paddock	Yes
36	*Eucalyptus porosa*	In paddock	Yes
37	*Eucalyptus porosa*	In paddock	Yes
38	*Eucalyptus porosa*	In paddock	Yes
39	*Eucalyptus porosa*	In paddock	Yes
40	*Eucalyptus porosa*	In paddock	Yes
41	*Eucalyptus porosa*	In paddock	Yes
42	*Eucalyptus porosa*	In paddock	Yes
43	*Eucalyptus porosa*	In paddock	Yes

Tree Number	Species	Position	Within Preliminary Design Footprint
44	*Eucalyptus porosa*	In paddock	Yes
45	*Eucalyptus porosa*	In paddock	Yes
46	*Eucalyptus porosa*	In paddock	Yes
47	*Eucalyptus porosa*	In paddock	Yes
48	*Eucalyptus porosa*	Substation Road roadside vegetation	No
49	*Eucalyptus porosa*	Substation Road roadside vegetation	No
50	*Eucalyptus porosa*	Substation Road roadside vegetation	No
51	*Eucalyptus porosa*	Substation Road roadside vegetation	No
52	*Eucalyptus porosa*	In paddock	Yes
53	*Eucalyptus porosa*	In paddock	Yes

Note further details are contained within electronic DEWNR scattered trees assessment sheets, that will be provided when vegetation clearance details are finalised.