APPLICATION ON NOTIFICATION – CROWN DEVELOPMENT

Applicant:	Solar Reserve Australia Pty Ltd
Development Number:	010/V061/17
Nature of Development:	Construction of a solar power station and associated ancillary infrastructure for connection to the grid
Type of development:	Crown development
Zone / Policy Area:	Unincorporated Pastoral Land – Out of Council; Primary Industry – Port Augusta Council
Subject Land:	S2 in H540100, Q5 in D47636, QP51 in 51471, Q3 in D47636, 236 Corraberra Road, Carriewerloo, Certificate of Lease: **6181/119**. Q3 of D47635, 2310 Stuart Highway, Mount Arden, Certificate of Lease: **6180/595** Q1 in D47635, Lot 1 Government Road, Port Augusta West, Certificate of Lease: **6180/595.** S229 in H540200, Stuart Highway, Port Augusta West, Certificate of Lease: **656/34**
Contact Officer:	Lee Webb
Phone Number:	7109 7066
Start Date:	11 October 2017
Close Date:	2 November 2017

During the notification period, hard copies of the application documentation can be viewed at the Department of Planning, Transport and Infrastructure, Level 5, 50 Flinders Street, Adelaide during normal business hours. Application documentation may also be viewed during normal business hours at the local Council office (if identified on the public notice).

Written representations must be received by the close date (indicated above) and can either be posted, hand-delivered, faxed or emailed to the State Commission Assessment Panel (SCAP). A representation form is provided as part of this pdf document.

Any representations received after the close date will not be considered.

Postal Address:
The Secretary
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5001

Street Address:
Development Division
Department of Planning, Transport and Infrastructure
Level 5, 50 Flinders Street
ADELAIDE

Email Address: scapadmin@sa.gov.au
Fax Number: (08) 8303 0753

DEVELOPMENT ACT, 1993
S49/S49A – CROWN DEVELOPMENT
REPRESENTATION ON APPLICATION

Applicant:	Solar Reserve Australia Pty Ltd
Development Number:	010/V061/17
Nature of Development:	Construction of a solar power station and associated ancillary infrastructure for connection to the grid
Zone / Policy Area:	Pastoral Unincorporated Area – Out of Council; Primary Industry Zone – Port Augusta Council
Subject Land:	S2 in H540100, Q5 in D47636, QP51 in 51471, Q3 in D47636, 236 Corraberra Road, Carriewerloo, Certificate of Lease: **6181/119**. Q3 of D47635, 2310 Stuart Highway, Mount Arden, Certificate of Lease: **6180/595** Q1 in D47635, Lot 1 Government Road, Port Augusta West, Certificate of Lease: **6180/595.** S229 in H540200, Stuart Highway, Port Augusta West, Certificate of Lease: **656/34**
Contact Officer:	Lee Webb
Phone Number:	7109 7066
Close Date:	2 November 2017

My name:_____

My phone number: _____

PRIMARY METHOD(s) OF CONTACT: Email address: _____

Postal address:_____

_____Postcode_____

You may be contacted via your nominated PRIMARY METHOD(s) OF CONTACT if you indicate below that you wish to be heard in support of your submission.

My interests are:
- [ ] owner of local property
- [ ] occupier of local property
- [ ] a representative of a company/other organisation affected by the proposal
- [ ] a private citizen

The address of the property affected is .....Postcode.....

The specific aspects of the application to which I make comment on are: .....

.....

.....

.....

.....

.....

.....

.....

I
- [ ] wish to be heard in support of my submission
- [ ] do not wish to be heard in support of my submission

(Please tick one)

by
- [ ] appearing personally

[ ] being represented by the following person : .....
(Cross out whichever does not apply)

Date: ..... Signature: .....

Return Address: The Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide, SA 5001 or scapadmin@sa.gov.au

DEVELOPMENT APPLICATION FORM

PLEASE USE BLOCK LETTERS

COUNCIL: Land Not Within a Council Area and Pt Augusta City Council

APPLICANT: SolarReserve Australia II PTY LTD

Postal Address: Level 25, 108 St Georges Tce Perth WA 6000

Owner: _____

Postal Address: _____

BUILDER: _____

Postal Address: _____

_____ Licence No: _____

CONTACT PERSON FOR FURTHER INFORMATION

Name: Simone Fogarty

Telephone: 0417 541 486 [work] _____ [Ah]

Fax: _____ [work] _____ [Ah]

EXISTING USE: Pastoral Lease - Grazing Land

FOR OFFICE USE

Development No: _____

Previous Development No: _____

Assessment No: _____

☐ Complying	Application forwarded to DA
☐ Non Complying	Commission/Council on
☐ Notification Cat 2	/ /
☐ Notification Cat 3	Decision: _____
☐ Referrals/Concurrences	Type: _____
☐ DA Commission	Date: / /

	Decision required	Fees	Receipt No	Date
Planning:				
Building:				
Land Division:				
Additional:				
Development Approval				

DESCRIPTION OF PROPOSED DEVELOPMENT: Construction of a solar power station and ancillary infrastructure for connection to grid

LOCATION OF PROPOSED DEVELOPMENT: Stuart Highway, Port Augusta

House No: _____ Lot No: ____ Street: _____ Town/Suburb: Mount Arden, 5713

Section No [full/part] 2 Hundred: Castine Volume: 6181 Folio: 119

Section No [full/part] _____ Hundred: _____ Volume: _____ Folio: _____

LAND DIVISION:

Site Area [m^2] _____ Reserve Area [m^2] _____ No of existing allotments _____

Number of additional allotments [excluding road and reserve]: _____ Lease: **YES** ☐ **NO** ☐

BUILDING RULES CLASSIFICATION SOUGHT: _____ Present classification: _____

If Class 5,6,78 or 9 classification is sought, state the proposed number of employees: Male: _____ Female: _____

If Class 9a classification is sought, state the number o persons for whom accommodation is provided: _____

If Class 9b classification is sought, state the proposed number of occupants of the various spaces at the premises: _____

DOES EITHER SCHEDULE 21 OR 22 OF THE DEVELOPMENT REGULATIONS 2008 APPLY? **YES** ☐ **NO** ☒

HAS THE CONSTRUCTION INDUSTRY TRAINING FUND ACT 2008 LEVY BEEN PAID? **YES** ☐ **NO** ☒

DEVELOPMENT COST [do not include any fit-out costs]: $ 300,000,000

I acknowledge that copies of this application and supporting documentation may be provided to interested persons in accordance with the Development Regulations 2008.

SIGNATURE: _____ _____ _____ Dated: 19 / 09 / 2017

_____ _____

Appendix A – Title References

Copy of Title reference for main site (copy included in Appendix)

Title references for infrastructure and transmission route options (tale below)

	Option 1	Option 2	Option 3	Road Access and water Pipeline
Title	CL 6181/119	CL 6181/119	CL 6181/119	CT 6058/91
Parcel ID	H540100 S2	H540100 S2	H540100 S2	H540100 S6
Title	CL 6181/119	CL 6180/595	CL 6180/595	CR 6142/38
Parcel ID	D47636 Q5	D47635 Q3	D47635 Q1	F219623 Q2
Title		CT 5439/775	CL 656/34	CR 6142/38
Parcel ID		D47636 A102	H540200 S229	F219623 Q1
Title		CT 5480/470	CL 6181/119	CL 6181/119
Parcel ID		D47635 A104	D47636 Q3	H835200 B679
Title			CL 6181/119	CR 5767/528
Parcel ID			D51471 Q51	H540200 S298
Title			CT 5439/775	CL 6181/119
Parcel ID			D47636 A101	H540200 S312
Title			CT 5439/775	
Parcel ID			D47636 A100	

Product	Register Search (CL 6181/119)
Date/Time	18/09/2017 03:35PM
Customer Reference	3318266
Order ID	20170918011614
Cost	$28.25

REAL PROPERTY ACT, 1886
South Australia

This Crown Lease Register Search is a true and correct extract of the Register of Crown Leases maintained by the Registrar-General.

Pastoral Leases are granted and administered pursuant to the Pastoral Land Management and Conservation Act 1989 by the Department of Environment, Water and Natural Resources.

REGISTRAR - GENERAL SOUTH AUSTRALIA

Crown Lease - Volume 6181 Folio 119

Parent Title(s) CL 1436/40

Creating Dealing(s) RT 12591880

Title Issued 28/09/2016 **Edition** 1 **Edition Issued** 28/09/2016

Estate Type

CROWN LESSEE

Owner

THE CROWN

Crown Lessee

BUCKLEBOO NOMINEES PTY. LTD. (ACN: 008 046 731)
OF PRIVATE BAG 116 PORT AUGUSTA SA 5700

Description of Land

SECTIONS 1, 2, 4 AND 5
HUNDRED OF CASTINE
IN THE AREA NAMED CARRIEWERLOO

SECTIONS 311 AND 312
HUNDRED OF COPLEY
IN THE AREA NAMED CARRIEWERLOO

SECTION 25
HUNDRED OF HANDYSIDE
IN THE AREA NAMED CARRIEWERLOO

BLOCK 679
OUT OF HUNDREDS (PORT AUGUSTA)
IN THE AREA NAMED CARRIEWERLOO

ALLOTMENT COMPRISING PIECES 3 AND 4 DEPOSITED PLAN 47636
IN THE AREA NAMED CARRIEWERLOO
HUNDRED OF COPLEY

ALLOTMENT COMPRISING PIECES 5 AND 6 DEPOSITED PLAN 47636
IN THE AREA NAMED CARRIEWERLOO
HUNDRED OF CASTINE

ALLOTMENT 55 DEPOSITED PLAN 51471
HUNDRED OF COPLEY

ALLOTMENT COMPRISING PIECES 51 AND 52 DEPOSITED PLAN 51471
HUNDRED OF COPLEY

ALLOTMENT COMPRISING PIECES 53 AND 54 DEPOSITED PLAN 51471
HUNDRED OF COPLEY

TOTAL AREA: 282KM² (APPROXIMATE)

DIAGRAM BOOK PAGES 1,2,3,6 AND 7 HUNDRED OF CASTINE
DIAGRAM BOOK PAGES 8,10 AND 47A HUNDRED OF COPLEY
DIAGRAM BOOK PAGE 7 HUNDRED OF HANDYSIDE
DIAGRAM BOOK PAGE 303 OUT OF HUNDREDS NORTH

Lease Details

Lease Number	PE002496
Lease Type	PASTORAL
Commencing On	07/03/1990
Expiring On	14/10/2054

Conditions

CROWN LEASE CONDITIONS VIDE CL 1436/40

Easements

SUBJECT TO CERTAIN RIGHT(S) AND LIBERTIES OVER PORTION OF PIECE 5 MARKED A ON D47636 (AS 8727981)

SUBJECT TO EASEMENT(S) OVER PORTION OF PIECE 51 MARKED A ON D51471 (TT 8252760)

SUBJECT TO EASEMENT(S) OVER PORTION OF PIECES 3 AND 5 MARKED A ON D47636 (TT 8252760)

SUBJECT TO EASEMENT(S) WITH LIMITATIONS OVER PORTION OF ALLOTMENT 55 AND PIECE 3 MARKED K ON THE PLAN ATTACHED TO GU 5086956 TO THE NATURAL GAS AUTHORITY OF SOUTH AUSTRALIA EXPIRING ON 31/03/2038 (GU 5086956)

Schedule of Dealings

Dealing Number	Description
11531746	MORTGAGE TO WESTPAC BANKING CORPORATION
12598780	CAVEAT BY SOLARRESERVE AUSTRALIA PTY. LTD. (ACN: 165 388 410) OVER PORTION

Notations

Dealings Affecting Title NIL

Priority Notices NIL

Registrar-General's Notes

APPROVED FX40361

Administrative Interests NIL

Additional Information

This additional information is provided by the Department of Environment, Water and Natural Resources and does not constitute part of the Crown Leases Register maintained by the Registrar-General. Contact the Department of Environment, Water and Natural Resources to verify the currency of this information and to obtain further details.

Related Leases

Related Leases: PE 002423

Maximum Stocking Rate: 4,900 Sheep Equivalents

Annual Rent

Annual Rent: $0

Rent Review: Rent to be review no later than Unknown

Solar Reserve

Aurora Solar Energy Project
Development Application

October 2017

Executive summary

SolarReserve is pleased to have been selected by the South Australian Government to put forward a project that will assist South Australia with its long term energy plan. The Aurora project is at the cutting edge of new renewable technology but will also have the benefit of the experiences associated with similar projects that have been or are planned to be built.

From a social, economic and environmental perspective this project will:

- Deliver approximately 500,000 megawatt hours of electricity annually;
- Power approximately 90,000 South Australian homes;
- Displace approximately 200,000 tonnes of CO2 annually;
- Create up to 4,000 direct, indirect and induced jobs during construction and 50 jobs during the operation phase;
- Will result in $650 million worth of investment in the State; and
- Provide greater electricity network stability.

In addition, as part of the State's Energy Plan, this project will help to suppress wholesale energy prices and enhance power supply in SA.

Project Summary

SolarReserve are seeking approval for a large-scale solar thermal electricity generation plant located approximately 30km north-west of Port Augusta as identified on Figure 1-1.

Aurora shares fundamental design and configuration elements with SolarReserve's operational Crescent Dunes CSP facility located in Tonopah, Nevada. This technology uses a field of dual-axis controlled heliostats (mirrors) to concentrate and direct sunlight to a solar receiver located on a tower in the centre of the plant to capture energy. Molten salt is pumped through the receiver where it is super-heated and either immediately used to convert water into superheated steam to drive a steam generator to produce electricity or stored at temperature to generate electricity for a later time.

The plant is laid out around a central circular core (power block) of approximately 267m diameter, which includes the tower, salt storage tanks, the steam generator, heat exchangers, air cooled condenser, water treatment plant and a range of other ancillary, control and storage facilities. This core is then surrounded by a field of tracking heliostats which is approximately 3.2km in diameter. Each heliostat is mounted on a single pedestal and footing and is able to be positioned relative to the sun.

The total site area for Aurora is approximately 800 hectares.

In close proximity to the site is the Stuart Highway, a major road connecting South Australia to the Northern Territory; a water pipeline to the Department of Defence at Woomera; an interstate rail line; and 132 kV and 275 kV transmission lines which service Olympic Dam, Woomera and Roxby Downs.

Access to the site is via the Stuart Highway from Port Augusta. Connection to the grid will be via the existing 275kV transmission line located to the east of the site or via a direction connection to the Davenport substation using new and existing transmission line towers.

The site is Crown Land, but operates under a long-term pastoral lease to private pastoralists who utilise the land for sheep grazing.

0

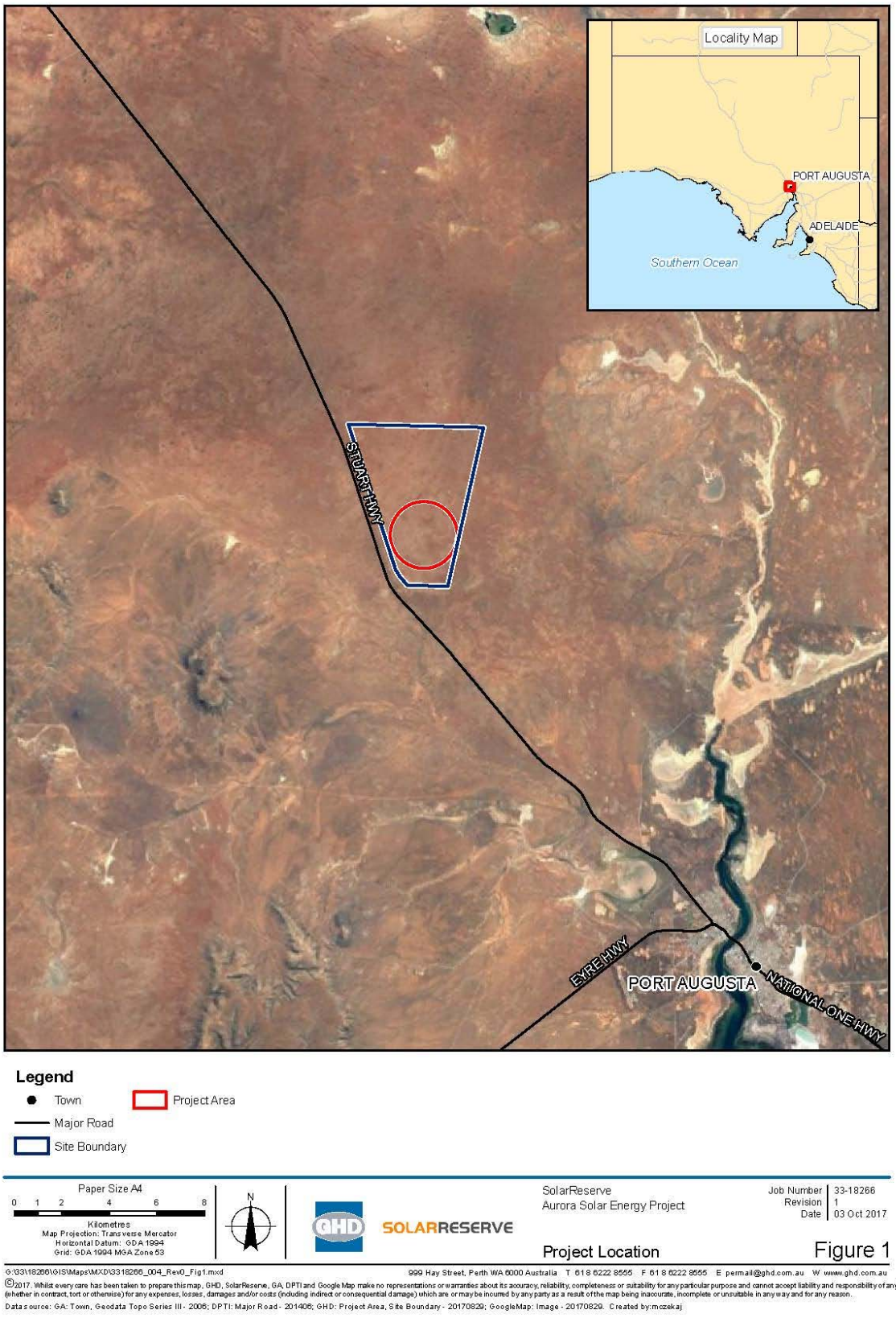


Figure 1 Project Location

Impact Assessment and Considerations

SolarReserve have engaged a number of specialists to investigate and explore a range of potential impact issues including: traffic, visual impact, cultural heritage, flora & fauna, aviation and land use planning.

The solar thermal technology that will be employed in the Aurora project is a predominantly "closed" system which means that there are no emissions or waste associated with the main operation. Some limited waste will be generated by treating the SA Water supply to achieve the very high quality standard of water needed for the facility's steam turbine generator. This will produce by-products from the SA Water supply and steam system that will be placed into a lined evaporation pond and managed to pose no issues for human or environmental health.

It is important to note that sectors of the Port Augusta community led by Repower Port Augusta have vocally advocated for the establishment of a solar thermal power station in Port Augusta for many years. Whilst the project has received strong community support, SolarReserve acknowledges the need for a proper and appropriate impact assessment process and are confident that all issues can be suitably addressed based on previous experiences.

Given the timeframes involved, there are a number of issues that will require the provision of more detailed design development. These relate to issues where the risk of impact is low and the method to manage any risk is well known. In this context SolarReserve anticipate that, should this project be approved, there is likely to be a number of conditions requiring the submission of detailed plans prior to construction.

Conclusion

The nature of the proposed development is such that there will be relatively few impacts experienced as a result of the project.

The most significant impact will be from a visual perspective. All other impacts can be appropriately managed and controlled through the careful design of infrastructure (e.g. traffic, stormwater, storage of materials etc…).

To some extent the degree of visual impact will largely depend on the personal preferences of the individual. At a technical level, Port Augusta has a significant and long history with large-scale infrastructure (such as coal-fired power) and the proposed solar thermal technology represents an evolution in energy generation in the region.

Overall, the project's social, economic and environmental benefits include supporting energy security in SA, reducing energy related green-house gas emissions, and providing significant employment opportunities in Port Augusta, following closure of coal fired power stations in the area. As such, the project represents a positive transition towards a sustainable future for the Port Augusta community and South Australia economy.

Table of contents

Table index

Figure index

Appendices

1. Introduction

SolarReserve is seeking approval for a large-scale solar thermal electricity generation plant located approximately 30 km north of Port Augusta (Figure 1-1). The Aurora Solar Energy Project (Aurora) reflects the same fundamental design, layout and configuration as SolarReserve's operational Crescent Dunes facility located in Tonopah, Nevada.

Aurora will use SolarReserve's Concentrated Solar Power (CSP) technology with storage that is capable of producing solar powered electricity 24 hours a day. Once completed, Aurora will be the largest CSP facility in Australia.

In March 2017, the South Australian Government requested electricity generators to tender proposals for infrastructure capable of providing stable, reliable electricity generation and capable of meeting the state's government's energy requirements for the next 20 years. The Aurora project was selected by the SA Government following a competitive tender process that included a detailed project review and evaluation process.

SolarReserve are keen to progress their project as well as support the South Australian Government's Energy Plan initiatives.

1.1 Project overview and Evolution

The proposed development will have a generating capacity of 150MW with the ability to store up to 1,100MWh per day. The project includes up to 13,000 heliostats (tracking mirrors), a central receiving tower, electricity generation plant, associated ancillary infrastructure and a transmission line for connection to the grid. The site of the proposed development is legally defined in Appendix A which includes relevant title references.

The proposed location of Aurora has been specifically identified as the preferred location in order to take advantage of the "world class" levels of sunlight, Direct Natural Irradiance (DNI), required for a CSP. This is shown in Figure 1-2. Additionally a flat site is very important to the overall layout. The proposed site also has good road access and is located relatively close to a major transmission line. Social acceptance of the project has also been an important site selection factor with sectors of the Port Augusta community, led by Repower Port Augusta, vocally advocating for the establishment of a solar thermal power station in Port Augusta for many years.

The process of site selection and concept development involves a series of investigations over a period of time. These investigations address both impact issues as well as the technical requirements for the project and their results progressively influence the project concept. SolarReserve commissioned a number of impact assessment studies, based on early concept layouts, which have identified issues and resulted in changes to the concept. Detailed technical studies are currently being undertaken to inform the detailed design. As the project has progressed, the concept has been adjusted to provide a reasonable balance between minimising overall impacts and meeting technical requirements.

This assessment process may identify further issues through public and government agency consultation. As such, the concept may change in response to the issues raised.

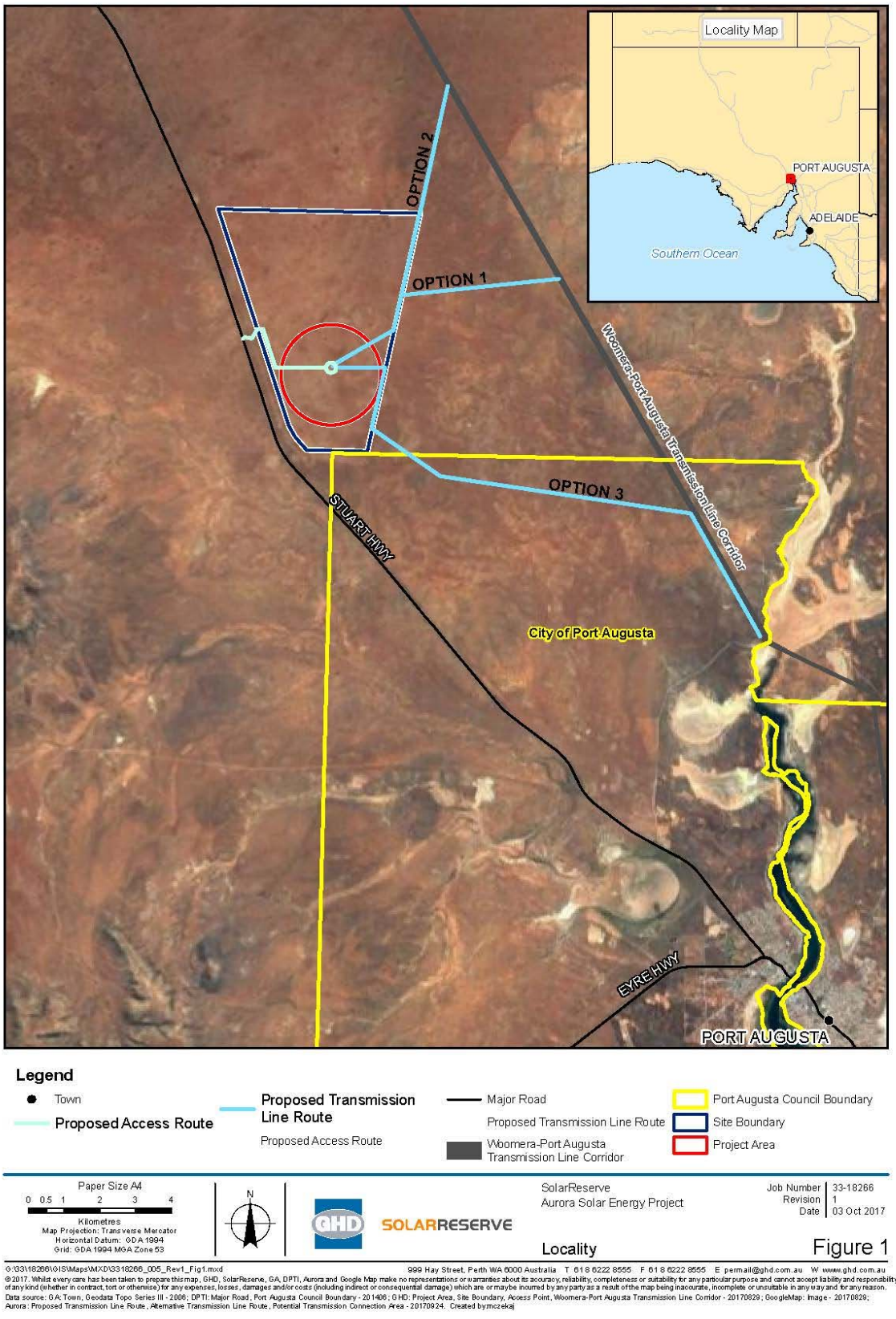


Figure 1-1 Project Location

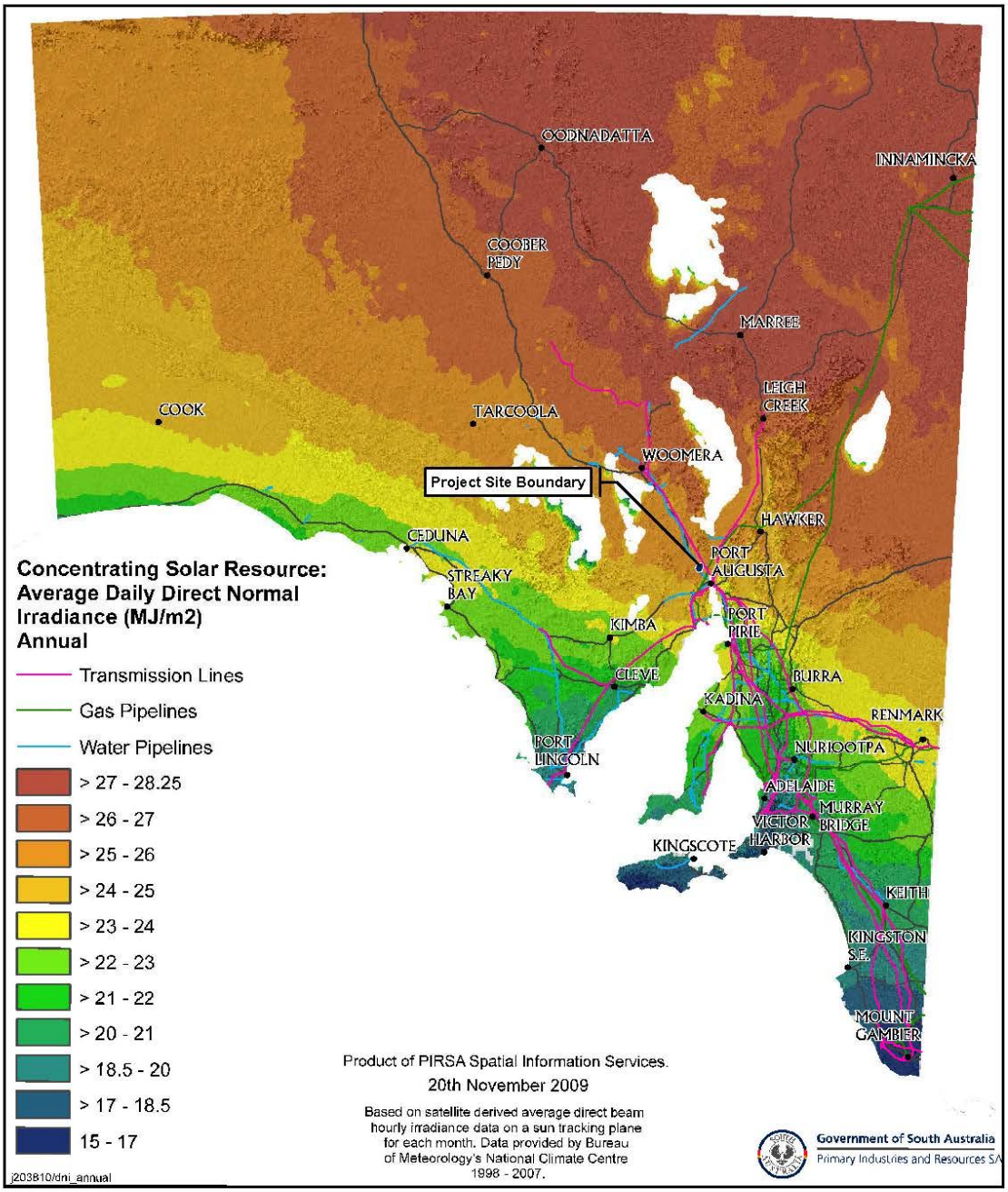


Figure 1-2 Solar Resource

1.2 The proponent

SolarReserve is a leading global developer of utility-scale solar power projects, including both Concentrating Solar Power (CSP) and Photovoltaic (PV) technologies. The Company has commercialised and owns the intellectual property rights to an advanced solar thermal technology with integrated energy storage that solves the intermittency issues experienced with other renewable energy sources. This proven technology generates renewable baseload and dispatchable power and can compete with traditional fossil-fired and nuclear electricity generation.

SolarReserve is a privately held company backed by a group of market leading and well capitalised private equity firms including U.S. Renewables Group, Bregal Energy Group, and Seven Mile Capital Partners. Since its founding in 2008, it has received in excess of USD$225 million of capital inflows and has successfully financed five large-scale projects, including the world's largest molten salt power tower and the largest PV project in Africa.

SolarReserve has a highly experienced team across all disciplines including development, operations, finance, construction, and mergers and acquisitions, with an exceptional track record of industry success.

SolarReserve's proprietary CSP technology was tested and proven through the U.S. Department of Energy's Solar Two Facility, a 10 MW pilot plant built in the late 1990s. It operated for four years and successfully demonstrated the ability of the technology to provide cost effective thermal energy storage for electricity generation.

Approximately 15 years after Solar Two was decommissioned, SolarReserve's flagship 110 MW Crescent Dunes Project (near Tonopah, Nevada) has come online. During this period, tens of millions of dollars have been invested and continue to be invested in research and development, resulting in significant performance and cost improvements in the technology.

The company currently has more than USD$1.8 billion of projects in construction and operation worldwide, with development and long-term power contracts for 625 MW of solar projects representing USD$3 billion of project capital. SolarReserve has equity interests in excess of USD$100 million in these projects.

1.3 Application pathway

The main site of the proposed development is not located within the boundary of a local council area. In such situations, the State Commission Assessment Panel (SCAP) is the relevant development assessment authority and the Land Not Within a Council Area (Flinders) Development Plan (29 November 2012) is the relevant document for development assessment purposes. Schedule 10 Clause 14 (1) of the *Development Regulations 2008* also requires that the SCAP be the relevant authority for development of an electricity generation plant capable of producing in excess of 5 MW.

The proposed development will be assessed in accord with Section 49 of the *Development Act 1993* which is the normal assessment process for infrastructure projects that have some level of public benefit. This means that the SCAP will undertake an assessment of the project and provide advice but the final decision will rest with the Minister for Planning. The application will be sent to the Port Augusta Council for comment prior to a decision being made.

Accordingly, this development application has been lodged with the State Commission Assessment Panel (SCAP). As required by the legislation, a copy of the relevant Agency Sponsorship letter and Office of the Technical Regulator documentation is contained in Appendix B.

This application will be assessed on its merits, having regard to the relevant policies in the Development Plan and will be notified publically for a period of 15 business days.

1.4 Purpose of this report

This report has been prepared for the purpose of providing supporting information to assist with a Development Application and assessment process under the *Development Act 1993*. The contents of this report only address planning matters relevant to the development assessment process.

Issues and matters relating to other legislation will be addressed as required by the relevant authority. These matters are being progressed concurrently with this development application and are outlined in the following Table.

Table 1 Concurrent processes

Issue	Status
Access to land – It is not a requirement of the SA planning system to demonstrate access to land.	Discussions with the current leaseholders, Crown Lands and the relevant Native Title representatives have commenced. This aspect is running in parallel to the development assessment process. There are no indications that there are any fundamental hurdles to obtaining access to the land.
Native Vegetation Clearance – The Native Vegetation Council determines vegetation clearance once a development approval has been issued.	Native vegetation impacts were investigated at the earliest stages of this project in 2015. An application for clearance was lodged in June 2017. This application will be refined to reflect the final outcome of any development approval. There is no indication of fundamental barriers to the project on the subject site but some refinement of the main site location and transmission line route will be required (including additional survey work where relevant).
Aboriginal Heritage – the *Aboriginal Heritage Act 1988* protects Aboriginal heritage.	The applicant has undertaken the relevant preliminary steps to ensure that Aboriginal heritage will be appropriately addressed during the lifetime of the project. Further discussions with the relevant indigenous community are anticipated. The applicant acknowledges that site surveys and miro-siting of the project are likely to be required and appropriate practices will be required during the construction phase.
Materials and Chemicals – the manner in which materials and chemicals are stored by any business is controlled by SafeWork SA.	SolarReserve are aware that they will need to comply with relevant national and state legislation that controls certain types of materials and chemicals both in terms of its transport to site and storage on-site.

Water treatment and wastewater evaporation ponds - potential licencing by SA EPA	It is noted that the EPA will be a referral agency as part of the Development Assessment process. Should this application receive approval, the water treatment processes and wastewater evaporation ponds associated with the facility may require licencing by the EPA. Detailed plans associated with the water treatment process and evaporation ponds will be provided to the EPA as part of the licencing process. The design requirements of these aspects are well known and understood and there is no impediment to achieving a design that meets licencing requirements

2. Description of the development

This chapter provides a description of the development including:

- Project elements:
  - heliostat field,
  - power block, and
  - support infrastructure and ancillary elements;
- On-going management and maintenance requirements; and
- Construction and decommissioning activities.

The overall layout and site context is shown in Figure 2-1. Plans of the proposed development are contained in Appendix C and a Draft Construction Environmental Management Plan (CEMP) is contained in Appendix D.

2.1 Project elements

A summary of the main project elements over the project's operational lifecycle are outlined below, and further details are provided in the following sections under respective headings.

Heliostat field

- Up to 13,000 heliostats, all approximately 96 square metres in size and anchored to a post or pier type foundation.

Power Block:

- Solar receiver/tower with a total height up to 250 metres is comprising:
  - A cylindrical concrete tower structure at a height of up to 200 metres;
  - A 36 metre tall receiver assembly on the top of the tower; and
  - A 4.5 metre tall crane required for maintenance work on the receiver.
- Steam turbine generator and associated infrastructure.
- Air cooled condenser.
- Molten salt storage tanks (one hot and one cold), each being up to 15m (height) x 45m (diameter) in size.
- Water storage tanks, treatment plant (reverse osmosis and demineralisation), water pipeline and evaporation ponds.
- Additional ancillary facilities located in the Power Block required for facility operation and maintenance (e.g. operations control room, warehouse, workshop, emergency fire suppression systems, backup diesel generators, and diesel fuel tanks).

Support Infrastructure and Ancillary elements

- Substation, switchgear, transformers and transmission line to connect the facility with the national electricity grid.
- Administration, security, operations and maintenance buildings located outside the heliostat field (including staff, contractor and visitor amenities).
- Access road from the Stuart Highway.
- Perimeter fencing up to 3m high (wire mesh topped with barbed wire).

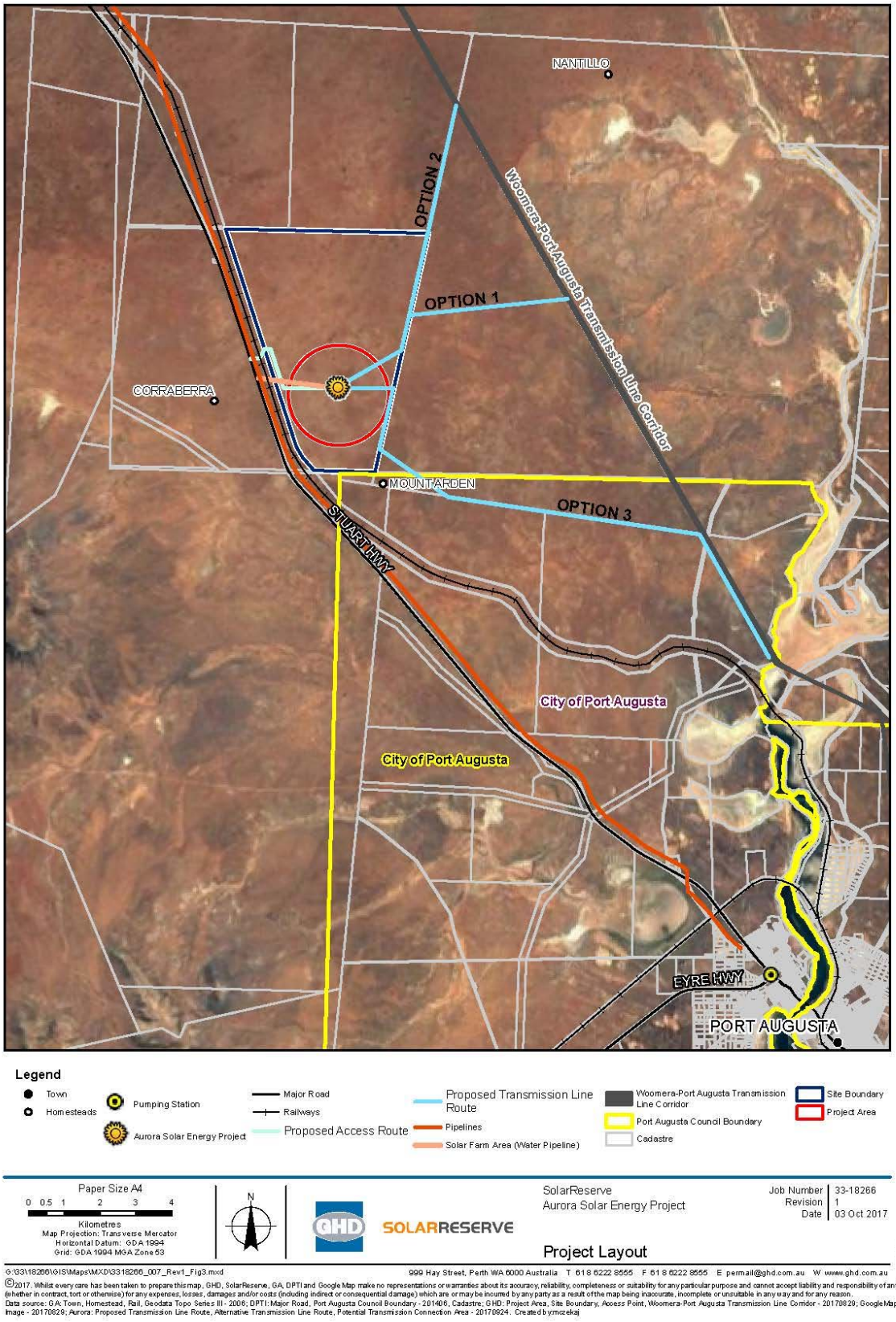


Figure 2-1 Project Concept

It should also be noted that the heliostat assembly building will be used during construction and then re-purposed for on-going operational use, including heliostat maintenance and storage of heliostat cleaning trucks.

2.1.1 Heliostat field

The proposed development predominantly consists of a field of heliostats, which are tracking mirrors that reflect sunlight (solar energy) onto a central solar receiver located within the power block.

The proposed heliostat field contains up to 13,000 heliostats, typically 96.3 m^2 in area and are individually mounted on a tilting post or pier type structure. The estimated total solar capture area will be up to 1,300,000 m^2 and will cover an approximate area of up to 800 hectares. The heliostats contain a standard glass mirror reinforced to withstand the elements. Figure 2-2 depicts an individual heliostat providing an indication of the size and mounting structure. Each heliostat is individually controlled by a sophisticated computer system to track the sun and reflect solar energy onto the receiver.

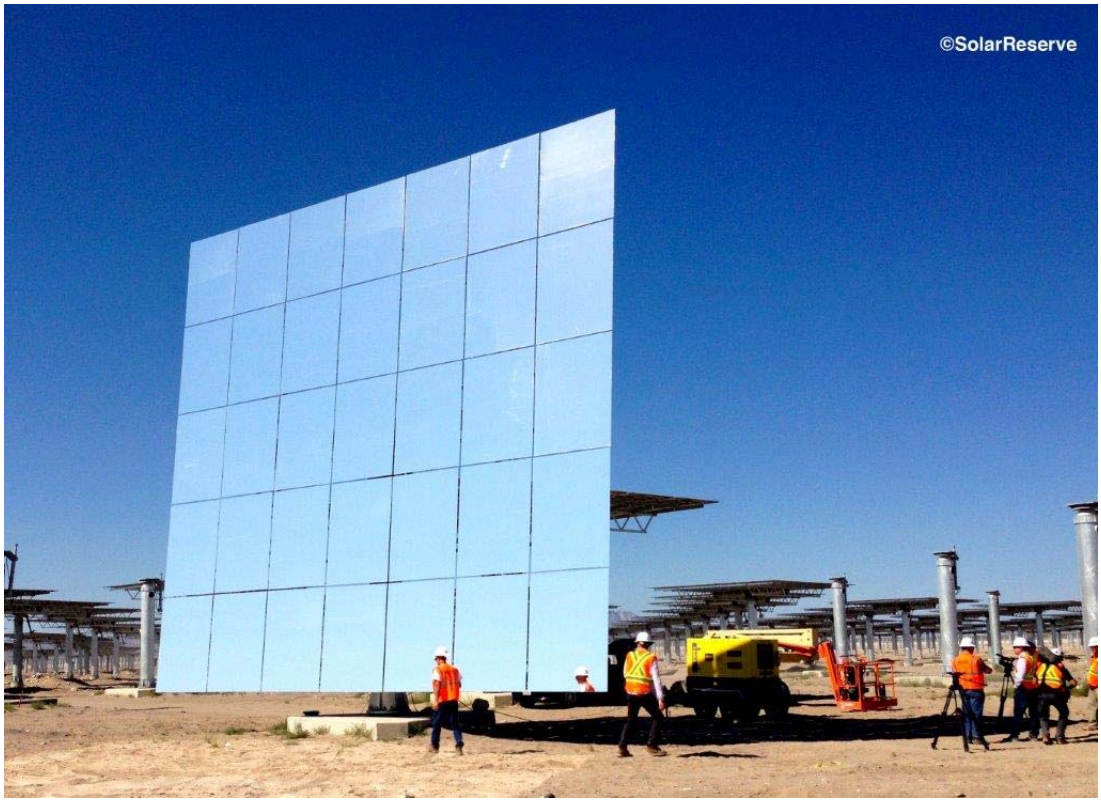


Figure 2-2 Heliostat example

Within the heliostat field, the individual heliostats are placed in concentric rings around the central receiver tower, as shown in Figure 2-3, which is a photograph of SolarReserve's Crescent Dune facility.

Figure 2-3 Heliostat field arrangement

Each heliostat is connected to two underground cables one of which controls the orientation of the heliostat and the other is for power. The cables run back to one of a number of ground mounted distribution panels that are located throughout the heliostat field and which in turn connect back to the control system in the facility's control room.

The heliostats are spaced to avoid shadowing effects from one heliostat on the next. The spacing also serves as access for the wash trucks that move throughout the field to wash the heliostat mirrors.

The land beneath the heliostats will be managed to retain low level native vegetation and minimise dust and erosion.

The specific foundation requirements for each heliostat will depend on the results of a detailed geotechnical survey which will be undertaken prior to construction. A typical foundation will be a single bore hole several meters deep and filled with steel reinforced concrete with additional above grade concreting as required.

2.1.2 Power block

Located at the centre of the heliostat field is the power block. This central area includes the solar receiver tower and related electricity generation plant, energy storage facilities and associated infrastructure required for operation of the facility. Figure 2-3 shows the layout of the Crescent Dune facility which has been used as a template for the Aurora design.

Figure 2-4 Power block arrangement

The proposed receiver tower will be up to 250 metres tall, which includes the receiver assembly and maintenance crane. The tower also houses a variety of infrastructure required to service the plant including elevators, stairway and emergency coolant vessel.

The detailed design of the tower will need to respond to site specific issues such as geotechnical conditions and therefore will require some micro-siting. Accordingly, the final location and detailed design of the tower and surrounding heliostat field will need to be determined following a detailed geotechnical survey and prior to construction.

The preferred foundation for the tower will be a reinforced concrete foundation 40 metres in diameter and 3 metres thick located 3 to 6 metres below existing grade. This would be of similar construction as the Crescent Dunes facility. Alternative foundation designs are possible but will need to be finalised following a geotechnical survey.

A number of buildings and structures will be constructed within the power block. The detailed design of these elements will need to conform to industry design and safety standards. However, it is acknowledged that any building or structure that falls within the Building Code of Australia will require building certification. SolarReserve or their contractor will engage a suitably qualified Building Certifier to assess the detailed design and obtain certification prior to construction.

Concentrated Solar Power (CSP) technology with Storage

An overview of the project's CSP technology with storage is provided in Figure 2-5. Molten salt (a mixture of sodium nitrate and potassium nitrate) is used as the means by which heat is captured, also called the heat transfer fluid (HTF). The process utilises reflected solar energy to heat the salt, which then flows through a heat exchanger to boil water, generating high temperature, high pressure steam for the steam turbine generator. The HTF also provides a mechanism for thermal energy storage which can be used to generate electricity during cloudy periods or at night time.

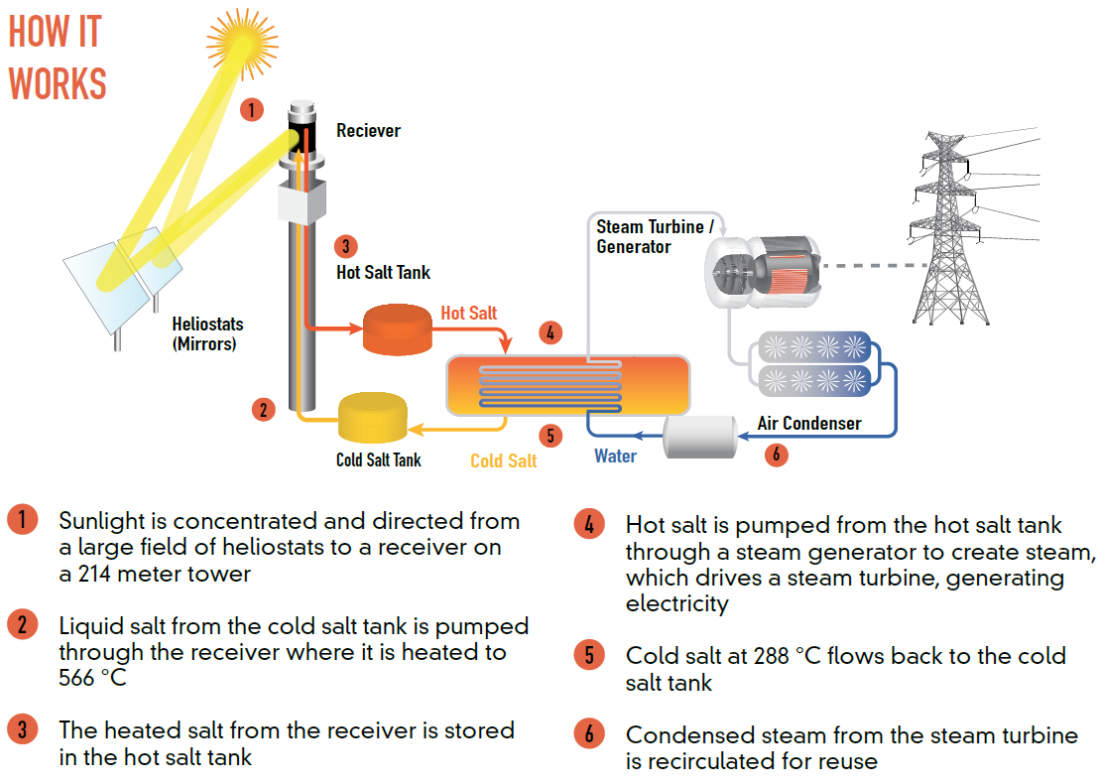


Figure 2-5 CSP Technology with Storage Operation Cycle

The HTF is stored in the 'cold' storage tank and maintained at a minimum temperature of 288°C. During the operational phase of the facility, the HTF is utilised as the energy source for the steam turbine generator. The HTF requires heating to a temperature of 566°C to produce the steam required to drive the turbine. Heating of the HTF occurs during circulation through the solar receiver. Heat exchanger tubes use concentrated solar energy to heat the HTF to the desired temperature before being transferred to the hot storage tank. Solar energy, in the form of heated HTF, is stored at the required temperature for powering the steam generator turbine. This ability to store solar energy allows the steam generator turbine to be powered solely by renewable energy 24 hours a day.

The two large tanks required to store the molten salt are approximately 15m (height) x 45m (diameter). Figure 2-6 provides an indication of the type of tanks required.

The storage tanks are assembled onsite and constructed below existing grade in a containment area capable of containing 110 per cent of the total molten salt required for the project. The foundations form part of this containment area and the detailed specifications will be dependent on results of a geotechnical survey.

Figure 2-6 Molten salt storage tank

Electricity generation

The solar energy captured by the facility is utilised as the power source for a 150MW steam turbine generator. The generator system uses steam which requires a high quality water supply.

The water supply for this project will be sourced from SA Water via a pipeline that is located adjacent the Stuart Highway. On-site reverse osmosis will also be utilised to ensure that the water is of a high enough quality to be used in the generator system.

Once processed, the water is held in the steam generation system where the HTF is circulated through an evaporator and an economiser to superheat the water. The resulting steam powers the turbine generating electricity. The HTF then returns to the cold storage tank and is maintained in a molten state awaiting reheating.

2.2 Support Infrastructure and Ancillary elements

2.2.1 Additional Buildings

In addition to the buildings and structures located within the central power block, three additional buildings will be located outside of the heliostat field and required for the on-going operation. These include:

- an administration building – this will be the base facility for support staff (approx. 50 operational staff) including office and staff amenities;
- a maintenance and storage facility – this will include storage facilities, a workshop and house site vehicles; and
- a small security/gate house building – located adjacent the main entrance this, relatively small building will have basic office facilities for security personnel.

It should also be noted that a heliostat assembly building will be required during construction and then re-purposed for on-going as the maintenance and storage facility for operational use, including heliostat maintenance and storage of heliostat cleaning trucks.

Indicative layouts are provided in Appendix C. The buildings will be constructed of colourbond (or similar material) in an olive green colour to blend with the existing landscape.

2.2.2 Electricity transmission

The project requires connection to the national grid which will take the form of a 275 kV transmission line which will either:

- Option 1 and 2 - Connect directly to an existing 275 kV transmission line that connects the Olympic Dam mine to the Davenport Substation at Port Augusta (option 1 and 2 are currently under assessment). A substation will require to be constructed at the point of connection to the 275kV transmission line; or
- Option 3 – Connect to the existing Davenport Substation at Port Augusta via a new transmission line from the project site to Yorkeys Crossing and then using existing transmission line towers with spare capacity from Yorkeys Crossing to the Davenport substation. A substation does not require construction for this option.

Both options utilise existing infrastructure in order to minimise impacts. However, further assessment is required to determine the most suitable option. This process has commenced but has not been finalised.

Figure 2-7 identifies the three transmission connection options.

Any new sections of transmission line will need to be designed to industry standards for a 275kV line. This is likely to include steel monopoles or lattice structures, up to 60m in height, with a distance between towers of around 500– 600 metres. The detailed design of this line will need to respond to site specific issues including cultural heritage, native vegetation and geotechnical conditions and therefore will require some micro-siting.

Accordingly, the final detailed design of the towers and routing of the transmission will be determined prior to construction.

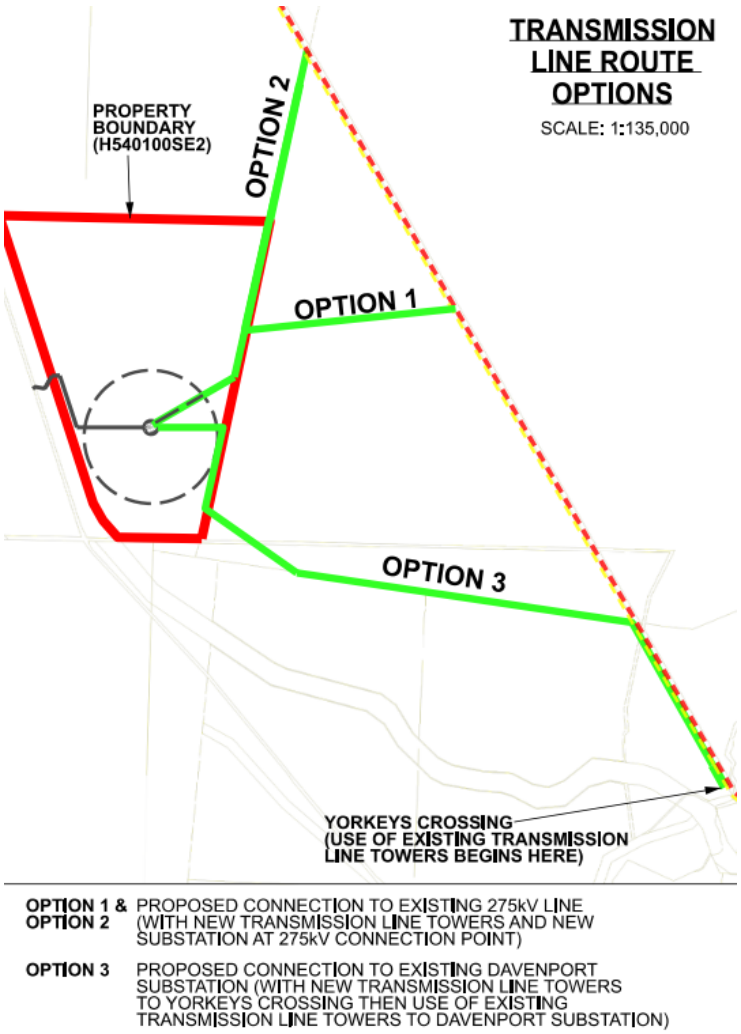


Figure 2-7 Transmission Route Options

2.2.3 Site access

The site is serviced by a major national highway (Stuart Highway) and existing traffic volumes are low in comparison to the capacity of the road. However, it is anticipated that the construction of auxillary lanes in both directions will allow for safe access to the site and allow other traffic to pass unhindered.

Access from the Stuart Highway to the site and central power block will consist of a paved asphalt able to accommodate two-way traffic with a width of 7.0 metres and minimum 1.2 metre graded shoulders.

SolarReserve acknowledge that site access will also involve crossing a railway line and a mains water pipeline. Detailed plans of auxiliary lanes and infrastructure crossings will need to be developed in consultation with DPTI and SA Water to ensure appropriate design and any assets are protected from traffic impacts, particularly during construction. Should this project receive approval, then a condition that addresses this matter is anticipated.

Internal access

The central power block will be surrounded by an asphalt ring road and all roads within the central power block will be paved with asphalt. Concrete ramps will be constructed within the power block to provide access into the molten salt tank containment area.

In addition, a 6.0 metre graded and compacted perimeter ring road will encircle the outer boundary of the heliostat field, while unpaved roadways within the heliostat field will provide access for cleaning of the heliostats.

Unpaved roads will be designed as all-weather roads able to manage stormwater for in a 1 in 5 event, including appropriate swales. It is assumed that when heavy rainfall events occur, some level of localised erosion may occur. This will be managed by implementing localised land rehabilitation and stabilisation techniques as part of the on-going operational management regime.

All site access and internal access roads will be designed to appropriate Australian Standards.

2.2.4 Water and stormwater

Water supply and usage

The Aurora project will source all of its water requirements from SA Water. A potable water main runs parallel to and on the eastern side of the Stuart Highway. The project is estimated to use 250 megalitres per year of potable water for the following purposes:

- water for the steam turbine generation system,
- water cleaning the heliostat mirrors, and
- support infrastructure and ancillary services including toilets, showers, kitchens and sinks, along with fire protection flows and service water.

The project has been designed to achieve a high level of water efficiency. The project will consume 1/3 of the water usage compared to SolarReserve's flagship 110MW Crescent Dunes solar thermal energy facility in Nevada, USA.

Water will be taken from the main and stored in a tank. This tank will be sized to supply the operation water requirements as well as reserve store for fire protection water.

Water treatment

The SA Water potable water supply can generally be classified as fresh water as it has total dissolved solids (TDS) less than 1000 mg/L. The average TDS concentration in the SA Water supply at the proposed network connection point is approximately 225 mg/L. However, on-site reverse osmosis and demineralization will be required to ensure that the water supply is of a sufficiently high quality to be used in the steam turbine generation system and to clean the high precision heliostat mirrors. The reverse osmosis and demineralization process will result in waste water discharge which will be directed to evaporation ponds

Chemicals will also be added: (i) during the water treatment process, and (ii) to the water used in the steam turbine generation system for purposes such as pH, scale and corrosion control. The indicative chemical additives at SolarReserve's Crescent Dunes facility is shown below. The Aurora project will have significantly less chemical additives given the project will use 1/3 the water usage compared to Crescent Dunes.

Table 2 Indicative Chemical Additives

Indicative chemical additives at Crescent Dunes Facility	kg/day
Sulfuric Acid	313
Cooling Tower Corrosion Inhibitor	2
Cooling Tower Dispersant	4
Cooling Tower Non-Ox Biocide	0.5
Cooling Tower Oxidizing Biocide 1	81
Boiler Phosphate	4
BFW Amine	1
MgO (Mag Oxide)	553
Caustic as NaOH	398
Flocculent	1
Hydrated Aluminum Sulfate	13
RO Chlorine Scavenger	2
RO Anti-Scalant	4
Total	**1386**

Waste water discharge

The waste water from the project is predominately from the following sources:

- Water supply treatment (reject water from the reverse osmosis and demineralization process), and
- Steam turbine generation system blowdown water (water drained from the system to remove accumulated impurities that build up over time).

The indicative wastewater discharge at SolarReserve's Crescent Dunes facility is 240 ML/year. The Aurora project will have significantly less waste water discharge given the project will use 1/3 the water usage compared to Crescent Dunes.

As per the Crescent Dunes facility, the Aurora project will discharge waste water to on-site evaporation ponds where the water will be retained to evaporate, leaving solid waste constituents behind, which will be collected and disposed of at an appropriately licensed land fill facility.

An estimate of the evaporation pond residue at SolarReserve's Crescent Dunes facility is shown in the table below. The Aurora project will have significantly less residue given: (i) the project uses 1/3 the water usage compared to Crescent Dunes, and (ii) the SA Water potable water supply has lower levels of impurities (225 mg/L TDS) compared to the Crescent Dunes ground water supply (727 mg/L TDS). Moreover, the chemical makeup of the evaporation pond residue will vary due to differences in the chemistry of the water supply between both sites.

Table 3 Indicative Evaporation Pond Residue

Indicative evaporation pond residue at Crescent Dunes Facility	tonnes/year
Calcium	27
Magnesium	10
Potassium	24
Sodium	434
Chloride	70
Fluoride	3
Silica (Dissolved)	23
Sulfate	890
Total	**1482**

Evaporation Pond

The usage of evaporation ponds ensures that no waste water is discharged into the environment. SolarReserve's Crescent Dunes facility employs a system of three evaporation ponds totalling 21 ha as shown in the aerial photograph below. Given the project has 1/3 the water usage of Crescent Dunes, the total area of evaporation is likely to be 1/3 the size, or approximately 7 ha. However, the specific size of the evaporation ponds will need to be designed to suit the local evaporation rate.

The pond will be divided into three separate sections to allow each pond area to be taken off-line for maintenance. Wastewater will be retained in the pond to evaporate, leaving solid waste constituents behind, where they are collected and appropriately disposed to a licenced landfill facility. The pond will be designed to contain all the anticipated solid waste over the entire 30-year project life.

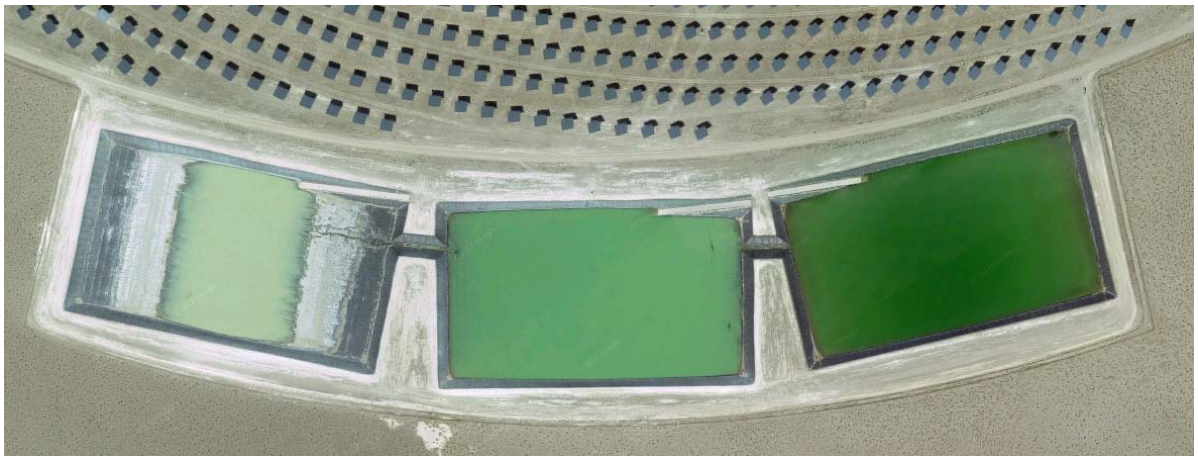


Figure 2-8 Crescent Dunes Evaporation Ponds

An indicative evaporation pond design based on SolarReserve's Crescent Dunes facility is contained within Appendix C. The evaporation pond design consists of:

- average design depth of 2.7 m which incorporates:
  - 0.9 m of sludge build-up over the entire project life;
  - 0.9 m of operational depth; and
  - 600 mm of freeboard.
- Double lined pond with:
  - A primary high density polyethylene (HDPE) liner;
  - A leak detection, collection and recovery system (LCRS) comprising a geonet, collection sump and piping;
  - A secondary HDPE liner; and
  - A compacted base; and
  - A ramp to provide access for equipment and maintenance.

The evaporation pond will designed in accordance with relevant Australian Standards and to comply with the South Australia Environmental Protection Agency's *Wastewater Lagoon Construction Guidelines* Issued November 2014.

The project will include a wastewater and evaporation pond management plan that will address the following:

- waste water quality sampling to document constituent concentrations;
- evaporation pond liner inspections;
- evaporation pond leak detection monitoring using the leak detection system; and
- evaporation sludge inspection and removal to a licence landfill.

This facility is not intended to collect surface stormwater, except potentially contaminated water from the power block.

Stormwater

Consideration has been given to the low rainfall levels (including the potential impact of isolated heavy storms), flat topography with limited natural drainage patterns on this site and the nature of the development. In this context, the stormwater management requirements for the majority of the site are not onerous and can be addressed through well planned site works to ensure that stormwater is retained on the project site.

Site works will incorporate a stormwater management system based on a series of shallow swales. The outer perimeter of the project site will have a perimeter cut-off drain that will divert the upstream catchment runoff away from the project site.

Within the project area, internal drains or swales will be incorporated into the access layout to capture and retain stormwater within the site. The design of all-weather access tracks that incorporate a side drain will be sufficient for this low rainfall area. This will assist with minimising washout around structure footings and access tracks. The swales will be sized to accommodate a 1 in 5 year event (which is the standard requirement for stormwater management).

It is anticipated that occasional isolated storms may result in localised and temporary flooding within the site area. Graded swales will accommodate much of this water with temporary isolated flooding of some parts of the array areas. In most cases, post storm event management will require minor repairs to address localised erosion.

This approach recognises a trade-off between over engineering the stormwater management system (which will result in significant earthworks) and a land management approach that deals with isolated storm impacts on a case by case basis.

In relation to operation aspects of the development, the stormwater associated with the central power block will be separately captured and treated before being directed to the evaporation pond. Stormwater management within the power block will be addressed in the following:

- Clean stormwater (e.g. from roof area and sealed pavement areas) will be collected and diverted to lined swales;
- Areas where stormwater has the potential to be contaminated (e.g. bunded areas, vehicle parking areas) will be collected, treated and then discharged to the evaporation pond.

Micro design may be required to manage localised impacts associated with cleaning (e.g. placement of loose rubble under minor drip lines to lessen the impact of splatter damage to ground surface). However, this will form part of an on-going monitoring system which will aim to monitor impacts and identify solutions to prevent erosion.

The detailed design for the stormwater management system will need to be undertaken once the detailed geotechnical investigations confirm the exact location of the power block and heliostat field. SolarReserve acknowledge that the preparation of this stormwater management plan is likely to be required as a condition, should the project receive approval.

2.2.5 Fire and Bushfire Protection

The proposed development will be fitted with fire protection services and equipment including a backup diesel generator. This equipment is predominantly located within the central power block area and in association with the main administration/maintenance and gate security buildings. Fire protection for the heliostats is of a lower priority.

The main water storage tank will be sized to include storage for firefighting. This tank will always hold a minimum volume of water for this purpose. A number of vehicles will be fitted with firefighting equipment to assist with fire and bushfire incidents.

In relation to bushfire protection, the development will incorporate a cleared perimeter in association with the permitter access road and security fence line. As recommended by the NRM Strategy, land management techniques will also aim to minimise risk by maintaining native vegetation cover and minimising exotic species and the vegetation level below the heliostats will be managed.

An alternative emergency exit route will be established with the transmission line which will link to an existing established track route that enables access to the Stuart Highway via the Mount Arden homestead site. This is in addition to the main western access road.

The operational procedures for the development will include appropriate fire and bushfire management procedures that include communication protocols.

2.3 On-going management and maintenance

The facility will be staffed 24 hours per day. Routine maintenance will be conducted on an ongoing basis including the heliostat cleaning. Scheduled maintenance will be conducted periodically according to asset management plans and a major maintenance is scheduled every 3-4 years. Additional site infrastructure that will be required for the ongoing management and maintenance of the facility include:

- Cleaning machinery facilities – including a purpose built heliostat cleaning trucks (refer Figure 2-8)

- Wastewater – the administrative, operations and maintenance areas will be equipped with kitchen, toilet and showering facilities. These facilities will be connected to septic tanks and leach fields. Contractors will be employed to clean and dispose of waste from septic tanks.
- Chemical storage – All chemicals will be stored within the power block area in accordance with regulatory requirements including within bunded areas.
- Fuel Store – diesel will be stored in two 12 m^3 fuel tanks. One will provide emergency generator backup to allow control of the heliostat field. The other will support separate generators for firefighting purposes.

Figure 2-9 Example of cleaning

In addition to these facilities, appropriate on-going management and monitoring plans will be established for the post construction phase to address key issues such as:

- Wastewater and Evaporation Pond Management
- Stormwater Management
- Vegetation and land management (including soil erosion)
- Cultural Heritage Management
- Bushfire preparation and response

2.4 Construction and decommissioning

2.4.1 Construction phase

SolarReserve view the existing flat topography of the proposed site as beneficial to the preparation work required for development. Existing topography is to be retained where possible, however grading to establish uniform surfaces of structurally competent soil appropriate for foundations will be required. Grading will also be required to create the stormwater management system.

Soil not suitable for structural fill will be stockpiled on site for other related construction requirements including bunding and swales.

Significant vegetation clearance (detailed description Section 4.2) will be required prior to commencement of construction. The construction phase will be undertaken in accord with a site specific Construction Environment Management Plan (CEMP). A draft CEMP outline is contained in Appendix D. The successful construction contractor will be required to prepare the site specific CEMP for the project.

Heat Transfer Fluid (HTF) heating kiln

The HTF is prepared onsite using a gas powered heating kiln. The required salt is delivered in a crystal form and heated until it reaches it's molten state at approximately 220°C which is the required temperature for storage. As the HTF system is a sealed system and there is no requirement for HTF replenishment, the kiln will be removed from site following the completion of construction and the site rehabilitated in accordance with the final CEMP.

Heliostat assembly building

Due to the number and size of the heliostats required for the project, a 7,500 m^2 building is proposed to house the onsite assembly. This structure will be retained post construction and re-purposed for on-going operational use, including heliostat maintenance and storage of heliostat cleaning trucks.

Construction facilities

A substantial construction facility will be required to support the proposed development, the details of which will be determined by the successful construction contractor. Figure 2-10 provides an indication of this facility which is likely to include transportable office buildings, ablutions, lunchrooms, parking etc, suitable for a workforce of up to 1,000 people.

This area also includes equipment laydown and materials storages areas.

Figure 2-10 Example of construction facilities

2.4.2 Decommissioning Phase

The project has a conservative lifespan of approximately 30 years, but with maintenance it is expected to operate for a much longer period.

In the event that the facility is not re-powered, decommissioning will involve the removal of all above ground infrastructure. Below ground infrastructure will be terminated to ensure that nothing remains exposed. Revegetation will be encouraged by addressing any critical areas of erosion with stabilisation, replanting and fencing. The property will then be returned to pastoral land.

3. Community and Stakeholder Consultation

SolarReserve has developed a community and stakeholder consultation plan based on a commitment to best practice engagement. This has been developed with the support of Repower Port Augusta to help identify key stakeholders and ensure that the plan is in line with what the community expects for a project of this scale.

The selection of the development site has been influenced by the strong community led push for CSP development. SolarReserve's approach to this project builds on this community support to ensure an outcome that is mutually beneficial.

The community group Repower Port Augusta was formed in 2012 following the release of a report by Beyond Zero Emissions and numerous forums about the potential for solar thermal with storage to replace the existing Port Augusta coal-fired power stations. Since then it has grown into an alliance that includes the Port Augusta City Council, Business Port Augusta, unions, environmental groups, and health organisations. The alliance has provided an avenue for the community to advocate for CSP through a local community vote which saw over 4,000 people participate and over 98% of them vote to replace the Northern coal power station with solar thermal generation, rather than natural gas. The Walk for Solar campaign included engagement with State Government Select Enquiries, petitioning the coal station owner Alinta Energy during their ongoing solar thermal feasibility study, numerous public forums, politician engagement, and significant media coverage of the 328 km walk from Port Augusta to Adelaide. The ongoing community support for CSP has made Port Augusta a prime location for developing Aurora.

SolarReserve has engaged extensively with Repower Port Augusta during the development of Aurora and understands from these discussions that community support for CSP in Port Augusta has been driven by:

- The opportunity for local job creation, especially with the closure of the existing coal-fired power stations in 2016;
- The opportunity for clean power generation without the associated health impacts of burning coal;
- The development of a climate change solution that brings tangible benefits to the local community;
- CSP with storage's ability to provide clean power day and night, on demand.

SolarReserve has maintained sound relationships with this group over an extended period.

In addition to the community based consultation, SolarReserve have also engaged with a wide selection of other interested parties including elected representatives, community leaders and key individuals. Several parties have provided letters of support for this project.

Next Steps

SolarReserve planned a "drop-in" information day on the 21st September in Port August prior to the statutory public notification period for the Development Application. This information day aims to inform the community of the progress of the project, provide clear next steps information in relation to the development assessment process and the opportunity for public review and comment.

Further discussions will also be held with stakeholders that have a direct interest in the subject land, infrastructure assets that may be affected by the project and licencing authorities; including:

- Barngarla Aboriginal Corporation (cultural heritage management and Native Title where relevant);
- Involved pastoralists;
- Crown Lands;
- Port Augusta Council;
- Department of Planning Infrastructure and Transport (road and rail);
- Environment Protection Authority;
- Native Vegetation Council;
- CASA and Defence (aviation);
- BHP; and
- SA Water.

4. Locality and site context

4.1 Locality

The site for the proposed development is located in the Out of Council Areas (Flinders Ranges) region. It is also within the SA Arid Lands Natural Resource Management Area, which covers over half of the State.

Environment and Climate

In this locality, summer temperatures can range up to 36-39 degrees C but can reach as high as 50ºC with winter temperatures dropping to 18-24ºC but which can drop to below zero in some areas. The region's environmental processes are determined by irregular rainfall and other episodic weather events and has some of the most intact natural ecosystems and natural biodiversity in the state.

The site is located within the Gawler bioregion which features calcrete plains and gypsum dune-fields and ranges which drain into terminal salt lakes. Vegetation cover is critical to protecting soil from erosion cause by episodic, irregular and extreme boom and bust periods. While introduced ground cover species have been used to stabilise soils, native species are considered more appropriate in this region to manage fuel loads and minimise the impact of bushfires.

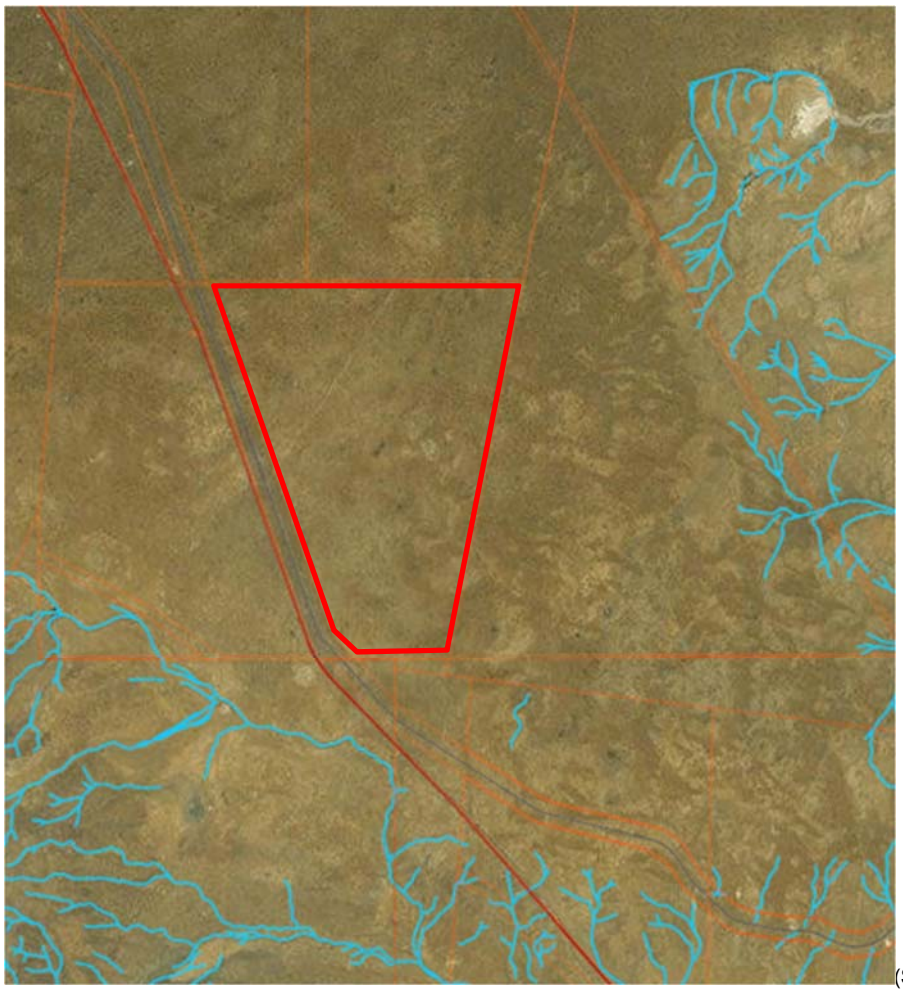
As previously indicated, this is a semi-arid location with a very low rainfall. The mean annual rainfall is less than 220 mm per year. The area has relatively few days of rainfall where the mean rainfall days (rain ≥ 1 mm) is only 34 days in a year. Nevertheless, while the annual rainfall is low, the area does experience isolated high rainfall events (particularly in summer) that can lead to short duration flooding.

There are no identified natural watercourses within the project site which indicates that there are limited natural flows of stormwater across the site. Figure 4-1 shows the project site in the context of surrounding drainage systems. To the east of the project site are low lying intermittent drainage lines and water surface ponds, which feed into low lying areas at the top of Spencer Gulf. There are also intermittent watercourses to the north and south of the project site, which have distinct channels through the landscape. These appear to skirt the project site. A small remnant salt lake appears to be located on the site but this is no longer fed by a catchment.

Land Use Activity

Located north of Goyder's Line, land uses in the locality are generally focused on grazing, mining and conservation. The region is home to a number of Aboriginal communities as well as outback homesteads. Lease holdings tend to be large scale and population levels are low and geographically dispersed. Farming practices in the region rely on the grazing of stock on large properties that result in low population numbers in areas of large expanse. The pastoral leaseholds held by graziers are historically large allotments, where changing markets and farming practices have resulted in graziers seeking to diversify operations.

A desk top evaluation of cultural heritage has been undertaken to determine potential impacts. No European heritage was identified, but there are sufficient indicators to suggest that Aboriginal heritage is likely to exist. Additional information is provided in the following Chapter.



(Source: Location SA)

Figure 4-1 Drainage lines

The nearest occupied dwelling is a homestead located 1.8km to the south-west of the site, on the western side of the Stuart Highway. Another homestead is located approximately 3km to the south of the pastoral lease boundary and is used as a property maintenance base. It is not permanently occupied.

The Stuart Highway is a major transport and tourist route being the main highway source of transport for northern regional communities as well as the main access route for tourist destinations such as the Cooper Pedy, Simpson Desert, Alice Springs and the Uluru and Kata Tjuta National Park.

The closest and most significant settlement is the regional centre of Port Augusta that has recently seen the closure of the Northern Power Station, a coal fired power station and large regional employer. Since then a number of renewable energy projects have received approval and a number of additional projects are being planned, including:

- SunDrop Farms : Solar Thermal Facility, Princess Highway, Port Augusta;
- DP Energy: Port Augusta Renewable Energy Park (wind & solar), Princess Highway, Port Paterson;
- Bungala Solar Project, Yorkeys Crossing;
- Lincoln Gap Wind Farm, Eyre Highway South west of Port Augusta.

4.2 Site features

The selection of a suitable site for the Aurora Solar Energy Project required the consideration of key site attributes. These attributes include adequate availability of solar resourcing measured as Direct Normal Irradiance (DNI). DNI is a representation of the kWh's per square metre that the ground surface of the subject site receives. Therefore, a higher DNI measured at a location represents a higher suitability of a site for harvesting solar energy.

The locality offers large flat expanses, which is important to the construction of a large-scale CSP facility. The heliostats need to be carefully sited and constructed to ensure that they can accurately 'focus' on the tower. For this reason a flat site is important to minimise earthworks which reduces cost as well as reduces impact on native vegetation. The proximity to a major connection point to the national grid reduces development costs and minimises the Marginal Loss Factor (MLF) for electricity transmission into the grid. SolarReserve also considers the site to be desirable due to the availability of water, transport access and proximity to Port Augusta as a source of construction and operation personnel.

Solar resource

A key decision factor for SolarReserve in relation to site selection is the available solar resource. The subject site is estimated to have a DNI of 2,460 kWh/m^2 as shown on Figure 4-3 below. This figure is indicative of the area as being a prime location for the harvesting of solar energy to generate electricity.

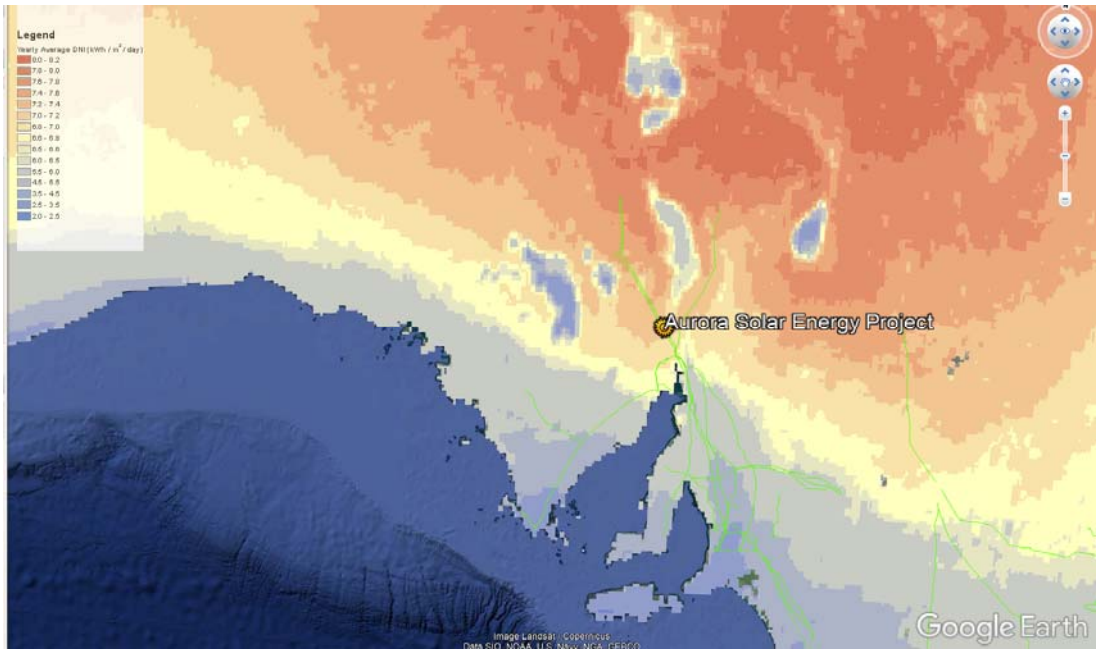


Figure 4-2 Solar resource indicator

Topography

Preliminary assessment of topography and a geotechnical assessment have been undertaken. The parcel of land within which the facility is located, contains a relatively significant depression. This depression has a level difference of up to 10 m as indicated on the Figure below. Early investigations suggest that this depression may be a small, old salt lake that no longer has a catchment.

Figure 4-3 Site Topography

Vegetation

The proposed site, and surrounds, is vegetated with native scrub (Figure 4-4). The vegetation varies from a variety of low-lying native grasses and bushes to various sized native trees. The site is within the Hesso environmental association (Interim Biogeographical Regionalisation of Australia) which is described as having various low open woodland, tall shrubland and chenopod shrubland of various associations. Most of the vegetation cover in this association is remnant native vegetation, although weeds species can be prominent.

Figure 4-4 View of site from current main entrance

Site specific vegetation assessment has been undertaken and the results are addressed in the following chapter.

Existing Infrastructure

The site is accessible by road from the Stuart Highway (Figure 4-5 Left) and rail (Figure 4-5 Right). Proximity to major transport infrastructure is considered important for transportation of materials and infrastructure during the construction phase. It also provides important accessibility for maintenance purposes during operation.

Figure 4-5 Site access

An existing privately owned 275 kV transmission line is situated approximately 4 kms from the proposed Aurora site (Figure 4-6 Left). SolarReserve are working with the owner of this line, BHP, to identify the whether this line can be used to connect to the Davenport Substation in Port Augusta. The proximity to such infrastructure provides the project an opportunity for connection to the national electricity grid.

An alternative option is a new transmission line connection to the Davenport Substation at Port Augusta using the existing transmission line towers from Yorkeys Crossing.

A potable water pipeline is also located along the boundary of the proposed site (Figure 4-6 Right). Discussions with SA Water indicate that the pipeline has sufficient capacity to supply the potable water requirements for the site. SolarReserve are progressing a connection agreement with SA Water which has been confirmed by SA Water in a letter dated 12 September 2017 (included in Appendix B).

Figure 4-6 Existing transmission line and water pipeline

It is not proposed to use ground or surface water sources at this this stage.

4.3 Policy context

The Far North Region Plan (July 2010) is the strategic planning document of relevance to the proposed site and provides more up-to-date information on development priorities. Key issues for this region relate to environmental and cultural assets, mineral resources, defence and aerospace and tourism. The Plan makes only limited specific references to renewable energy types however, there is recognition of the need to "introduce sustainable and innovative approaches to securing water and energy supplies" (p16). Given that the Plan is seven years old and the recent pace of change in the renewable energy sector, it is likely that the type of project proposed would not have been anticipated when the Plan was prepared.

However, the Plan does acknowledge the need for electricity infrastructure up-grades including augmentation of energy supplies to support Olympic Dam. The proposed development has the potential to support this aim.

The strategy identifies the location of important assets such as water ecosystems & resources, biodiversity areas, defence and Aboriginal lands. Protection of the Region's cultural and environmental assets are key principals which underpin the cultural identity and tourism values of the Region. The importance of scenic landscapes, particularly the Flinders ranges are highlighted. The proposed development does not conflict with the protection of these assets and values.

The principles relating to economic development tend to focus on the role of existing sectors (such as tourism, defence and mining) in the Region. The proposed development will not conflict with these activities and may have a minor 'tourism' role as a place of interest.

The proposed project also has strategic alignment with the following aspects of the South Australian Strategic Plan (SASP):

- *"We have a skilled sustainable workforce"* - aligns with the proposal, seeking to utilise the existing skills within the Port Augusta workforce. Following the closure of the Port Augusta Power Station, a proposal such as this addresses unemployment of skilled workers in the community (SASP Target 49) and subsequently supports regional population levels (SASP Target 46).
- *"South Australia plans and delivers the right infrastructure"* - this proposal is the result of the State Government soliciting proposals for sustainable energy production to satisfy state electricity needs. This proposal addresses climate change through the application of renewable energy technology. Stable electricity production is delivered to the grid through the implementation of innovative energy storage capabilities.
- "South Australians think globally, act locally and are international leaders in addressing climate change" - securing grid stability with reliable, renewable energy infrastructure addresses the State Governments targets of lowering carbon emissions and ensuring the state has stable access to electricity.

In general terms, the proposed development does not undermine key strategic regional assets or industry sectors. Furthermore, it has the potential to make a significant contribution to the Region's economic outlook and state wide energy policy.

4.4 Development Plan Policy

The "Land Not Within a Council Area (Flinders) Development Plan is the relevant document providing planning policy direction for development. This is a substantial area that extends from the Port Augusta area well into the far north of the state covering the full extent of the "Flinders Ranges" and a substantial hinterland. While plan clearly defines environmental and landscape

values, particularly in relation to the Flinders Ranges, the policy in the plan is relatively generic for other areas and locations.

The regional section of the Development Plan highlights the state and national significance of the Flinders Ranges identifying the value of this “spectacular landscape” and its “outstanding natural beauty” for both tourism and conservation reasons. To this end the Development Plan identifies two areas of conservation significance (Class A & B). Highlighting the importance of conservation and landscape protection in these areas.

The site of the proposed development is not located within either of these areas, but is identified as pastoral land. In addition, the site is located adjacent a designated Primary Road (Fig LNWCA(F)/1).

While most of the policy relates to urban forms of development in urban locations and settlements, there is some policy direction for more ‘rural’ locations. The Objectives under the “conservation” heading highlight that conservation of the scenic value of the Flinders Ranges in the most critical areas (i.e. Class A and B) is paramount. However, it is also acknowledged that other areas are suitable for other forms of land use, particularly agricultural and pastoral uses whilst still emphasising the preservation of the rural character.

The Council Wide Objectives of the Development Plan seek the development of renewable energy infrastructure in areas most suitable to the harvesting of natural resources for the efficient generation of electricity (Obj 18, 19 and 20). While wind farm infrastructure is specifically mentioned, this is considered reflective of the rapid pace of changing technology rather than a preference for only wind farm infrastructure.

Council Wide Principles of Development Control (PDC’s) indicate that renewable energy facilities should be located in areas to maximise efficient generation and supply of electricity.

The proposed site is within the Pastoral Zone where wind farm infrastructure is specifically identified as a form of envisaged development. In essence, this is an indication that renewable infrastructure and its impacts are generally considered acceptable within the Zone. It is noted that highly sensitive landscape zones do not make the same provision for renewable infrastructure. The site is not located in a landscape zone.

More specifically, in relation to wind farms, it is stated that “the large scale of these facilities (in terms of both height and spread of components), renders it difficult to mitigate the visual impacts of wind farms to the degree expected of other types of development. Subject to implementation of management techniques these visual impacts are to be accepted in pursuit of benefits derived from increased generation of renewable energy”. The policy within the zone also recognises that this infrastructure may be visible from scenic routes and areas and may be located closer to roads.

While the proposed development is not a wind farm, elements of the project reflect the same issues including the need to locate relative to the resource and technical siting requirements, a form of infrastructure that is difficult to address in terms of visual impact, and pursuit of renewable energy.

In the context of the above discussion, the proposed development is considered a suitable land use for the proposed location.

In terms of the more detailed site impacts, a number of issues are identified by Development Plan policy that point to the various management techniques that should be employed to address such impacts, including:

- Impact on scenic qualities;
- Safe access to and from main roads;

- Address the safety of air transport;
- Management of erosion and surface hydrology;
- Design and layout to address bushfire risk;
- Use of landscaping to address amenity issues;
- Buildings associated with public utilities to be unobtrusive and landscaped;
- Electricity transmission routes to have minimal adverse environmental impact;
- Preservation of native vegetation and roadside vegetation; and
- Considered and balanced approach to native vegetation removal.

5. Impact assessment and management

Addressing impacts and identification of management strategies is core to the development assessment process. The following Chapter includes a review of the key impact considerations, potential issues and proposed management responses.

A number of specialist studies have been undertaken to address a range of issues. Some of these studies are of direct relevance to the development assessment process. However, some of the studies relate to matters addressed by other legislation but have been included to provide context and transparency.

These specialist studies are contained in the Addendum package which includes:

- Landscape and Visual Impact Assessment;
- Flora and Fauna Assessment;
- Traffic Impact Assessment;
- Aviation Impact Assessment; and
- Cultural Heritage Assessment.

5.1 Key Considerations

Nature of the Project

While the project is very large in scale and represents a reasonably significant construction exercise, overall the on-going potential impact issues are limited.

The project will not generate air emissions and while some noise is generated by the steam generator, the levels are not able to be detected beyond the perimeter of the site.

The project will employ approximately 50 full time staff (in shifts) which represents a very minor traffic impact on the Stuart Highway. While the construction phase will generate significant volumes of traffic and heavy vehicles, they will not be ‘oversized’ vehicles as is the case for wind farm projects.

The most significant on-going impact will be the visual impact, particularly the tower.

There will be an impact on native vegetation, particularly during construction, although micro-siting and post-construction rehabilitation will reduce the on-going impact.

The project will also generate a relatively small quantity of waste water which will be managed using an evaporation pond.

Nature of the Locality

The site is located in a semi-arid location with a very low rainfall but which is also subject to isolated high rainfall events (particularly in summer) that can lead to short duration flooding. This combined with vegetation clearance means erosion management is an important issue.

It is noted that that the native vegetation in the northern half of the site is of the highest quality with a significant environmental benefit condition rating of 8:1.

There is also a notable depression on this site which represents a construction constraint but is also associated with high quality native vegetation. This, combined with the potential for Aboriginal cultural heritage means that it was considered prudent to shift the site further to the south. However, it is noted that this will result in the loss of two trees that contain Wedge-tailed Eagle nests.

This site should also consider the potential for bushfire to impact on the development. Appropriate management systems and infrastructure needs to be included.

5.2 Potential Issues

Based on the above the following section addresses the potential impact issues of direct relevance to this project under key headings. Consideration has been given to a range of impact issues including issues identified by Development Plan policy.

The specialist studies have also identified potential impacts and included recommendations for avoidance, mitigation or management.

5.2.1 Landscape and Visual Amenity

This region is highly valued at the State and National level for its stunning landscapes. This is particularly the case for the Flinders Ranges. However, the proposed site is sufficiently removed from these key landscape sites that it will not have a detrimental impact.

Within the locality, the project will result in an impact to the landscape by introducing the tower and land coverage by the heliostats.

At the site level, the construction facilities, the security building and the main administration/maintenance building have been located on the Stuart Highway side of the site which helps to reduce the vegetation clearance required for an access road. These buildings will be located approximately 160 m from the highway and constructed in an olive green colourbond (or similar material). These buildings will be visible from the highway.

Light Impacts

A detailed assessment of glint and glare was undertaken for Crescent Dunes in order to determine whether there were likely to be health or distraction issues associated with the project. A copy of this report is contained in Appendix E of this package. It is important to note that some aspects need to be reversed for a southern hemisphere location.

Light impacts have also been considered in the visual impact assessment.

Glint is a momentary flash of light, whereas glare is a continuous source of brightness relative to ambient lighting. The difference between glint and glare is temporal. Glint is more likely to be associated with glimpses of the heliostats where are glare is more likely to be associated with the tower.

Illuminance is a measure of light intensity as perceived by the human eye with every wavelength weighted differently (according to the human eye's sensitivity), while irradiance is a measure of the physical energy with all the wavelengths weighted equally. In the discussion of visual impact (pertaining to the human visual system), illuminance is typically the metric used.

With respect to energy collection and potential hazard assessment, irradiance is used.

While the intensity of the source does not change, the irradiance or thermal flux is less the further it is away from the source as the total radiation is distributed over a larger area.

The issue of light impacts has been identified as a potential issue, particularly as this aspect is less well understood. Due to it's very nature, the project will generate light impacts from two main sources:

- The receiving tower;
- The heliostats.

Receiving Tower

The receiver surface of the tower is not continuously flat, but actually consists of many metal tubes coated with a speciality matte textured black finish (rather than a smooth shinny finish). This coating is designed to increase heat transfer which means that maximum light is scattered and absorbed rather than reflected from the receiver.

The light emitted from the tower will be visible from some distance as is experienced by the Sun drop farms development which is a much smaller scale example of this type of development.

In the Crescent Dunes example, the closest viewing point is 1.2 km from the tower. The investigations for Crescent Dunes found that at this distance the glare from the receiver will not cause potential eye damage, and is unlikely to leave an after-image in the retina. Figure 5-1 provides a representation of the 'glow' of the Crescent Dunes tower.

Figure 5-1 Crescent Dunes Tower

A calculation has been undertaken for the Aurora project to determine the likely level of glare (refer Landscape and Visual Impact Report – Section 8.3). In this case the, the closest viewing point from the road will be approximately 2.2 km from the tower, at which will point the luminance level will be similar to a 60W incandescent light bulb from a distance of 0.51 metres.

As another form of relative comparison, the luminance for an observer on the road (2.2 km from the tower) will be approximately 264 Lux. Australian and New Zealand standards for office lighting is 320 Lux.

Furthermore, this light source will not result in unintended driver distraction as the tower will be visible from some distance (i.e. it will not 'appear' as a surprise) and will not 'blind' drivers if they happen to look at the tower.

Heliostats

The heliostats are arranged to 'face' the tower, which means that they present their backs (or undersides) to the external perimeter. The heliostats that might present a reflection at ground level will be those located on the opposite side of the viewing point. In the Aurora example, if a person were to stand on the edge of the Stuart Highway, the heliostats on the far eastern side

(at least 2.4km away) could be reflecting light in the direction of the viewer. However, the backs of the thousands of heliostats on the western side of the field will screen any view of the eastern side.

Figure 5.2 demonstrates how the heliostats closest to the viewer screen the reflection of heliostats on the other side of the field.

Figure 5-2 View from within the field

As such, reflection from the heliostats is an issue for aviation and remote elevated viewing locations rather than land based travel. To an elevated observer at a distance, a section (or wedge) of the heliostat field will exhibit glint or glare that is similar to sunlight reflected off of a still body of water or a building with glass windows. The location of this 'section' will change with the angle of the sun. The other heliostats will appear to be blue, reflecting the sky.

Specialist Study

The proponent commissioned a Landscape and Visual Impact Assessment that was undertaken by GHD. This assessment considers the likely impact of the proposed development on the existing landscape of the region. Given the nature of the region, its topography and its importance to the South Australian community, the assessment has taken into account the visual impact covering an extended area of this region. While the heliostats and the development within the central power block will be variously screened to a large extent by distance and native vegetation, the potential impact of the receiving tower was a key focus for this assessment.

The methodology used for this assessment is based on accepted national and international industry standards. Key site and regional information was collected by the author of the report during a site visit in August 2017.

The landscape within the study are contains a number of features of significance to landscape and visual amenity. These features include the Flinders Ranges, Red Cliff, Eyre Peninsula Coastline, Australian Arid Lands Botanic Garden and Yorkeys Crossing most of which are located some distance from the site to the east and south-east (around Port Augusta). The Ranges View Rest Area, Uro Bluff and Tent Hills are closer to the site.

The history and character of Port Augusta, together with the presence of existing power infrastructure as well as future approved power infrastructure (such as wind farms and solar PV farms), suggests that the addition of a new renewable energy facility would not be out of character for the region generally.

It is acknowledged that the very flat terrain and lower level vegetation of this region will do little to conceal views of the receiving tower. However, given the context this may be considered a positive element in a landscape that is sparsely dotted with features.

The assessment has identified that there will be visual impacts in the region and the photomontages provide an indication of the degree of impact. Whether this impact is considered positive or negative is a personal judgement. However, a mixture of natural and constructed 'features' in the landscape already exists in the Port Augusta region, including electricity infrastructure such as coal fire power stations (decommissioning in progress), new renewable energy infrastructure and high voltage overhead transmission lines.. The addition of another 'feature' in the form of the receiving tower is not considered an unacceptable impact in this context.

5.2.2 Traffic and Transport

A traffic impact assessment has been undertaken to determine the likely impacts of the project in relation to traffic type and volumes expected during and post construction. A summary of the findings is provided in the sub-section below.

Tourist viewing area

From a planning perspective, the Stuart Highway is an important transport route and tourist route. While it is not an identified scenic route, it does take substantial volumes of traveller traffic.

As identified in the previous section, the project (i.e. the tower) will be visible from the highway from a considerable distance. As such, it is expected that, once constructed, travellers are likely to stop to look at the project. This will not be encouraged during the construction phase. However, post construction, it is intended that a safe pull-over area be established. This will be the subject of a separate application.

Glint and Glare

As explained in the previous section, the 'bright' nature of the tower and the potential for glint/glare from the heliostats are unlikely to present issues for drivers travelling along the Stuart Highway.

The tower will be evident from quite some distance which will minimise distraction and will not generate illumination to such a degree that it poses a problem for driver eyesight. Obviously this light will not be evident at night.

The image in Figure 5-3 demonstrates the view of the Crescent Dunes facility from the adjacent public road located approximately 350 metres from the edge of the heliostat field. The closest point between the heliostat field and the Stuart Highway will be approximately 600 m.

Figure 5-3 Crescent Dunes view from adjacent road

Specialist Study

The Stuart Highway, is part of the national highway network and the main highway connecting South Australia and the Northern Territory. The Stuart Highway carries single land traffic in both directions with a speed limit of 110km/hr in the vicinity of the site. It is categorised to take heavy vehicles.

All access to this site, both during the construction and operation phases will be via the Stuart Highway.

The traffic impact assessment has been undertaken in accord with accepted national and DPTI practice. This has included an on-site inspection, evaluation of current conditions, consideration of projected vehicle numbers, types and duration.

The report found that the project is likely to generate an additional 490 vehicles per day (vpd) during the peak construction period with 90 vpd being heavy vehicles. This, combined with the current traffic average on the Stuart Highway of 900 vpd means a total of 1,390 vpd is estimated for this section of the Stuart Highway. Given that the Stuart Highway is an interstate highway and is classified as a high capacity road capable of carrying an estimated 15,000 vpd, this volume can be accommodated. However, it is acknowledge that some modifications and management will be required to address potential safety issues. This includes:

- the existing access/egress point from Stuart Highway is to be upgraded to accommodate the expected increase of traffic;
- an Auxiliary or Channelised Right Turn (CHR) lane into the site and auxiliary (merging) lane out of the site is needed to accommodate all vehicle movements (especially heavy vehicle). This will require consultation with DPTI to ensure appropriate sight distance and road safety requirements are met;

- During the construction phase, temporary speed signage and truck warning signage will need to be implemented on approach to the intersection of Stuart Highway. DPTI will need to make a determination as to whether a reduction in the posted speed limit would be required leading up to the sites access/egress, i.e. 60 or 80 km/h.
- Construction of current internal access (small dirt) tracks on the private pastoral lands will need to be upgraded to accommodate two-way vehicle movement (7.0m wide);
- Additional work on the rail corridor and gas line/water pipe needs to be undertaken to ensure that crossings do not compromise the existing infrastructure, this needs to be in accordance with the following:
  - Australian Standards, AS 1742.7:2016 – Manual of uniform traffic control devices – Railway crossings;
  - DPTI Railway Crossing Safety Strategy, 2017;
  - Austroads, Measures for Managing Safety of Heavy Vehicles at Passive and Active Railway Level Crossings;
  - Austroads, Improved Railway Road Design for Heavy Vehicles; and
  - SA Water Technical Standard 142, Vehicle Cross-overs for above ground trunk mains (Dec 2010).

5.2.3 Stormwater and wastewater management

The approach to stormwater and wastewater management has been developed having regard to the climate (including episodic events), the topography and land characteristics.

The stormwater management approach:

- Ensures the separation of clean and contaminated water; and
- Balances the need for infrastructure with less intrusive impacts on the environment.

It is noted that native vegetation ground cover will be retained below the heliostats to assist with soil stabilisation but its height will be managed to prevent interference with the heliostats above.

It is accepted that in the event of extreme storm events, some post storm management may be required to address localised impacts. This approach can be embedded into an operational management plan.

Waste water will be generated from the power block and the administration/security facilities. Wastewater generated by the staff amenities will be directed to an appropriate septic system. Wastewater from the power block will be treated as required and directed to the evaporation pond. This pond will be appropriately managed and residue material will be removed to a licenced landfill.

SolarReserve recommend a condition that requires the preparation of a stormwater and wastewater management plan that addresses both the initial establishment as well as an on-going management plan.

5.2.4 Flora and fauna

It is acknowledged that the proposed project will have an impact on flora and therefore generally on fauna. The proponent has engaged EBS Ecology to undertake surveys and provide early advice on flora and fauna impacts, a summary of which is provided below.

No issues of EPBC significance have been identified and therefore no referral is warranted at this point in time.

Careful consideration has been given to the siting of the development. There is a need to avoid the ‘depression’ on the site as well as minimise impact on the highest quality native vegetation. However, this means that two trees containing Wedge-tailed Eagle nests will be removed.

SolarReserve aim to retain native vegetation, where possible, but this needs to be decided at the miro-siting level. For example, it is likely that much of the lower level vegetation cover below the heliostats can be retained subject to the miro-siting of the heliostat footings. In addition, Solar Reserve have aimed to use existing access tracks routes for the proposed transmission route.

The final approach to native vegetation clearance will need to be addressed by the Native Vegetation Council and specific requirements will be included in the final CEMP.

Specialist Study

SolarReserve engaged EBS Ecology to undertake an assessment of potential flora and fauna impact for the proposed site and transmission route. The initial investigations were undertaken in late 2015 with follow up surveys undertaken in 2017.

EBS did not identify the need for an EPBC referral.

An application for clearance of Native Vegetation has been lodged with the Native Vegetation Council. This application will be refined and finalised once the overall project layout has been confirmed:

EBS Ecology have undertaken the flora and fauna assessments in accord with accepted South Australian and national standards. This has included desktop assessment of relevant databases and the findings of relevant previous assessments as well as a number of field surveys in 2015 and 2017.

The early findings identified that the original transmission line route should be reconsidered in order to minimise clearance requirements. For this and other reasons, the transmission route has now been changed. Additional survey will be undertaken for the new route and included in an addendum to the current clearance application.

The results of the flora survey are summarised in the following extract from the EBS report. The highest quality native vegetation is located toward the northern end of the area surveyed.

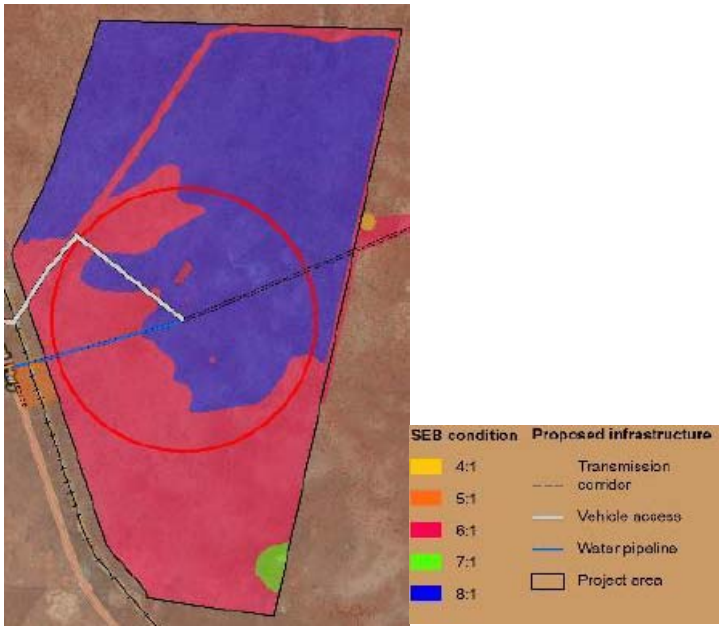


Figure 5-4 Summary of Vegetation Survey

While the relevant data bases indicate the possibility of threatened species, no conservation significant flora species were identified during the field surveys. One fauna species (Blue-winged Parrot) was recorded that is of State level conservation significance. However, a requirement for EPBC referral was not identified.

The original key recommendations included:

- Provide a 500m buffer around the known Wedge-tailed Eagle nests;
- Avoid disturbing construction activities, during sensitive times and close to nesting sites;
- Prepare a CEMP that includes best practice management, staff awareness and training and a weed hygiene procedure for the site.

It was originally considered appropriate to try to avoid and minimise the impact on the Wedge-tailed Eagle nests. While Wedge-tailed Eagles are not listed as a threatened species, it is acknowledged that they are iconic to the region. However, preliminary geotechnical investigations have identified a 'depression' on the site which would result in considerable earthworks (i.e. fill) in order to meet technical construction requirements and have a much greater impact on the surrounding native vegetation which is rated as the highest quality.

On balance it was decided to shift the site 900m to the south. This avoids the depression and reduces impact on high quality vegetation but does result in the remove of the tress that contain the eagle nests.

Solar Flux and Avian Mortality

SolarReserve is aware of an incident at its Crescent Dunes facility that requires some additional explanation.

SolarReserve's flagship 110MW CSP Crescent Dunes facility adopted an Avian and Bat Protection Plan (ABPP), which included a monitoring program to ensure that an adaptive management approach was employed to minimise the potential for avian and bat mortalities.

During early operation of the Crescent Dunes facility a significant avian mortality event was publicised in the media (see http://reneweconomy.com.au/one-weird-trick-prevents-bird-deaths-at-solar-tower-power-plants-98846/). The avian mortality event was the result of the facility's 10,000 plus heliostat mirrors focusing the sun's energy on a single point just above the central solar receiver, which created a visible 'halo' of light with intense heat.

The heliostats were originally programmed to focus on this point just prior to being redirected onto the receiver. However, following a review of the mortality event, the practice was immediately discontinued. Instead heliostats are now programed to focus the sun's energy in a diffused pattern above the solar receiver at an intensity which does not cause avian mortality. Local regulatory agencies were notified of the event and ongoing monitoring and reporting has subsequently occurred in accordance with the ABPP. No further avian mortality events have since been reported due in relation to this aspect.

5.2.5 Bushfire Risk and Management

The project is located in a relative remote location and is almost surrounded by vegetation. This can pose a risk for bushfire protection. However, the general layout includes a significant fire break (perimeter fencing and access road) as well as firefighting services (water supply, backup generator, sprinklers and connection points).

Two access points are proposed including the main access on the western side of the project and a second access on the eastern side associated with the transmission route and connecting to existing tracks that link to the Stuart Highway.

In addition, land management practices will have regard to managing fuel loads within the heliostat field.

5.2.6 Cultural heritage

The site does not contain European cultural heritage but may contain Aboriginal cultural heritage. While not a direct issue of relevance to a development assessment process, this matter has been considered and will be addressed in accord with accepted best practice and the requirements of the *Aboriginal Heritage Act, 1988*.

This includes a risk management approach that involves the following steps:

- An early desk top assessment;
- Engagement with community;
- Site survey prior to construction; and
- Management protocols during construction.

The proponent commissioned initial investigations to address both Aboriginal and European cultural heritage associated with the site. EBS Heritage were engaged to undertake a detailed Risk Assessment and Cultural Heritage Desktop Assessment. A copy of this report is contained in the Specialist Report Addendum.

EBS Heritage undertook a review of primary sources of information including heritage data bases, reference materials, previous assessments and reports. The risk to heritage and associated recommendations has been based on the findings of the preliminary research, the historic land use of the site, the proposed construction techniques and the available geotechnical data. Additional insight was also obtained during the flora/fauna site investigations.

Based on previous experience in the region and recent field survey work, EBS Heritage have identified that there is a high likelihood that the site contains unidentified (previously unrecorded) heritage sites and cultural materials which could be disturbed during construction. In addition, given the site's proximity to Tent Hill, there is a medium risk that the site is associated with mythological sites.

Accordingly EBS Heritage have recommended the following:

- The recognised Aboriginal Traditional Owners for the land be engaged;
- A cultural heritage site avoidance survey is undertaken for the proposed infrastructure footprint;
- Where sites are identified, they are either avoided (through modifications with the project) or addressed in accord with the *Aboriginal Heritage Act (1988); and*
- The preparation of a Cultural Heritage Management Plan for the long term management of sites within the Project Area.

In the context of a Development Assessment process, the protection of Aboriginal Heritage is most appropriately addressed by the *Aboriginal Heritage Act (1988)*. However, some flexibility in the detailed siting of elements of the project (micro-siting) will be required in order to respond to potential cultural heritage issues.

In this is context and should this project be granted approval, a condition of approval requiring the lodgement of a final layout plan (after micro-siting has occurred) would be appropriate.

5.2.7 Aviation

Landrum and Brown were engaged to undertake an Aviation Impact Statement (AIS) and liaise with CASA and Defence in relation to the project. This is an ongoing process which will be followed through to approval.

The preparation of the AIS has addressed a number of key issues including:

- Consideration of the potential to impact “prescribed airspace”;
- Analysis of Obstacle Limitation Surfaces (OLS)
- Analysis of Procedures for Air Navigation Services (PANS-OPS)
- Consideration of the potential impact of glare from the receiving tower and the heliostats
- Consideration of potential impacts on air traffic control, navigation aids, communications and surveillance systems.

The investigations concluded that:

- The project will not impact on the OLS and PANS-OPS surfaces for an aerodrome within 30 km;
- The project will not impact on the Lowest Safe Altitudes of Air Routes in the vicinity;
- The project will not impact on the performance of any navigation aids or airspace surveillance sensors;
- Notification of the proposed heights of the central receiving tower and construction cranes must be provided in accordance with AC 139 08 (0); and
- Direct and reflected glare from the project may result in pilot visibility impacts. Appropriate notification is to be provided to nearby airports, aero clubs, operators, CASA, AsA and Department of Defence and clearly indicated in aeronautical information publications.

5.2.8 Construction phase

It is recognised that the construction phase is likely to generate the most significant of the impacts identified in relation to traffic generation and land disturbance. As is accepted practice, these impacts along with other related issues (e.g. cultural heritage) will be managed via a site specific CEMP.

A draft CEMP is contained in Appendix D which provides an outline of the matters that will need to be addressed. The successful construction contractor(s) will be required to prepare a detailed site specific, final CEMP which is provided to the EPA.

This final CEMP will be required to include an additional or detailed issues identified by the development assessment process, the native vegetation clearance assessment process and cultural heritage site investigation results.

5.3 Impact management approach

Based on the above summary of impacts and the recommendations offered through the specialist reports, the following provides an account of the manner in which SolarReserve propose to manage impacts.

The impacts identified are well known and understood. This means that the responses available to avoid, mitigate or manage such impacts are also well known and understood. As such, all of the impacts can be managed through detailed design responses or detailed management techniques or both.

Critical to the management of the outstanding issues, is the need for a detailed geotechnical survey which will establish the baseline information for the construction approach. This will have an impact on the detail of footings, foundations and siting of project elements generally.

Once this information is available, the detailed of the layout and micro-siting can occur having regard to native vegetation and cultural heritage issues. At this point, final detailed plans can be developed.

Recommended conditions:

- Provision of a final layout of the heliostat field, the power block, the transmission line and ancillary facilities;
- Provision of detailed sizing estimates and plan for the evaporation pond;
- Provision of a services plan for the site and the power block (roads, water, wastewater and fire protection systems);
- Agreement with DPTI in relation to the design of access (including auxiliary lanes) to the Stuart Highway;
- Provision of plans detailing the rail/water pipeline crossing, developed in consultation with relevant Agencies;
- Provision of a final, site specific CEMP to address site construction issues including (but not limited to):
  - Minimising native vegetation clearance and weed hygiene
  - Protection of fauna (where relevant)
  - Minimising soil erosion and stormwater management
  - Protection from contamination
  - Traffic and safety management
- Provision of on-going management plans (including monitoring) addressing:
  - Vegetation and Land management
  - Wastewater and evaporation pond management
  - Stormwater management
  - Fire and Bushfire management
  - Cultural Heritage management

6. Conclusion

As a public infrastructure project, consideration needs to be given to both the potential impacts of the project and the potential opportunities that it offers. The potential impacts are guided by land use policy (as expressed in the Development Plan).

Land Use Planning Considerations

The primary reason for the selection of a site in this region is due to the exceptional DNI levels (solar resource) and relatively flat land. Further to this, the site selected presents as the preferred location due to its close proximity to required infrastructure, including:

- Site proximity to Port Augusta;
- Transmission line for connection to the National Grid;
- SA Water potable water pipeline; and
- Access from the Stuart Highway.

In addition, there is strong community support for a solar thermal project at Port Augusta and the closure of other generating facilities offers the opportunity to tap into a workforce that is already skilled in the energy generation sector.

These site specific qualities align with the Objectives and PDC's of the Development Plan, specifically Council Wide PDC 89 which acknowledge the need to locate renewable energy facilities to maximise efficient generation and supply of electricity. Policy contained within the Pastoral Zone should be viewed in addition to the Council Wide provisions, which also recognise the unique issues associated with renewable energy projects particularly in relation to the visibility of some elements of these projects.

It is acknowledged that the proposed development:

- Is of significant scale in terms of its land area and the height of the receiving tower;
- Generates minimal emissions and waste;
- Will generate a significant level of traffic and activity during construction;
- Will generate a minimal level of activity during operation.

In this context, the proposed development is not dis-similar to wind farms in its broad nature and level of impact in the following respects:

- It needs to be located relative to the natural resource;
- An element of the development is very tall and will be visually prominent;
- The heliostats cover a significant area of land (less than the total area of a wind farm but a more intense use);
- Operational impacts are minimal (waste, traffic etc…); and
- Construction impacts are more significant but for a limited time.

However, there is one key difference and that relates to the nature of the topography needed for this project. Unlike wind farms, this development requires flat land rather that elevated land or ridgelines. This somewhat reduces the visual prominence but also means that the most valued natural landforms in the regional remain unaffected.

While policy is silent on the specifics of solar generation, in terms of fundamental planning principles and the high level objectives for the region, the project is considered to align with the broad intent of the current Development Plan policy.

Environmental and Cultural Impact Considerations

It is acknowledge that the proposed development will have an impact on native vegetation and potentially impact on cultural heritage. In addition, the desalination and evaporation pond aspects may require an EPA licence. These issues are controlled under other legislation, namely:

- Native Vegetation Act, 1991
- Aboriginal Heritage Act, 1988
- Environment Protection Act, 1993

SolarReserve have undertaken the preliminary investigations into these issues at a very early stage of the project and have reviewed the concept as this and other specialist information has come to light.

An application for vegetation clearance has been lodged with the Native Vegetation Council. This application will be up-dated to reflect this development application should it be approved. The process for managing and minimising native vegetation clearance is well established and relies on a practical and detailed approach to site clearance and construction management. SolarReserve have employed qualified and respected professionals to assist with this process.

Similarly, SolarReserve has employed the assistance of a cultural heritage advisor to manage potential cultural heritage issues that are likely to arise during the construction phase. The Aboriginal Heritage Act provides clear legal guidance on the process for protection of cultural heritage and its management.

Should this application receive approval, the desalination process and evaporation pond will be investigated for any licencing by the EPA. At this stage detailed information can be provided to the EPA prior to obtaining this licence. The design requirements of these aspects are well known and understood and there is no impediment to achieving a design that meets licencing requirements.

Impact Response and Management Strategies

It is acknowledged that the project will be visually prominent and will have an impact on the landscape, although the most valuable landscape (the Flinders Ranges) is not unreasonably affected. For some people this may be a positive impact in the greater Port Augusta area. Nevertheless, there is little that can be done to address this impact because:

- The technology cannot be modified to reduce visual impact for technical reasons (colour, heights, arrangements);
- The landscape (flat) and vegetation (low height) does not facilitate screening; and
- The harsh climate is not conducive to effective landscape screening.

The project will also have an impact on the native vegetation, however this can be minimised through careful project planning, miro-siting and on-going management. This approach will be refined and detailed as part of the native vegetation clearance application.

Other impacts are considered to be low risk and minimal, including:

- The peak traffic generation of 490 vpd can be accommodated by the existing interstate highway and safety issues can be addressed through appropriate design and management. On-going traffic impacts will be minimal;

- Waste and water impacts are minimal and can easily be managed;
- Aviation impacts are also minimal and can be managed through the provision of accurate information to the appropriate authorities and lighting (as may be required);
- Similarly bushfire management can also be addressed with appropriate site infrastructure, site management and emergency procedures; and
- There will be no emissions and no noise impacts beyond the site.

In contrast, there are a number of social, economic and environmental benefits:

- Deliver approximately 500,000 megawatt hours of electricity annually;
- Power approximately 90,000 South Australian homes;
- Displace approximately 200,000 tonnes of CO2 annually;
- Create up to 4,000 direct, indirect and induced jobs during construction and 50 jobs during the operation phase;
- Will result in $650 million worth of investment in the State; and
- Provide greater electricity network stability.

In addition, as part of the State's Energy Plan, this project will help to supress wholesale energy prices and enhance power supply in SA.

It is acknowledge that, in order to properly support the State's Energy Plan program, the timing of this project has now been significantly condensed. This means that there are some issues that require more detailed documentation for statutory purposes.

However, these matters are low risk impact issues that are well understood and which have established and accepted design/management responses (e.g. management of stormwater, management of waste water, road design etc).

SolarReserve acknowledge this and accept that, should this project be approved, there may be a requirement to include conditions requiring the preparation of this additional information.

Appendix A – Title References

Copy of Title reference for main site (copy included in Appendix)

Title references for infrastructure and transmission route options (tale below)

	Option 1	Option 2	Option 3	Road Access and water Pipeline
Title	CL 6181/119	CL 6181/119	CL 6181/119	CT 6058/91
Parcel ID	H540100 S2	H540100 S2	H540100 S2	H540100 S6
Title	CL 6181/119	CL 6180/595	CL 6180/595	CR 6142/38
Parcel ID	D47636 Q5	D47635 Q3	D47635 Q1	F219623 Q2
Title		CT 5439/775	CL 656/34	CR 6142/38
Parcel ID		D47636 A102	H540200 S229	F219623 Q1
Title		CT 5480/470	CL 6181/119	CL 6181/119
Parcel ID		D47635 A104	D47636 Q3	H835200 B679
Title			CL 6181/119	CR 5767/528
Parcel ID			D51471 Q51	H540200 S298
Title			CT 5439/775	CL 6181/119
Parcel ID			D47636 A101	H540200 S312
Title			CT 5439/775	
Parcel ID			D47636 A100	

Appendix B – Statutory Documentation

Section 49 Sponsorship letter

Office of the Technical Regulator Certification

SA Water Letter

Appendix C – Application Plans

Project Layout

Power Block Layout

Site plan Admin Building and Security Gatehouse

Admin building Elevation

Security Gatehouse Elevation

Heliostat Assembly General Arrangement

Heliostat Assembly Elevation

General Admin/Workshop Compound Site Plan

Heliostat Dimensions

Transmission Tower Dimensions

Evaporation Pond

Appendix D – Draft CEMP

Appendix E – Additional Information

Central Tower Receiver Glint/Glare (Blue Book), SolarReserve, 2011

GHD

Level 4 211 Victoria Square Adelaide SA 5000
GPO Box 2052 Adelaide SA 5001 Australia
T: 61 8 8111 6600 F: 61 8 8111 6699 E: adlmail@ghd.com

G:\33\18266\WP\DA Package for Lodgement\Post Lodgement Ammended Application\Development Application Updated 28_9.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	S Fogarty	M Scott		M Scott		19/09/2017
1	S Fogarty	K Roberts		M Scott		03/10/2017

www.ghd.com