

**Application for Development Approval**  
**Proposed Southern Cross Wind Farm**  
**Various Lots (Lots 231, 620, 622 and 640)**  
**Shire of Yilgarn**



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February 2024 (Revised)



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Document ID: <a href="#">YIL SOU GE/ 2402 DA Report</a>						
Issue		Status	Prepared by;		Approved by:	
			Name	Initials	Name	Initials
1	<a href="#">13/06/2023</a>	DRAFT	<a href="#">Tom Hockley</a>	TH		
2	<a href="#">26/06/2023</a>	FINAL DRAFT	<a href="#">Tom Hockley</a>	TH		
3	<a href="#">31/08/2023</a>	REVISED DRAFT	<a href="#">Tom Hockley</a>	TH		
4	<a href="#">19/09/2023</a>	FINAL	<a href="#">Tom Hockley</a>	TH	<a href="#">Tom Hockley</a>	TH
4	<a href="#">02/02/2024</a>	FINAL REVISED	<a href="#">Tom Hockley</a>	TH	<a href="#">Tom Hockley</a>	TH
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## EXECUTIVE SUMMARY

Allerding & Associates has been engaged by Yilgarn Holdings Pty Ltd to prepare an Application for Development Approval for a wind farm and associated battery storage in the locality of Southern Cross. The proposal involves the installation of 10 wind turbines and 10MWh of battery storage across a total of four (4) freehold rural lots within Southern Cross. The land identified for the proposal is cleared and has historically been used for cropping. The project will be connected to the Western Power South West Interconnected System (**SWIS**) and will provide power for local consumption and reduce the importation of distant power generation through the SWIS to Southern Cross and surrounding industries and therefore diversify energy supply options within the Shire of Yilgarn (**the Shire**).

The project is proposed to be located approximately 12km south-east of the Southern Cross townsite. The project is located across four (4) freehold rural lots comprising a total land area of approximately 1,464ha (the “project area”). The landholdings included as part of the proposal include Lots 231, 640, 620 and 622 which are located between Great Eastern Highway to the north, Emu Fence Road to the east, and Southern Cross Marvel Loch Road to the west. A Location Plan is included at **Figure 1** demonstrating the location of the properties forming the project area. A Wind Farm Layout Plan demonstrating the location of the proposed wind turbines and ancillary equipment across the project area is included as **Figure 2**.

In addition to the wind turbines and battery storage, the project will comprise a number of ancillary features such as transformers, above and below ground cabling, roads, crane hardstands, switch rooms and communication equipment. Importantly, as the final positioning of the wind turbines and associated infrastructure can only be confirmed once detailed engineering investigations have been undertaken. The wind turbines may therefore require micro-siting in consultation with the Shire prior to commencement of development. However, given the significant area of the combined landholdings which form part of the proposal, the variance to the final location of each turbine will have only limited observable difference in the locality as viewed from the public realm.

Western Power has been consulted with respect to the possible connection points to existing infrastructure in proximity to the wind farm. At the time of writing, Western Power has indicated that a potential technical solution is to construct a new 33 kV powerline running parallel to the Glendower Road carriageway within the existing road reserve, connecting the existing 33 kV power line on Marvel Loch Road to the west to the proposed wind farm to the north-east. This option provides for a convenient connection point to the south switch room located on Lot 622 with minimal disruption to the local road networks and vegetated areas. The final connection arrangement will be confirmed with Western Power at detailed design stage. Investigations are currently ongoing for a connection to the north switch room located in the south-eastern corner of Lot 640 via the existing power line network which extends south along Ghooli South Road from Great Eastern Highway.

There is the demand and capacity to add a second project phase incorporating additional wind, solar and energy storage across the subject site. However, the second project phase is subject to separate approval and therefore does not form part of the current proposal.

The proposal will result in numerous economic, social and environmental benefits to the Shire and the local community, including.

- During the construction phase, locally sourced accommodation will be utilised for construction workers and specialist personnel, whilst aggregate, sand, and other materials and equipment necessary for construction will be sourced locally where possible;

- Once operational, regular routine and breakdown maintenance will be undertaken several times per year by visiting specialised wind turbine maintenance technicians and other specialists who will rely on local accommodation and services while visiting the region; and
- On an ongoing basis, landowners will be provided with a diversified revenue stream for the life of commercial wind farm operations, thereby encouraging agricultural activities to continue to be undertaken on the land.

Generation capacity from the project will at times exceed the electricity consumption of Southern Cross and Marvel Loch and therefore the renewable energy generated has the capacity to create supply for both local and regional consumption. Furthermore, experience from other operational wind farms suggests additional benefits may result from the wind farm strengthening the local network, reducing the number of unplanned outages that would otherwise occur.

As the estimated cost of this proposed development is above \$10 Million, this development application constitutes a mandatory Regional Joint Development Assessment Panel (**JDAP**) application. The associated application forms are included in **Annexure 1**.

The proposed Development Plans are provided in **Annexure 3** of this report.



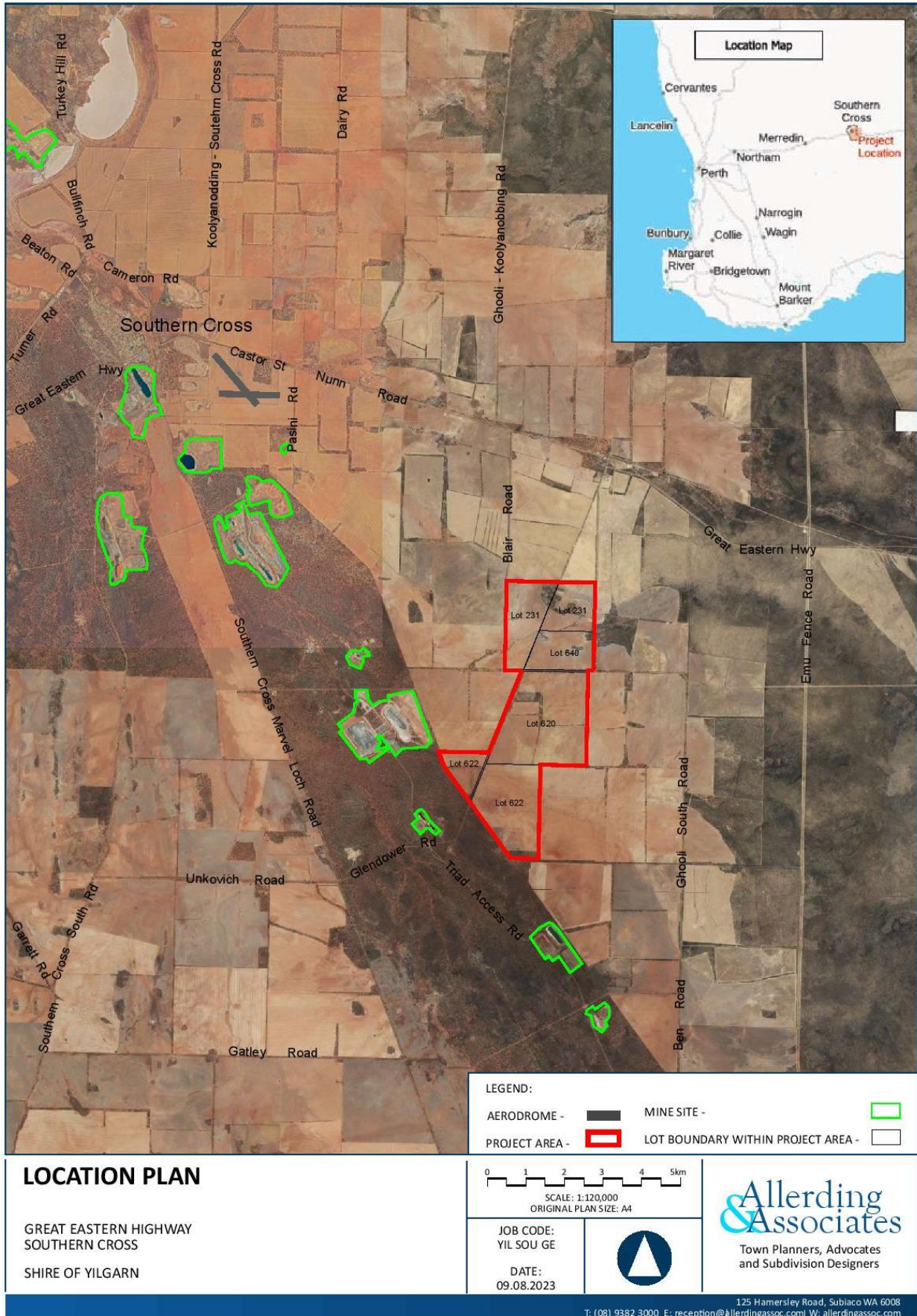


Figure 1: Location Plan





**Figure 2: Wind Farm Layout Plan**



## 1.0 INTRODUCTION

Yilgarn Holdings Pty Ltd proposes to construct a wind farm located approximately 12km southeast of Southern Cross townsite. Southern Cross Wind Farm is proposed to comprise 10 wind turbines and 10MWh of battery storage. The wind farm is constructed on an area of freehold rural land cleared and historically used for cropping.

This report has been prepared in support of an Application for Development Approval to the Shire and the Joint Development Assessment Panel (JDAP) and considers how the proposal responds to the applicable State and local planning framework and associated environmental legislation.

The report also considers how the proposal has been developed having regard to operational management arrangements and off-site impacts which have been addressed as part of the accompany technical studies, including:

- Noise Impact Assessment (refer **Annexure 4**);
- Visual Impact Assessment (refer **Annexure 5**);
- Aboriginal Cultural Heritage (refer **Annexure 6**);
- Western Heritage Assessment (refer **Annexure 7**);
- Flora and Fauna Desktop Assessment associated with clearing works (refer **Annexure 8**);
- Aviation Impact Assessment (refer **Annexure 9**); and
- Feasibility Study Instrument Procedure Assessment Report (refer **Annexure 10**).

Other operational and design considerations detailed within this report include:

- Traffic management;
- Bushfire risk;
- Western heritage impact;
- Construction management, de-commissioning, and public safety;
- Shadow flicker and blade glint; and
- Electro-magnetic interference.

## 2.0 BACKGROUND

Southern Cross Wind Pty Ltd is a wholly owned subsidiary of Yilgarn Holdings Pty Ltd whose purpose is to explore and develop utility scale renewable energy solutions in Western Australia.

Yilgarn Holdings Pty Ltd is a Western Australian owned and funded enterprise operated by a small group of seasoned wind industry professionals. With over 28 years of combined experience in the wind industry, the team contains extensive experience in wind farm project prospecting and development. Since 2008 they have worked independently or as partners supporting the early identification, appraisal and delivery of utility-scale renewable energy projects in Western Australia with project development portfolio exceeding 490MW.

This proposal represents the latest renewable energy project to be advanced by Yilgarn Holdings Pty Ltd in regional Western Australia.

### 3.0 SITE DETAILS

#### 3.1 Subject Site

The lots forming the project area are described in **Table 1**.

**Table 1: Site Details**

Lot No.	House No.	Diagram	Volume	Folio	Area
231	N/A	DP143975	1508	751	356.955 ha
640	N/A	DP143975	1508	751	161.876 ha
620	N/A	DP204376	1936	533	516.569 ha
622	282	DP204376	1575	39	428.926 ha

Copies of the Certificates of Title are included in **Annexure 2** and **Figure 1** provides a plan of the properties forming the project area.

#### 3.2 Location and Context

The project area is located within the Southern Cross locality in the Wheatbelt Region of Western Australia, approximately 12km south-east of the Southern Cross townsite and approximately 380km east of the Perth CBD. The project area and surrounding land comprises predominantly cleared agricultural land. Historically the land has been utilised for agriculture having been cleared and farmed for more than 100 years.

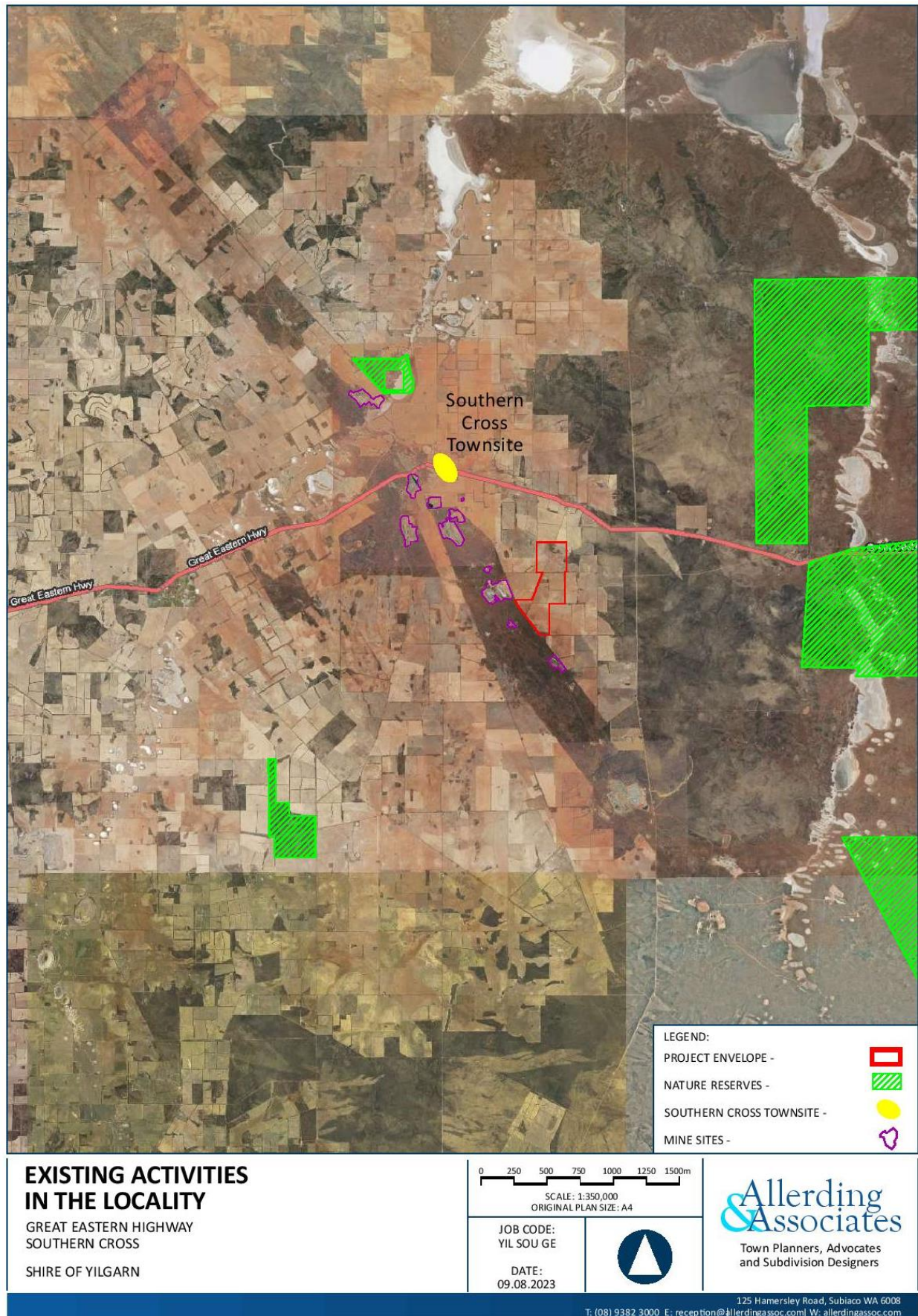
Southern Cross townsite to the north-west has a population of approximately 700 who service mining and rural land use in the Shire. Southern Cross is also a bulk goods receival site for the surrounding grain cropping activities. To the north of the project area is the abandoned townsite of Ghooli. The townsite is on the route of the historic Goldfields water pipeline and pumping station. To the east is arid land comprising native vegetation and the 35,000 ha Yellowdine Nature Reserve with seasonal lakes and diverse flora are features.

To the south is the small heritage town of Marvel Loch established in 1911 which consists of a townsite, mine and processing mill. The townsite has a population of approximately 100 residents, and services mining and rural uses with the nearby Marvel Loch Gold Mine. Marvel Loch is also a bulk goods grain receival site.

Several mining exploration licences are pending or have been granted on or adjacent to the project area to exploration companies. The proponent has initiated contact with the relevant stakeholders and invited preliminary feedback from them. The proposal is not expected to materially impact or impair the exploration aspects on the subject lots and provides opportunity for future energy synergies if the exploration prospects mature further.

A plan identifying the existing activities within the locality is included at **Figure 3**.





**Figure 3: Existing Activities in Locality**

### 3.3 Existing Services and Infrastructure

#### 3.3.1 Power

It is intended that the project area will be connected at two (2) locations to the north and west via the existing powerline network. It is proposed that the south switch room on Lot 622 will connect to the existing 33 kV power line on Marvel Loch Road to the west to the proposed wind farm. This connection will require the construction of a new 33 kV powerline running parallel to the Glendower Road carriageway within the existing road reserve.

The north switch room on Lot 640 is proposed to be connected to the existing powerline which connects to Great Eastern Highway to the north via Ghooli South Road.

A Western Power Networks HV transmission corridor easement exists in an east to west alignment through Lot 620. The project layout does not encroach within this easement.

A power infrastructure plan is included at **Figure 4** demonstrating the existing and proposed infrastructure connections.

#### 3.3.2 Water

Water is not currently available within the project area and given that the wind farm and battery storage proposal will not rely on a water supply as part of its operations, a water supply is not intended to be provided as part of the development. Temporary water will be required for a number of construction activities, however this will be sourced as required during the construction phase either from the existing standpipe on Great Eastern Highway in proximity to the Ghooli South Road intersection, or the Shire's standpipe at Castor Street. Both sources operate under a pay-per-use arrangement.

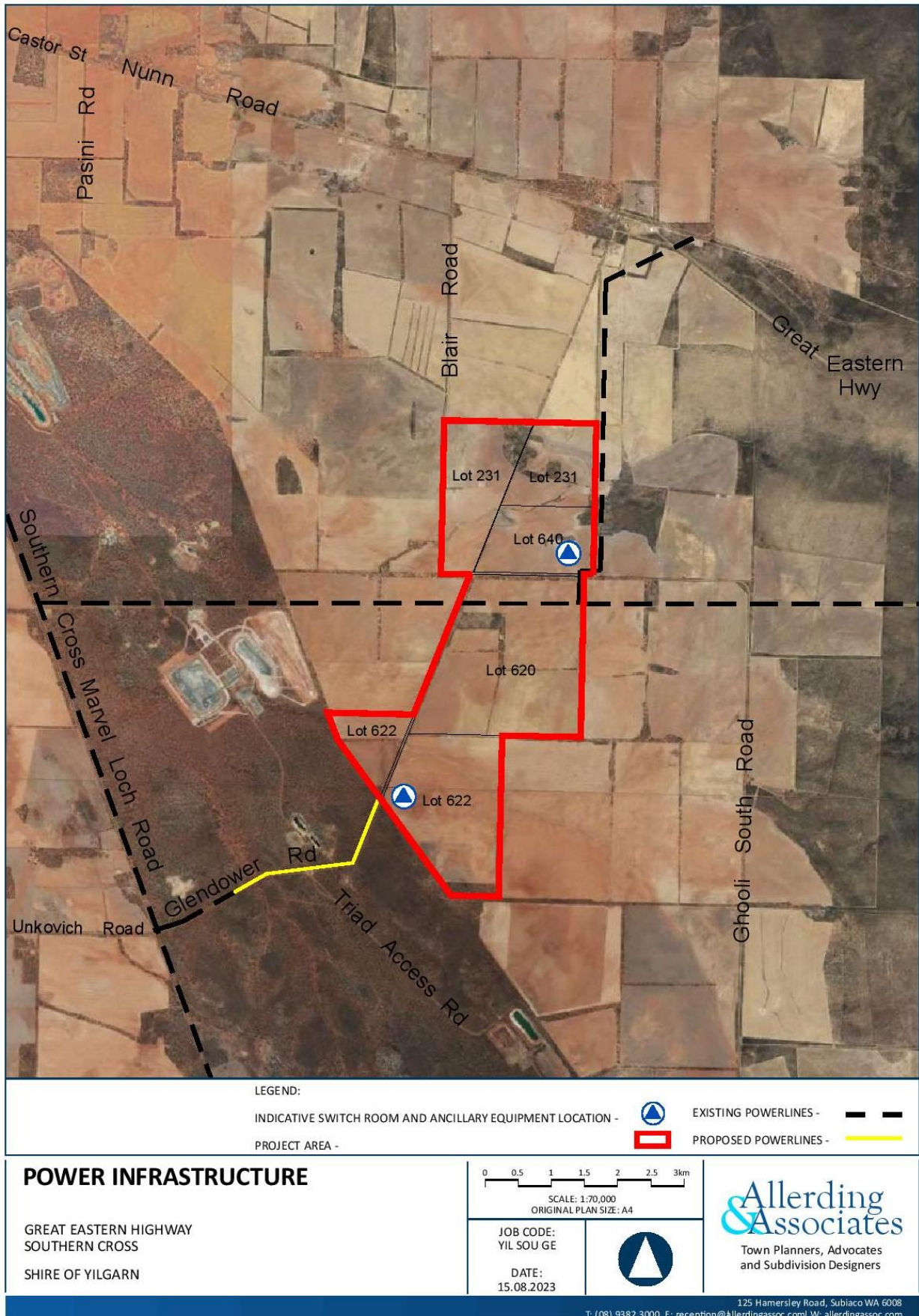
#### 3.3.3 Roads

Vehicle access to the project area is provided via the existing local road network. A road layout plan is included at **Figure 5**.

Ghooli South Road runs north to south along the lot boundary of Lots 231 and 640, before intersecting Great Eastern Highway to the north of the project area. Ghooli South Road is a minor public road comprising compacted gravel and approximately 15 m wide along its length. Glendower Road commences at the intersection of Marvel Loch Road, approximately 4km south-west of Lot 622. Within the project area, Glendower Road tracks northeast traversing Lot 622 and tracking the boundary of Lot 620, before turning east along Lot 640 and joining Ghooli South Road. Glendower Road is also a minor public comprising compacted gravel and approximately 15 m wide along its length.

Given that Ghooli South Road and Glendower Road connect the lots forming the project area to the main public road networks, this local road network is ideally suited to the transporting of wind farm equipment to its final destination using Over Size Over Mass (OSOM) vehicles.





**Figure 4: Power Infrastructure Plan**

### 3.4 Land Use

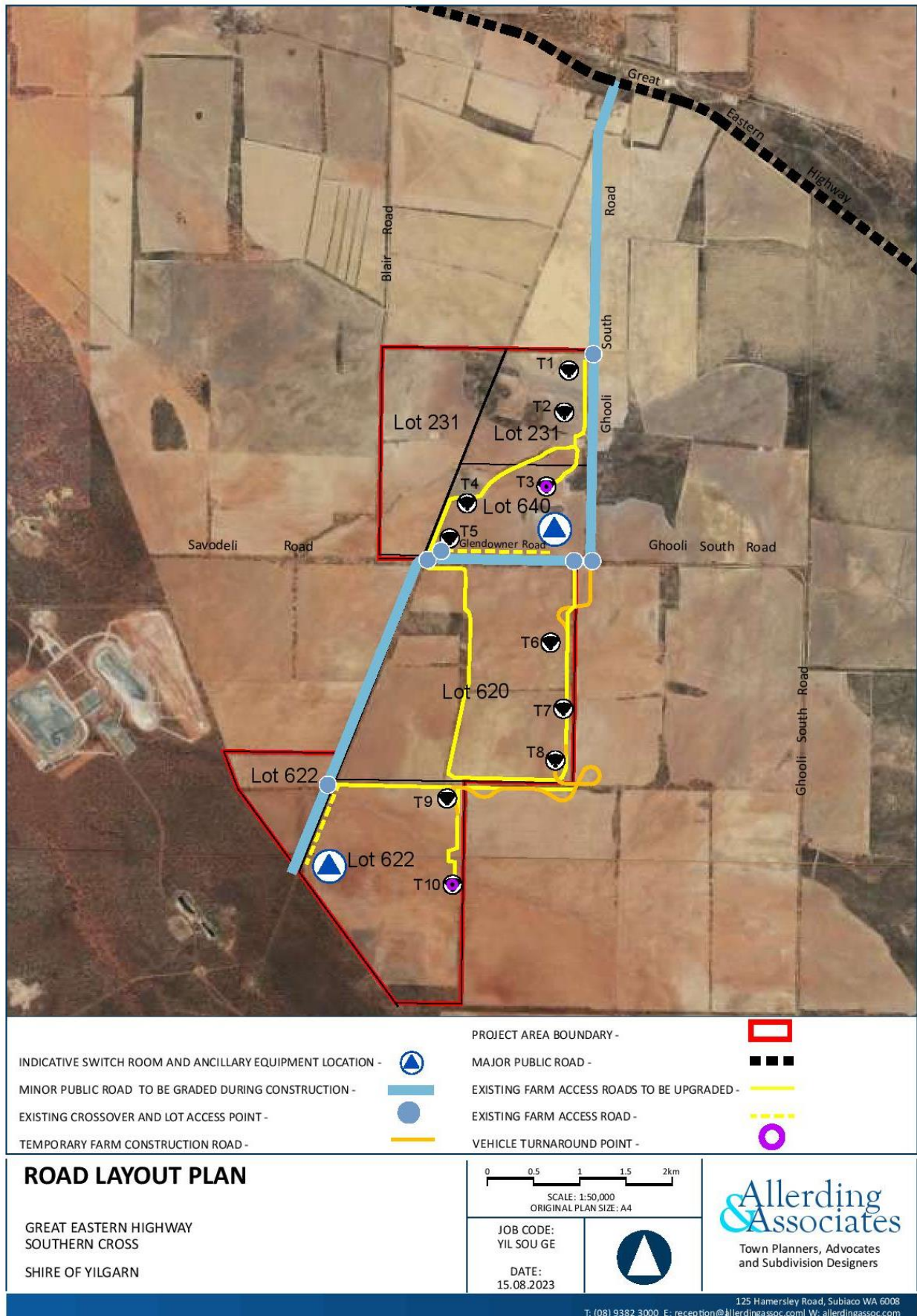
The project area and adjoining properties are situated within the 370 – 470 m AHD contour. Landform relief consists of a uniform gentle slope with increasing elevation from west to east across the site. Peak elevations in the 440 – 450 m AHD range are noted along the eastern edge of the site parallel to Emu Fence Road.

Natural watercourses are not clearly defined due to the low annual rainfall and soil types that do not readily retain surface water for extended periods. Permanent water bodies are limited to those resulting from mining and quarrying activities to the west of the project area.

Vegetation elements consist of pastoral fields of cereal crops with wide open views as the dominant site characteristic. The landscape is predominantly cleared for cropping and pastoral activities. Remnant pockets of vegetation remain along with roadside vegetation (refer **Figure 6**).

Existing development includes the Great Eastern Highway and Goldfields Water supply scheme pipeline to the north of the project area. There is also a lateral line off the main pipeline running to Marvel Loch Township which crosses Lot 231 running parallel with Ghoul South Road. Telecommunications towers and Water Corporation storage tanks and infrastructure are located adjacent to Great Eastern Highway in close proximity to Emu Fence Road. Dwellings and structures to support broadacre agricultural land use are evident within and adjacent to the project area. Widely dispersed, single storey farmhouses, dams, machinery and shearing sheds are evident across the location (refer to **Figure 7**).





**Figure 5: Road Layout Plan**





**Figure 6: Typical Road with Roadside Vegetation**



**Figure 7: Typical Rural Shed**

## 4.0 PROPOSED DEVELOPMENT

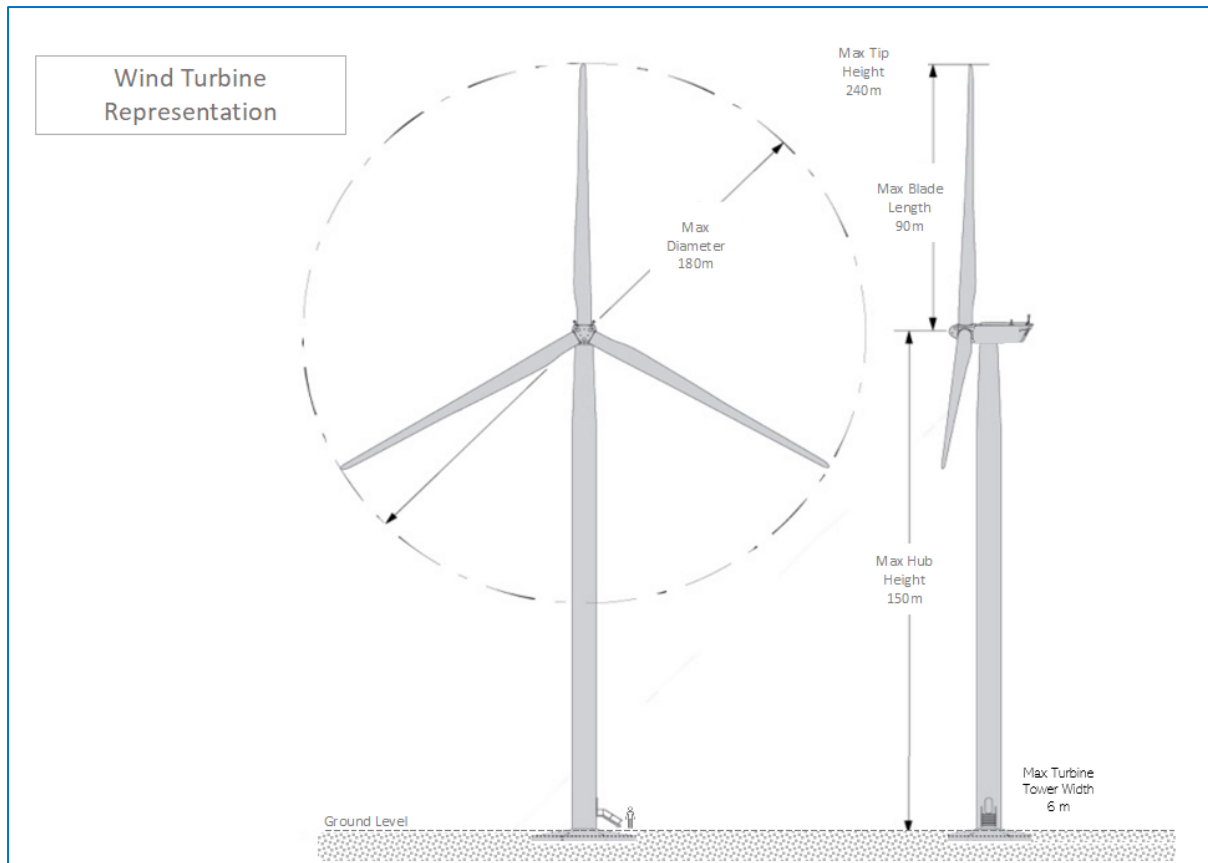
### 4.1 Summary

The application proposes up to 10 wind turbines, up to 10 MWh of battery storage and will connect into the Western Power SWIS via two new electrical switch rooms. At the time of writing, a connection for the southern and northern switch rooms located on Lot 622 and Lot 640 respectively, are being progressed in consultation with Western Power Networks. The southern switch room will connect the wind farm to the existing Western Power 33 kV power line on Marvel Loch Road via a new 33 kV powerline running parallel to the Glendower Road carriageway, within the existing road reserve. The northern switch room will connect to the existing power line which extends south along Ghooli South Road from Great Eastern Highway.

The final selection of wind turbine model and size is subject to commercial and procurement processes and will be completed following development approval. However, the combined blade length and tower height of turbines will not exceed 240m Above Ground Level (AGL). A plan of the typical wind turbine design is included at **Figure 8**. A full set of plans is included at **Annexure 3**.

The proposed wind farm will be positioned across four (4) rural lots with a combined area of 1,464 ha. The project area was identified as a suitable location for the proposal, having regard to:

- The underlying wind resource profile providing for viable power generation;
- The limited existing vegetation across the subject lots, with land being historically cleared and utilised for cropping and pastoral activities;
- The ability to undertake the project with largely no land clearing requirements, apart from minor maintenance of access tracks during the construction phase and targeted clearing within the Glendower Road road reserve as part of the power line extension;
- The compatibility with existing land uses across subject lots and adjacent sites, noted as predominantly cropping and mining activities;
- The ability to position the turbines a distance of at least 2km from the nearest residential dwelling;
- The proximity to an electrical network connection on Marvel Loch Road to the west and Great Eastern Highway to the north;
- An open level landscape enabling convenient construction and 'on plot' transportation;
- Accessibility to a suitable public road network for Over Size Over Mass (OSOM) vehicles and equipment;
- The securing of support from landowners across the subject lots and the establishment of suitable land tenure arrangements;
- The proximity to the adjacent and nearby mining activities seeking power directly from renewable sources; and
- Sufficient size to construct and install the proposed wind farm and a later expansion project (subject to separate approval), with capacity to further grow the wind farm in future years.



**Figure 8: Typical Wind Turbine Design**

The subject lots forming the project area will require the following works to facilitate the transportation and construction process:

- Existing on-farm roads and tracks will require upgrade and extension from the existing road or track to each turbine base. All upgraded and/or extended roads and tracks will be constructed on cleared cropping land (Refer to **Figure 5**).
- On-farm upgraded roads and tracks will follow existing lot boundaries and firebreaks to the extent possible to minimise impact on arable land and to improve the underlying effectiveness of firebreaks.
- Turbine hardstands will be constructed at each turbine site with dual use for lay-down and to position heavy lift cranes for pre-assembly of turbine blades before installation.
- Earthworks and site preparation will be undertaken for the foundations of the wind turbines and associated infrastructure.
- Trenching works and installation of underground and above ground cabling across the subject lots to connect wind turbines and battery storage to switch rooms.

Existing local roads surrounding the subject lots will also require grading and top dressing in consultation with the Shire to ensure roads are capable of OSOM vehicle movement (Refer to **Figure 5**).



Once operational, the proposed wind farm will not require full time staff given the relatively small number of wind turbines and associated equipment to be installed. However, regular routine and breakdown maintenance will be undertaken several times per year by visiting specialised wind turbine maintenance technicians and other specialists.

## 4.2 Rationale

Renewable energy is becoming a more prominent means of energy generation in Western Australia as technological developments continue to make renewable energy generation and storage more efficient, accessible, and affordable. This proposed wind farm and battery storage facility will increase the local energy supply to the Southern Cross locality and surrounding areas, which will increase the base load capacity of the current grid. Integrating renewable energy facilities capable of being integrated into the existing grid is a step towards achieving national energy transformation goals.

As demonstrated in **Figure 4** above, the proposed wind farm will be connected to the existing power networks via two (2) locations, including a new 33 kV powerline along Glendower Road to the south-west of the project area and an existing powerline along Ghooli South Road connecting to Great Eastern Highway

## 4.3 Project Description

### 4.3.1 Wind Turbines

The project will involve the installation of 10 horizontal axis, three blade wind turbines, with a blade tip height up to 240m above ground level. Wind turbines will comprise tower height up to 150m above ground level and blade length up to 90m. Turbine towers at their widest point will be approximately 6.0m in diameter (refer **Figure 8**). Wind turbines will have a minimum separation distance of two (2) rotor diameters.

The final position of each turbines will be subject to detailed geotechnical and micro-siting studies. Provision for each nominated lot within the project area includes sufficient area for micro-siting whilst still enabling the equipment to be wholly contained within the combined lot boundaries. It is anticipated that a maximum variance of 500m for the final turbine location in all directions will be achieved for each turbine (subject to achieving lot boundary setbacks and separation from existing vegetation). A 500m variance has been selected based on the recommendations of the Aviation Impact Assessment (refer **Annexure 9**) and the findings of Feasibility Study Instrument Procedure Assessment Report (refer **Annexure 10**). Both reports have concluded that the micro-siting of turbines within a maximum tolerance of 500m will not constrain or impact the viability of the implementation of instrument flight procedures for Southern Cross Aerodrome runway 09/27. The positioning of the turbine variance will also avoid the siting of turbines closer than 2km from existing dwellings.

Turbines will be constructed upon 35m x 35m circular turbine foundations comprising reinforced concrete and a central steel anchor cage. This foundation area will be backfilled with the excavated spoil to ground level.

As part of the construction and commissioning phase of the project, turbine hardstands will be constructed. Each hardstand will have an area of approximately 6,000m<sup>2</sup> comprising the maintenance vehicle parking area, turbine foundation, storage for blade and tower elements, storage for lattice boom components and the crane working area. **Figure 9** provides the typical footprint for the wind turbine hardstand during construction. Turbine hardstands areas will be engineered and constructed to appropriate standards and will facilitate stormwater runoff and to support appropriate drainage.



Once completed, the turbine hardstands will be reduced in size, with the maintenance vehicle parking area and turbine foundations being retained for the operations of the turbine, with an area of approximately 600m<sup>2</sup> per turbine. The hardstand areas comprising the laydown and constructions areas will be removed and remediated post-construction.

#### **4.3.2 Battery Storage**

A total of 10 MW/10 MWh of battery storage will be installed, with five (5) installed adjacent to the north switch room on Lot 640 and five (5) installed adjacent to the south switch room on Lot 622 (refer to **Figure 2**). The battery storage will comprise self-contained modularised battery units housed in 20' shipping container enclosures (refer **Figure 10**). In operation the battery storage footprint will occupy approximately 150m<sup>2</sup> of the project area (approximately 15m<sup>2</sup> module).

#### **4.3.3 Total Development Footprint**

As previously noted, each turbine will require the construction of a hardstand of approximately 6,000m<sup>2</sup>, representing a total area of 6ha across the 10 wind turbine sites. Post-construction, the hardstand areas will be reduced to 1,500m<sup>2</sup> per turbine, representing a total area of 15,000m<sup>2</sup> across the 10 wind turbine sites. In addition to this, approximately 150m<sup>2</sup> of battery storage will be provided.

The total combined land area of the project area is around 1,464ha and in this context, the development footprint both during construction and post-construction represents only a fraction of the overall site area.

#### **4.3.4 Ancillary Equipment**

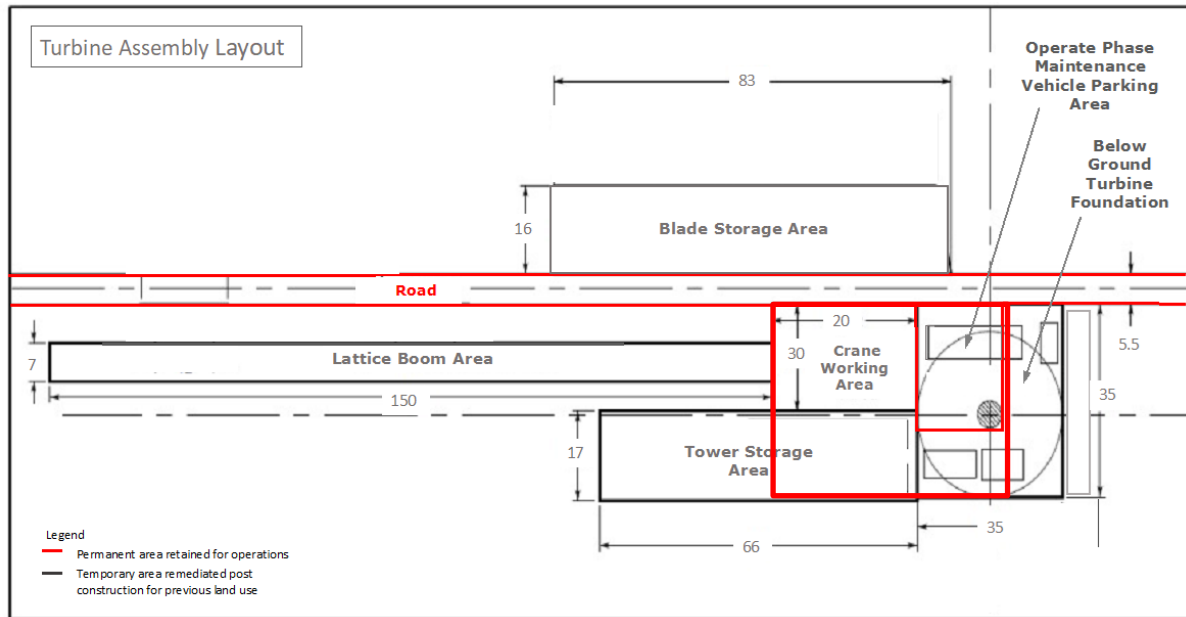
The proposal will involve the installation of ancillary equipment and incidental works to facilitate the construction and commissioning of the facility. This includes:

- Construction of approximately 4km of new powerlines connecting to the Western Power Network on Marvel Loch Road to the south-west of the project area.
- Construction of two (2) new electrical switch rooms and associated equipment (on Lots 622 and 640).
- Construction of approximately 13km of new underground powerlines and approximately 3km of overhead powerlines to connect wind turbines and battery storage to switch rooms.
- The installation of new communications infrastructure may also be required to enable communication with Western Power Networks and to facilitate remote monitoring and control of equipment, subject to confirmation at detailed design stage.

#### **4.3.5 Road Upgrades**

To facilitate the delivery of turbine components and ancillary equipment to the sites, the proposal will involve a combination of upgrading and extension of farm roads/tracks (within the subject properties) and the grading of existing local roads.

As demonstrated in **Figure 5**, approximately 14km of farm roads/tracks will require some form of upgrade and approximately 4km of existing minor public roads will also require grading and top dressing. The works to existing local roads will be undertaken with agreement, and in liaison with the Shire to ensure roads are capable of OSOM vehicle movement.



**Figure 9: Typical Wind Turbine Footprint and Hardstand During Construction**



**Figure 10: Typical Battery Storage Unit**

Farm roads/tracks will be extended from the existing road or track to each turbine base. All upgraded/extended roads and tracks will be constructed on cleared cropping land and will follow existing lot boundaries and firebreaks where practicable to minimise impact on arable land and to improve the underlying effectiveness of firebreaks.

The design of extended farm roads will ensure proper crossfall to efficiently evacuate surface water and avoid erosion. Furthermore, civil design will incorporate provisions as required to ensure existing water course paths are maintained.

Given wind turbine model is still to be finalised, there may be some minor adjustments to road layout and construction depending upon final turbine selection.

#### **4.3.6 Traffic Management**

As part of its initial planning and investigations for the project area, the operator has considered traffic impacts and management arrangements associated with transportation of wind turbine components to site given their size and geometry. It is estimated that approximately 120 Over Size Over Mass (OSOM) vehicle movements will be required to facilitate the construction of the wind farm. Transportation is anticipated to be based on a 24-hour, 7 day per week schedule and therefore, out of hours OSOM movements has been assumed.

Equipment and components will be shipped from their Original Equipment Manufacturers (OEM) to the Australian Marine Complex port at Henderson. Port selection and the preliminary transportation route has been chosen in part, due to the successful transportation of similar-sized OSOM components for Yandin Wind Farm (Dandaragan, WA) from Henderson. The port is also extensively connected to Main Roads Western Australia (MRWA) road network.

It has been assumed that OSOM equipment would track the following route:

- Start. Henderson, Route 12 (Cockburn Road) for 5km onto Route 1.
- Route 1 (Rockingham Road) for 4km onto Route 21.
- Route 21 (Thomas Road) for 18km onto Route 4.
- Route 4 (Tonkin Highway) for 31km onto Kewdale Road.
- Kewdale Road, Abernethy Road, and Baldwin Street for 4km onto Route 3.
- Route 3 (Roe Highway) for 10km onto Route 94.
- Route 94 (Great Eastern Highway) for 350km onto Ghooli South Road.
- Ghooli South Road for 1.6 km onto the north construction site (Finish).

*and*

- Ghooli South Road for 7km onto Glendower Road.
- Glendower Road for 2.6km onto the south construction site (Finish).

The suitability of the proposed transportation route for wind farm OSOM components has also been considered by the operator. Requirements for alteration of roads and verges along the route and for removal of 'street furniture' through the built environment away from the port was assessed as being of low likelihood.



Prior to commencement of construction, a specialist transportation company will be contracted to develop a detailed Traffic Management Plan. The Traffic Management Plan will provide information on all transportation issues based on defined parameters in conjunction MRWA and the appropriate Local Authorities. It will propose strategies to minimise traffic impact, risks, and disruption to local communities, along with suitable access points and preparation of a road condition report prior to commencement of the construction.

As part of the construction process, the operator has identified the following potential arrangements to further reduce vehicle traffic associated with the project:

- It is envisaged that a concrete batching plant will be located on the construction site reducing movements of vehicles on local roads; and
- Locally sourced aggregate and other construction equipment will be sourced locally where possible, to further reduce vehicle movements.

Existing on-farm roads/tracks will require minor upgrades and extension to construction areas, and some sections of Shire gravel roads will require grading to enable OSOM vehicle movements from Great Eastern Highway to their final location. These works will be undertaken in consultation with the Shire.

#### **4.3.7 Construction Management**

The wind farm construction activities will involve:

- Site geotechnical surveys;
- Upgrading of existing roads/tracks between access points and turbines;
- Earthworks and preparation for foundations;
- Foundation formwork and concrete;
- Turbine hardpoint construction;
- Electrical switch room construction;
- Delivery and storage of turbine components;
- Trenching and installation of underground and above ground cabling;
- Installation of turbine towers, nacelles, and blades; and
- Installation of battery storage modules.

The duration of the construction phase is estimated to be approximately 12 months.

With only very negligible clearing required, construction risks are likely to be very low in scale and nature.

Temporary water will be required for a number of construction activities. Water demand is expected to vary over time, depending on the phase of construction and the specific activity, however given the relatively small scale of the wind farm, water usage is anticipated to be limited. Works requiring the consumption of water will include:

- Bulk earthworks and material conditioning;
- Dust suppression.
- Concrete batching; and
- Ablution facilities.

A water sourcing strategy will be developed during the detailed design phase and confirmed with the Department of Water and Environmental Regulation and the Water Corporation prior to construction.

During construction additional temporary infrastructure and equipment will be required including:

- Temporary fencing and gates;
- Turbine component laydown and storage;
- Demarcation zones and restricted access areas;
- Component receivals area;
- Laydown assembly and storage area;
- Construction site office, cribbing and ablutions;
- Carparking;
- Portable concrete batching plant;
- Electricity;
- Potable water; and
- Waste disposal, vehicle wash bay/weed management and signage.

It is anticipated that a Construction Management Plan will be required as a condition of development approval. The Construction Management Plan will include specific details to safely manage people, construction activities, and vehicle movements at the construction site.

A Decommissioning Philosophy will also be prepared during the operational phase of the project which will detail the proposal for the wind farm at end of life, such as repowering wind turbines or removal and remediation.

#### **4.3.8 Lease Terms**

Southern Cross Wind Pty Ltd will have lease agreements of up to 25 years with all freehold landowners hosting wind turbines and battery storage infrastructure as part of the project.

Landowners will not be prevented from the continued use of their land for rural and agricultural purposes, except for those areas where project equipment is located.

The project will be apportioned on the land as follows:

- Lot 231 (DP143975) – Two (2) wind turbines;
- Lot 640 (DP143975) – Three (3) wind turbines, switch room and 5 MW/5 MWh of Battery Storage;
- Lot 620 (DP204376) – Three (3) wind turbines; and
- Lot 622 (DP204376) – Two (2) wind turbines, switch room and 5 MW/5 MWh of Battery Storage.

As previously noted, battery storage and ancillary equipment will be located adjacent to switch rooms.

The design life of the wind farm is 25 years. At the end-of-life wind turbines will be refurbished or replaced. Any extension in design life resulting from the refurbishment or replacement of turbines, will be subject to new lease agreements with landowners.



## 5.0 STATE OF WESTERN AUSTRALIA GOVERNMENT STRATEGIES

### 5.1 Energy Transformation Strategy 2019

In 2019, the then Minister for Energy announced the *Energy Transformation Strategy 2019*. This strategy was prepared in response to developing technologies that will significantly change the energy generation, supply, storage, and use of Western Australia's power. The Strategy reported on the renewable energy projects that occurred prior to the release of this Strategy and outlined directions for the implementation of more renewable energy projects. This high-level Strategy specifically mentions the South West Interconnected System (**SWIS**) as an area where an increase in standalone power system technologies can facilitate an affordable and reliable supply of electricity. The extent of the SWIS is shown in **Figure 11**, with the approximate location of the project area identified by the yellow star.



**Figure 11: South West Interconnected System**

The proposal responds to the Strategy direction by facilitating the integration of new technology into the power system by way of a wind, and battery storage facilities. It will provide a local power generation source further ensuring a means to support the expectations of the Strategy.

## 6.0 STATE PLANNING FRAMEWORK

### 6.1 Strategic Planning Framework

#### 6.1.1 State Planning Strategy 2050

State Planning Strategy 2050 provides the strategic context underpinning frameworks and decisions regarding sustainable land use and land development in WA. As the highest order strategic planning document in WA, the Strategy is integral in ensuring that State, regional and local planning frameworks are aligned and able to meet future challenges.

The Strategy identifies investment in technology and innovation as critical measures in adapting to growth and changing modes of energy storage, supply and distribution. This ties in with the following planning principles behind the Strategy:

***“Economy: Facilitate trade, investment, innovation, employment and community betterment***

***Environment: Conserve the State’s natural assets through sustainable development.”***

Building upon the above principles is the individual strategic directions, Section 2.3 of the strategy states the following in relation to energy:

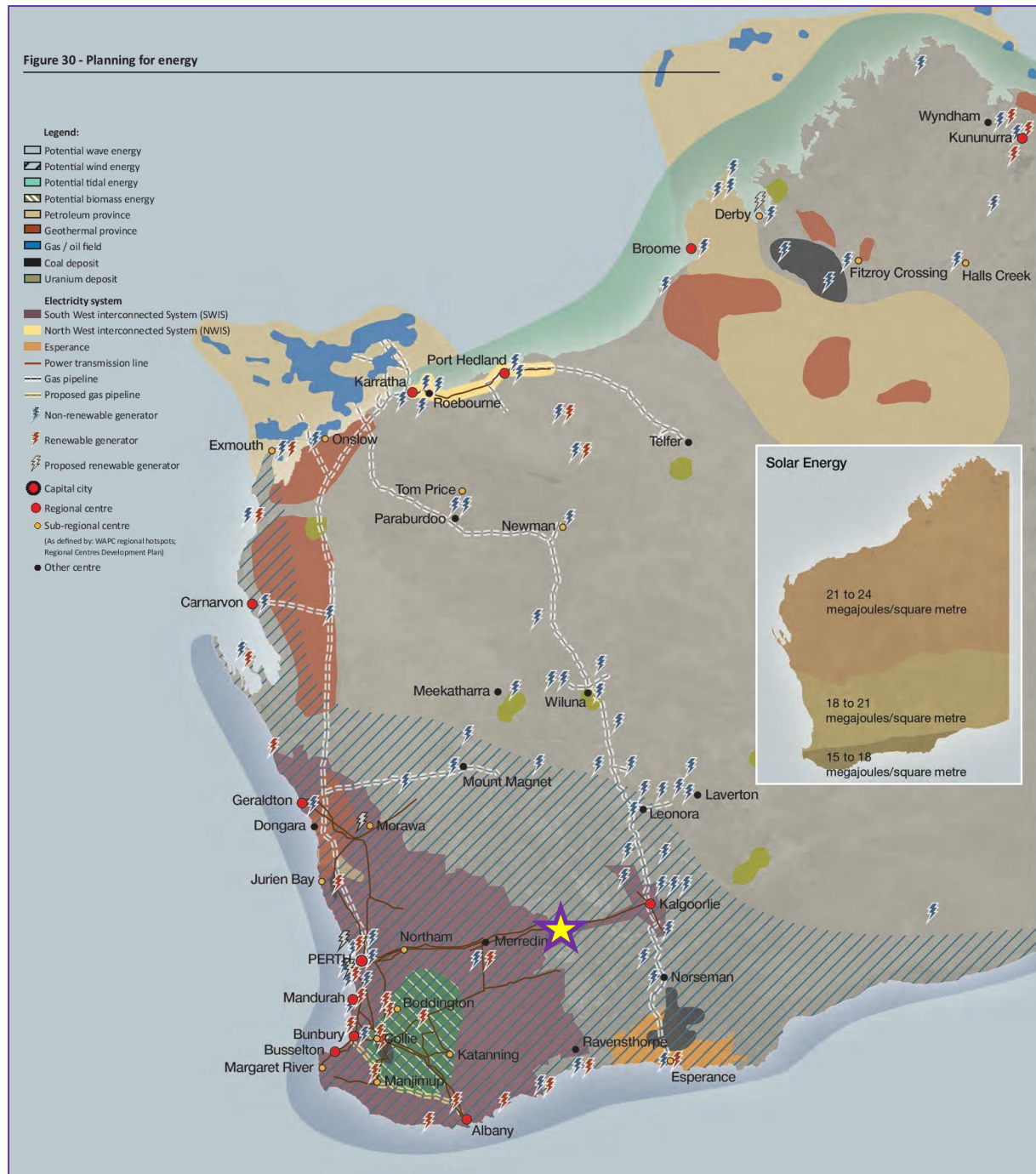
***“to enable secure, reliable, competitive and clean energy that meets the State’s growing demand.”***

It is considered that energy sourced from a diverse range of low carbon sources will make businesses and industries more sustainable and resilient.

In particular, the Strategy identifies the ageing of infrastructure in the South West Interconnected System (SWIS) as an ongoing challenge for the State regarding energy resources. Therefore, newly developed technologies are promoted to ensure the State’s energy needs are met in the longer term. The strategic approach to energy planning is outlined in Table 11 of the *State Planning Strategy 2050* and includes the following aspirations relevant to this application:

- ***“Energy efficiency improvements continue to be realised through the use of low emission technologies.***
- ***Various forms of renewable energy (wind; solar; wave; tidal; geothermal; biofuels) continue to be developed and integrated into the grid.”***

The development of a wind farm with associated battery storage is consistent with the highest-level strategic goals of the State. The project is well located within an area identified as a potential wind energy area in Figure 30 of the *State Planning Strategy 2050* (refer **Figure 12** below). Furthermore, connecting the project to the SWIS will provide power for local consumption and reduce the importation of distant power generation through the SWIS to Southern Cross and surrounding industries and thereby provide a diverse mix of energy supplies in the Shire.

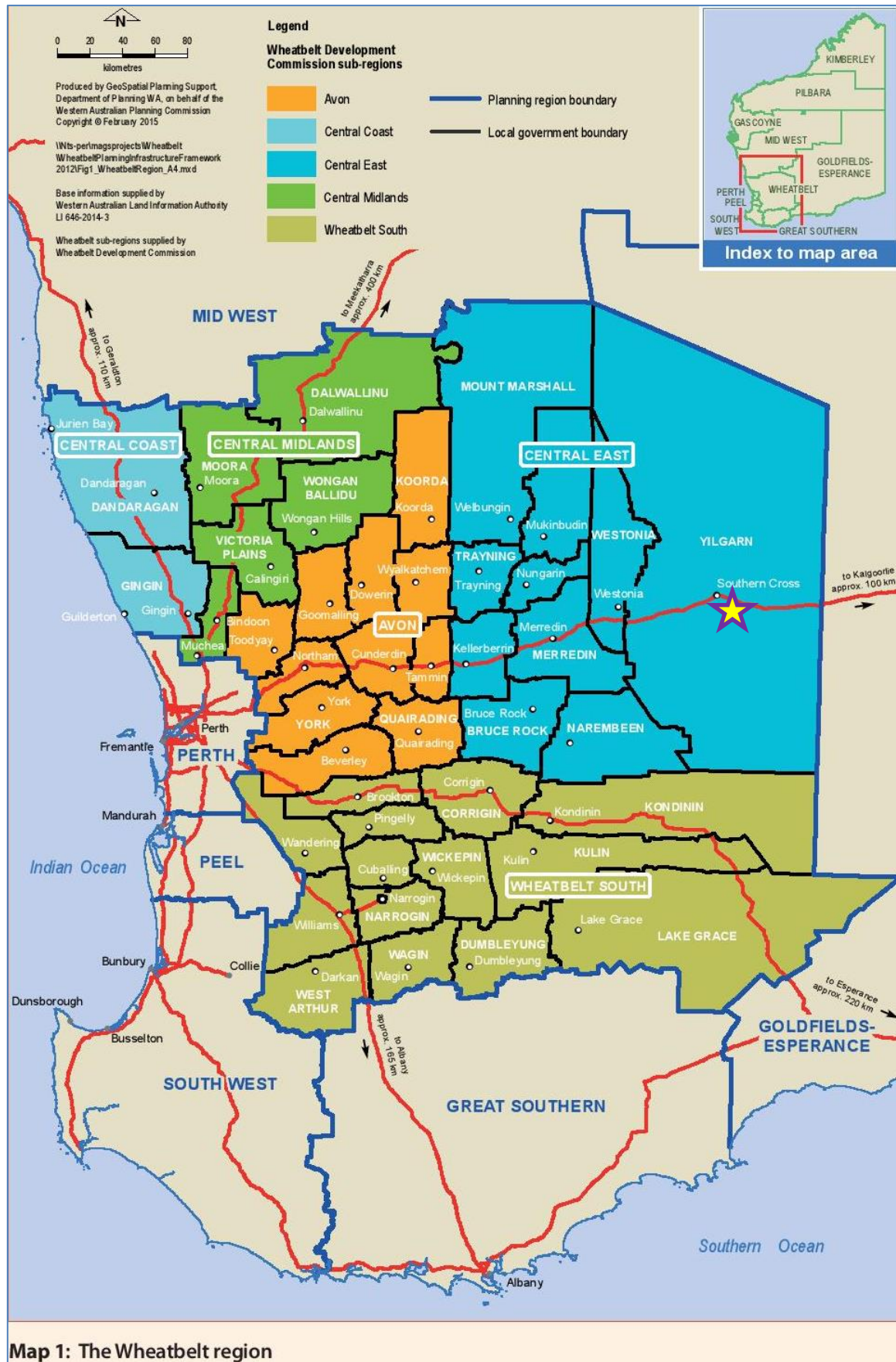


**Figure 12 –State Planning Strategy 2050 Figure 30 (Planning for Energy)  
(Project Area Identified by Yellow Star)**

### 6.1.2 Wheatbelt Regional Planning and Infrastructure Framework (2015)

The project area is located within the Wheatbelt Regional Planning region and is identified within the Central East sub-region under Map 1 of the *Wheatbelt Regional Planning and Infrastructure Framework Part A: Regional Strategic Planning (the Framework)*. A copy of Map 1 identifying the project area with a yellow star is included at **Figure 13**.





**Figure 13: Wheatbelt Regional Planning and Infrastructure Framework Part A: Regional Strategic Planning Map 1**

Section 4 of the Framework contains the “Vibrant Economy” strategic measures, with the relevant objectives contained at Section 4.1 as follows:

*A diversified and adaptive economy that:*

- *increases its contribution to the Western Australian economy; ...*
- *enables diversification through the establishment and growth of new and innovative industries.*

Section 4.11.3 (Electricity) states as follows:

*“The wheatbelt offers an abundant source of renewable energy. The climatic and geographic conditions of the Wheatbelt are conducive to alternative energy generation such as wind, solar, geothermal and biomass generation. Renewable energy offers the capacity to reduce reliance on centrally distributed energy. .... and there is potential to establish other alternative energy initiatives.”*

*“While the wheatbelt offers an abundant source of renewable energy, the Southwest Interconnected System has limited capacity to receive renewable energy. As such, renewable energy projects are likely to be most required in ‘end of grid’ or for areas outside of the system. With opportunities to feed into the System now limited, there remains an opportunity for localized energy production.”*

The proposed wind farm will be connected to the grid to export energy and its location supports the potential for supplying local energy intensive processing or industrial businesses. This proposal improves opportunities for industrial development through ‘behind the meter’ energy supply and thereby reducing their costs and encouraging new business investment.

## 6.2 State Planning Policies

### 6.2.1 State Planning Policy 1: Planning Framework

The State Government’s broad planning framework, *State Planning Policy No. 1 (SPP1)*, arose from the *State Planning Strategy 2050* (WAPC 2020) and brought together a statutory planning framework for Western Australia. The *State Planning Strategy 2050* combined State and regional policies and articulated general principles for land use planning and development. It sets the key principles relating to the environment, community, economy, infrastructure, regional development, and governance, which guide how future planning decisions are made regarding each of those six elements. Under Section 5 (General Principles for Land Use Planning and Development) of that Policy, it states:

*“The primary aim of planning is to provide for the sustainable use and development of land.”*

The State Planning Strategy identifies the principles that further define this primary aim and outlines elements that influence good decision-making in land use planning and development. Planning should consider, and give effect to, these principles and related policies to ensure integrated decision making throughout government. As they relate to the proposal, these elements are included in **Table 2**:

**Table 2: Principles and Elements of SPP 1.0**

Principle	Elements	Comment
<b>Community</b>  <u>Principle</u>  Enables diverse, affordable, accessible, and safe communities	<p>Planning anticipates and responds to the needs of existing and future communities be zoned and serviced land for housing, employment, recreation and open space, commercial and community facilities. Planning should recognise the need for and, as far as practicable, contribute towards more sustainable communities by:</p> <ul style="list-style-type: none"> <li>i. accommodating future population growth and provide housing choice and diversity to suit the needs of different households, including specialist housing needs and the services they require;</li> <li>ii. promoting a range of accessible community resources, including affordable housing, places of employment, open space, urban tree canopy, education, health, cultural and community services;</li> <li>iii. integrating land use and transport planning and promoting patterns of land use which reduce the need for transport, promote the use of public transport and reduce the dependence on private cars;</li> <li>iv. ensuring high standards of urban design and encouraging safe environments and a sense of neighbourhood and community identity;</li> <li>v. promoting commercial areas as the focus for shopping, employment and community activities at the local, district and regional levels; and</li> <li>vi. providing effective systems of community consultation at appropriate stages in the planning and development process.</li> </ul>	<p>It is intended that the proposed wind farm will be constructed on an area of cleared rural land which has historically been used for cropping. The project is proposed to be located approximately 12km south-east of the Southern Cross townsite located across four (4) freehold rural lots comprising a total land area of approximately 1,464ha. The proposal is therefore capable of being sited to minimise impacts on surrounding land uses in terms of visual impacts and noise.</p> <p>Once operational, local energy generation from the proposed wind farm can be utilised to support downstream agricultural, goods, processing, and other local energy intensive industries with minimal impact upon agricultural land and the surrounding area.</p>

Principle	Elements	Comment
<b>Economy</b>  <u>Principle</u>  Facilitate trade, investment, innovation, employment, and community betterment.	Planning should contribute to the economic wellbeing of the State, regions and local communities by supporting economic development through the provision of land, facilitating decisions and resolving land use conflicts. In particular, planning should provide for economic development by: <ul style="list-style-type: none"> <li>i. providing suitable zoned and serviced land for industry, business and other employment and wealth generating activities;</li> <li>ii. protecting agricultural land resources from inappropriate uses;</li> <li>iii. avoiding land use conflicts by separating sensitive and incompatible uses from industry and other economic activities with off-site impacts;</li> <li>iv. promoting local employment opportunities in order to reduce the time and cost of travel to work;</li> <li>v. providing sites for tourism accommodation and facilities taking account of their special location and servicing needs; and</li> <li>vi. ensuring that plans and policies are clear and certain, decisions are made in accordance with plans and policies, and decisions are made expeditiously.</li> </ul>	<p>The proposed wind farm and battery storage facility will be a significant investment in the energy infrastructure of Western Australia.</p> <p>The proposal will generate employment during the construction and commissioning phase and will also provide demand for ongoing employees as part of the monitoring and maintenance of the infrastructure.</p> <p>The community will benefit significantly from this renewable energy proposal through the provision of an alternative supply of energy and storage that can service local demand in an efficient and sustainable manner without requiring additional base load capabilities to be generated through conventional means.</p>
<b>Environment</b>  <u>Principle</u>  Conserve the State's natural assets through sustainable development	Protecting environmental assets and the wise use and management of resources are essential to encourage more ecologically sustainable land use and development. Planning should contribute to a more sustainable future by: <ul style="list-style-type: none"> <li>i. promoting the conservation of ecological systems and the biodiversity they support, including ecosystems, habitats, species, and genetic diversity;</li> </ul>	<p>The proposal has been designed with focus on limiting environmental impact.</p>



Principle	Elements	Comment
	<p>ii. assisting in the conservation and management of natural resources, including air quality, energy, waterways and water quality, land, agriculture and minerals, to support both environmental quality and sustainable development over the long term;</p> <p>iii. protecting areas and sites with significant historic, architectural, aesthetic, scientific and cultural values from inappropriate land use and development;</p> <p>iv. adopting a risk-management approach which aims to avoid or minimise environmental degradation and hazards; and</p> <p>v. preventing environmental problems which might arise as a result of siting incompatible land uses close together.</p>	<p>Aside from the connection of the wind farm to existing power line infrastructure in close proximity to the project area and minor maintenance of access tracks during the construction phase, land clearing will be limited in this development application, as the proposed wind farm and battery storage is to be located on cleared farmland which has been historically actively cropped. The project area requires minimal site preparation work, preserving the State's natural assets, when compared with utilising uncleared land.</p> <p>The proposal is specifically aimed at providing a viable alternative energy source that will benefit the surrounding community and efficiency in delivering energy to the SWIS. Alternative energy sources are becoming increasingly important in protecting the environment and promoting sustainability.</p> <p>The wind farm and battery storage proposal is suitably located in an agricultural area approximately 12km south-east of the townsite of Southern Cross and will be capable of operating to ensure there are no compatibility issues arising from externalities associated with light, dust, noise or pollution associated with the activity.</p>
<b>Infrastructure</b>  <u>Principle</u>  Ensure infrastructure supports development.	Planning should ensure that physical and community infrastructure by both public and private agencies is coordinated and provided in a way that is efficient, equitable, accessible, and timely. This means:	The proposal will be connected to the SWIS and electricity generated will support local and regional loads.

Principle	Elements	Comment
	i. planning for land use and development in a manner that allows for the logical and efficient provision and maintenance of infrastructure, including the setting aside of land for the construction of future transport routes and essential services;  ii. protecting key infrastructure, including ports, airports, roads, railways and service corridors, from inappropriate land use and development;	Generation capacity from the project will at times exceed the electricity consumption of Southern Cross and Marvel Loch and the renewable energy generated will therefore form part of the local and regional consumption.

### 6.2.2 State Planning Policy 2.5: Rural Planning

State Planning Policy 2.5: Rural Planning (**SPP2.5**) has been developed with the purpose of protecting and preserving Western Australia's rural land assets due to the importance of their economic, natural resource, food production, environmental and landscape values. It also seeks to ensure broad compatibility between land uses is essential to delivering this outcome. SPP2.5 applies to development proposals on rural zoned land and is therefore applicable to the project area. Section 4 of SPP2.5 contains the policy objectives and includes the following relevant objectives:

- (a) *support existing, expanded and future primary production through the protection of rural land, particularly priority agricultural land and land required for animal premises and/or the production of food; ...*
- (e) *avoid and minimise land use conflicts;*

The above objectives are supported by policy measures under Section 5, which include the following relevant provisions which are addressed under **Table 3** and demonstrate that the proposal is compatible with the existing agricultural activities:

**Table 3: SPP2.5 Response**

Policy Measure	Relevant Sub-Clause	Comment
<b>5.1 Protection of rural land and land uses</b>  The WAPC will seek to protect rural land as a State resource by:	(c) ensuring retention and protection of rural land for biodiversity protection, natural resource management and protection of valued landscapes and views;	The proposal is unlikely to involve the clearing of remnant vegetation for the construction of the wind farm and battery storage components and through the site selection process, the potential for impacts to the surrounding environment and biodiversity has been limited. Minor clearing works may be required as

Policy Measure	Relevant Sub-Clause	Comment
		<p>part of the 33 kV powerline connection to Marvel Loch Road, however it is intended that the connection will be via an underground connection within existing cleared land along the shoulder of Glendower Road in order to minimise clearing works.</p> <p>Additionally, existing on-farm roads and tracks will be upgraded as required and several extended. It has been identified that some very negligible instances of vegetation clearing may be required for minor maintenance of access tracks during the construction phase. Where this occurs, field surveys to assess the conservation significance of vegetation will be undertaken, and any potential impacts identified will be mitigated accordingly with appropriate measures developed in the Construction Management Plan. For the protection of value landscape and views refer to Section 6.3.1, <b>Table 4</b> outlining the findings of the Visual Impact Assessment.</p>
	(d) protecting land, resources and/or primary production activities through the State's land use planning framework;	<p>The location of the proposed wind farm infrastructure occupies a small proportion of the land, approximately 14 ha of a combined lot area of 1,464 ha and will therefore allow farming practices to continue around the structures and equipment.</p>



Policy Measure	Relevant Sub-Clause	Comment
		Therefore, the proposal is not considered to materially compromise existing or potential future potential primary production of rural land. Further, the Department of Primary Industries and Regional Development (DPIRD) has been contacted in relation to the proposal and has confirmed that the “High Quality Agricultural Land” mapping has not extended across the South West Land Division. The proposal therefore is not proposed to be located on priority agricultural land and for the reasons provided above, will not prevent the existing landowners from undertaking primary production (where required) from their landholdings.
<b>5.5 Regional variation, economic opportunities and regional development</b>  Western Australia is a large and diverse State with regional variations of climate, economic activity, cultural values, demographic characteristics and environmental conditions. The WAPC’s decisions will be guided by the need to provide economic opportunities for rural communities and to protect the State’s primary production and natural resource assets. WAPC policy is to:	(d) recognise the differing needs of the various regions, and consider regional variations where they meet the stated objectives of this policy and are supported in strategies and schemes.	As outlined previously, the project will provide power for local consumption and reduce the importation of distant power generation through the SWIS to Southern Cross and surrounding industries and thereby provide a diverse mix of energy supplies in the Shire. The project area is located within an area identified as a potential wind energy area under the <i>State Planning Strategy 2050</i> .

Policy Measure	Relevant Sub-Clause	Comment
		The project footprint when considered against the overall land area within the project area is limited and will not prevent the continued rural activities occurring from the land.
<b>5.12 Preventing and managing impacts in land use planning</b>  One of the key elements in achieving the objectives of this policy is ensuring that zones and sites are suitable for their intended purpose. As a result, at each stage of the planning framework, planning decision-makers need to consider the broad suitability of land uses and the ability to manage offsite impacts prior to determining whether the use of a buffer is necessary.	<b>5.12.1 Avoiding land use conflict</b> Planning decision-makers shall take the following approach to avoid land use conflict:  (b) where a development is proposed for a land use that may generate off-site impacts, there should be application of the separation distances used in environmental policy and health guidance, prescribed standards, accepted industry standards and/or Codes of Practice, followed by considering –  (ii) whether surrounding rural land is suitable, and can be used to meet the separation distances between the nearest sensitive land use and/or zone, and would not limit future rural land uses;	The site selection process involved the establishment of a 2km (minimum) separation distance from occupied dwellings on rural lots (refer <b>Figure 14</b> ). The siting of turbines at these separation distances meets planning requirements for such separations and exceeds the separation provided for other operational wind farms.

### 6.2.3 State Planning Policy 3.7: Planning for Bushfire Prone Areas

A package of reforms was introduced in 2015 to help protect lives and property against the threat of bushfires throughout Western Australia. State Planning Policy 3.7: Planning for Bushfire Prone Areas (**SPP3.7**) and the Guidelines for Planning in Bushfire Prone Areas (**the Guidelines**) were released and took effect on 7 December 2015.

SPP 3.7 provides the foundation for land use planning decisions in designated bushfire prone areas. Areas within Western Australia have been designated as bushfire prone by the Fire and Emergency Services (**FES**) Commissioner, and the Map of Bushfire Prone Areas which identifies the parts of the State that are designated as bushfire prone came into effect on 8 December 2015. An extract of this Map depicting the portions of the sites forming the project area as bushfire prone at **Figure 15**.

As shown in **Figure 15**, the project area and the land within the subject lots where development is proposed to occur is positioned outside of the mapped bushfire prone areas due to the historic use of the land for cropping and agriculture. The areas mapped as bushfire prone in proximity to the project area relate to existing vegetated road reserves comprising long narrow strips of canopy trees with limited understorey vegetated. Given this predominant vegetation structure, the bushfire risk in this locality is considered to be minimal and the proposed turbines and associated infrastructure have been sited to achieve a 100m (minimum) separation to lot boundaries.

In terms of the applicability of SPP3.7 and the Guidelines to the current proposal, Section 2.6 of the Guidelines states as follows:

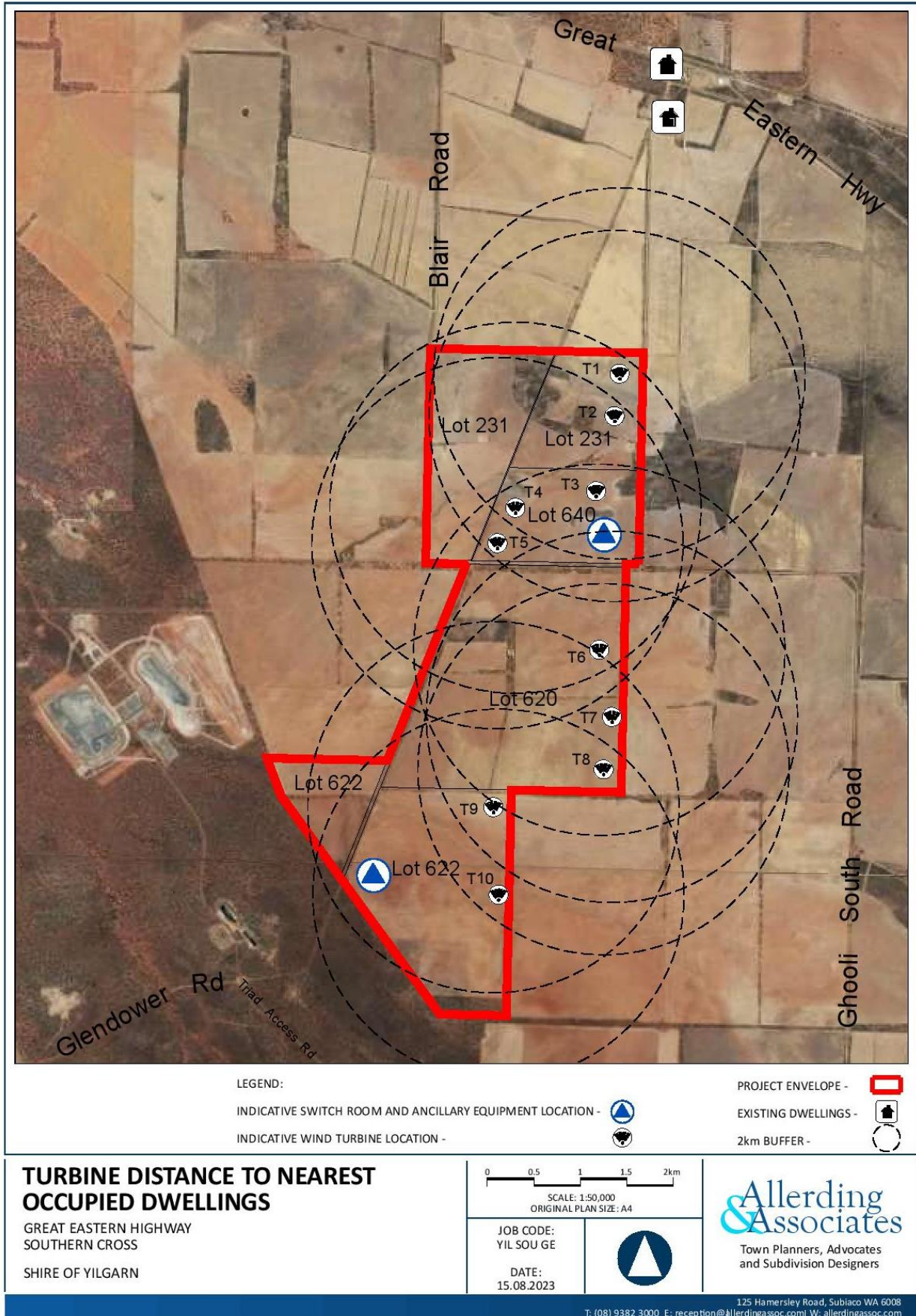
*Decision-makers can apply exemptions from the requirements of SPP 3.7 and these Guidelines where there is no intensification of land-use, and/or the proposal is not increasing the bushfire threat. Intensification of land use and/or development may include planning proposals that:*

- a) result in an increase of visitors, residents or employees; or*
- b) involve the occupation of employees on site for more than three hours at a time for multiple periods during a week.*

The proposed structures which form the proposal, including the wind turbines, battery storage containers and project switch rooms will all be non-habitable structures.

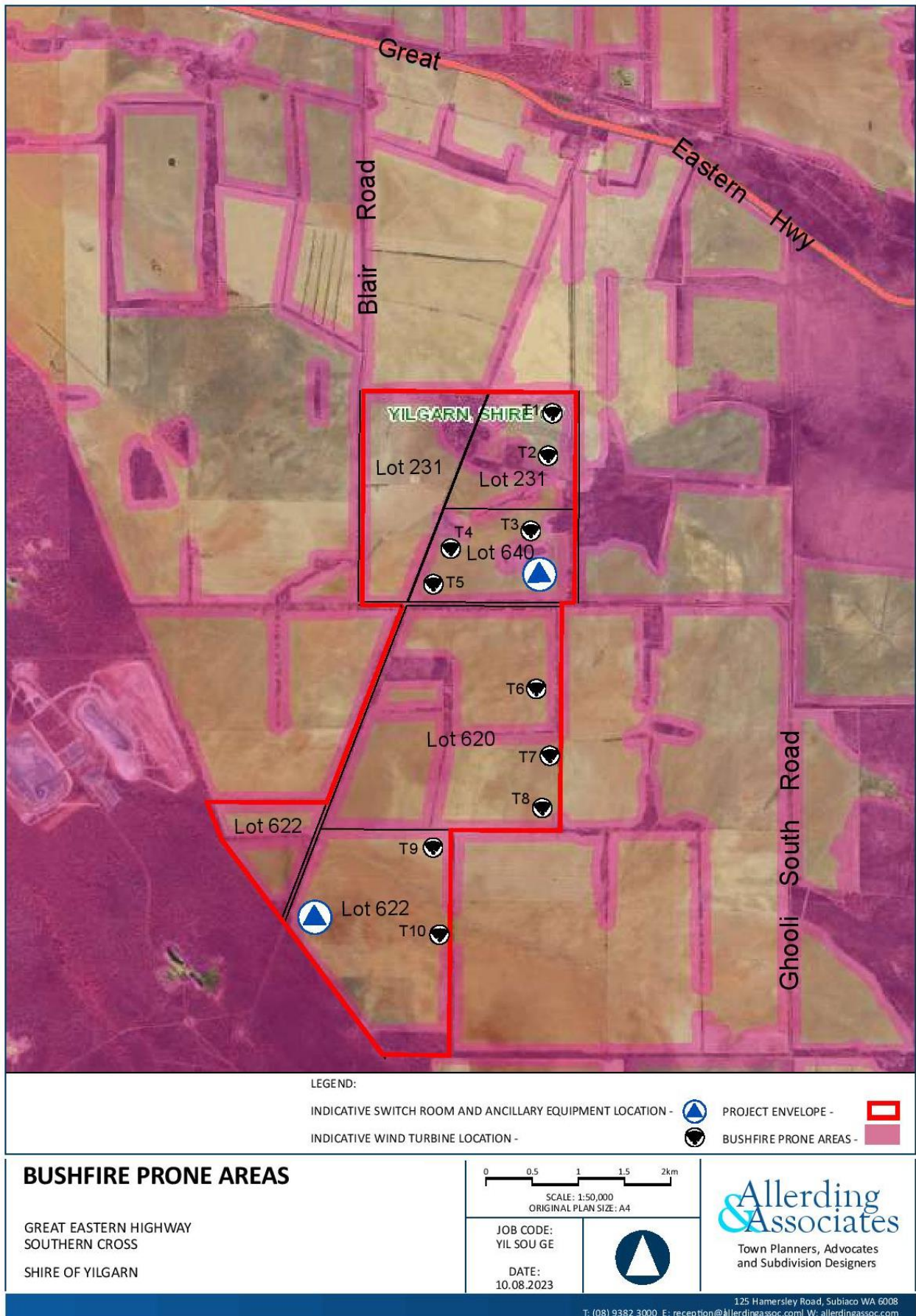
The project will not require full time employment of personnel for the proposed operations given the relatively small number of wind turbines and associated equipment installed. However regular routine and breakdown maintenance will be undertaken several times per year by visiting specialised wind turbine maintenance technicians and other specialists. The development will therefore be unoccupied for extended periods between routine maintenance works. Given that the project will not be occupied by employees for more than three hours at a time for multiple periods during a week (pursuant to the provisions of Section 2.6 of the Guidelines referenced above), the proposal meets the requirements from an exemption from SPP3.7.





**Figure 14: Turbine Distance to Nearest Occupied Dwellings**





**Figure 15: Bushfire Prone Areas Map**

## 6.3 Position Statements

### 6.3.1 Renewable Energy Facilities

The WAPC's *Position Statement: Renewable Energy Facilities (the Position Statement)* was adopted in March 2022 to support the consistent consideration of renewable energy facilities in Western Australia. This Position Statement is consistent with *State Planning Strategy 2050* in promoting renewable energy initiatives.

The Position Statement objectives are to guide the establishment of renewable energy facilities, outline key planning and environmental considerations, ensure consistent consideration of such facilities, and to facilitate development of renewable energy facilities while minimising potential impacts upon the environment, natural landscape and urban areas.

A response to the policy measures under Section 5.3 for renewable energy facility proposals is included at **Table 4** demonstrating how the proposal achieves the intent of the Position Statement in ensuring that the renewable energy proposal is located as to minimise potential impact upon the environment, natural landscape and urban areas while maximising energy production returns and operational efficiency:

**Table 4: Renewable Energy Facility Proposal Comment**

Position Statement Section	Applicant's Comment
5.3.1  Community Consultation	<p>Yilgarn Holdings Pty Ltd has met with representatives of the Shire during 2022 to discuss the proposal through the early stages of development. This process has assisted in identifying potential matters that may arise once the project is presented to the local community.</p> <p>Landowners within the project area have also been engaged with regularly since 2021, involving:</p> <ul style="list-style-type: none"> <li>• Face to face and telephone discussions focussed on an introduction to the project.</li> <li>• Initial concept plans discussed and shared to promote an understanding and prompt questions.</li> <li>• Regular follow up engagements with landowners as the project matures.</li> </ul> <p>Neighbouring landowners were contacted from March 2023, involving:</p> <ul style="list-style-type: none"> <li>• An introductory meeting and telephone discussions focussed on an introduction to the project.</li> <li>• Project concept discussed and shared to help improve understanding and prompt questions.</li> </ul> <p>Engagement with Western Power also commenced in September 2022 to introduce the project and discuss the network planning strategy and key assumptions for project network access enquiry.</p>

Position Statement Section	Applicant's Comment
	<p>A Stakeholder Consultation diary has been prepared outlining the consultation undertaken and the future consultation planned. A copy of the A Stakeholder Consultation diary is included at <b>Annexure 11</b>.</p> <p>A Community Engagement Philosophy has also been prepared in support of the application to provide a clear set of requirements that will be used during the development of the Southern Cross Community Engagement Plan for the execute phase of the project. A copy of the Community Engagement Philosophy is included at <b>Annexure 12</b>.</p>
5.3.2  Environmental impact	<p>The Position Statement notes that an environmental survey of the project area should be conducted prior to the commencement of the renewable energy facility design. Ecoscape Australia Pty Ltd were commissioned to undertake a Flora and Fauna Assessment of the proposed wind farm. A copy of that assessment is included at <b>Annexure 8</b>.</p> <p>The Assessment concludes that the project area did not intersect any mapped Environmentally Sensitive Areas or any Department of Biodiversity, Conservation and Attractions (DBCA) legislated Nature Reserves.</p> <p>The Assessment notes the nearest Environmentally Sensitive Areas are located 9km east of the project area at the Yellowdine Nature Reserve (refer <b>Figure 16</b>).</p> <p>The nearest legislated conservation land to the project area was listed as Nature Reserve R25801, which is 8km northwest of the project area, Yellowdine Nature Reserve is 9km east, and Wokallarry Nature Reserve some 19 km southwest (refer <b>Figure 16</b>).</p> <p>The Assessment identified no Threatened or Priority Ecological Communities as occurring within the Investigation Area (refer <b>Figure 17</b>).</p> <p>The Assessment provided 17 conservation listed fauna species likely to occur within the project area and an applied 70km buffer (refer <b>Figure 18</b>). Of these species, only <i>Leipoa ocellata</i> (Malleefowl), and <i>Tringa nebularia</i> (Common Greenshank) have been recorded in the previous 20 years. Wind farms are well understood to impact native bird populations, particularly raptors, microbats, and migratory waterbirds, in that the operation of turbines have potential to cause mortality by turbine strike.</p> <p>Apart from possible minor clearing associated with the powerline connection and access tracks during the construction phase, the proposed development will substantially avoid the clearing of remnant vegetation which will, in turn, ensure little to no impact to flora and fauna species. Notwithstanding, the operator will commit to the following management measures for flora and fauna protection:</p>



Position Statement Section	Applicant's Comment
	<ul style="list-style-type: none"> <li>Setting back of wind turbines and associated equipment a minimum of 100m from common lot boundaries and 70m from remnant vegetation;</li> <li>Locating equipment on cleared actively managed farmland;</li> <li>Developing an Environmental Management Plan and executing this prior to construction activities. The plan will support pre-construction, construction, and operations phase of the wind farm;</li> <li>Undertaking studies to assist to identify communities of raptors, microbats, and migratory waterbirds that may be present in the project area. Studies will begin prior to construction to establish baselines results and will continue through construction and into commercial operations; and</li> <li>Undertaking studies to assist to identify any Threatened Ecological Communities or Priority Ecological Communities in areas where wind farm equipment may be located.</li> </ul> <p>In summary, given the land subject of the application is cleared farmland that has been actively cropped for many years, advice from the environmental experts appointed as part of the project suggest limited risk of identified flora or fauna within the project area.</p>
5.3.3 Visual and landscape impact	<p>The Position Statement indicates that renewable energy facility proposals may require a visual and landscape impact assessment.</p> <p>EPCAD were commissioned to complete a Visual Impact Assessment assessing potential impacts to landscape and landforms where visual amenity is a consideration. A copy of that assessment is included at <b>Annexure 5</b>.</p> <p>The majority of significant viewsheds in Southern Cross and Marvel Loch to and from the project area do not have proximal visibility of the project itself. The project is not within any recognised sites of visual significance noted within Yilgarn Shire to the west. Visual impacts to the east are insignificant given the sparsely populated region. Due consideration has been given to the landscape, proposed land use, separation distances, and relatively low number of turbines to be installed in assessing the level of visual impact. The Visual Impact Assessment concludes that the visual impact of the proposal will be low to moderate in nature.</p>
5.3.4 Noise impact (wind turbine proposals)	<p>The Position Statement recommends that renewable energy facility proposals involving wind turbines are separated by a minimum of 1,500m (measured between a noise-sensitive land uses and a wind turbine).</p>

Position Statement Section	Applicant's Comment
	<p>The proposal achieves a minimum setback distance between identified receiver points and wind turbines of at least of 2,000m. A Noise Impact Assessment has been undertaken by a specialist in wind farm noise assessment to assess the noise impact from the proposal (refer <b>Annexure 4</b>). The assessment concludes that noise emissions at identified receiver locations (dwellings) are calculated at approximately 25 dB(A), which comply with the most stringent criteria of 35 dB(A) at all hub-heights and wind speeds.</p> <p>Background noise levels will be assessed in further detail (if required) once the final wind turbine locations are determined.</p>
5.3.5  Public and aviation safety	<p>Whilst public access is not proposed in proximity to the wind farm, consideration has been given to aviation safety risk and bushfire risk as required under the Position Statement.</p> <p>In relation to aviation safety, an aviation expert was engaged in the early phases of the project to:</p> <ul style="list-style-type: none"> <li>• Assess the potential aviation impacts associated with the project;</li> <li>• Provide aviation safety advice in respect of relevant requirements of air safety regulations and procedures; and</li> <li>• Inform and document consultation with relevant aviation agencies.</li> </ul> <p>The Aviation Impact Assessment is included at <b>Annexure 9</b>. As outlined in the Executive Summary, the aviation impact statement contains the following conclusions:</p> <p><i>Based on the Project WTG layout and maximum blade tip height of up to 240 m AGL, the blade tip elevation of the highest WTG associated with both proposed WTG configurations, will not exceed 678 m AHD (2224.41 ft AMSL) and:</i></p> <ul style="list-style-type: none"> <li>• <i>will not infringe Southern Cross aerodrome (YSCR)'s obstacle limitation surfaces</i></li> <li>• <i>infringes the PANS-OPS surfaces of Southern Cross aerodrome and will require amendments to both instrument approach procedures</i></li> <li>• <i>will not constrain the implementation of instrument flight procedures aligned with runway 09/27 at Southern Cross aerodrome – refer section 6.5</i></li> <li>• <i>the infringements to the YSCR PANS-OPS surfaces will not create an impact to the existing flight paths for runway 14/32</i></li> <li>• <i>will require an increase to the LSALT for air route V242</i></li> <li>• <i>will require an increase to the Grid LSALT to 2100 ft AMSL</i></li> <li>• <i>will not have an impact on operational airspace</i></li> <li>• <i>is wholly contained within Class G airspace</i></li> </ul>

Position Statement Section	Applicant's Comment
	<ul style="list-style-type: none"> <li>• <i>is outside the clearance zones associated with civil aviation navigation aids and communication facilities.</i></li> </ul> <p>Given that the proposed wind farm will require an increase to the Lower Safe Altitudes (LSALT) and Minimum Sector Altitude (MSA), this would impact the operations of certain aircraft operators landing in accordance with the Visual Flight Rules (VFR) at the Southern Cross Aerodrome. The proposal would therefore require the design and implementation of instrument flight procedures for runway 09/27 to assist with landing in low visibility conditions.</p> <p>The Aviation Impact Assessment concludes that the proposal “will not constrain the implementation of instrument flight procedures aligned with runway 09/27”. This also aligns with the findings of the Feasibility Study Instrument Procedure Assessment Report (refer <b>Annexure 10</b>) which is intended to be read in conjunction with the Aviation Impact Assessment and concludes that the proposed wind farm does not impact the assessed instrument flight procedures.</p> <p>In addition to addressing aviation safety impacts associated with the proposed wind farm, the project will provide a positive benefit to the Southern Cross Aerodrome and its local amenity through development of instrument flight procedures which will increase the probability of accessing the aerodrome.</p> <p>It is understood that all costs associated with the development, implementation and ongoing management of instrument flight procedures for runway 09/27 of the Southern Cross Aerodrome will be borne by the developer of the wind farm proposal. A separate agreement is currently being prepared in consultation with the Shire which will set out the terms of funding arrangements to the satisfaction of the Shire.</p> <p>Further consultation with respect to aviation will occur during the assessment phase involving the Aerodrome Management Services (AMS), Maroomba Airlines, Australian Civil Aviation Safety Authority (CASA), Airservices Australia, Department of Defence, Royal Flying Doctor Service of Australia and the Shire of Yilgarn.</p> <p>In relation to bushfire risk, the proposal involves the setting back of wind turbines and associated equipment a minimum of 100m from common lot boundaries and 70m from remnant vegetation. This will assist to minimise the bushfire risk associated with proposed structures to surrounding bushland. Given the land surrounding the wind turbines and battery storage structures will either comprise hardstand or cleared grassland, the establishment of 10m Asset Protection Zones will be possible to ensure bushfire risk is limited across the project area.</p>

Position Statement Section	Applicant's Comment
5.3.6 Heritage	<p>The potential for impact to Aboriginal heritage has been assessed as part of the Aboriginal Heritage Assessment (refer <b>Annexure 6</b>). The assessment considered local archaeological and ethnographical records, and any potential for impact to the natural environment that have aesthetic, historical, scientific, or social significance, or other objects of special value for the present and future community, as well as historic heritage characteristics of adjoining/nearby places. The assessment concluded that there were no identified heritage sites of value within the project area.</p> <p>Wind farm representatives have also recently met with Traditional Owners to outline the wind farm development and the next steps for the project.</p> <p>Historic heritage sites within 10km of the project area have also been reviewed having regard to available records through InHerit and other supporting documentation in order to identify whether any significant western heritage features existing in on or in proximity to the sites. A copy of that review is included at <b>Annexure 7</b>.</p> <p>All heritage sites identified are located outside of the project area. These sites relate to the Goldfields boom period, the water pipeline servicing the Goldfields, and associated mining histories, including:</p> <ul style="list-style-type: none"> <li>• Goldfields Water Supply Scheme - Mundaring to Kalgoorlie (Place No 106003);</li> <li>• No 6 Steam Pumping Station - Ghooli (Place No 2789);</li> <li>• Bronti Tank - Emu Fence Road, Ghooli (Place No 10869); and</li> <li>• Second Pumping Station – Ghooli (Place No 8196).</li> </ul> <p>During construction of the wind farm, staff and contractors will follow procedures to ensure if during construction activities an object is found that may be of historic value, work will stop until an assessment is performed on the object by an appropriately qualified consultant.</p>
5.3.7 Construction impact	<p>It is anticipated that a Construction Management Plan will be required as a condition of development approval. The Construction Management Plan will include specific details to safely manage people, construction activities, and vehicle movements at the construction site.</p> <p>Public safety will be managed for the construction phase through the Construction Management Plan. Public safety throughout the operational life of the wind farm will be managed through the Operations Management System and its supporting processes and procedures.</p>



## 6.4 Guidelines

### 6.4.1 Draft National Wind Farm Development Guidelines (July 2010)

In January 2009, the Australian Government’s National Environment Protection Council (**NEPC**) directed a Working Group of officials to draft the National Wind Farm Development Guidelines (**the Development Guidelines**) in light of the expected increase in wind farm developments in coming years. The intent and application of the Development Guidelines has been described by the NEPC in the following terms:

*“... The draft Guidelines outlined best practice for industry and planning authorities and were not mandatory, nor did they seek to change existing jurisdictional statutory processes. The draft Guidelines were released for public consultation in July 2010 for a period of twelve months to allow jurisdictions time for further consultations with relevant stakeholders.*

*As a result of these consultations, it has become apparent that jurisdictions have developed, or are currently developing planning application, assessment and approval processes within their own planning frameworks to manage community concerns about wind farm developments such as turbine noise, shadow flicker, electromagnetic interference and impacts of landscapes and wildlife. The Environment Protection and Heritage Standing Committee has therefore decided to cease further development of the Guidelines.*

*Wind farm proposals that may impact on matters of national environmental significance will continue to be assessed under the provisions of the Environment Protection and Biodiversity Conservation Act 1999.*

*The draft guidelines remain a valuable reference document for industry and planning authorities and may be used and reproduced for non-commercial purposes. ...”*

The Development Guidelines therefore have no statutory affect with respect to the assessment of wind farm proposals and have not been included in response to the applicable planning framework below. The Development Guidelines do nevertheless set out a range of considerations relevant in the assessment and consideration of new wind farm proposals. The “Wind Farm Specific Issues” outlined under Section 3 of the Development Guidelines are outlined in **Table 5** below. It is also noted that the WAPC’s *Position Statement: Renewable Energy Facilities* has been adopted to support the consistent consideration of renewable energy facilities in Western Australia. A response to the Position Statement is included under Section 6.3.1 in the preceding section of this report. Where the provisions of the Position Statement have been addressed in response to the wind farm proposal under Section 6.3.1, they have not been repeated under **Table 5**.

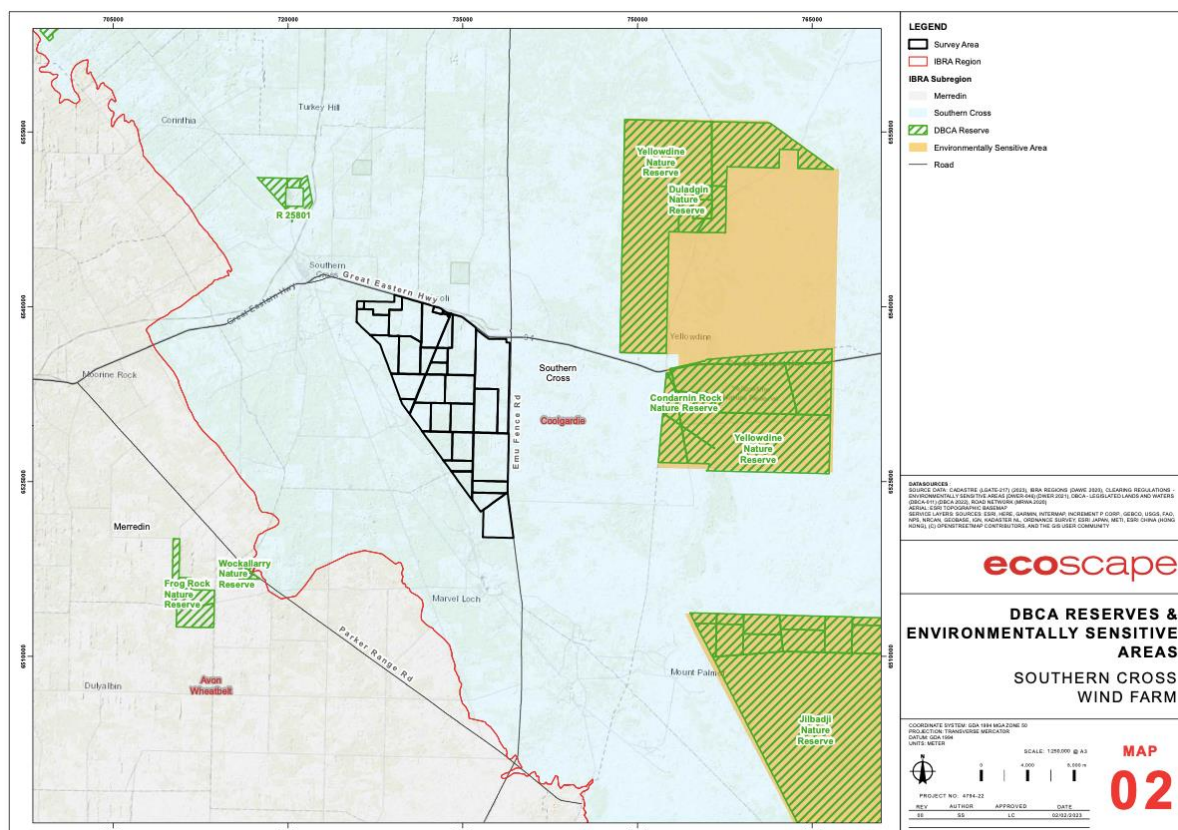
**Table 5: Response to Wind Farm Specific Issues under the Development Guidelines**

Wind Farm Specific Issue	Applicant’s Comment
3.1 Community and stakeholder consultation	Refer to response to Position Statement Section 5.3.1 (Community Consultation) under <b>Table 4</b> of Section 6.3.1.
3.2 Wind Turbine Noise	Refer to response to Position Statement Section 5.3.4 (Noise Impact) under <b>Table 4</b> of Section 6.3.1.

Wind Farm Specific Issue	Applicant's Comment
3.3 Landscape	Refer to response to Position Statement Section 5.3.3 (Visual and Landscape Impact) under <b>Table 4</b> of Section 6.3.1.
3.4 Birds and bats	Refer to response to Position Statement Section 5.3.2 (Environmental Impact) under <b>Table 4</b> of Section 6.3.1.
3.5 Shadow flicker	<p>The Development Guidelines note that shadow flicker is produced by wind turbine blades blocking the sun for short periods of time (less than 1 second) as the blades rotate, causing a strobing effect. The likelihood of shadow flicker affecting people is dependant on the alignment of the wind turbine and the sun, and their distance from the wind turbine. The main risk associated with shadow flicker is the potential to disturb residents in the immediate vicinity.</p> <p>The operator has calculated that the impact of shadow flicker has potential to occur up to distances of 10 rotor diameters away from a turbine, or approximately 1,300m to 1,800m, based on a rotor diameter of 130m to 180m.</p> <p>The operator has selected a conservative set back of 2,000m (minimum) to the nearest dwelling, which is significantly more than that suggested in the Development Guidelines. Through the modelling undertaken as part of this proposal, it has also been demonstrated that there will be no shadow flicker impact to dwellings (refer <b>Figure 19</b>). This is due to:</p> <ul style="list-style-type: none"> <li>• The nearest dwellings being located approximately 2,800m from the nearest turbine; and</li> <li>• The nearest dwellings being located to the north of the proposed wind turbines. This means that the angle of the sun at all times throughout the year (including winter) will be either over head or from the north and therefore any shadow cast by the turning turbine blades will not be visible from the nearest dwellings and those dwellings will therefore not be exposed to the effects of shadow flicker.</li> </ul> <p><b>Figure 19</b> demonstrates the areas surrounding the turbines which may experience shadow flicker effects. However, it is noted that <b>Figure 19</b> is conservative and it is likely that the total area of surrounding land which will experience shadow flicker will be far less during the summer months when the sun is directly above. In the winter months, the effects will be to the south of the turbines (and therefore positioned away from the nearest dwellings to the north).</p>
3.6 Electromagnetic interference (EMI)	The Development Guidelines state that wind turbines can interfere with electromagnetic (or radio communication) signals either by blocking, reflecting or refracting electromagnetic waves emitted from a source. They can also on-transmit or scatter radio communication signals. Microwave, television, radar and radio transmissions are all

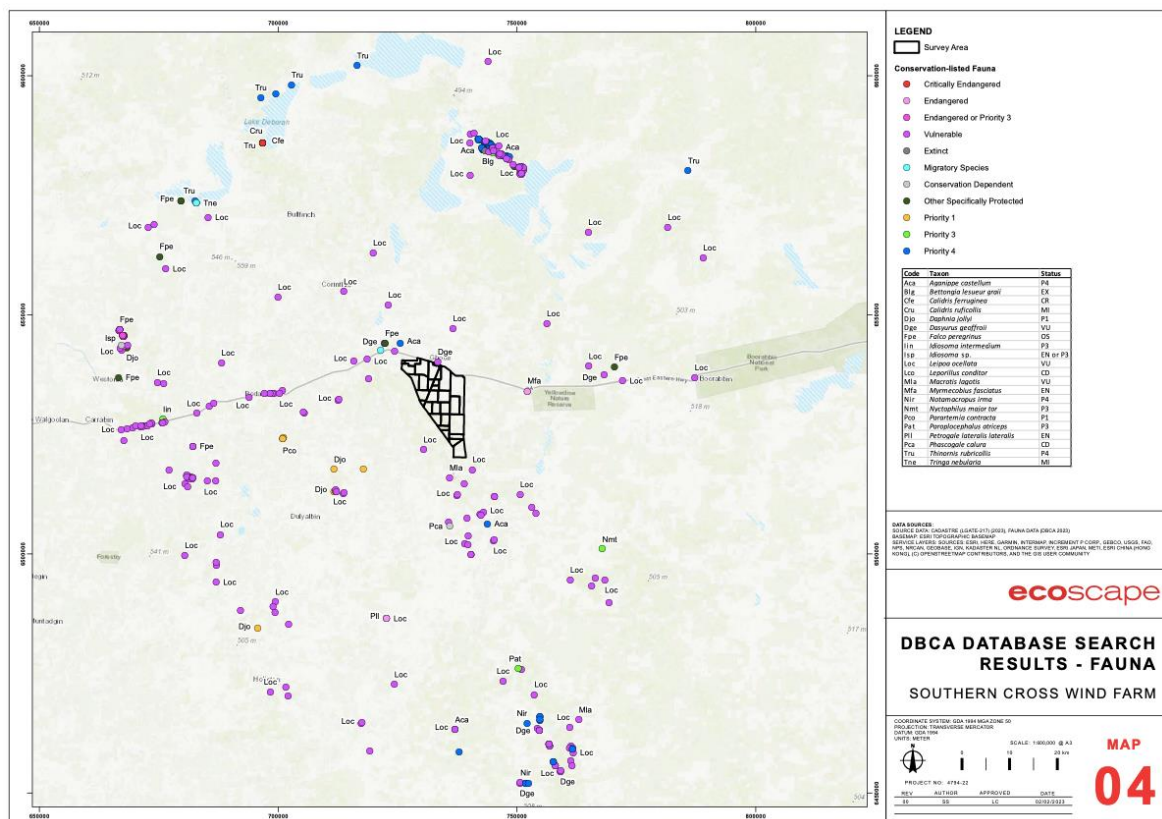
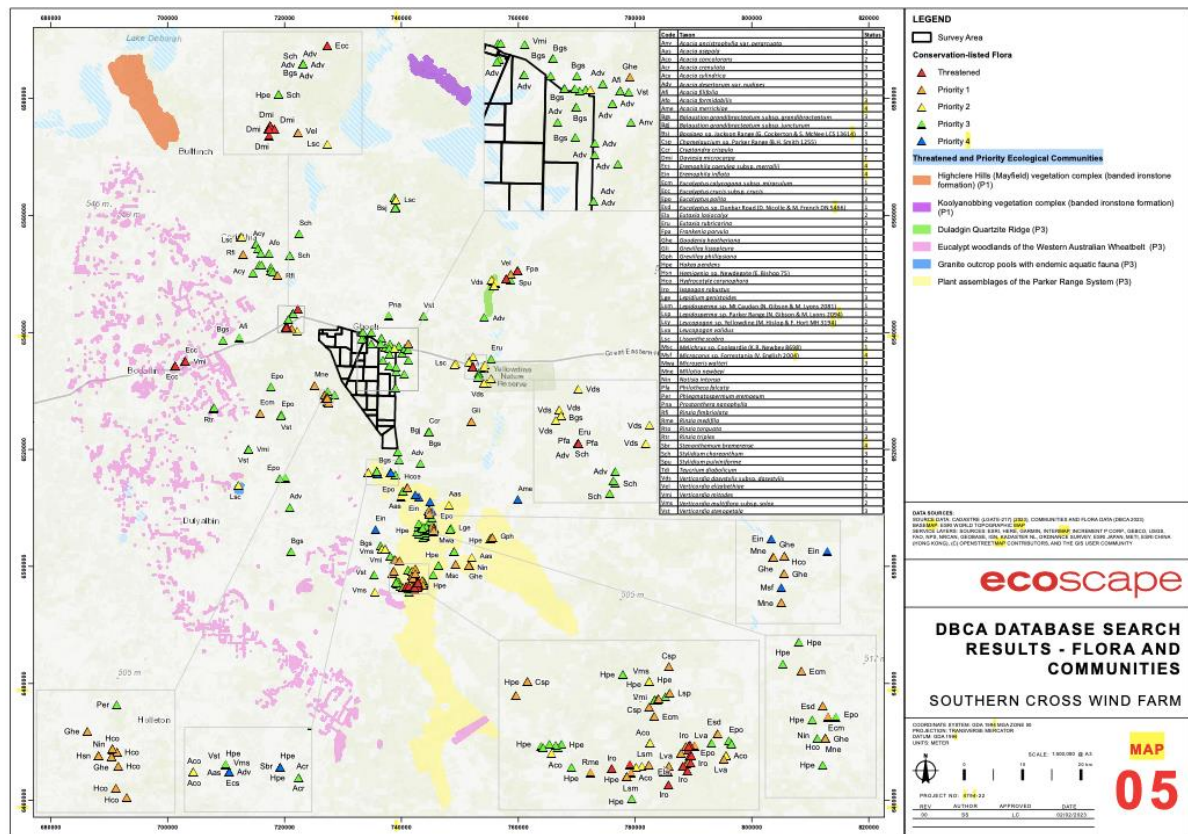
Wind Farm Specific Issue	Applicant's Comment
	<p>examples of radio communication signals which may be impacted by the development of a wind farm.</p> <p>As the proposal will introduce fixed elevated structures into the landscape, the operator has undertaken an Electromagnetic Interference Assessment to determine whether there would be any potential for interference to existing signal transmission. The assessment considered 10 turbine locations with commercially available turbines of a maximum tower height of 150m and blade length of 90m (240m total height). The assessment was informed by the provisions of the Development Guidelines and the Position Statement, where relevant.</p> <p>In summary, the proposal has been assessed as not likely to impact the following:</p> <ul style="list-style-type: none"> <li>• Radiocommunications towers;</li> <li>• Fixed license of point-to-multipoint services;</li> <li>• Emergency services;</li> <li>• Aircraft navigation and radar;</li> <li>• Meteorological radar;</li> <li>• Geodetic markers; and</li> <li>• Mobile phone coverage (G3, G4 and G5) and Wireless Internet.</li> </ul> <p>There may be some impacts to fixed license of point-to-point services, with seven point-to-point linkages across the project area identified as having the potential for impact due to the location of wind turbines No. 1 and No. 2. It is important to note that information contained within the Australian Communications and Media Authority (ACMA) Register used for this assessment has an accuracy level of +/- 100m and as such, the error level within the assessment relating to wind turbines No. 1 and No. 2 may be eliminated when final turbine locations are determined.</p> <p>In the event that there is potential for fixed license point-to-point services to be impacted by the proposal following the final positioning of to wind turbines No. 1 and No. 2, the operator will consider either minor repositioning of turbines or the realignment or replacement of television antenna in consultation with relevant stakeholders.</p>
3.7 Aircraft safety	Refer to response to Position Statement Section 5.3.5 (Public and Aviation Safety) under <b>Table 4</b> of Section 6.3.1.
3.8 Blade glint	<p>The Development Guidelines note that blade glint can be produced when the sun's light is reflected from the surface of wind turbine blades. Blade glint has potential to annoy people.</p> <p>The guidance notes under the Development Guidelines also state that:</p>

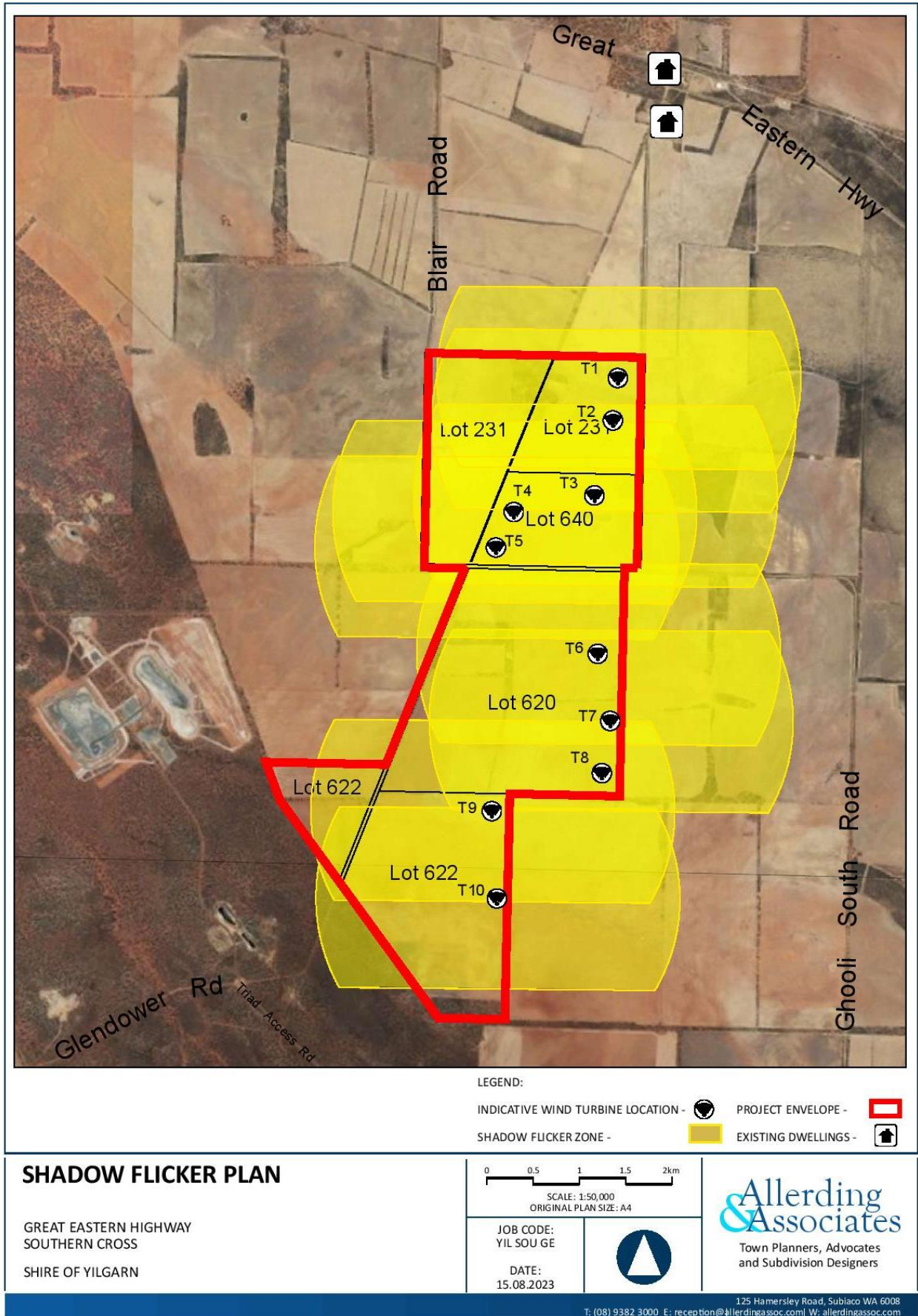
Wind Farm Specific Issue	Applicant's Comment
	<p><i>All major wind turbine blade manufacturers currently finish their blades with a low reflectivity treatment. This prevents a potentially annoying reflective glint from the surface of the blades and the possibility of a strobing reflection when the turbine blades are spinning. Therefore the risk of blade glint from a new development is considered to be very low.</i></p> <p><i>Proponents should ensure that blades from their supplier are of low reflectivity.</i></p> <p>The proposed wind turbine blades will be design with low reflectivity.</p>
3.9 Fire risk	Refer to response to Position Statement Section 5.3.5 (Public and Aviation Safety) under <b>Table 4</b> of Section 6.3.1.
3.10 Heritage	Refer to response to Position Statement Section 5.3.6 (Heritage) under <b>Table 4</b> of Section 6.3.1.
3.11 Indigenous Heritage	Refer to response to Position Statement Section 5.3.6 (Heritage) under <b>Table 4</b> of Section 6.3.1.



**Figure 16: Reserves and Environmentally Sensitive Areas**







**Figure 19: Shadow Flicker Zone**



## 7.0 LOCAL PLANNING FRAMEWORK

### 7.1 Statutory Planning Framework

#### 7.1.1 Shire of Yilgarn Town Planning Scheme No. 2

The project area is zoned “Rural/Mining” under the *Shire of Yilgarn Town Planning Scheme No. 2 (TPS2)*. The zoning map of the TPS2 is available in **Figure 20**.

Clause 3.1.1(f) states as follows in relation to the Rural/Mining zone:

**f) Rural/Mining Zone**

*The Rural/Mining Zone is to be used for agricultural, residential and public recreation uses. Extractive industry (mining) occurs widespread in the rural area of the Shire but, owing to its high impact, needs to be approved by Council after satisfactory advertisement.*

The term “Renewable Energy Facility” is defined in Clause 38 (Land use terms used) in TPS2 as follows:

*renewable energy facility means premises used to generate energy from a renewable energy source and includes any building or other structure used in, or relating to, the generation of energy by a renewable resource. It does not include renewable energy electricity generation where the energy produced principally supplies a domestic and/or business premises and any on selling to the grid is secondary;*

However, the Renewable Energy Facility land use is not contained within the Zoning Table.

Clause 3.2 of TPS2 outlines the relevant provisions with respect to the interpretation of the uses permitted by the Scheme in various zones. Clause 3.2.5 states:

*If the use of the land for a particular purpose is not specially mentioned in the Zoning Table and cannot reasonably be determined as falling within the interpretation on one of the use categories the Council may:*

- a) *determine that the use is consistent with the objectives and purposes of the particular zone and is therefore permitted; or*
- b) *determine that the proposed use may be consistent with the objectives and purpose of the zone and thereafter follow the "SA" procedures of Clause 6.3 in considering an application for planning approval; or*
- c) *determine that the use is not consistent with the objectives and purposes of the particular zone and is therefore not permitted.*

(Underline emphasis added)

The proposal is consistent with the intent of the Rural/Mining zone, as it will ensure that broadacre farming and cropping activities can continue on the land given the comparatively small footprint of the proposed development.

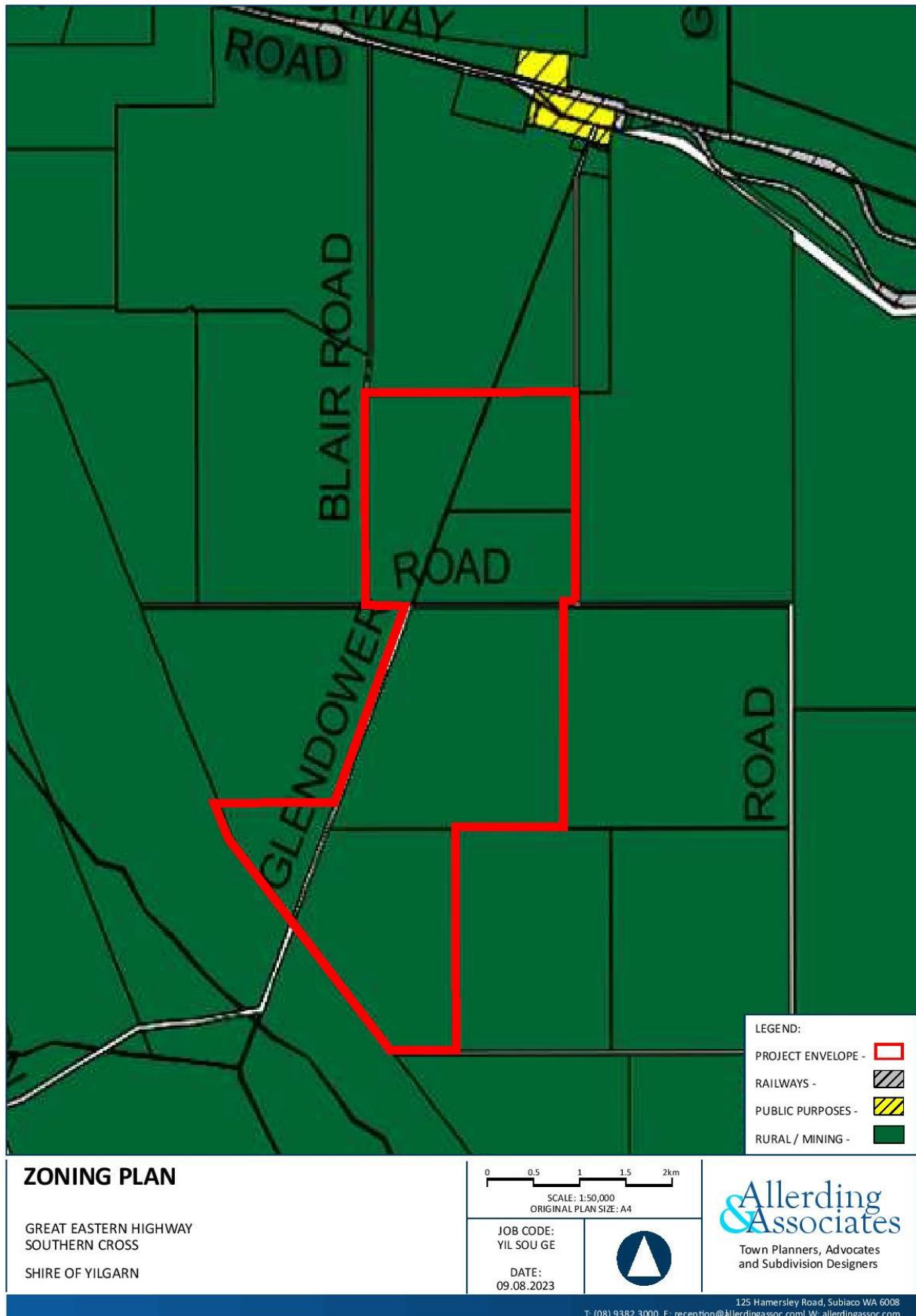


Figure 20: Town Planning Scheme No. 2 Map



### 7.1.2 Planning and Development (Local Planning Schemes) Regulations 2015

The Regulations have introduced a set of deemed provisions within Schedule 2 that automatically form part of the Scheme. In particular, Clause 67(2) of Schedule 2 deals with matters to be considered by Local Government and include the following key provisions relevant to this application in **Table 6**:

**Table 6: Regulations Clause 67(2) Matters to be Considered.**

Matters to be considered	Comment
(a) <i>the aims and provisions of this Scheme and any other local planning scheme operating within the Scheme area;</i>	As noted above, as the land use term “Renewable Energy Facility” is not contained within the Zoning Table, the proposed wind farm will be capable of consideration and approval as a “use not listed.” As outlined, the proposal is consistent with the intent of the Rural/Mining zone, as it will ensure that broadacre farming and cropping activities can continue on the land given the comparatively small footprint of the proposed development.
(b) <i>the requirements of orderly and proper planning including any proposed local planning scheme or amendment to this Scheme that has been advertised under the Planning and Development (Local Planning Schemes) Regulations 2015 or any other proposed planning instrument that the local government is seriously considering adopting or approving;</i>	The proposed development is considered to be consistent with the requirements of orderly and proper planning as it will facilitate the delivery of a sustainable form of development without impacting the ongoing use of the land for rural purposes.
(c) <i>any approved State Planning Policy</i>	The proposed development is consistent with the applicable provisions of SPP1, SPP2.5 and SPP3.7, as demonstrated in Sections 6.2.1, 6.2.2 and 6.2.3 above.
(d) <i>any environmental protection policy approved under the Environmental Protection Act 1986 section 31(d)</i>	No environmental protection policies under the <i>Environmental Protection Act 1986</i> Section 31(d) apply.
(e) <i>any policy of the Commission</i>	As outlined in Section 6.3.1 above, the proposal addresses the intent of the WAPC’s Position Statement: Renewable Energy Facilities.
(f) <i>any policy of the State;</i>	The proposed development is consistent with the applicable provisions of the <i>State Planning Strategy 2050</i> and the <i>Wheatbelt Regional Planning and Infrastructure Framework</i> as demonstrated in Sections 6.1.1 and 6.1.2 above.

<i>(fa) any local planning strategy for this Scheme endorsed by the Commission</i>	Not applicable.
<i>(g) any local planning policy for the Scheme area</i>	Not applicable.
<i>(h) any structure plan, activity centre plan or local development plan that relates to the development;</i>	Not applicable.
<i>(i) any report of the review of the local planning scheme that has been published under the Planning and Development (Local Planning Schemes) Regulations 2015;</i>	Not applicable.
<i>(j) in the case of land reserved under this Scheme, the objectives for the reserve and the additional and permitted uses identified in this Scheme for the reserve;</i>	The sites forming the project area are not reserves under the <i>Shire of Yilgarn Town Planning Scheme No. 2</i> and therefore no reserve objectives are relevant to the subject site.
<i>(k) the built heritage conservation of any place that is of cultural significance</i>	No areas of built heritage significance were identified in the project area.
<i>(l) the effect of the proposal on the cultural heritage significance of the area in which the development is located;</i>	No areas of cultural heritage significance have been identified on the subject site.
<i>(m) the compatibility of the development with its setting, including —</i> <i>(i) the compatibility of the development with the desired future character of its setting; and</i> <i>(ii) the relationship of the development to development on adjoining land or on other land in the locality including, but not limited to, the likely effect of the height, bulk, scale, orientation and appearance of the development;</i>	<p>This application for development approval is for a wind farm and associated battery storage consisting of 10 wind turbines and 10MWh of battery storage across a total of four (4) freehold rural lots within Southern Cross. The rural lots have been cleared and have historically been used for cropping. The proposal will therefore result in minimal disruption to vegetated areas. The sites forming the project area comprise a Total land area of approximately 1,464ha and whilst the wind turbines will be visible from various vantage points due to their height and span, it is anticipated that limited offsite impacts will arise due to the significant scale of the landholdings and the separation achieved from existing rural dwellings. The proposed development is therefore considered compatible with its rural setting by virtue of being adequately sited and buffered.</p>
<i>(n) the amenity of the locality including the following —</i>	The location of this renewable energy facility has regard to the environmental considerations of the site by largely preserving the vegetated areas and requiring only very limited clearing in the

<p>(i) <i>environmental impacts of the development;</i></p> <p>(ii) <i>the character of the locality;</i></p> <p>(iii) <i>social impacts of the development;</i></p>	<p>road reservation to facilitate connection to existing powerlines.</p> <p>Measures including the siting and setting back of wind turbines for major roads and existing rural dwellings have been taken to preserve the character of the locality.</p> <p>The proposed wind farm and battery storage facility will allow land that has already been cleared for broadacre farming activities to be used to support the grid of the Shire of Yilgarn and support the growth and diversification of energy distribution in the area, thereby encouraging energy security.</p>
<p>(o) <i>the likely effects of the development on the natural environment or water resources and any means that are proposed to protect or to mitigate impacts on the natural environment or water resource.</i></p>	<p>As the proposed wind farm is to be located on existing farming land, only very limited land clearing is likely to be required, associated with the powerline connection and access track maintenance during construction phase. As demonstrated within the supporting studies submitted as part of this application, the potential for limited environmental impacts arising from the proposal is offset by the ability to appropriately manage the facility to mitigate potential environmental risk.</p>
<p>(p) <i>whether adequate provision has been made for the landscaping of the land to which the application relates and whether any trees or other vegetation on the land should be preserved;</i></p>	<p>Remnant vegetation exists adjacent to roads and property boundaries within the project area, with the majority of the land being completely cleared. Due to the large scale of the project, no landscaping is proposed.</p>
<p>(q) <i>the suitability of the land for the development taking into account the possible risk of flooding, tidal inundation, subsidence, landslip, bushfire, soil erosion, land degradation or any other risk</i></p>	<p>The wind farm and associated battery storage facility, once operational, will require no on-site employee and only limited maintenance staff on an occasional basis. Therefore, bushfire risk is considered to be minimal.</p> <p>No other land-based development risks are applicable.</p>
<p>(r) <i>the suitability of the land for the development taking into account the possible risk to human health or safety;</i></p>	<p>The cleared nature of the project area is deemed suitable for development when taking into account human health and safety. Aviation safety issues have been assessed as part of the Aviation Impact Assessment which has concluded that aviation risks can be mitigated through the recommended measures including instrument flight procedures and lighting.</p>

<p>(s) <i>the adequacy of -</i></p> <p>(i) <i>the proposed means of access and egress from the site; and</i></p> <p>(ii) <i>arrangements for the loading, unloading, manoeuvring and parking of vehicles;</i></p>	<p>As outlined in Section 4.3.5 above, access to the development sites within the project area will be possible within the existing local road network, subject to minor road upgrades and internal connecting roads. During the construction and commissioning phase, turbine hardstands will be constructed to provide an adequate arrangement for the loading, unloading, manoeuvring and parking of vehicles.</p>
<p>(t) <i>the amount of traffic likely to be generated by the development particularly in relation to the capacity of the road system in the locality and the probable effects on traffic flow and safety;</i></p>	<p>As outlined in Section 4.3.6 above, traffic generation and management during the construction phase has been considered having regard to the capacity for the local and regional road network to accommodate Over Size Over Mass (OSOM) vehicle movements associated with the delivery of turbine components and other smaller vehicle movements associated with the construction and commissioning works. The existing road system will provide for suitable access arrangements, subject to consultation with the Shire with respect to any upgrades required. The operator will also commission a Traffic Management Plan prior to commencement of construction to assist with the management of vehicle movements during the construction phase.</p>
<p>(u) <i>the availability and adequacy for the development of the following-</i></p> <p>(i) <i>public transport services;</i></p> <p>(ii) <i>public utility services;</i></p> <p>(iii) <i>storage management and collection of waste;</i></p> <p>(iv) <i>access for pedestrians and cyclists (including end of trip storage, toilet and shower facilities);</i></p> <p>(v) <i>access by older people and people with disability;</i></p>	<p>The subject site is located within proximity to an existing power line network along Marvel Loch Road to the west of the project area therefore facilitating it's connection to the local grid that will allow the proposed wind farm facility to distribute power.</p>
<p>(v) <i>the potential loss of any community service or benefit resulting from the development other than potential loss that may result from economic competition between new and existing businesses;</i></p>	<p>No loss of community service is anticipated. Conversely, the development will provide a much-needed alternate energy source that will complement and support the adjacent industrial land uses. Further, the project will provide a positive benefit to the Southern Cross Aerodrome and community through development of instrument flight procedures</p>



	which will increase the probability of accessing the aerodrome.
(w) <i>the history of the site where the development is to be located</i>	Historically, the land forming the project area has been used for broadacre agricultural activities which has resulted in a cleared landscape with minimal vegetation buffers along existing roads. The land is therefore entirely suitable for the proposed wind farm renewable energy facility.
(x) <i>the impact of the development on the community as a whole notwithstanding the impact of the development on particular individuals;</i>	The impact of the development on the community will be minimal due to its limited offsite impacts and location within a Rural/Mining zoned area. It will increase the capacity of the local power grid to generate and store energy, which is an essential part of the energy transition and benefits the community by facilitating energy supply and security.
(y) <i>any submissions received on the application;</i>	As advertisement under Clause 64 of the <i>Planning and Development Act (Local Planning Scheme Regulations) 2015</i> has yet to occur during the lodgement of this development application, submissions have yet to be received.
(za) <i>the comments or submissions received from any authority consulted under clause 66;</i>	As advertisement under Clause 64 of the <i>Planning and Development Act (Local Planning Scheme Regulations) 2015</i> has yet to occur before the lodgement of this development application, submissions on this application from authorities consulted under Clause 66 have yet to be received.
(zb) <i>any other planning consideration the local government considers appropriate;</i>	This will be confirmed once assessment is undertaken by the Shire.

## 8.0 CONCLUSION

On behalf of Yilgarn Holdings Pty Ltd, we seek the support of the Regional Joint Development Application Panel for the use of 6ha (approx.) portion of the 1,464ha landholdings forming the project area for a wind farm and battery storage facility. This application is consistent with the State's Strategic goal of supplying a renewable form of energy to the Southwest Interconnected System to supplement the growing demand in the region. The proposal involves the installation of 10 wind turbines and 10MWh of battery storage across a total of four (4) freehold rural lots within Southern Cross.

In summary, it can be seen that:

- There is significant demand for added power storage in the South West Interconnected System, and the State Government has recognised this in the Energy Transformation Strategy;
- The use of the project area for renewable energy generation and battery storage is directly consistent with the State Government's strategic recognition of the importance of developing the State's energy capacity with the possibility of adding further renewable energy generation capability in the future should that be determined to be appropriate;
- This proposal ensures the renewable energy generated has the capacity to create supply for both local and regional consumption. Furthermore, there is potential for the project to strengthen the local network, reducing the number of unplanned outages that would otherwise occur;
- Offsite impacts considered as part of this proposal have been assessed as minimal and capable of mitigation through detailed design and operational management arrangements; and
- The proposal is capable of approval under the Shire of Yilgarn's planning framework with the support of the Shire.

Therefore, we seek the Regional Joint Development Assessment Panel's favourable consideration and support of this proposal to approve the proposed Southern Cross Wind Farm renewable energy project.

# **Annexure 1:**

# **Application for Development Approval**

# **Forms**



## SHIRE OF YILGARN - APPLICATION FOR DEVELOPMENT APPROVAL

Owner details		
Name: Joseph Michael Guerini		
ABN (if applicable):		
Address: PO Box 106 Southern Cross WA Postcode: 6426		
Phone: Work: Home: Mobile: 0428491020	Fax:  	Email: joeguerini@bigpond.com
Contact person for correspondence: JO'ANNE GUERINI		
Signature: <i>J M Guerini</i>		Date: 10-9-23
Signature:		Date:
<p><i>The signature of the owner(s) is required on all applications. This application will not proceed without that signature. For the purposes of signing this application an owner includes the persons referred to in the Planning and Development (Local Planning Schemes) Regulations 2015 Schedule 2 clause 62(2).</i></p>		
Applicant details (if different from owner)		
Name: Allerding & Associates		
Address: 125 Hamersley Road Subiaco WA Postcode: 6008		
Phone: 9382 3000 Work: Home: N/A Mobile:	Fax:  	Email: tom@allerdingassoc.com
Contact person for correspondence: Tom Hockley		
<p>The information and plans provided with this application may be made available by the local government for public viewing in connection with the application. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		
Signature: <i>T Hockley</i>		Date: 18/9/23



Property details of Proposed Development		
Lot No: 620	House/Street No:	Location No:
Diagram or Plan No: 204376	Certificate of Title Vol. No: 1936	Folio: 533
Title encumbrances (e.g. easements, restrictive covenants): C773954 Easement to the State Energy Commission of Western Australia. See sketch on Vol 1936 Fol 533. Registered 18/5/1984.		
Street name: No Street Address Info Available		Suburb:
Nearest street intersection:		
Proposed development		
Nature of development: <input type="checkbox"/> Works <input type="checkbox"/> Use <input checked="" type="checkbox"/> Works and use		
Is an exemption from development claimed for part of the development? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, is the exemption for: <input type="checkbox"/> Works <input type="checkbox"/> Use		
Description of proposed works and/or land use: Wind farm with associated infrastructure.		
Description of exemption claimed (if relevant):		
Nature of any existing buildings and/or land use: Vacant.		
Approximate cost of proposed development:		\$85,000,000.00
Estimated date of commencement:		January 2024
Estimated date of completion:		June 2025
OFFICE USE ONLY		
Acceptance Officer's initials:		Date received:
Local government reference No:		

Card Payments (Credit Cards incur a 1.5% charge)		
Mastercard/Visa:		
Name on Card:	Expiry:	CVC:
Card Number _____	Amount: \$	
Signature:	Date:	



## DAP FORM 1

### Notice of Development Application to be Determined by a Development Assessment Panel

Planning and Development Act 2005

Planning and Development (Development Assessment Panel) Regulations 2011 – regulations 7, 10 and 21

#### Application Details

To	Name of local government and/or Western Australian Planning Commission Shire of Yilgarn	
Planning Scheme(s)	Name of planning scheme(s) that applies to the prescribed land Town Planning Scheme No. 2	
Land	Lot number, street name, town/suburb Lot 620 - No street address information available	
Certificate of Title (provide copy)	Volume Number 1936	Folio 533
	Location Number	Plan / Diagram Number 204376
Details of development application made to responsible authority	Summary of Proposal Wind farm with associated infrastructure.	
Development Use	Residential / Commercial / Industrial / Rural / Mixed Use / Other Other	
Estimated cost of development (GST Exc)	\$ 85,000,000.00	

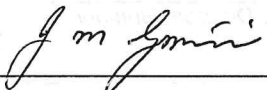
#### Part A – Acknowledgement by Applicant and Landowner

Mandatory Application	<input checked="" type="checkbox"/> I give notice that I understand that this is a mandatory Development Assessment Panel application (regulation 5)
Optional Application	<input type="checkbox"/> I give notice that I have elected to have the development application that accompanies this form determined by a Development Assessment Panel (regulation 6)
Delegated Application	<input type="checkbox"/> I give notice that I understand that this is an application of a class delegated to a Development Assessment Panel for determination (regulation 9)

#### Applicant Details (to be completed and signed by applicant)

- By completing this notice, I declare that all the information provided in this application is true and correct.
- I understand that the information provided in this notice, and attached forming part of the development application will be made available to the public on the Development Assessment Panel and local government websites.

Name	Tom Hockley	
Company	Allerding & Associates	
Address	Street Number/PO Box number, street name, suburb, state, postcode 125 Hamersley Road, Subiaco WA 6008	
Contact Details	Email tom@allerdingassoc.com	Phone 9382 3000
Signature		Date 18/9/23

<b>Landowner Details (to be completed and signed if landowner is different from applicant)</b> <ul style="list-style-type: none"> <li>• By completing this notice, consent is provided to submitting this application.</li> <li>• If there are more than two landowners, please provide all relevant information on a separate page.</li> <li>• Signatures must be provided by all registered proprietors or by an authorised agent as shown on the Certificate of Title.</li> <li>• Alternatively, a letter of consent, which is signed by all registered proprietors or by the authorised agent, can be provided.</li> <li>• Companies, apart from sole directors, are required to provide signatories for two directors, a director and the company seal or a director and a company secretary.</li> </ul>		
Company (if applicable)	/	
Contact Details	Email Joeguerini@bigpond.com	Phone 0427 366 991
Address	Street Number/PO Box number, street name, suburb, state, postcode PO Box 103, Southern Cross WA 6426	
Name/s	Joseph Michael Guerini	
Title/s	Landowner/Sole Director/Director (2 signatures required)	Additional Landowner/Director/Secretary (if applicable)
Signature/s		
Date	10 - 9 - 23	

#### Part B – Acknowledgement by Local Government

Responsible Authority	<input type="checkbox"/> Local Government (LG) <input type="checkbox"/> * Western Australian Planning Commission (WAPC) <input type="checkbox"/> * Dual – Local Government and Western Australian Planning Commission <input type="checkbox"/> Department of Finance – <i>Public Primary School Applications</i>	
* WAPC/DUAL reporting details	If WAPC or DUAL is selected, please provide details of relevant provision (or within covering letter)	
Fees for applications (DAP Regulations - Schedule 1)	\$ Amount that has been paid by the applicant \$ Amount to be paid by local government (delegated applications only - regulation 22)	
Statutory Timeframe (regulation 12)	<input type="checkbox"/> 60 days (advertising not required) <input type="checkbox"/> 90 days (advertising required or other scheme provision)	
LG Reference Number		
Name of planning officer (Report Writer)		
Position/Title		
Contact Details	Email	Phone
Planning Officer's Signature		Date

Please refer to the [Guidance Note: Lodging a DAP Application](#) for further information.





## SHIRE OF YILGARN - APPLICATION FOR DEVELOPMENT APPROVAL

Owner details		
Name: Anthony David Guerini & Paul Stephen Guerini		
ABN (if applicable):		
Address: Both of 86 Antare Street (as joint tenants) Southern Cross WA Postcode: 6426		
Phone: Work: Home: Mobile: 0488 283 288	Fax:  	Email: judy@wn.com.au
Contact person for correspondence: JUDY GUERINI		
Signature:		Date: 10/09/2023
Signature:		Date: 10/09/2023
<i>The signature of the owner(s) is required on all applications. This application will not proceed without that signature. For the purposes of signing this application an owner includes the persons referred to in the Planning and Development (Local Planning Schemes) Regulations 2015 Schedule 2 clause 62(2).</i>		
Applicant details (if different from owner)		
Name: Allerding & Associates		
Address: 125 Hamersley Road Subiaco WA Postcode: 6008		
Phone: 9382 3000 Work: Home: N/A Mobile:	Fax:  	Email: tom@allerdingassoc.com
Contact person for correspondence: Tom Hockley		
The information and plans provided with this application may be made available by the local government for public viewing in connection with the application. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Signature:		Date: 18/9/23



Property details of Proposed Development		
Lot No: 622	House/Street No:	Location No:
Diagram or Plan No: 204376	Certificate of Title Vol. No: 1575	Folio: 39
Title encumbrances (e.g. easements, restrictive covenants):		
Street name: 282 Glendower Road		Suburb: Southern Cross
Nearest street intersection:		
Proposed development		
Nature of development: <input type="checkbox"/> Works <input type="checkbox"/> Use <input checked="" type="checkbox"/> Works and use		
Is an exemption from development claimed for part of the development? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
If yes, is the exemption for: <input type="checkbox"/> Works <input type="checkbox"/> Use		
Description of proposed works and/or land use: Wind farm with associated infrastructure.		
Description of exemption claimed (if relevant):		
Nature of any existing buildings and/or land use: Vacant.		
Approximate cost of proposed development:		\$85,000,000.00
Estimated date of commencement:		January 2024
Estimated date of completion:		June 2025
<i>OFFICE USE ONLY</i>		
Acceptance Officer's initials:		Date received:
Local government reference No:		

Card Payments (Credit Cards incur a 1.5% charge)		
Mastercard/Visa:		
Name on Card:	Expiry:	CVC:
Card Number _____	Amount: \$	
Signature:	Date:	



## DAP FORM 1

### Notice of Development Application to be Determined by a Development Assessment Panel

Planning and Development Act 2005

Planning and Development (Development Assessment Panel) Regulations 2011 – regulations 7, 10 and 21

#### Application Details

To	Name of local government and/or Western Australian Planning Commission Shire of Yilgarn	
Planning Scheme(s)	Name of planning scheme(s) that applies to the prescribed land Town Planning Scheme No. 2	
Land	Lot number, street name, town/suburb Lot 622 (282) Glendower Street, Southern Cross WA 6426	
Certificate of Title (provide copy)	Volume Number 1575	Folio 39
	Location Number	Plan / Diagram Number 204376
Details of development application made to responsible authority	Summary of Proposal Wind farm with associated infrastructure.	
Development Use	Residential / Commercial / Industrial / Rural / Mixed Use / Other Other	
Estimated cost of development (GST Exc)	\$ 85,000,000.00	



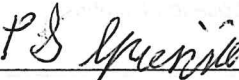
#### Part A – Acknowledgement by Applicant and Landowner

Mandatory Application	<input checked="" type="checkbox"/> I give notice that I understand that this is a mandatory Development Assessment Panel application (regulation 5)
Optional Application	<input type="checkbox"/> I give notice that I have elected to have the development application that accompanies this form determined by a Development Assessment Panel (regulation 6)
Delegated Application	<input type="checkbox"/> I give notice that I understand that this is an application of a class delegated to a Development Assessment Panel for determination (regulation 9)

#### Applicant Details (to be completed and signed by applicant)

- By completing this notice, I declare that all the information provided in this application is true and correct.
- I understand that the information provided in this notice, and attached forming part of the development application will be made available to the public on the Development Assessment Panel and local government websites.

Name	Tom Hockley	
Company	Allerding & Associates	
Address	Street Number/PO Box number, street name, suburb, state, postcode 125 Hamersley Road, Subiaco WA 6008	
Contact Details	Email tom@allerdingassoc.com	Phone 9382 3000
Signature		Date 18/9/23

<b>Landowner Details (to be completed and signed if landowner is different from applicant)</b>		
<ul style="list-style-type: none"> <li>By completing this notice, consent is provided to submitting this application.</li> <li>If there are more than two landowners, please provide all relevant information on a separate page.</li> <li>Signatures must be provided by all registered proprietors or by an authorised agent as shown on the Certificate of Title.</li> <li>Alternatively, a letter of consent, which is signed by all registered proprietors or by the authorised agent, can be provided.</li> <li>Companies, apart from sole directors, are required to provide signatories for two directors, a director and the company seal or a director and a company secretary.</li> </ul>		
Company (if applicable)		
Contact Details	Email judyg@wn.com.au	Phone 0427 904 912
Address	Street Number/PO Box number, street name, suburb, state, postcode Both of 86 Antare Street (as joint tenants) Southern Cross WA 6426	
Name/s	Anthony David Guerini	Paul Stephen Guerini
Title/s	Landowner/Sole Director/Director (2 signatures required)	Additional Landowner/Director/Secretary (if applicable)
Signature/s		
Date	10/09/2023	10/9/2023

#### Part B – Acknowledgement by Local Government

Responsible Authority	<input type="checkbox"/> Local Government (LG) <input type="checkbox"/> * Western Australian Planning Commission (WAPC) <input type="checkbox"/> * Dual – Local Government and Western Australian Planning Commission <input type="checkbox"/> Department of Finance – Public Primary School Applications	
* WAPC/DUAL reporting details	If WAPC or DUAL is selected, please provide details of relevant provision (or within covering letter)	
Fees for applications (DAP Regulations - Schedule 1)	\$ Amount that has been paid by the applicant  \$ Amount to be paid by local government (delegated applications only - regulation 22)	
Statutory Timeframe (regulation 12)	<input type="checkbox"/> 60 days (advertising not required) <input type="checkbox"/> 90 days (advertising required or other scheme provision)	
LG Reference Number		
Name of planning officer (Report Writer)		
Position/Title		
Contact Details	Email	Phone
Planning Officer's Signature		Date

Please refer to the [Guidance Note: Lodging a DAP Application](#) for further information.





## SHIRE OF YILGARN - APPLICATION FOR DEVELOPMENT APPROVAL

Owner details		
Name: Anthony David Guerini, Paul Stephen Guerini & Michael John Guerini		
ABN (if applicable):		
Address: PO Box 149 (As Joint Tenants) Southern Cross WA Postcode: 6426		
Phone: Work: ..... Home: ..... Mobile: 0888 283 288	Fax: ..... .....	Email: judyg@wn.com.au
Contact person for correspondence: JUDY GUERINI		
Signature: [Signature]		Date: 10/9/2023
Signature: [Signature]		Date: 10/9/2023
<p><i>The signature of the owner(s) is required on all applications. This application will not proceed without that signature. For the purposes of signing this application an owner includes the persons referred to in the Planning and Development (Local Planning Schemes) Regulations 2015 Schedule 2 clause 62(2).</i></p>		
Applicant details (if different from owner)		
Name: Allerding & Associates		
Address: 125 Hamersley Road Subiaco WA Postcode: 6008		
Phone: 9382 3000 Work: ..... Home: N/A Mobile: .....	Fax: ..... .....	Email: tom@allerdingassoc.com
Contact person for correspondence: Tom Hockley		
<p>The information and plans provided with this application may be made available by the local government for public viewing in connection with the application. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>		
Signature: [Signature]		Date: 18/9/23



Property details of Proposed Development		
Lot No: 231 & 640	House/Street No:	Location No:
Diagram or Plan No: 143975	Certificate of Title Vol. No: 1508	Folio: 751
Title encumbrances (e.g. easements, restrictive covenants):		
Street name: No Street Address Info Available		Suburb:
Nearest street intersection:		
Proposed development		
Nature of development: <input type="checkbox"/> Works <input type="checkbox"/> Use <input checked="" type="checkbox"/> Works and use		
Is an exemption from development claimed for part of the development? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
If yes, is the exemption for: <input type="checkbox"/> Works <input type="checkbox"/> Use		
Description of proposed works and/or land use: Wind farm with associated infrastructure.		
Description of exemption claimed (if relevant):		
Nature of any existing buildings and/or land use: Vacant.		
Approximate cost of proposed development: \$85,000,000.00		
Estimated date of commencement: January 2024		
Estimated date of completion: June 2025		
OFFICE USE ONLY		
Acceptance Officer's initials:		Date received:
Local government reference No:		

Card Payments (Credit Cards incur a 1.5% charge)		
Mastercard/Visa:		
Name on Card:	Expiry:	CVC:
Card Number _____	Amount: \$	
Signature:	Date:	



## DAP FORM 1

### Notice of Development Application to be Determined by a Development Assessment Panel

Planning and Development Act 2005

Planning and Development (Development Assessment Panel) Regulations 2011 – regulations 7, 10 and 21

#### Application Details

To	Name of local government and/or Western Australian Planning Commission Shire of Yilgarn		
Planning Scheme(s)	Name of planning scheme(s) that applies to the prescribed land Town Planning Scheme No. 2		
Land	Lot number, street name, town/suburb 231 & 640 - No street address information available		
Certificate of Title (provide copy)	Volume Number 1508	Folio 751	
	Location Number	Plan / Diagram Number 143975	
Details of development application made to responsible authority	Summary of Proposal Wind farm with associated infrastructure.		
Development Use	Residential / Commercial / Industrial / Rural / Mixed Use / Other Other		
Estimated cost of development (GST Exc)	\$ 85,000,000.00		

#### Part A – Acknowledgement by Applicant and Landowner

Mandatory Application	<input checked="" type="checkbox"/> I give notice that I understand that this is a mandatory Development Assessment Panel application (regulation 5)
Optional Application	<input type="checkbox"/> I give notice that I have elected to have the development application that accompanies this form determined by a Development Assessment Panel (regulation 6)
Delegated Application	<input type="checkbox"/> I give notice that I understand that this is an application of a class delegated to a Development Assessment Panel for determination (regulation 9)

#### Applicant Details (to be completed and signed by applicant)

- By completing this notice, I declare that all the information provided in this application is true and correct.
- I understand that the information provided in this notice, and attached forming part of the development application will be made available to the public on the Development Assessment Panel and local government websites.

Name	Tom Hockley		
Company	Allerding & Associates		
Address	Street Number/PO Box number, street name, suburb, state, postcode 125 Hamersley Road, Subiaco WA 6008		
Contact Details	Email tom@allerdingassoc.com	Phone 9382 3000	
Signature			Date 18/9/23

<b>Landowner Details (to be completed and signed if landowner is different from applicant)</b>		
<ul style="list-style-type: none"> <li>• By completing this notice, consent is provided to submitting this application.</li> <li>• If there are more than two landowners, please provide all relevant information on a separate page.</li> <li>• Signatures must be provided by all registered proprietors or by an authorised agent as shown on the Certificate of Title.</li> <li>• Alternatively, a letter of consent, which is signed by all registered proprietors or by the authorised agent, can be provided.</li> <li>• Companies, apart from sole directors, are required to provide signatories for two directors, a director and the company seal or a director and a company secretary.</li> </ul>		
Company (if applicable)	/	
Contact Details	Email Judyg@wn.com.au	Phone 04888 283 288
Address	Street Number/PO Box number, street name, suburb, state, postcode PO Box 149 (As Joint Tenants) Southern Cross WA 6426	
Name/s	Anthony David Guerini	See additional separate pages
Title/s	Landowner/Sole Director/Director (2 signatures required)	Additional Landowner/ Director/Secretary (if applicable)
Signature/s	REFER TO SEPARATE SHEET FOR DETAILS	
Date		

#### Part B – Acknowledgement by Local Government

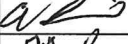

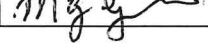
Responsible Authority	<input type="checkbox"/> Local Government (LG) <input type="checkbox"/> * Western Australian Planning Commission (WAPC) <input type="checkbox"/> * Dual – Local Government and Western Australian Planning Commission <input type="checkbox"/> Department of Finance – <i>Public Primary School Applications</i>	
* WAPC/DUAL reporting details	If WAPC or DUAL is selected, please provide details of relevant provision (or within covering letter)	
Fees for applications (DAP Regulations - Schedule 1)	\$ Amount that has been paid by the applicant  \$ Amount to be paid by local government (delegated applications only - regulation 22)	
Statutory Timeframe (regulation 12)	<input type="checkbox"/> 60 days (advertising not required) <input type="checkbox"/> 90 days (advertising required or other scheme provision)	
LG Reference Number		
Name of planning officer (Report Writer)		
Position/Title		
Contact Details	Email	Phone
Planning Officer's Signature		Date

Please refer to the [Guidance Note: Lodging a DAP Application](#) for further information.

## DAP Form 1: Landowner Attachment

DAP Form 1, Part A: Acknowledgement by Applicant and Landowner.

In adherence with DAP Form 1 Part A, we hereby provide relevant details of landowners of Lot 231 and lot 640.

	Title	Name	Signature	Date
Landowner 1	Landowner	Anthony David Guerini		10/9/2023
Landowner 2	Landowner	Paul Stephen Guerini		10/9/2023
Landowner 3	Landowner	Michael John Guerini		10/9/2023

Address	PO Box 149 (As Joint Tenants) Southern Cross WA 6426		
Name/s	Landowner 1 Anthony David Guerini	Landowner 2 Paul Stephen Guerini	Landowner 3 Michael John Guerini
Title/s	Landowner	Landowner	Landowner



## **Annexure 2:**

# **Certificates of Title**

WESTERN



AUSTRALIA

TITLE NUMBER

Volume

Folio

1508

751

## RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

*BGRoberts*  
REGISTRAR OF TITLES



### THIS IS A MULTI-LOT TITLE

#### LAND DESCRIPTION:

LOTS 231 & 640 ON DEPOSITED PLAN 143975

#### REGISTERED PROPRIETOR: (FIRST SCHEDULE)

ANTHONY DAVID GUERINI  
MICHAEL JOHN GUERINI  
PAUL STEPHEN GUERINI  
ALL OF PO BOX 149 SOUTHERN CROSS  
AS JOINT TENANTS

(T N288753 ) REGISTERED 31/3/2016

#### LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS: (SECOND SCHEDULE)

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.  
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF TITLE-----

#### STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1508-751 (231/DP143975), 1508-751 (640/DP143975)
PREVIOUS TITLE:	1170-16
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF YILGARN

WESTERN



AUSTRALIA

TITLE NUMBER

Volume Folio

**1575 39**

## RECORD OF CERTIFICATE OF TITLE UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

*BGRoberts*  
REGISTRAR OF TITLES



### LAND DESCRIPTION:

LOT 622 ON DEPOSITED PLAN 204376

### REGISTERED PROPRIETOR: (FIRST SCHEDULE)

ANTHONY DAVID GUERINI  
PAUL STEPHEN GUERINI  
BOTH OF 86 ANTARE STREET, SOUTHERN CROSS  
AS JOINT TENANTS

(T D548897 ) REGISTERED 31/8/1987

### LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS: (SECOND SCHEDULE)

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.  
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF TITLE-----

### STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: 1575-39 (622/DP204376)  
PREVIOUS TITLE: 1369-417  
PROPERTY STREET ADDRESS: 282 GLENDOWER RD, SOUTHERN CROSS.  
LOCAL GOVERNMENT AUTHORITY: SHIRE OF YILGARN

WESTERN



AUSTRALIA

TITLE NUMBER

Volume

Folio

1936

533

## RECORD OF CERTIFICATE OF TITLE UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

*BGRoberts*  
REGISTRAR OF TITLES



### LAND DESCRIPTION:

LOT 620 ON DEPOSITED PLAN 204376

### REGISTERED PROPRIETOR: (FIRST SCHEDULE)

JOSEPH MICHAEL GUERINI OF PO BOX 106, SOUTHERN CROSS

(T J353871 ) REGISTERED 8/7/2005

### LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS: (SECOND SCHEDULE)

1. C773954 EASEMENT TO THE STATE ENERGY COMMISSION OF WESTERN AUSTRALIA. SEE SKETCH ON VOL 1936 FOL 533. REGISTERED 18/5/1984.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.  
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF TITLE-----

### STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

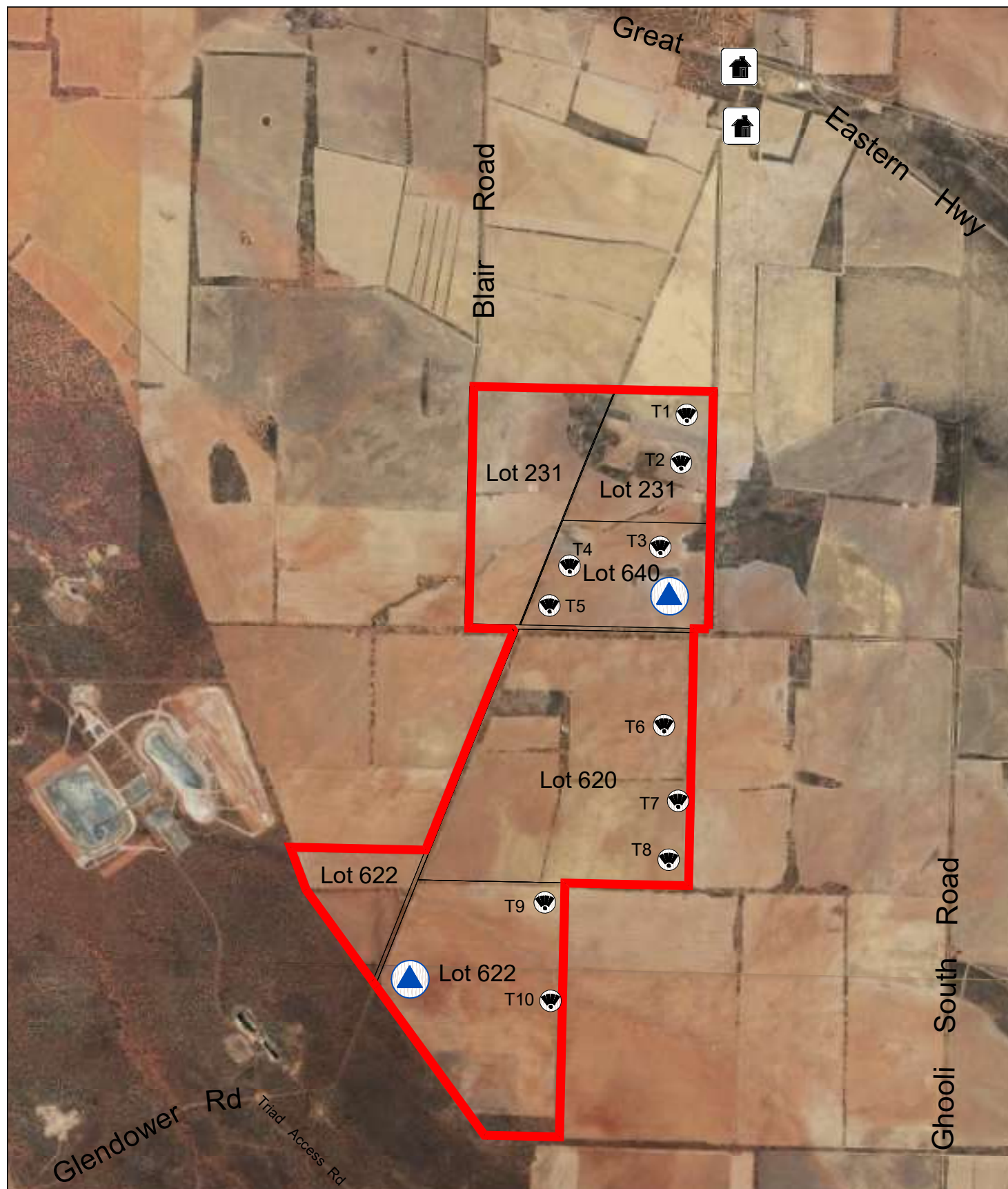
SKETCH OF LAND: 1936-533 (620/DP204376)  
PREVIOUS TITLE: 1648-915  
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.  
LOCAL GOVERNMENT AUTHORITY: SHIRE OF YILGARN





## **Annexure 3:**

# **Development Plans**



LEGEND:

INDICATIVE SWITCH ROOM AND ANCILLARY EQUIPMENT LOCATION -



PROJECT ENVELOPE -



INDICATIVE WIND TURBINE LOCATION -



EXISTING DWELLINGS -



## WIND FARM LAYOUT PLAN

GREAT EASTERN HIGHWAY  
SOUTHERN CROSS  
SHIRE OF YILGARN

0 0.5 1 1.5 2km

SCALE: 1:50,000  
ORIGINAL PLAN SIZE: A4

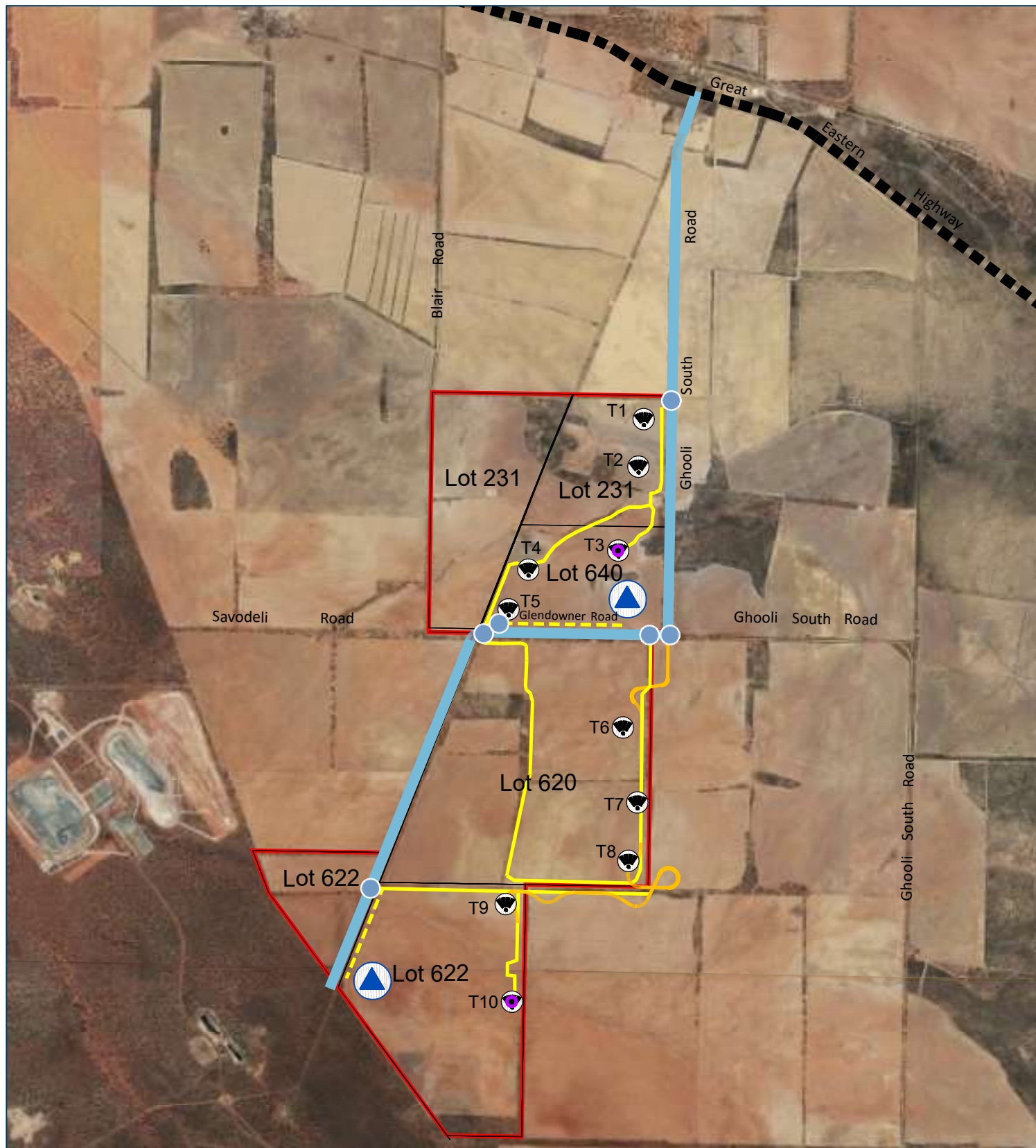
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DATE:  
15.08.2023



**Allering  
& Associates**

Town Planners, Advocates  
and Subdivision Designers



INDICATIVE SWITCH ROOM AND ANCILLARY EQUIPMENT LOCATION -   
 MINOR PUBLIC ROAD TO BE GRADED DURING CONSTRUCTION -   
 EXISTING CROSSOVER AND LOT ACCESS POINT -   
 TEMPORARY FARM CONSTRUCTION ROAD - 

PROJECT AREA BOUNDARY - 

MAJOR PUBLIC ROAD - 

EXISTING FARM ACCESS ROADS TO BE UPGRADED - 

EXISTING FARM ACCESS ROAD - 

VEHICLE TURNAROUND POINT - 

## ROAD LAYOUT PLAN

GREAT EASTERN HIGHWAY  
 SOUTHERN CROSS  
 SHIRE OF YILGARN

0 0.5 1 1.5 2km

SCALE: 1:50,000  
 ORIGINAL PLAN SIZE: A4

JOB CODE:  
 YIL SOU GE

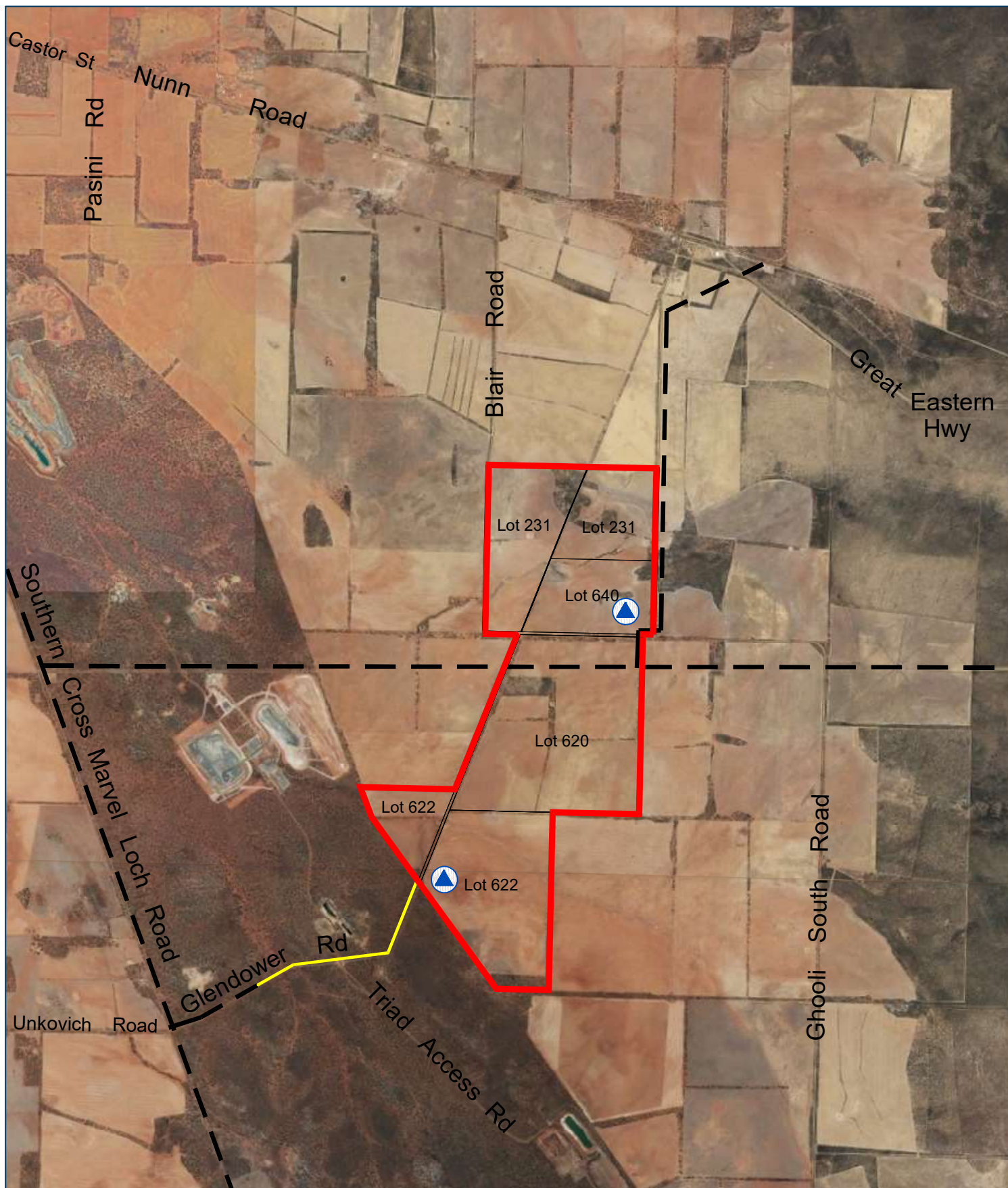
DATE:  
 15.08.2023



**Allering  
 & Associates**

Town Planners, Advocates  
 and Subdivision Designers





LEGEND:

INDICATIVE SWITCH ROOM AND ANCILLARY EQUIPMENT LOCATION -



EXISTING POWERLINES -



PROJECT AREA -



PROPOSED POWERLINES -



## POWER INFRASTRUCTURE

GREAT EASTERN HIGHWAY  
SOUTHERN CROSS

SHIRE OF YILGARN

0 0.5 1 1.5 2 2.5 3km

SCALE: 1:70,000  
ORIGINAL PLAN SIZE: A4

JOB CODE:  
YIL SOU GE

DATE:  
15.08.2023



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& Associates**

Town Planners, Advocates  
and Subdivision Designers



## **Annexure 4:**

# **Noise Impact Assessment**

**YILGARN HOLDINGS PTY LTD**

**SOUTHERN CROSS WIND FARM**

**SOUTHERN CROSS**

**APPENDIX 2 - NOISE IMPACT ASSESSMENT**

**SEPTEMBER 2023**

**OUR REFERENCE: 30608-4-23030**

DOCUMENT CONTROL PAGE

**NOISE IMPACT ASSESSMENT**  
SOUTHERN CROSS WIND FARM, SOUTHERN CROSS

Job No: 23030

Document Reference : 30608-4-23030

FOR

**YILGARN HOLDINGS PTY LTD**

DOCUMENT INFORMATION				
Author:	George Watts	Checked By:	Tim Reynolds	
Date of Issue :	6 February 2023			
REVISION HISTORY				
Revision	Description	Date	Author	Checked
1	Revision following client feedback	8/2/2023		
2	Revision following change of WTG locations	25/8/2023		
3	Revision following feedback from local shire	18/9/2023		
DOCUMENT DISTRIBUTION				
Copy No.	Version No.	Destination	Hard Copy	Electronic Copy
1	3	Yilgarn Holdings Pty Ltd Attn: David Beardsmore Email: <a href="mailto:david.beardsmore@semaphoreenergy.com.au">david.beardsmore@semaphoreenergy.com.au</a>		✓

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1.	INTRODUCTION	1
2.	SUMMARY	1
3.	CRITERIA	1
4.	MODELLING	2
5.	RESULTS	3
6.	ASSESSMENT	4
7.	CONCLUSION	4

## APPENDICIES

A	Residential and Wind Turbine Locations
B	Predicted Noise Level Contours



## 1. INTRODUCTION

Herring Storer Acoustics were commissioned to carry out a noise impact assessment for the proposed Southern Cross Wind Farm development, to accompany the development application for the project.

The proposed development site is located approximately 13km south-east of Southern Cross township.

The proposed wind farm consists of 10 wind turbines, in freehold land that is utilised for cropping.

See Appendix A for locations of turbines and noise sensitive premises and Appendix B for a table of wind turbine locations.

The noise impact assessment has been carried out according to the WAPC Position Statement : Renewable energy facilities – March 2020. This position statement references both the Environmental Protection (Noise) Regulations 1997 and The South Australian Environmental Protection Authority – Wind Farms Environment Noise Guidelines (2009).

## 2. SUMMARY

Noise levels were assessed at 11 identified receiver points, with these locations shown in Appendix A.

Noise emissions at the identified receiver locations have been calculated to comply with the most stringent criteria of 35 dB(A) for all hub height wind speeds.

## 3. CRITERIA

The Western Australian Planning Commission “Position Statement : Renewable energy facilities” – March 2020, states that :

“Noise emissions from renewable energy facilities, including wind turbines, are required to meet the standards prescribed under the *Environmental Protection (Noise) Regulations 1997*. The South Australian Environmental Protection Authority – Wind Farms Environment Noise Guidelines (2009) should also be referenced for assessment purposes. These guidelines acknowledge the potential for operation in the presence of higher wind-induced background noise levels.”

In assessing potential noise emissions, the Department of Water and Environmental Regulations refers to the “Guideline - Assessment of Environmental Noise Emissions – May 2021”. In this guideline, it states that at wind speed above 3 – 4m/s at ground level, the background noise levels from local vegetation “can dominate the noise emission”.

In the instance of wind turbine generators, the cut in speed at hub height is at the speed recommended for assessment purposes by the Department of Water and Environmental Regulation – noting that this is the wind speed at hub height – not at ground level. The noise level emissions produced by the wind turbine generators increases with wind speed, hence, it is not appropriate to assess noise level emissions against a criteria for which the noise source would not contribute.

Hence, the reference within the Western Australian Planning Position Statement : Renewable energy facilities - March 2020 states that “*Wind Farms – Environmental noise guidelines– July 2009, Updated November 2021*” (Guidelines) should be referenced for assessment.

The Guidelines recommend the following criteria for the assessment of noise levels associated with proposed wind farms.

The predicted equivalent noise level ( $L_{Aeq, 10 \text{ minutes}}$ ), adjusted for tonality in accordance with the Guidelines, should not exceed :

- 35 dB(A), or
- 40 dB(A) in a primary production / rural industry zone, or
- the “Alternative Minimum Criteria” (Varying with Wind Speed); or
- the background noise ( $L_{A90, 10 \text{ minutes}}$ ) by more than 5 dB(A).

The criteria for background noise levels will vary with wind speed, as will wind turbine generated noise.

The alternative minimum criterion, varying with wind speed, is listed below in Table 3.1. This conservative minimum criterion has been determined based on a comparison of background noise levels at a number of existing and proposed wind farm sites around Australia.

**TABLE 3.1 – ALTERNATIVE MINIMUM CRITERIA (VARYING WITH WIND SPEED)**

	Wind Speed at 10m above ground level					
	≤ 5	6	7	8	9	≥ 10
Minimum Criteria $L_{Aeq}$ [dB(A)]	35	37	38	40	41	43

Background noise monitoring has not yet been undertaken at this stage of the project development, hence, this preliminary assessment has been based upon the most stringent criteria of 35 dB(A). It is noted that utilising this most stringent criteria, also aligns with the lowest assigned noise level that would be applicable under the *Environmental Protection (Noise) Regulations 1997*.

It is considered likely that background noise monitoring will be undertaken following development approval, which would further refine this assessment.

#### 4. MODELLING

Noise immissions at residential premises, due to the proposed wind farm, were determined by noise modelling, using the computer program “SoundPlan” version 9.0.

SoundPlan uses the theoretical sound power levels determined from measured sound pressure levels to calculate the noise level at any location.

The following input data was used in the SoundPlan model:

- a) Topographical Information – Ground contours of the development area;
- b) Residential and Wind Turbine Locations – See Appendix A; and
- c) Sound Power Levels, varying with wind speed, understood to be typical of the variety proposed to be utilised – see Table 4.1 below.
- d) Wind turbine generators assumed to be at a hub height of 150m, with a rotor diameter of 180m.

**TABLE 4.1 – ASSUMED OVERALL SOUND POWER LEVELS OF WIND TURBINE GENERATORS**

Typical WTG	Assumed Sound Power Level, dB(A)						
	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s
	92.3	92.3	95.3	98.3	102.3	105.6	107.0

The Guidelines indicate that noise immissions should be modelled to reflect typical, (but not extreme) “worst case” meteorological conditions for sound propagation towards the receiver.

After a review of the literature available on the subject, noise level emissions were modelled using the ISO 9613-2:1996 algorithm, with the conditions listed in Table 4.2. These conditions and calculating noise levels utilising a “G=0” ground absorption have been found to provide a conservative assessment of noise levels associated with wind turbines.

**TABLE 4.2 – METEOROLOGICAL CONDITIONS**

Condition	Value
Temperature	15 °C
Relative humidity	70%
Atmospheric Pressure	101.325 kPa

Noise levels attributable to the proposed wind farm were calculated for integer wind speeds 3 – 9m/s at a height of 150m. The sound power level of the turbines were varied for each integer wind speed, however the other weather conditions within the model remained constant at the conditions stipulated in Table 4.2 above.

## 5. RESULTS

Noise contour plots are attached in Appendix B.

The predicted noise level at each identified residential premises are listed in Table 5.1 below for each of the hub height wind speeds considered.

**TABLE 5.1 – PREDICTED NOISE LEVELS AT IDENTIFIED RECEIVER LOCATIONS**

Location#	Predicted Noise Level, L <sub>Aeq</sub> [dB(A)]						
	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s
R1	0	0	0	3	7	10	11
R2	0	0	0	2	6	10	11
R3	0	0	0	0	0	4	5
R4	0	0	0	0	1	5	6
R5	0	0	0	0	0	2	4
R6	0	0	0	0	4	7	9
R7	5	5	8	11	15	18	19
R8	5	5	8	11	15	18	20
R9	5	5	8	11	15	18	20
R10	5	5	8	11	15	18	20
R11	7	7	10	13	17	20	22

## 6. ASSESSMENT

Table 6.1 below summarises the calculated noise level compared to the alternative noise criteria, with the predicted levels exceeding the criteria highlighted in red and the level of exceedance listed in brackets adjacent.

**TABLE 6.1 – ASSESSMENT OF NOISE LEVELS AT IDENTIFIED RECEIVER LOCATIONS**

Location #	Predicted Noise Level, $L_{Aeq}$ [dB(A)]							Noise Criteria Based on Alternative Criteria, $L_{Aeq}$ [dB(A)]						
	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	3m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s
R1	0	0	0	3	7	10	11	35	35	35	37	38	40	41
R2	0	0	0	2	6	10	11	35	35	35	37	38	40	41
R3	0	0	0	0	0	4	5	35	35	35	37	38	40	41
R4	0	0	0	0	1	5	6	35	35	35	37	38	40	41
R5	0	0	0	0	0	2	4	35	35	35	37	38	40	41
R6	0	0	0	0	4	7	9	35	35	35	37	38	40	41
R7	5	5	8	11	15	18	19	35	35	35	37	38	40	41
R8	5	5	8	11	15	18	20	35	35	35	37	38	40	41
R9	5	5	8	11	15	18	20	35	35	35	37	38	40	41
R10	5	5	8	11	15	18	20	35	35	35	37	38	40	41
R11	7	7	10	13	17	20	22	35	35	35	37	38	40	41

As can be seen from the above tables, calculated noise levels at the identified receiver locations have been found to be in compliance with the alternative criteria. It is also noted that noise received at the receiver locations also would comply with the most conservative criteria of 35 dB(A) at all hub-height wind speeds.

## 7. CONCLUSION

Noise emissions at identified receiver locations have been calculated to comply with the most stringent criteria of 35 dB(A) at all hub-height wind speeds.

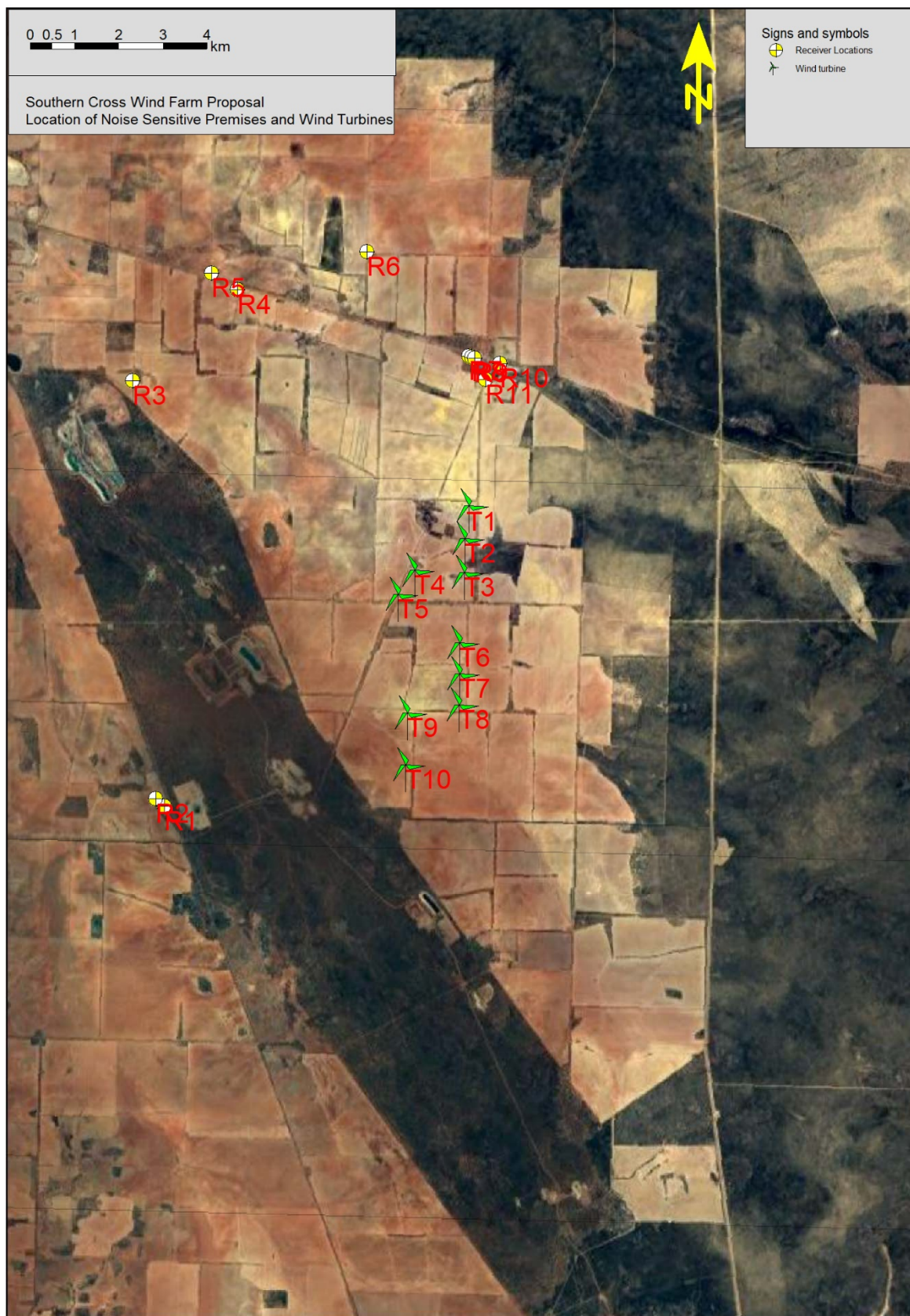
Yours faithfully,  
For **HERRING STORER ACOUSTICS**

George Watts



## **APPENDIX A**

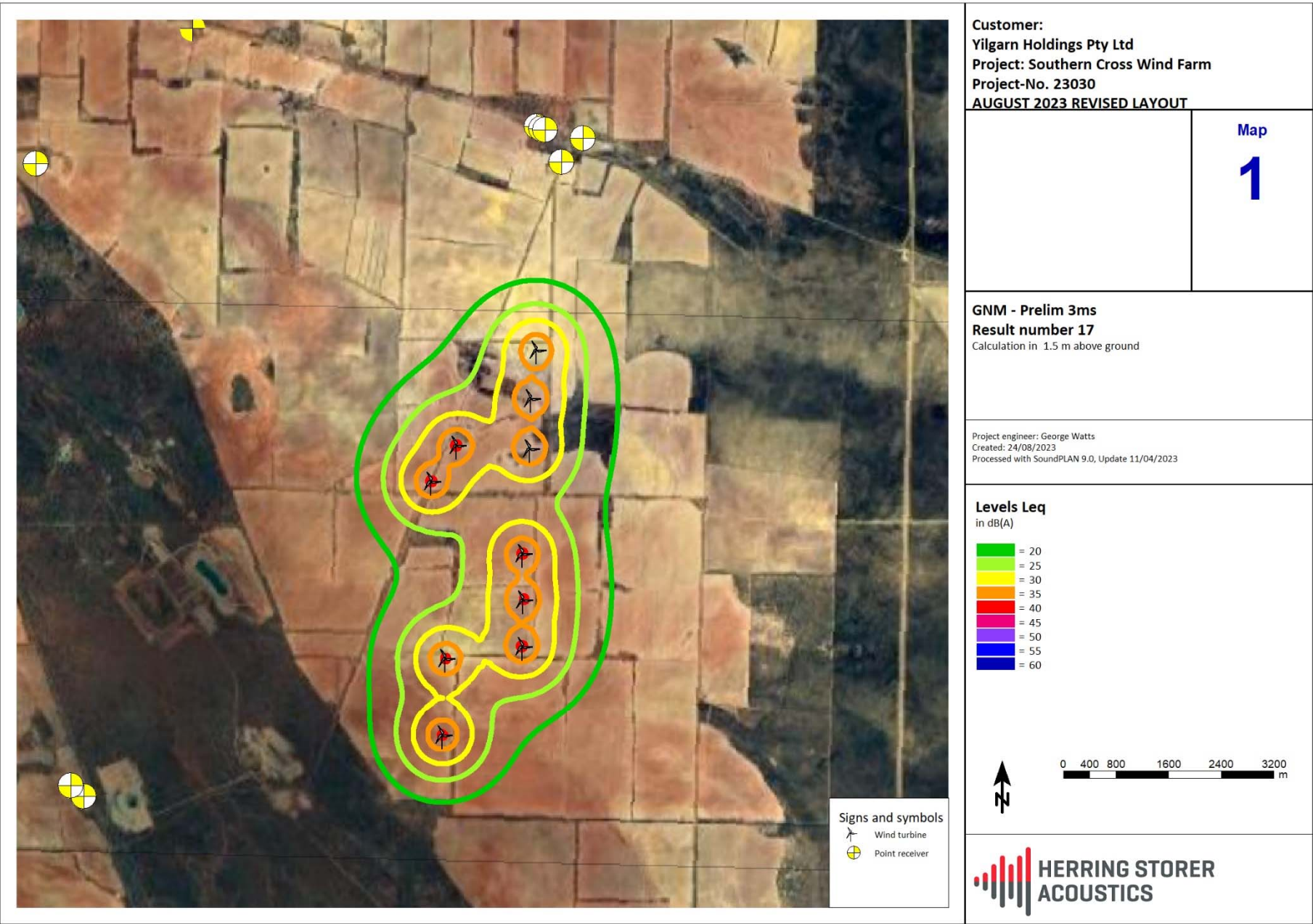
### **RESIDENTIAL AND WIND TURBINE LOCATIONS**



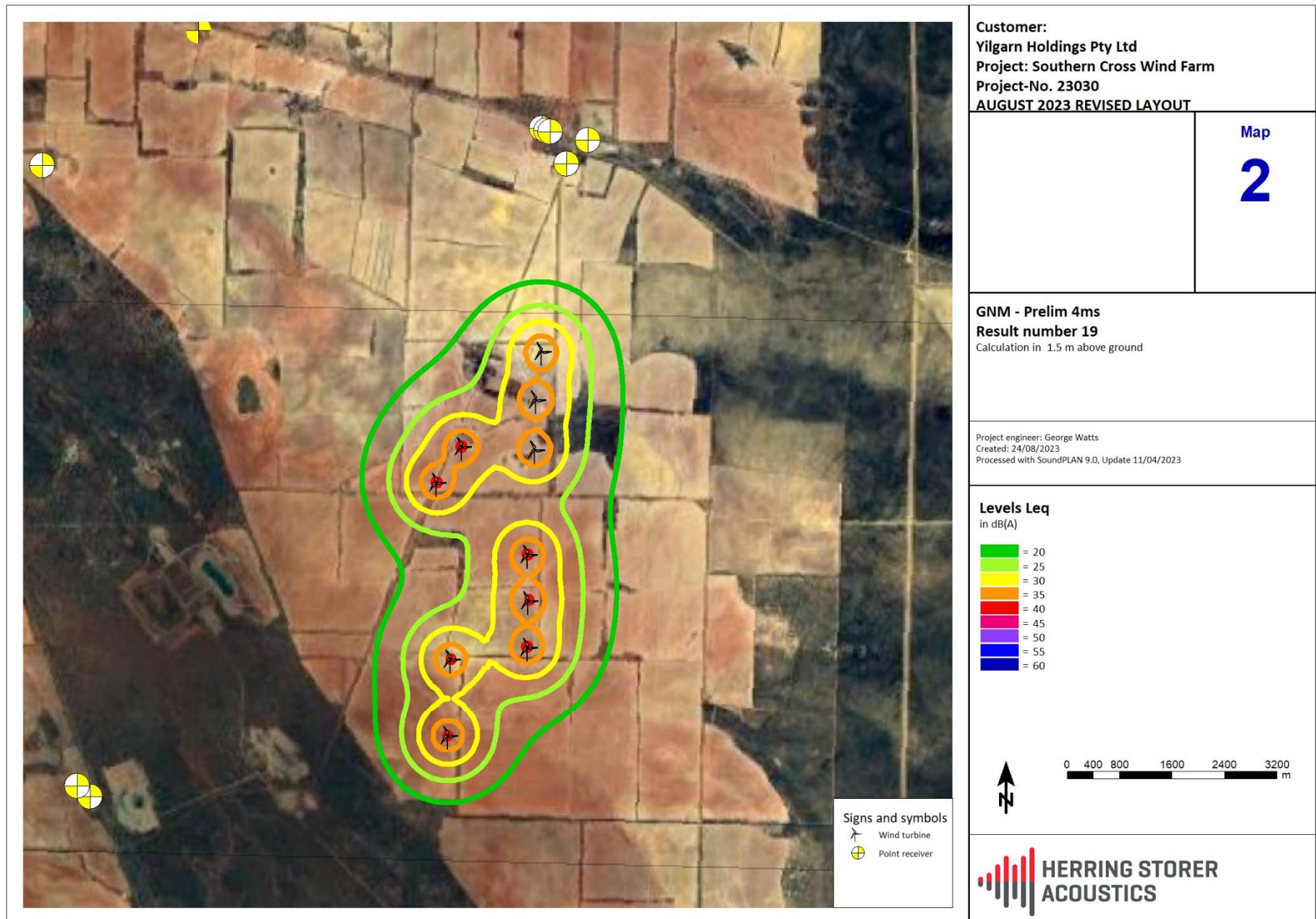
## **APPENDIX B**

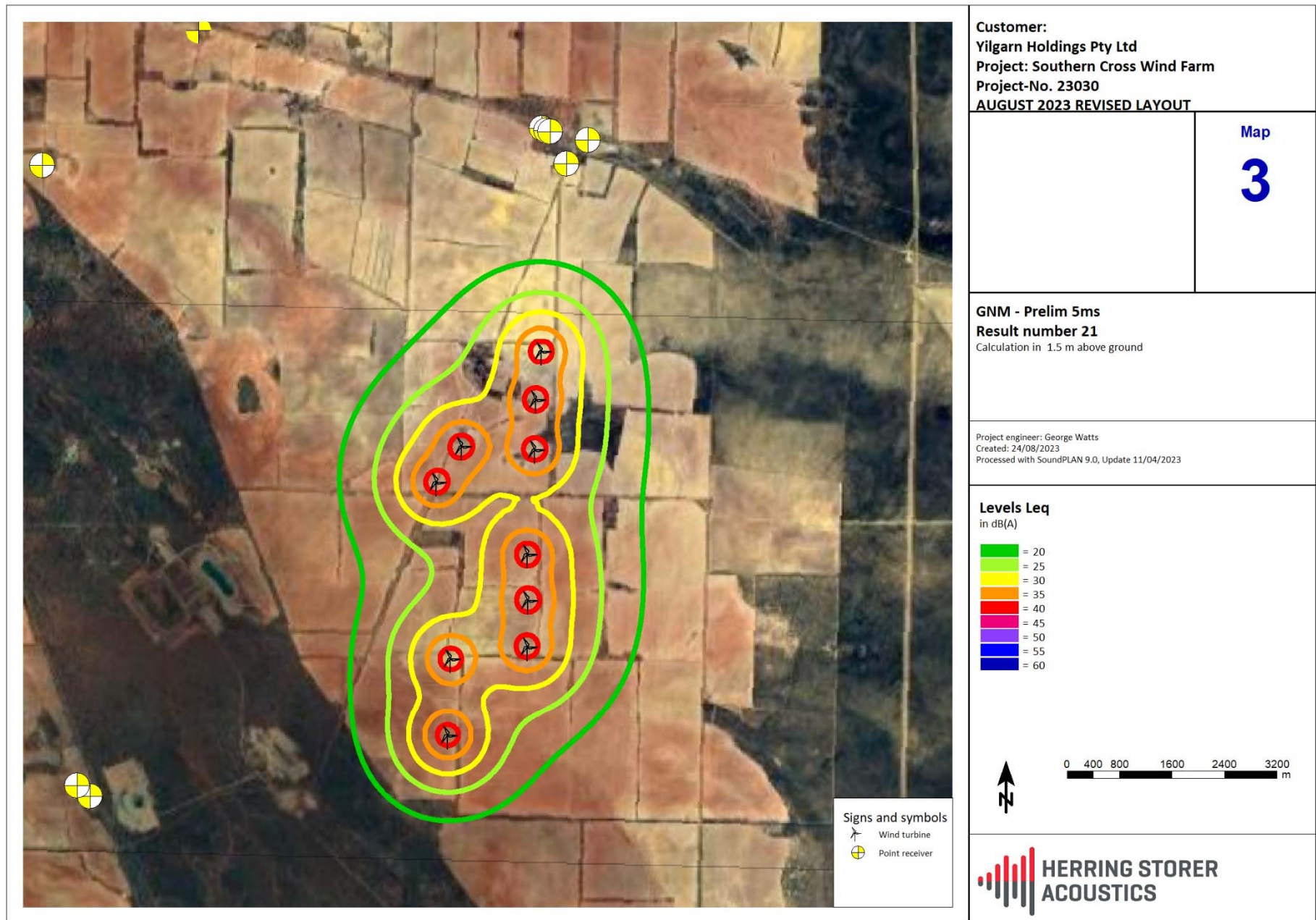
### **PREDICTED NOISE LEVEL CONTOURS**



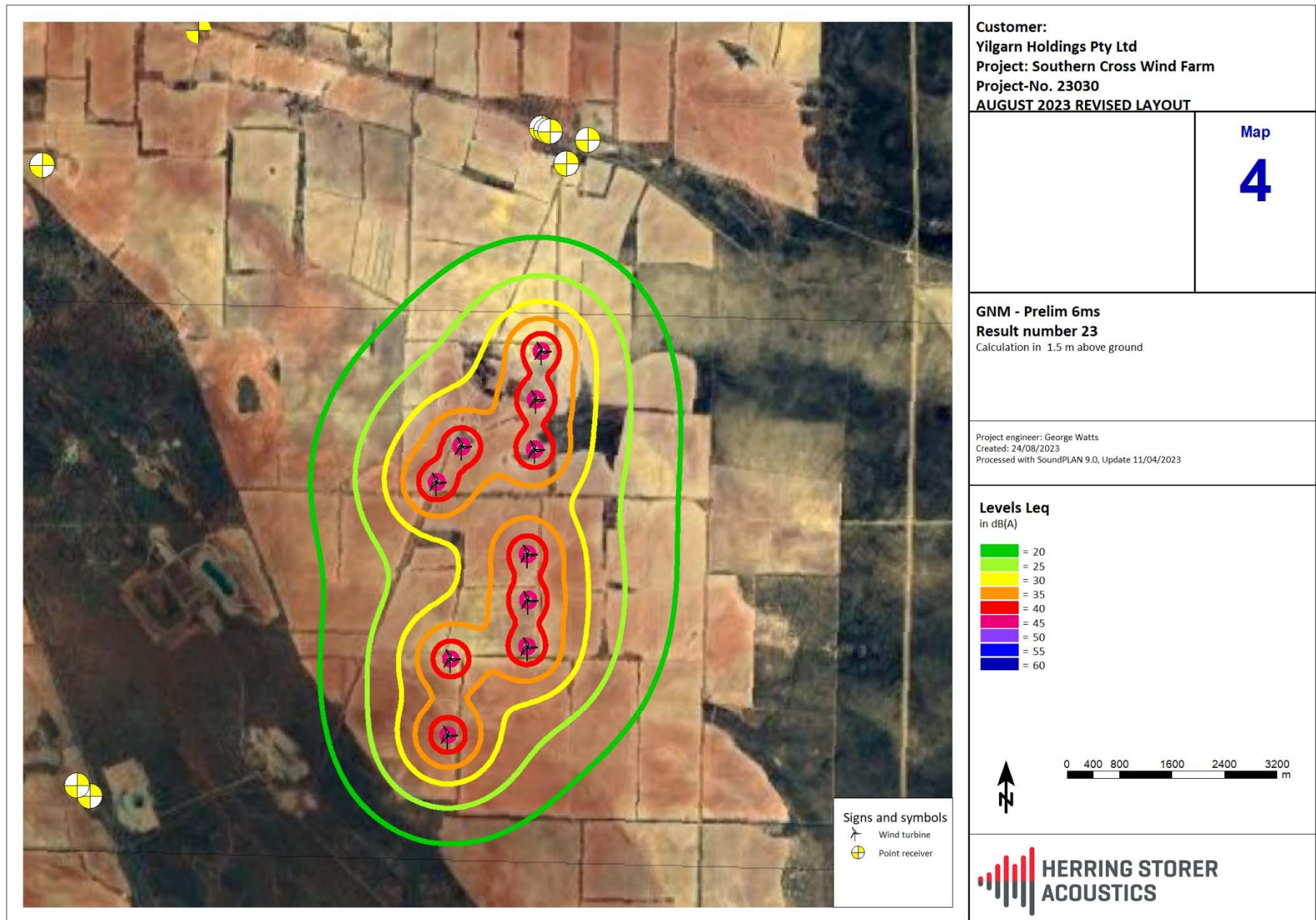


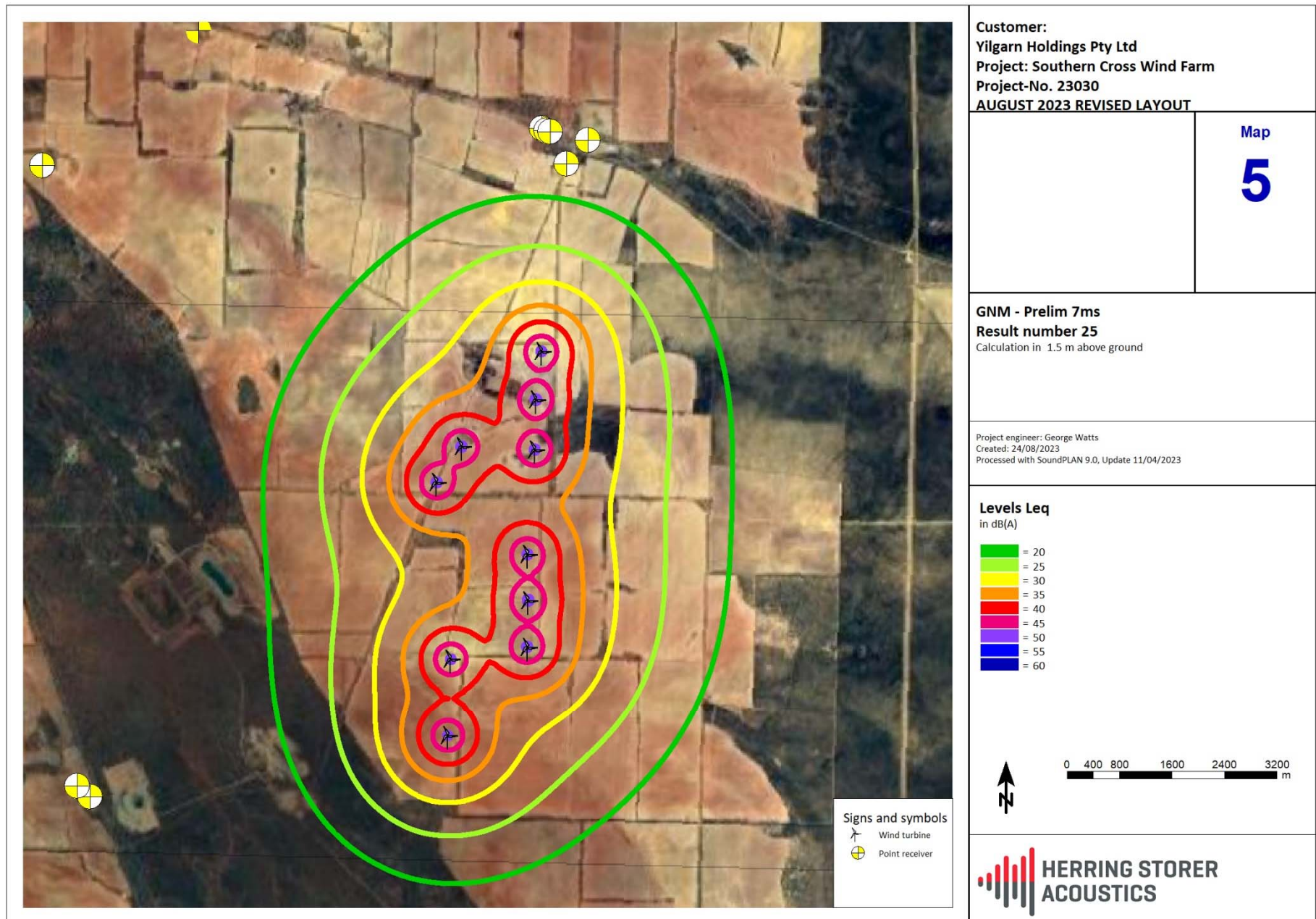




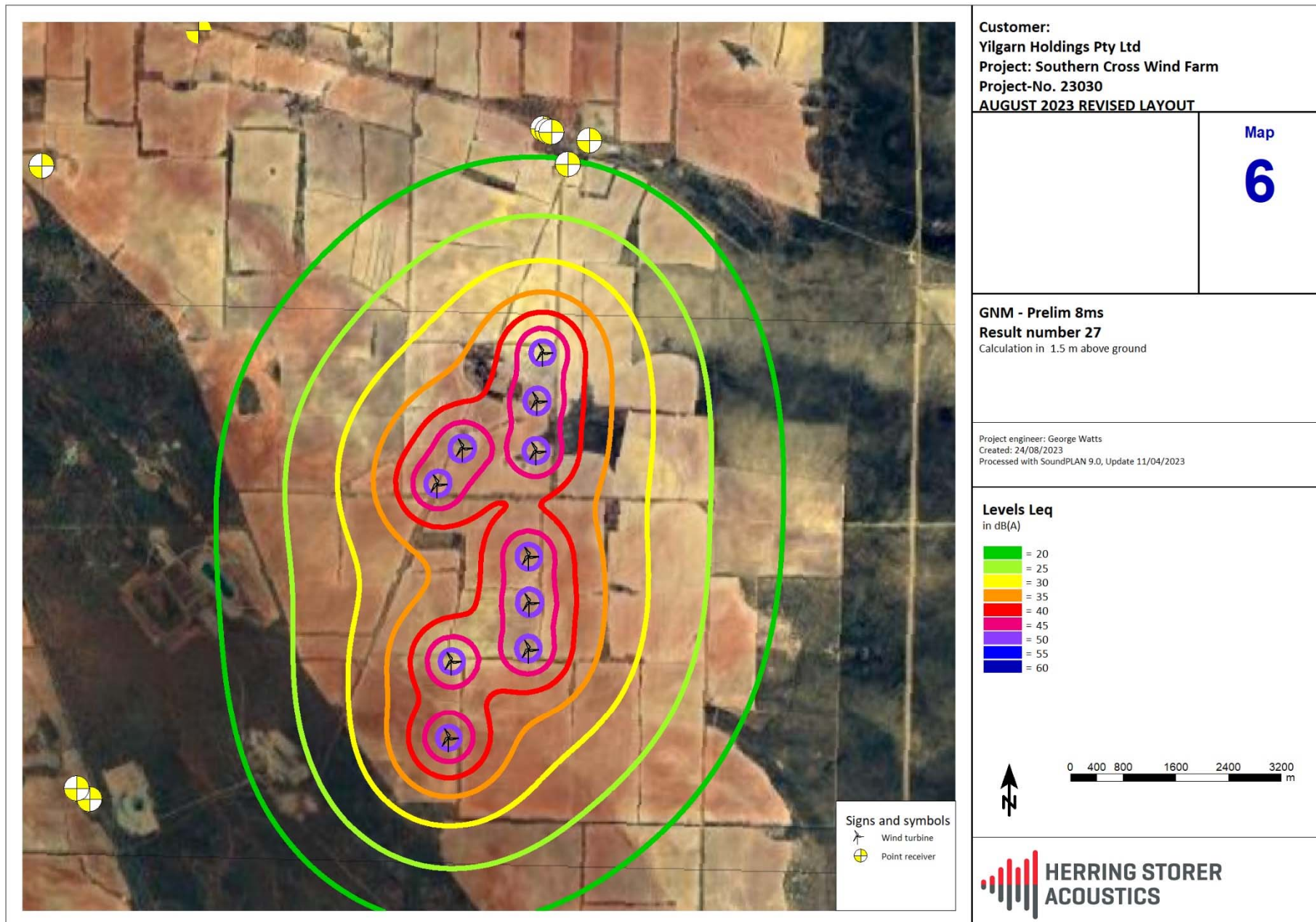


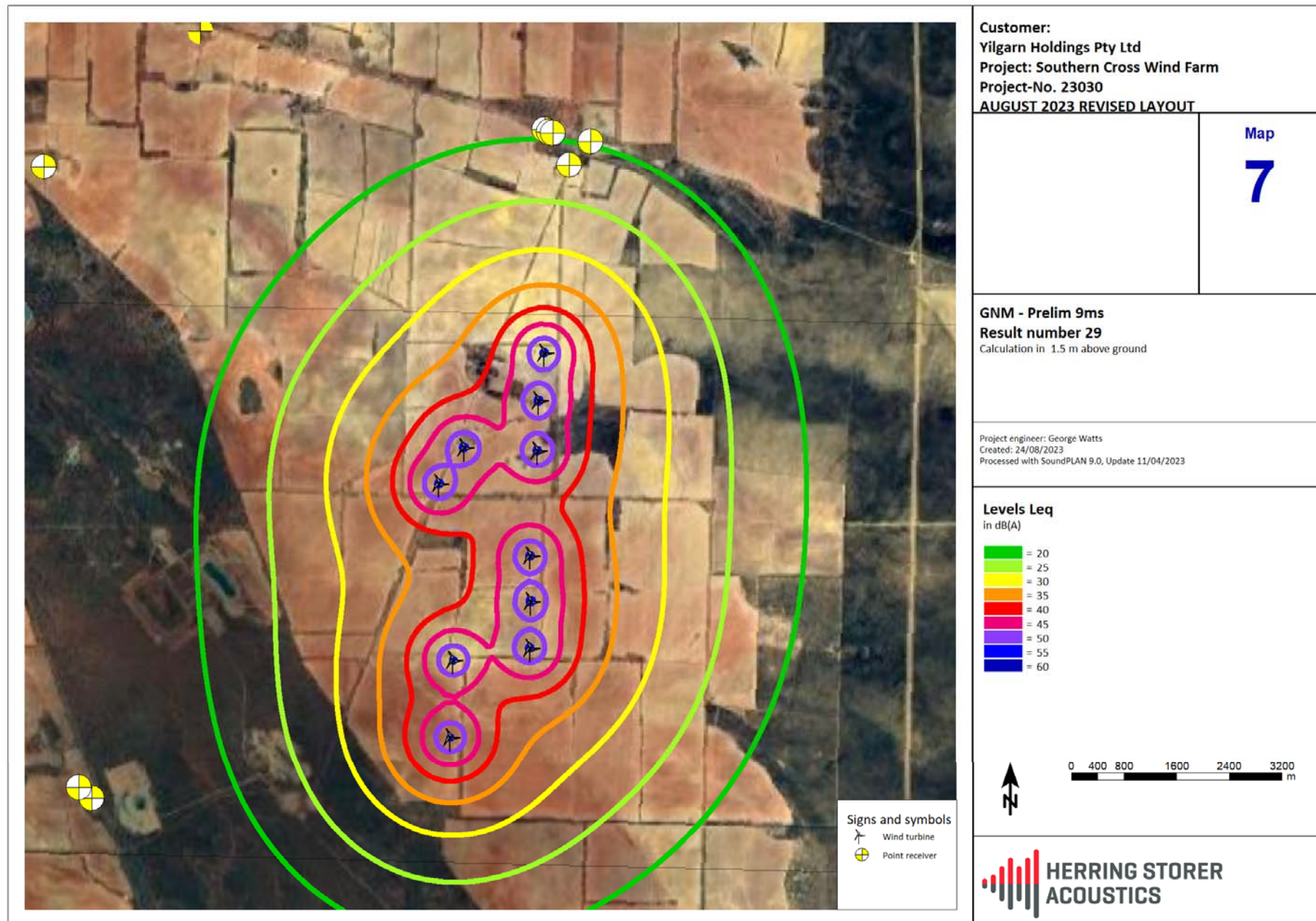














## **Annexure 5:**

# **Visual Impact Assessment**





EPCAD

# SOUTHERN CROSS WINDFARM for Yilgarn Holdings Pty Ltd

Visual Impact Assessment  
September 2023

Issue: **02**





# DOCUMENT CONTROL

Job Number	B1116
Document Title	Southern Cross Windfarm - Visual Impact Assessment
File Name	B1116 Southern Cross Windfarm_Report
Author	EPCAD Pty Ltd
Client	Yilgarn Holdings Pty Ltd

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	Issue	Issued To	Date	Reviewed	Approved
01	DRAFT	Tom Hockley	120923	JB/HM	HM
02	ISSUE	Tom Hockley	180923	JB/HM	HM



## EXECUTIVE SUMMARY

A new development has been proposed for a wind energy facility in the Shire of Yilgarn, Western Australia.

The land proposed for development lies south-east of the small township of Southern Cross. It is an area of remote, flat countryside currently used for agricultural purposes.

The development site will comprises up to 10 large wind turbines and associated energy storage. The turbines may require to be lit due to the proximity of the Southern Cross airport.

The turbines are positioned at approximately the same level to each other, openly spread out over a broad area.

The Great Eastern Highway primary public travel route passes north of the site. This serves as the main east/west tourist route from Perth.

There is a network of smaller gravel roads in closer proximity to the site which link to the main highway. These unsurfaced roads are less frequently used and by predominantly local traffic.

Generally all roads including the main highway are straight and direct in their layout and are largely flat with some gentle inclines and minor undulation.

The land immediately surrounding the site is generally flat, cleared farmland. Wimmera Hill

lookout within Southern Cross is a notable high point relative to the site which encourages public views towards the site and the wider landscape.

Parts of the town and Golf Course also have the potential to present elevated open views to the development.

As with all wind farm developments there will be inevitable change to the scenic values of the landscape due the scale, nature and siting requirements of the proposal.

There are not many sensitive receptors within the study area. These include people travelling along the Great Eastern Highway, residents at properties within Southern Cross and surrounding area, visitors to the town, golf course, train station, airport and cemetery.

The majority of viewing opportunities of the site are from public roads with speed limits of 50km/h to 110km/h. The site is located generally obliquely to the direction of travel.

There are no formal footpaths within the immediate road network.

The potential impact to the public within the study area is low to moderate.

The wind turbines can potentially become a significant and celebrated local feature of interest as part of the existing east/west tourist route.



## GLOSSARY

EPCAD / The Landscape Architect: EPCAD Pty Ltd, Landscape Architects; Author of this report and conductor of this Visual Assessment.

The site / The proposal / The development site / The subject land / The subject site / The proposed development site: The site as identified on the Location Plan (Figure 1).

WAPC: Western Australian Planning Commission.

VLPWA: Visual Landscape Planning in Western Australia.

Viewer / Observer / Member of public: Regular person with potential viewing experience of the proposal.

Viewing Locations / View Locations / Key Views: The locations where images were taken from.

LCU: Landscape Character Unit.



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2.3	<b>Landscape Planning Context</b>
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-----	--

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5.8	<b>Discussion of Landscape and Visual Impacts</b>
5.9	<b>Mitigation Measures</b>
5.10	<b>Conclusion</b>

**6 REFERENCES**

**APPENDIX I** - Photos  
**APPENDIX II** - Photomontages  
**APPENDIX III** - Typical Wind Turbine Design used in Visualisation  
**APPENDIX IV** - Southern Cross Windfarm Visual Impact Assessment, Thomas Sounness & Andrew Woodroffe February 2023





## 1. INTRODUCTION

This Visual Impact Assessment has been prepared for Yilgarn Holdings Pty Ltd. It supports the proposed development of a wind energy facility within the Shire of Yilgarn, in Western Australia. It utilises recent site investigation and assessment and incorporates a previous study see **Appendix IV** - Southern Cross Windfarm Visual Impact Assessment, Thomas Sounness & Andrew Woodroffe February 2023.

## 2. VISUAL LANDSCAPE EVALUATION

### 2.1 Scope & Context

The investigation area, within which the project has been shaped, is shown in **Figure 1**. It comprises cleared parcels of land currently used for agricultural purposes. Remnant vegetation lines the roads and property boundaries. The investigation area is bounded to the east by Emu Fence Road, to the north by the Great Eastern Highway and to the west by a line between 4km to 7km to the east of, and parallel, to the Southern Cross - Marvel Loch Road.

The investigation area was selected for the proximity to a substation, well-formed road network, strong electrical connectivity lines and actively farmed lands. There are two residences within the investigation area and several residences within 4km of the investigation area. The Mundaring - Kalgoorlie water pipeline travels along Great Eastern Highway to the north of the

site, and one of the past steam powered water pumping stations, Ghooli, is to the north of the site.

### 2.2 Methodology Process

The accepted guide for assessing potential impacts to landscape and landforms, where visual amenity is a consideration, is the Western Australian Planning Commission's (WAPC) Visual Landscape Planning in Western Australia; a manual for evaluation, assessment, siting and design (2007). This document provides a framework methodology and has been used in numerous other wind farm and renewable energy development proposals see **Table 1**.

The framework recommended for assessing scenic quality in situations like this is to use the visual classification system from 'Visual Landscape Planning in Western Australia'. The scale of the assessment will move from the regional through the local, then to the site within a study area.

1. Broadly consider the proposal in terms of = siting, and broad visual landscape criteria,
2. Review regulatory and legislator requirements applicable to the proposal,
3. Describe the existing landscape and visual character using desktop sources, online material and site inspections,
4. To identifying key vantage points of the proposal,
5. Prepare visual rendering images from these

vantage points, and

6. Assess the potential for impact on landscape and on visual amenity.

The assessment of the proposed developments impact on landscape and visual amenity is formed from the following framework.

1. Determine visual management objectives,
2. Describe proposed development,
3. Describe potential visual impacts,
4. Develop visual management measures,
5. Prepare final recommendations and monitoring options, and
6. Conclusion.

This report assesses the environment the impacts of the development and makes recommendations on the proposal.





# INVESTIGATION AREA

Figure 1

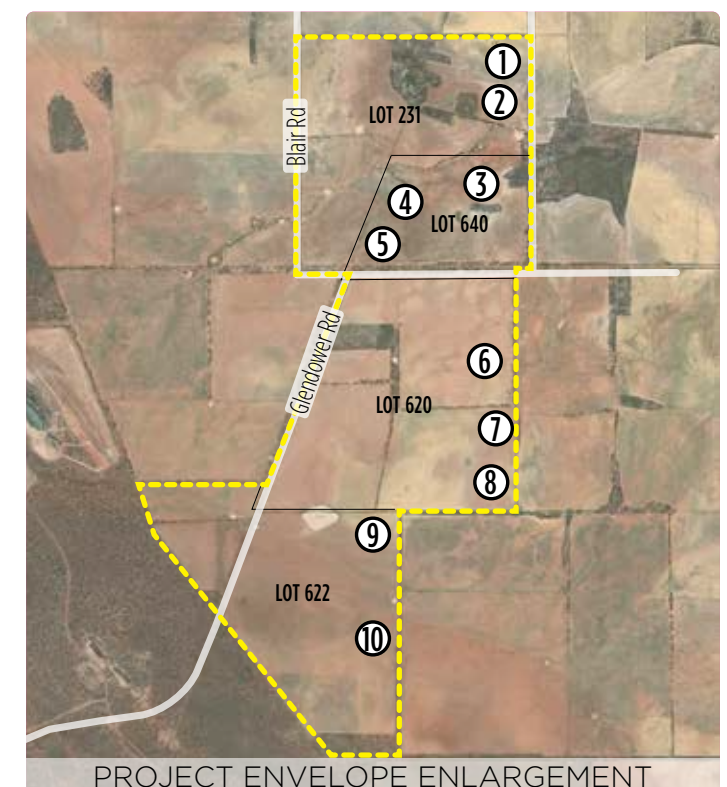
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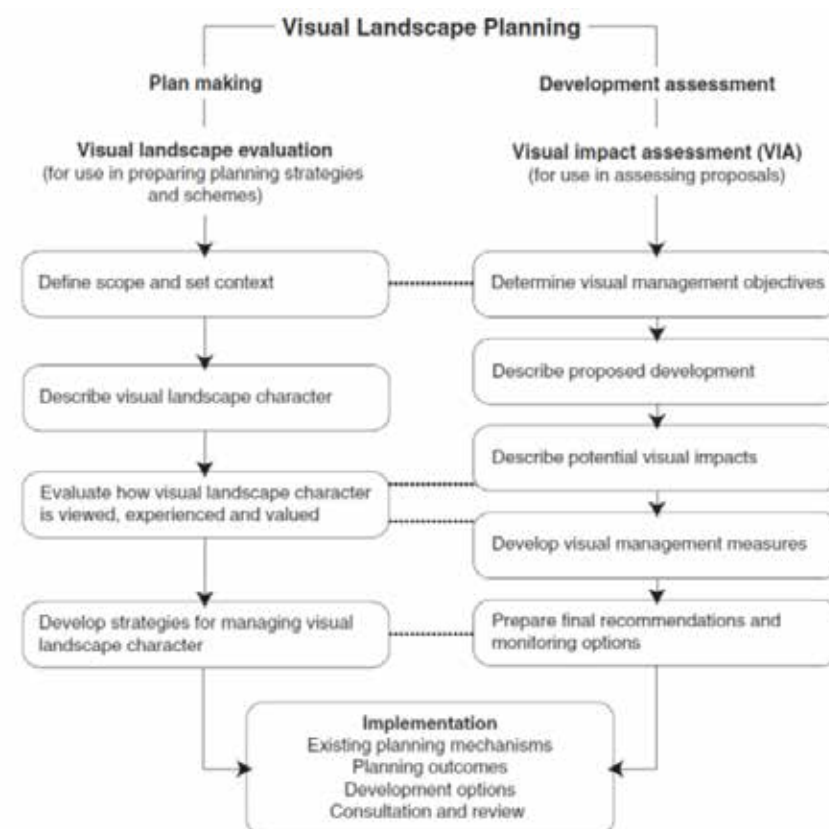
- Southern Cross Townsite
- Project Envelope
- Wind Turbine Locations (Numbered Below)
- Train Line
- Roads
- 20km Investigation Area (from centre of Wind Turbine Development Area)

## Sensitive Receptors

- Houses & Private Buildings 1 - 13
- Airport
- Golf Course







**Table 1** Visual Landscape Planning Process. Source: Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting and design (Western Australian Planning Commission, 2007)

## 2.3 Landscape Planning Context

Western Australia's image has been shaped and defined by its rural and remote landscapes. However, these landscape areas have been somewhat undervalued as their inherent visual, aesthetic character, and landscape quality tends to be overlooked in statutory processes in rural areas. Instead the perception of the land has primarily been in terms of economic return. In recent years there has been some

indication that community attitudes toward rural landscapes are changing; with a greater priority being placed on action to address landscape values and changes to rural character, as well as other environmental concerns such as land degradation, loss of biodiversity, and declining water quality. (WAPC 2007).

The existing landscape is formed from the natural environment of vegetation, land, rocks, soil, and climate. The visual environment is impacted by human interventions in the form of clearing, roads, mining, and buildings. The composition of this presents a visual environment which is experienced by residents & visitors and documented in many ways.

The broad visual landscape elements are described below and were compiled from a site inspection on 15th and 16th August 2023.

### 2.3.1 Regional Context

The subject land is within the Kalgoorlie Plain. This landscape lies between the Wheatbelt plateau subtypes to the west, and the Nullarbor plan landform to the east, the Esperance plains that extend south towards the coast, and to the north is the extensive plateau rich with Mulga called the Meekatharra Plateau see **Figure 2**.

The Kalgoorlie Plain topography is classified as 'very gentle' with salt lakes and conspicuous hills being separated by low ranges, granting extensive views of a wide horizon. The landscape

is ancient and eroded. Chalky red and yellow soils support open Salmon Gum woodlands with scrubby heath. Native vegetation has been substantially removed in the areas where agriculture is the dominant use. There are hills which are visible on horizons, with deep views between outcrops of vegetation available. Refer to 'Reading the Remote' CALM (1994).

Notable features are Mt Jackson to the north, Yellowdine Nature reserve to the east and Jilbadji Nature Reserve to the south. These are all considered part of the Great Western Woodlands. (Wheatbelt Region Parks and Reserves Management Plan 2021)

Farming extends through the western portion with grazing on pastoral leases taking place to the centre and east of the character type. There are some rocky outcrops through the area with lines of salt lake beds following drainage lines. Some outcrops head north-south towards the coastal plains. Other outcrops lie scattered through the gently undulating terrain. Refer to 'Reading the Remote' CALM (1994).

### 2.3.2 Local Area Context

The investigation area is the 20km area surrounding the development site. It contains the townsite of Southern Cross (population ~700), where the land uses include agricultural, rural or mining services, including the offices for the Shire of Yilgarn. The town of Marvel Loch (population ~140) is situated to the south of the study area.


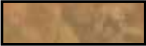


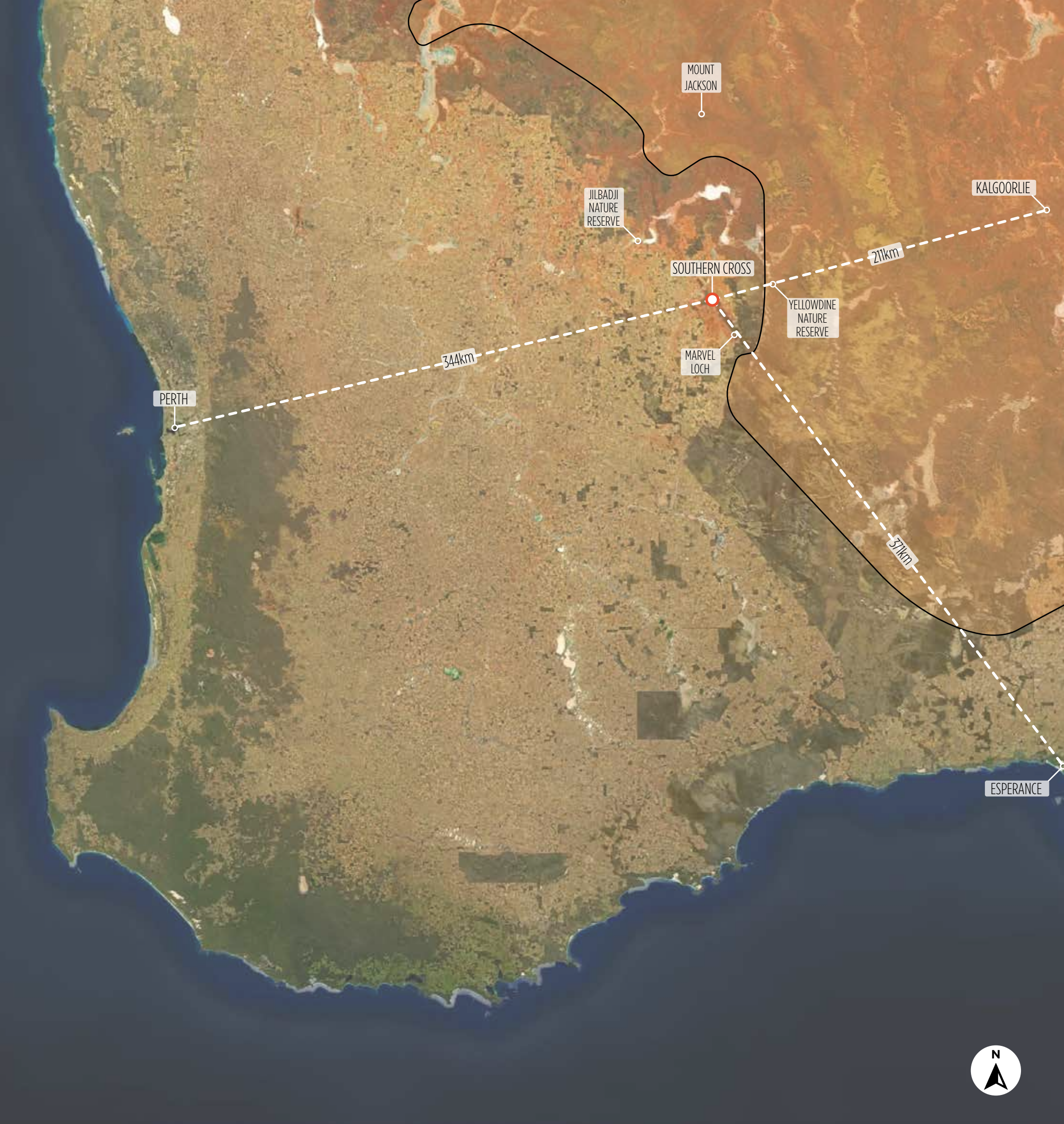


## GREATER REGION CONTEXT

Figure 2

Scale - 1:2,500,000

-  Southern Cross
-  Kalgoorlie Plain (As identified by 'Reading the remote' CALM 1994)







The investigation area is entirely within Shire of Yilgarn. The Shire of Yilgarn is at the western edge of the Kalgoorlie Plain landform and covers an area of 30,720 square kilometres. Here the landscape is transitioning from low scrubby vegetation to spacious cropping land. The region has an extensive mining history that continues to the present day. It is likely mining activity will continue to grow the future given the rich mining opportunities that exist in the area. The local economy is strongly connected to the current mines operating in the area and past mines that have been closed. These are visible from the roadside and air as open cut pits, tailings heaps and/or mullock piles.

The Shire of Yilgarn has a combination of open wheatbelt agriculture land, which is somewhat marginal in terms of rainfall, on the western margins, and low-lying scrubby vegetation interspersed with dry creek beds and salt pans, through the mid-east. Toward the eastern margins, native vegetation low lying scrub extends over pastoral leases, unclaimed crown land and mining tenements.

## 2.4 Site Description

### 2.4.1 Local Area Description and Land Use

The subject land is situated within the Kalgoorlie Plain, a landscape unit that sits within the complex and diverse geology of the Yilgarn Craton.

As shown in **Figure 3** a large portion of the

study area is cleared farmland, a smaller portion of native vegetation and a still smaller portion comprise large open cut mines. From Wimmera Hill a mostly farming and open cut mining view is visible.

The built environment is primarily represented within the townsites of Southern Cross and Marvel Loch with interconnecting highway and local roading infrastructure. Marvel Loch typical features that provide for a small town, such as a school and local store/post office plus accommodation for workers of nearby mining activity. There are sports grounds, significant heritage buildings and a local pool at Southern Cross as well as services consistent with a regional town centre.

The investigation area and surrounds possess very gently undulating terrain. Spoil heaps from mines and roadside vegetation characterise the broader landscape.

Beyond the townsites, views of the horizon are distant. The few outcrops of rock or ranges are at such a distance that they are not easily visible from the study area.

### 2.4.2 Investigation Area

A desktop study where guidance, site context and topography were assessed suggested an investigation area of 20km surrounding the site should be checked. This is informed by research that identifies visual dominance of windfarms see references section below,

‘References for windfarms and distance seen’ section.

The selected investigation area provides a guide to assessment and does not define where there are impacts.

On the basis that the theoretical ZVI extends over 20km, distant views will be possible.

Within the investigation area, the landscape character is defined by roads, remnant vegetation along lot boundaries and cleared farmland.

Roadsides contain limited remnant vegetation and are often so sparse that clear views through to farming land are common. Occasional stands of roadside trees screen views.

Within the investigation area, most of the land that is used for agricultural purposes is almost entirely cleared to allow cropping. Stands of remnant vegetation, screening mine sites, roads and townsites take up the balance. These open spaces are vast, only interspersed by stands of remnant roadside vegetation at road verges. Crops are generally low, reflecting the low rainfall levels of the district.



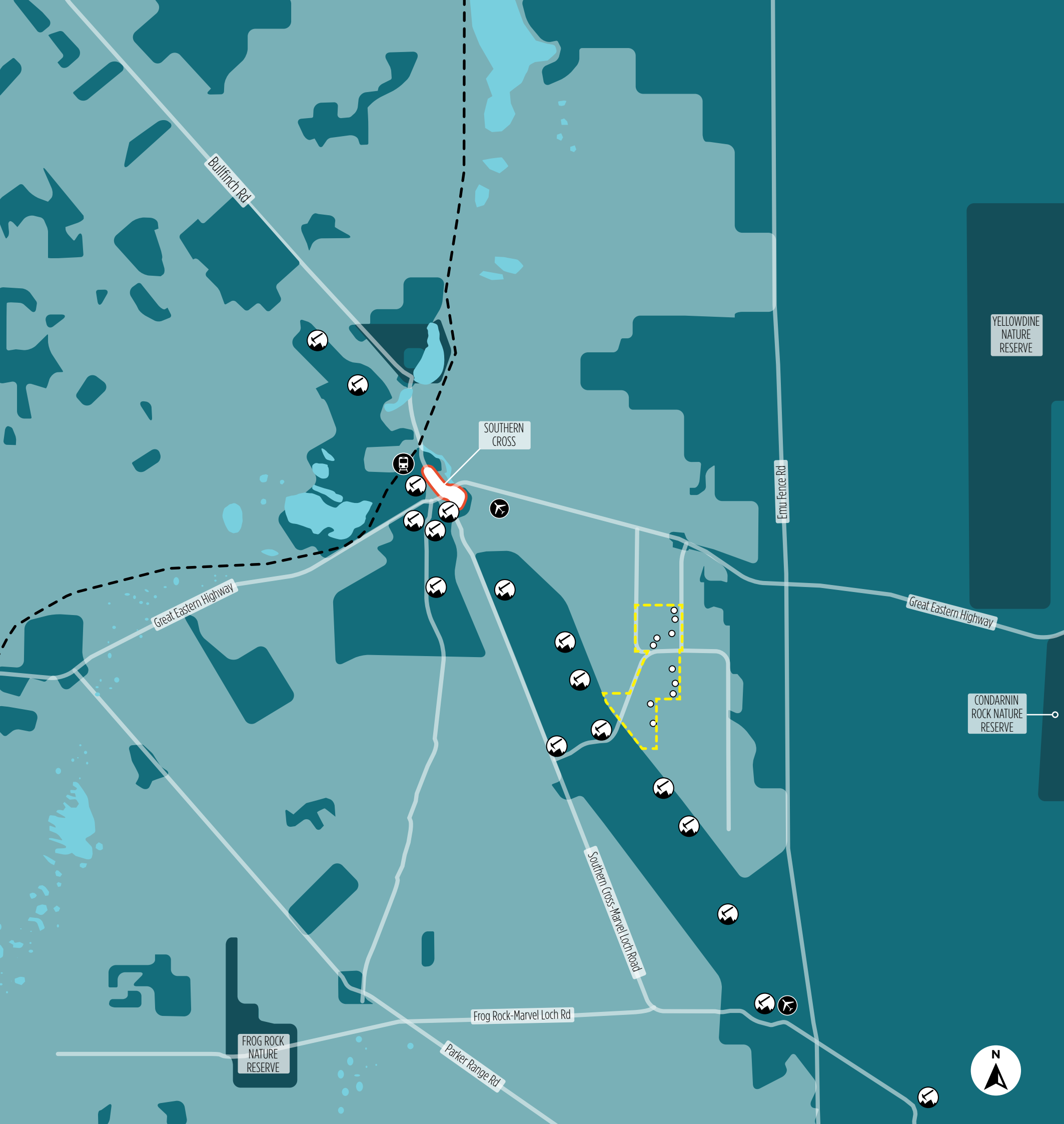
# LAND USE PLAN

Figure 3

Scale - 1 : 200,000



- Southern Cross Townsite
- Project Envelope
- Wind Turbine Locations (Numbered Below)
- Train Line
- Roads
- Nature Reserves
- Vegetation areas
- Farmland
- Seasonal Water Bodies
- Train Station
- Airport
- Operational or abandoned Minesite Operations





### 2.4.3 Topography

As shown in **Plate 1 & 2** the land in the investigation area is mainly flat to gently undulating. There are a number of locations which give the feeling of elevation such as the Wimmera Hill Lookout, the Golf Course and parts of Emu Fence Road but in general the landscape is experienced as a relatively flat topography. Refer **Figure 4** below.



Plate 1 - Flat Topography



Plate 2 - Gently Undulating Topography

### 2.4.4 Vegetation

The vegetation complexes within the study area fall into three types.

#### Type 1

The native vegetation that comprises the land lying between Southern Cross townsite and Marvel Loch townsite – within which are several open cut mines. These mines are largely screened by the vegetation. These trees are generally well defined and form a woodland environment. The vegetation appears to be quite intact see **Plate 3**.



Plate 3 - Typical Type 1 Vegetation

#### Type 2

The second type is the low heath mostly found to the east of Emu Fence Road. Here the vegetation is between 0.5m and 2m high with occasional stands of vegetation in excess of 2m occupying low undulating dunes or landforms see **Plate 4**.



Plate 4 - Typical Type 2 Vegetation





## CONTOUR PLAN

Figure 4

Scale - 1 : 200,000



 Southern Cross Townsite



 Project Envelope

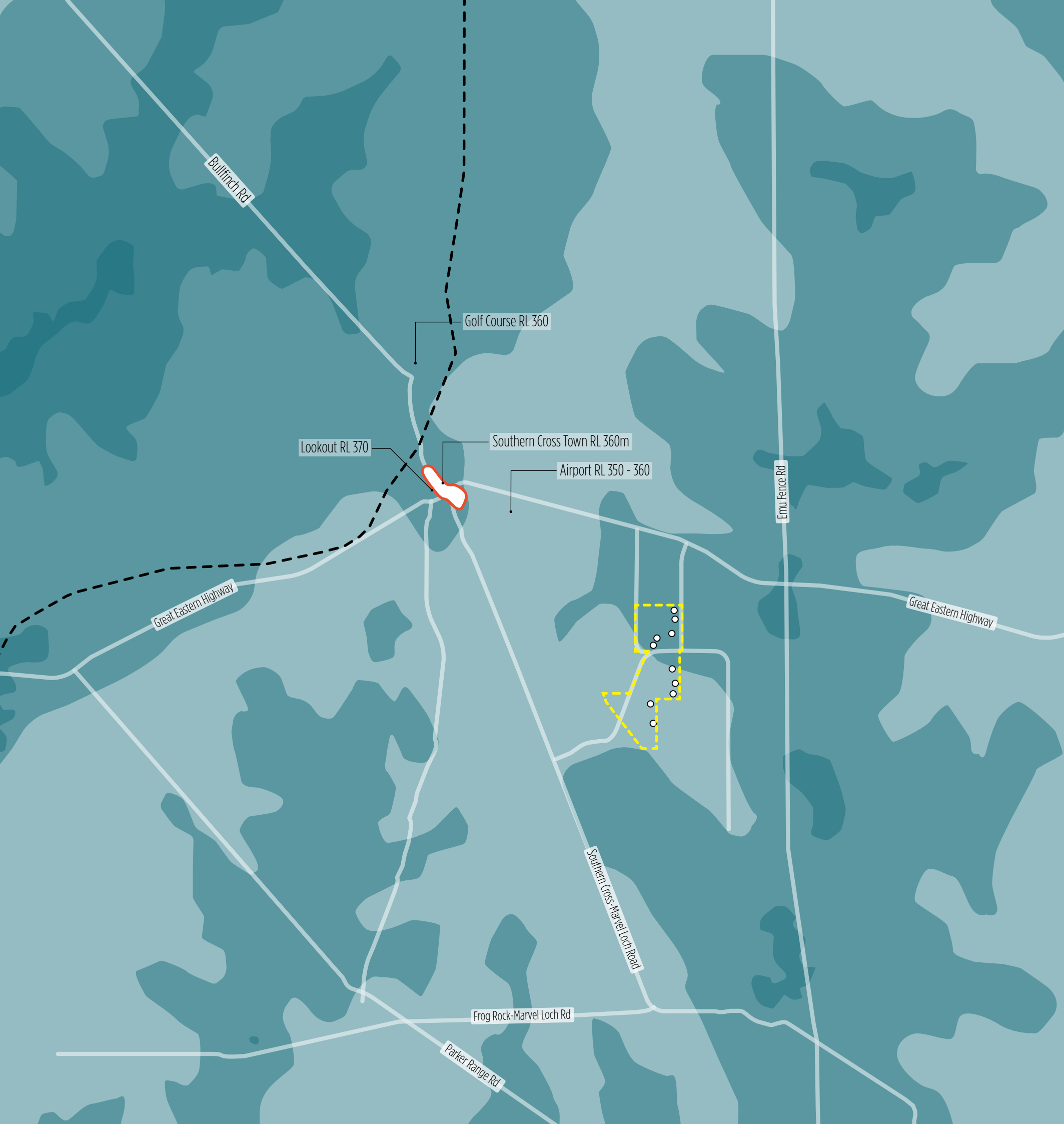
 Wind Turbine Locations

 Train Line

 Roads

Contour heights (Metres above sea level/MASL)

-  • 350-400 MASL
-  • 400-450 MASL
-  • 450-500 MASL





### Type 3

The third vegetation type is the land within the investigation area which is predominantly cleared farmland. Some remnant vegetation lies along roads and at the margins of properties see **Plate 5**.



Plate 5 - Typical Type 3 Vegetation

Of the three forms, Type 1 may be considered to be of high value as the vegetation is commonly found in the locality with common forms, size, shaping and coloration to other stands in the locality and wider district. Type 2 and Type 3 vegetation are of low value, being similar in character to much vegetation in the locality and wider district.

Conclusion: Scenic vegetation values in the study area are Low to High

### 2.4.5 Waterforms

There are no directly identifiable waterforms within the investigation area. Some waterforms are found at the very edges of the study area.

Conclusion: Scenic waterform values in the study area are Non-existent to Low

### 2.4.6 Built Form

As shown in **Plate 6 to 10** buildings and structures can be found throughout the investigation area. Residential properties make up the majority of built form in and around the townsite of Southern Cross. These are typically one storey dwellings on large lots. Properties are positioned with higher density within the centre of the town becoming more spaced out on the outskirts. There is a mix of some retail businesses, shops, service station, police station, a museum within the town. These buildings are of a scale and nature typical of a small country town.

Further away from the town centre properties are spaced significant distances apart and are more rural in character. They are typically set back some distance from the road with gravel driveways, post fencing and various sheds and outbuildings.

The Goldfields Water Supply Pipeline in an omnipresent element running above ground along large portions of the Great Eastern highway.

Various tall telecommunication masts and large water storage tanks are found infrequently spread out in the investigation area. When encountered they present notable features in an otherwise barren landscape.



Plate 6 - Residential Property in Southern Cross



Plate 7 - Residential Property on the Outskirts of Southern Cross





Plate 8 - Retail in Southern Cross



Plate 9 - Goldfields Water Supply Pipeline



Plate 10 - Communications Infrastructure

## 2.5 Landscape Character

### 2.5.1 Regional Landscape Character

The land subject to this proposal is cleared farmland. There are limited portions of remnant vegetation on site. The land has been cleared, is farmed for broadacre cropping, and has barely visible undulations and contours.

The regional landscape character has long been documented and described as Kalgoorlie Plain. The fieldwork undertaken for this study maintains this broad regional description.

‘Reading the Remote’ (CALM et al 1994) describes the Kalgoorlie Plain Character Type as follows:

“... expansive, gently included landform which appears level in many areas. Views over this landscape often enclosed and interrupted by the dominant woodland vegetation, and from high points such as Mt Charlotte in Kalgoorlie or the craggy summit of Peak Charles, the broad far-reaching views over the landscape extend to the distant, hazy, blue grey horizon.

“Dissecting this subdued terrain are a series of shallow to almost imperceptible depressions which act as floodway’s, linking the excessive scattered chains of salt lakes after heavy rains. These shallow lakes are found in broad, indistinct valleys with the eastern and southern peripheral margins occasionally fringed by low-lying dunes.

The extensive, ancient drainage lines which have been reduced to torturous linear strings of saline lakes are the characteristic waterform of the Kalgoorlie Plain. ... Scattered, glistening white salt flats often form part of a salt lake chain and after period of heavy rain, the saline water bodies flow into one another by linked drainage. channels ...” (CALM 1994)

Regionally the landforms of the Kalgoorlie Plain are distinguished by wide open landscape. Occasionally trees, machinery and sheds dot the landscape. Adjacent and within the site, there is remnant vegetation scattered along roadside corridors, including Salmon Gum (*Eucalyptus salmonophloia*) mallee timber (*Eucalyptus gross* sp.), smokebush (*Conospermum stoechadis*) and Red Beared Hopbush (*Dodonea lobulate*).





## 2.5.2 Local Landscape Character

Generally the investigation area is gently undulating cleared land, being used in a manner consistent with broadacre cropping agricultural use. It presents a commonly found wheatbelt rural character.

## 2.5.3 Landscape Character Units

As shown in **Figure 5** the landscape character of the local area can be classified into landscape character units (LCU) as follows:

- LCU 1 – Broad Agrarian Plain
- LCU 2 – Rural Townsite
- LCU 3 – Vegetated Kalgoorlie Plain
- LCU 4 – Industrial

### Broad Agrarian Plain (LCU 1)

As shown in **Plate 3 & 4** this character unit comprises broad open agricultural land, alluvial flood plains which flood and recede leaving seasonal salt pans. There is little mature vegetation of note in these character units.

LCU 1 character units generally have a low landscape character value due to limited mature natural elements within a largely man made environment. The exception is the seasonal Canola flowering which provides a memorable scene of yellow flowers stretching over large distances for approximately one month a year.

Scenic Quality: Low to Moderate (Seasonal)



Plate 11 - Broad Agrarian Plain (LCU 1)



Plate 12 - Broad Agrarian Plain (LCU 1)

### Rural Townsite (LCU 2)

As shown in **Plate 5 & 6** this character unit is the townsite of Southern Cross within the investigation area. The town is typical for a Western Australian country town. It has a small town centre which is formed around road intersections containing several hotels, small shops, community services and a tavern.

Roads and footpaths in LCU 2 are formally surfaced. Businesses and public facilities are moderately signposted, and a network of overhead powerlines run across the streets.

Residential properties are found in and around the town with properties on the outskirts becoming less frequent and spaced out on larger blocks of land.

Scenic Quality: Low



Plate 13 - Rural Townsite (LCU 2)



## LANDSCAPE CHARACTER UNIT (LCU) PLAN

Figure 5

scale - 1:200,000



○ Wind Turbine Locations

--- Project Envelope

--- Train Line

— Roads

LCU 1 – Broad Agrarian Plain

LCU 2 – Rural Townsite

LCU 3 – Vegetated Kalgoorlie Plain

LCU 4 – Industrial

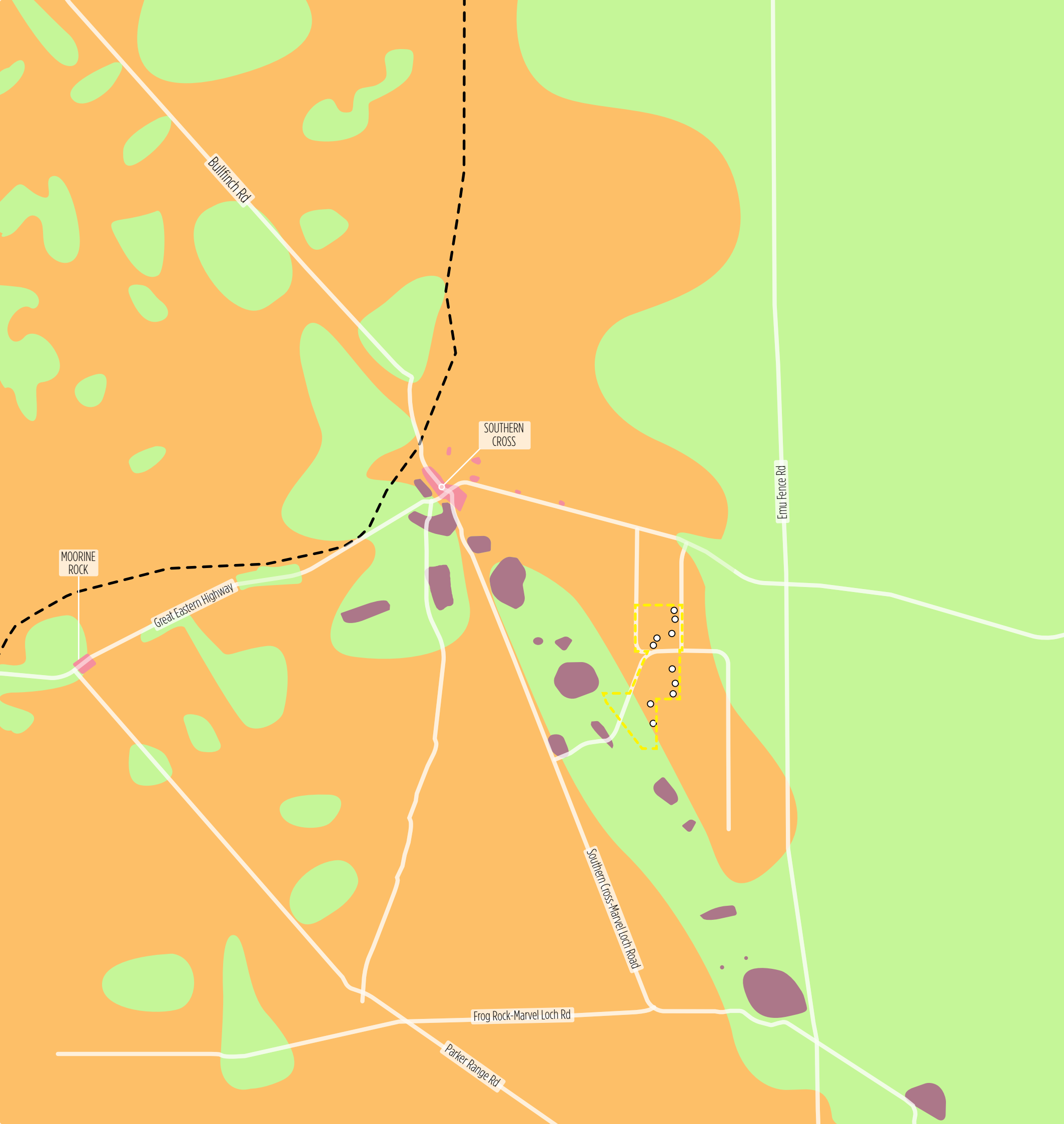






Plate 14 - Rural Townsite (LCU 2)

### Vegetated Kalgoorlie Plain (LCU 3)

As shown in **Plate 7 & 8** this character unit is the areas of remaining, naturally occurring vegetation within the investigation area. Vegetation in LCU 3 can be lines of trees along road sides, fields and property boundaries or groups of trees and scrub not cleared through farming practices.

Scenic Quality: Low to Moderate



Plate 15 - Vegetated Kalgoorlie Plain (LCU 3)



Plate 16 - Vegetated Kalgoorlie Plain (LCU 3)

### Industrial (LCU 4)

As shown in **Plate 9 & 10** this character unit contains areas where past and present industry is apparent. The investigation area contains many open mine sites and refineries and associated elements such as tailings mounds, tailings ponds, machinery and road infrastructure. A disturbed landform is generally observed in the landscape whether in excavation or fill.

Scenic Quality: Low



Plate 17- Industrial (LCU 4)



Plate 18 - Industrial (LCU 4)





### 3. VISUAL EXPERIENCE

#### 3.1 Representative Views

##### 3.1.1 Typical Views

The main viewing experiences are from roads whilst in a vehicle. There are few stationary opportunities for views.

As shown in **Figure 6** public views are generally from public roads with speed limits of 50km/h to 110km/h.

The site is located generally obliquely to the direction of travel corridors and obliquely to the direction of travel.

##### 3.1.2 Key Views

Key views are considered those that are obtained from locations of high sensitivity, where the visual experience is of a broad landscape or panorama.

Wimmera Hill Lookout is a key sensitive view with direct open views to the site as is the view from the Southern Cross Golf Course. The proposed turbines will be visible at distance from these locations.

There are no roads in the local area which align to present a view in direct line of sight and no public footpaths that allow open vistas to be observed.

As shown in **Figure 7** and **APPENDIX I** the images from location 1 - 34 have been selected from the initial desktop assessment.

#### 3.2 Viewing the Subject Land

Specific to the study area there are few points in the landscape that offer views similar that of Wimmera Lookout. The land is at best gently undulating along road, minimal vegetation on site. What has remained is of poor and isolated condition. Much of the land is farmed, grazed, or cropped.

From many points within the study area, views of the environment are open, spacious and very gently undulating. Due to the flat plain, views are consistently broad, encompassing much of the horizon in all directions.

The Kalgoorlie Plain aesthetic character, developed in Reading the Remote, is given below:

#### 3.3 Assessing Scenic Quality

The recommended framework for assessing scenic quality is to adopt the visual classification system from Reading the Remote and placing it within the assessment system from Visual Landscape Planning in Western Australia. (CALM 1994; WAPC 2007)

The Visual Quality Classification frame of reference, giving High, Moderate and Low scenic

qualities for the Kalgoorlie Plain landform is given in Reading the Remote.

#### 3.4 Scenic Landform Values

The land within the study area does not contain any sites which fit the criteria for High value landform sites. The landscape is slightly undulating and is consistent with the landforms surrounding it, with few landmarks around which can be used to orientate.

Conclusion: Scenic landform values in the study area are Low to Moderate.





SPEED AND TIMING PLAN

Figure 6

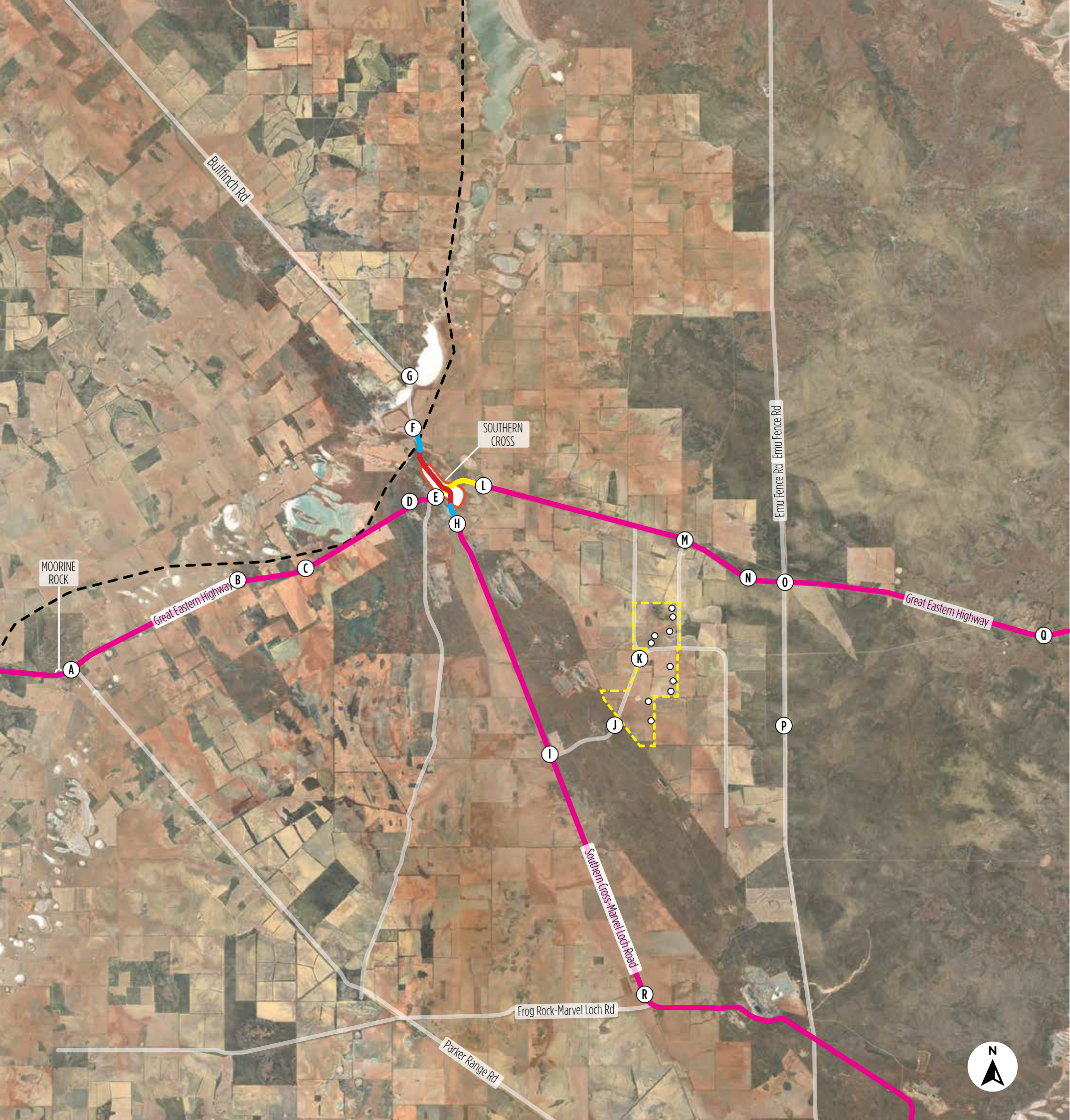
Scale - 1 : 200,000



- Southern Cross Townsite
- Project Envelope
- Wind Turbine Locations (Numbered Below)
- Train Line
- Speed Limits**
  - 60km/h
  - 80km/h
  - 110km/h
  - undefined (default 110km/h)

TIMING CALCULATIONS

Bidirectional Journey	Timing
Journey A - B:	5 mins 14 sec
Journey B - C:	1 mins 48 sec
Journey C - D:	3 mins 42 sec
Journey D - E:	0 mins 43 sec
Journey F - G:	1 mins 53 sec
Journey H - I:	7 mins 12 sec
Journey I - J:	1 mins 56 sec
Journey J - K:	2 mins 09 sec
Journey L - M:	5 mins 46 sec
Journey M - N:	2 mins 13 sec
Journey N - O:	1 mins 02 sec
Journey O - P:	3 mins 57 sec
Journey O - Q:	7 mins 30 sec
Journey I - R:	7 mins 31 sec







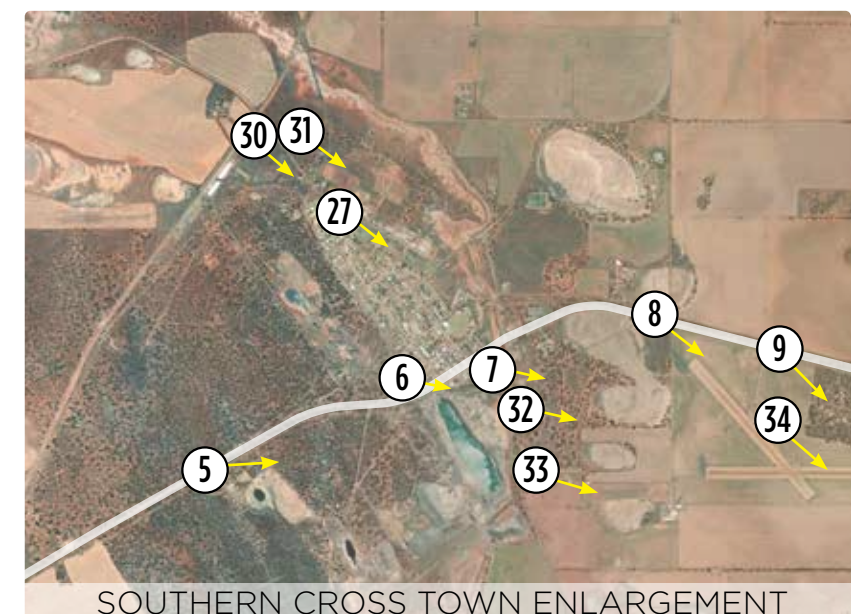
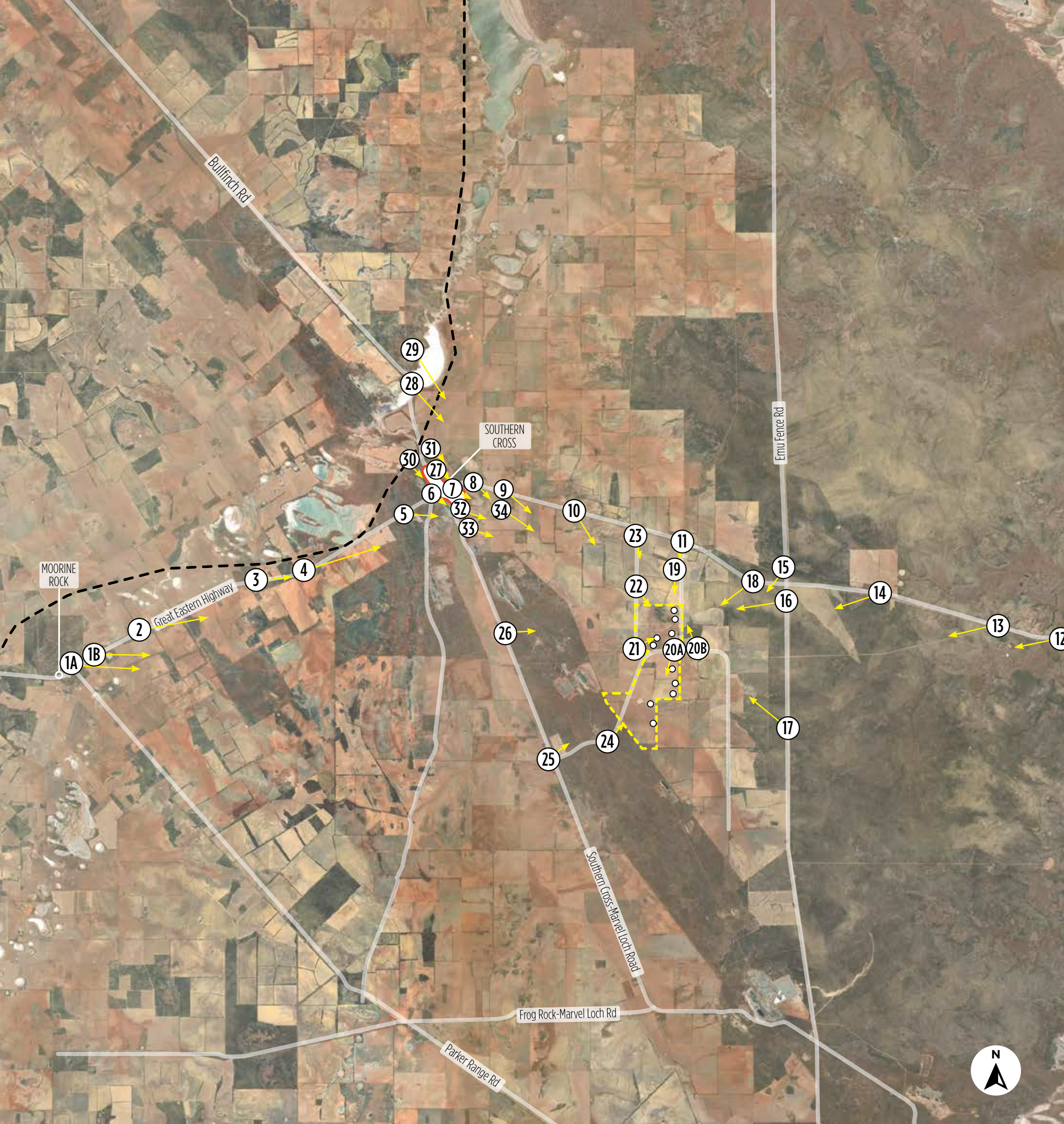
# PHOTO LOCATION PLAN

Figure 7

Scale - 1 : 200,000



- Southern Cross Townsite
- Project Envelope
- Wind Turbine Locations (Numbered Below)
- Train Line
- Roads
- Photo Locations (See **APPENDIX I** - Photos)







## 4. THE PROPOSAL

### 4.1 Description of the Proposed Development

The proposed development is located to the south east of the Southern Cross townsite between 8 and 15 kilometres from the town. Southern Cross is located ~370 kilometres east of the City of Perth, refer to **Figure 1 & 2**. The envelope within which development is proposed is approximately 1,464 ha.

The land proposed for development is currently used for agricultural purposes. The development proposed comprises a wind farm component and an energy storage component, as follows:

- The wind farm component comprises up to 10 horizontal axis, three blade wind turbines, with a maximum blade tip height up to 240 metres above ground level. The wind turbines will have a maximum tower height up to 150 metres above ground level and maximum blade length up to 90 metres.
- The energy storage component is proposed to be up to 10 MW/10 MWh of battery storage modules installed adjacent to the switch room. These will be commercially available modular equipment. In operation, the battery storage footprint will occupy approximately 0.015 ha of the 1,464 ha Project Envelope.

As is common for these types of projects, the final make, model of turbine, the tower height and number of turbines is yet to be finalised. The project will also have additional incidental infrastructure, including underground and overhead cabling, electrical transformers, access roads, hardstand areas for crane operations plus the installation of appropriate communications equipment.

The project will be subject to a commercial and procurement process following approval. While there will be some variability with the project in terms of turbine and micro-siting, the overall size and space occupied by the project will remain relatively unchanged. Refer turbine layout and allocated turbine numbers in **Figure 1**.

The proponent notes that the Civil Aviation Authority may require lighting to be installed to warn aircraft of the structures and their possible impact on low level flight. Refer **Appendix III**.

## 5. VISUAL IMPACT ASSESSMENT (VIA)

### 5.1 Assessment of Visual Impacts

As shown in **Figure 7** a series of 34 viewpoint locations which are representative of a viewers experience were selected for assessment based on the desktop study, visual assessment guidelines and understanding of the Development.

The following is a description of the photography equipment and settings used to capture the images. These are all high definition digital images.

Camera:

- OPPO Find X5 Lite Phone
- Tripod mounted to achieve 1.7m viewing height.

Camera Settings:

- f/1.7
- Shutter: 1/1000 - 1/2000

Focal length:

- Photo stitch images: 33.8mm
- Normal shots (impact vis shots): 26mm



## 5.2 Visual Impacts on Landscape Character

This section of the report assesses potential impacts on each of the representative public vantage points identified. This is in accordance with the methodology discussed above.

As previously discussed in this report the landscape within the investigation area has been categorised into landscape character types (units).

These character units and associated features form the overall existing character of the investigation area. Potential effects from the proposed development on the existing character is the subject of this Visual Impact Assessment (Refer to **Table 2**).

## 5.3 Zone of Visual Influence (ZVI)

As discussed previously in this report a desktop study suggested an investigation area of 20km surrounding the site should be checked.

The visibility of the turbines becomes of less dominance at 17km to 18km. See references section of this report 'references for windfarms and distance seen'.

The selected investigation district provides a representative area where views are capable. It is not definitive and constrained by accessibility however sufficient data has been collected to inform conclusions.

Because the land is gently undulating towards being flat, much of the investigation area shows high visibility to the proposed development.

The Zone of Visual Influence identifies the theoretical visibility within the landscape of the proposal and the degree to which it is visible. All 10 proposed turbines were used.

An analysis of the Zone of Visual Influence and substantiated by field study highlights the minor screening of the vicinity of the proposal behind mine tailings, mullock heaps, and in depressions at the far periphery of the project.

## 5.4 Photo Montages

The choice of locations used for visual impact assessment with rendering of turbines were based on the visibility to the turbines within the investigation area and the significance of the site for vistas within the public realm.

Wimmera Hill is a key site that was chosen because of its significance for views around Southern Cross townsite. The Southern Cross Airport was chosen as it is a gateway to arrivals, and it has uninterrupted views towards the investigation area.

Other vantage points such as the Southern Cross Golf Course were chosen because of their relative elevation, granting views of the development site with an expectation that there would be views of turbines at these locations.

From these vantage points, photographic images of the project site were taken during a site inspection. Utilising Geo-located imagery via Google Earth, a sketchup digital model, Lumion, and Photoshop Software these images were processed to render photomontage images of the turbines in place. In some of these views, the turbines are clear. In others, views were blocked by screening both vegetation and structures. Some photomontages show turbines at a great distance, further reducing turbine visibility in some cases to being almost unable to be seen.

Frequently, on-site screening or local site conditions reduced visual impacts. In some locations, such as Moorine Rock townsite or Yellowdine Service Station – the proposed development was too far away, or with too much intervening vegetation, to allow views. For others, intervening mullock heaps and native vegetation blocked views such that, at best, only blade glimpses were visible. Where a significant site was assessed, and there was no turbine structure visibility available (or only glimpses of blade tips) there was no assessment, as there would be nothing to render.

For example, for private buildings 12 and 13 (refer **Figure 1**) the turbines were not visible above the tree line, and only occasional blade tips glimpses may be possible between tree limbs. This site was excluded as these possible glimpses were screened by trees.

Table 2 - Landscape Character Unit Evaluation Table

LANDSCAPE CHARACTER UNIT EVALUATION					
LCU	LANDSCAPE VALUE	CAPACITY TO ACCOMMODATE CHANGE	SENSITIVITY TO CHANGE	MAGNITUDE OF CHANGE	SIGNIFICANCE OF IMPACT
Broad Agrarian Plain	Low/Moderate	Low - Open panoramic views allow clear contrast.	Moderate - High	Moderate - High	Moderate
Rural Townsite	Low	Moderate - Limited viewing potential from sensitive receptors	High	Moderate	Low
Vegetated Kalgoorlie Plain	Moderate	Low to Moderate - Possible views through gaps in vegetation.	Moderate	Moderate	Moderate
Industrial	Low	High	Low	Low	Low





## 5.5 Visual Analysis

As shown in **Figure 8** the following points were selected for closer analysis, where visibility of the turbines is likely and the public accessibility of these sites by car is frequent (along Great Eastern Highway) or likely (along Emu Fence Road).

- Location 4 - Great Eastern Highway
- Location 6 - Wimmera Hill Lookout
- Location 8 -Great Eastern Highway
- Location 10 - Great Eastern Highway
- Location 14 -Great Eastern Highway
- Location 18 - Great Eastern Highway
- Location 20B - Ghooli S Road
- Location 22 - Blair Road
- Location 30 - Southern Cross Train Station
- Location 34 - Airport

Photographs were taken from an elevation 1.7m above ground level where relatively clear views of the investigation area, such as on the sides of roads, could be achieved see **APPENDIX II**.

## 5.7 Assessing Impacts on Viewers

The viewer groups potentially affected by the proposed developments comprise mainly residents of the region, traffic on the Great Eastern highway and visitors to the local attractions. Community appreciation of scenery (both landscape) is based largely on the extent, diversity, integrity and naturalness of landscape features and characteristics visible from public viewpoints (such as lookouts and reserves),

tourist or recreation sites, or while travelling. Tourists are guided to routes to the west of the townsite and not through the study area.

Landscape impacts of the proposal on housing is also important. The location of the proposed turbines when seen from nearby occupied and/or abandoned houses have been assessed.

The assessment, including proximity of dwellings to proposed turbines, and comments on each location, are outlined in the table below.

**Table 3 - Sensitive Receptors Table**

SENSITIVE RECEPTORS		
SENSITIVE RECEPTORS	LEVEL OF SIGNIFICANCE	COMMENTS
USERS OF:		
G.E.H	1	National/State Significance
STATION	1	National/State Significance
GOLF	2	Local Significance
AIRPORT	2	Regional Significance
RESIDENTS OF:		
HOUSES + PRIVATE BUILDINGS	3	Local Significance
LOCAL ROAD USERS	3	Local Significance
VISITORS TO SOUTHERN CROSS TOWN	3	Local Significance

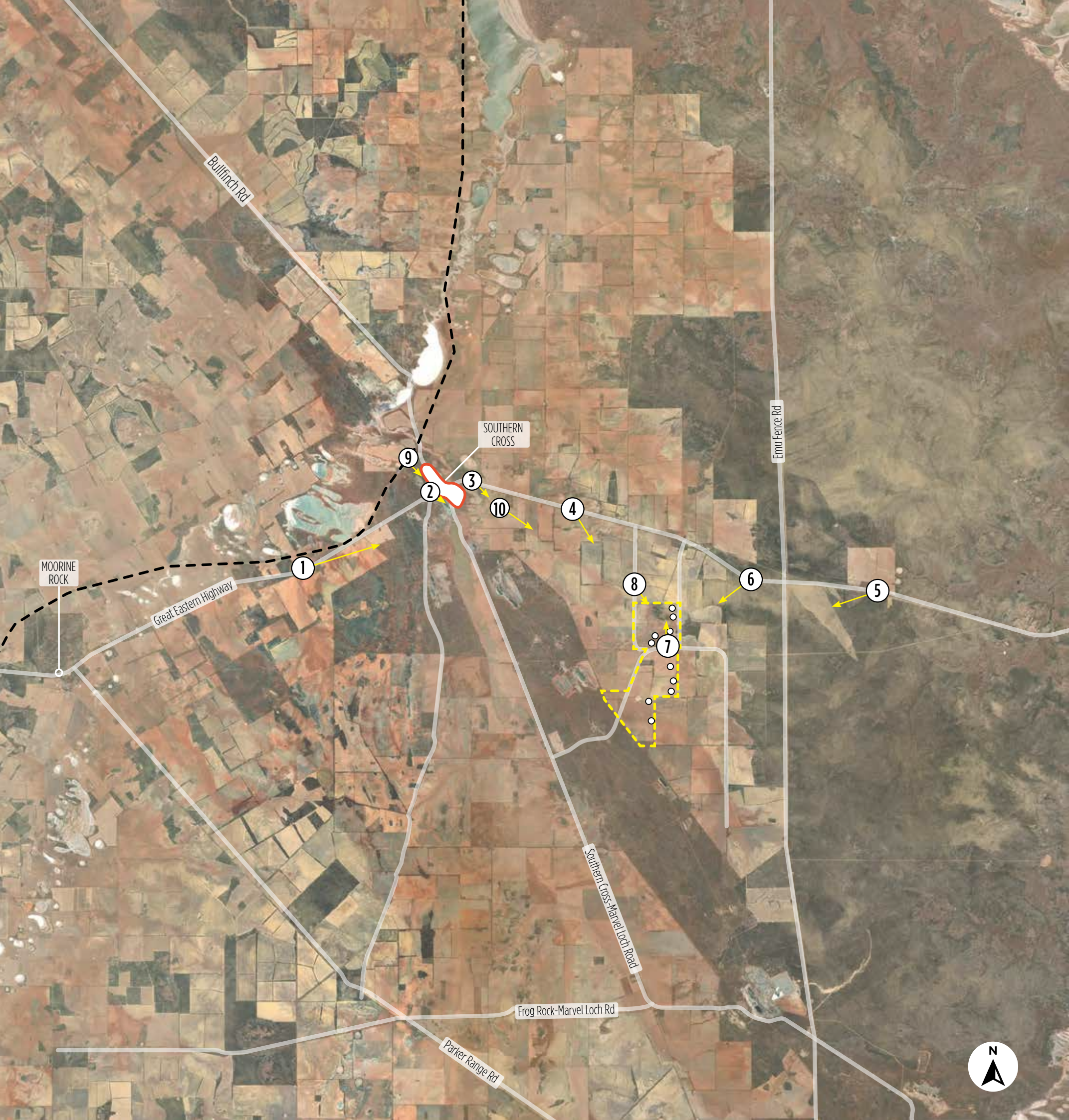
The visibility of the proposed project has been assessed by analysing the viewsheds of selected viewpoints, such as from important view corridors, scenic route sections or sensitive locations.

Recommendations to mitigate or ameliorate impacts are outlined in the conclusion to this report.

## 5.8 Discussion of Landscape and Visual Impacts

The Kalgoorlie Plan has numerous high aesthetic value landscape features to be found north and west of the study area. These are major elevated landforms, natural landscape filled with native vegetation or waterforms of wide lakes and salt plains. Of the Kalgoorlie Plain landscape features found within the study area, those identified have moderate significance. The uniformity of the landscape locally within the study area possess moderate to low levels of significance. Further, the impacts of mining have presented significant impacts to the natural environment and demonstrate quite visible levels of human intervention. The proposed development would introduce additional built features into the landscape.





# PHOTOMONTAGE LOCATION PLAN

Figure 8

Scale - 1 : 200,000



- Southern Cross Townsite
- Project Envelope
- Wind Turbine Locations (Numbered Below)
- Train Line
- Roads
- Photomontage Number (See **Appendix II** - Photomontages)







Highest impact factors relate to the proximity to the development and the alteration of rural character within the viewshed of Great Eastern Highway. Traffic along this highway will see part of or the whole of the development. Reducing both visibility and impact factors are the scattered roadside vegetation, providing screening of the site, and the high transit speeds which serve to reducing the duration in which the proposal is in view.

The view from the Wimmera Hill lookout and from the Airport show higher levels of project visibility within the landscape than many other areas of scenic value within the study area.

These views are considered to be of moderate importance and the impact of the turbines on the predominantly rural landscape is considered to be low to moderate.

Within Southern Cross town centre itself, the city buildings themselves and the uniform nature of town centre facing the main shopping strip prevent unobstructed viewing the turbines from street level. Views of the turbines from the town centre would be occasional, with distant glimpses between buildings.

The identified visual character values of the study area is not high, given the weighting description in 'Reading the Remote'. There are no highly significant rural character aspects within the viewshed looking eastward, whereas to the west, outside of the study area, there are more

significant views of landform and vegetation demonstrating significant aesthetic features of the Kalgoorlie Plain.

## 5.9 Mitigation Measures

The proponent has incorporated the following measures to mitigate visual impacts:

1. Exterior finishes to be matt in colour decreasing reflectivity or visibility.
2. Exterior finishes to be toned towards neutral colours reflective of the landscape colours through the seasons.
3. Adopted greater than required setbacks from residential dwellings to reduce the visual scale and dominance of the turbines relative to the nearest dwellings.
4. Increased separation distances between turbines to reduce visual overlap and clutter of turbines against the viewshed backdrop.
5. Adjusted turbine layouts for the northern grouping, to follow land contours and minimise linear 'row' or 'fence' aesthetic sightlines in the landscape as seen from Great Eastern Highway.

It is recommended that for House 11 (see **Figure 1**), an offer be made for landscaping within 100m of the house to form screening landscaping, if desired, within the first 2 years of the development.

## 5.10 Conclusions

The wheatbelt and the Kalgoorlie Plain holds wide horizon views, and these wide views are common features through the region.

The potential visual impact of the development area to Southern Cross and the number of residents/visitors who will be able to see the proposal, is moderate to high.

The somewhat lower value of landscape character values for the development site, given the study area's regional and local context, reduces the impact of the proposal to Moderate.

Considering the scale of the new turbine structures, the impact on this district is considered moderate to low.

Sensitive static receptors are limited to a small number of specific houses and private buildings. The views experienced from vehicles on the public roads are in the majority of cases at a distant and oblique to the direction of travel.

It is inevitable that wind farm turbines will be seen. Wind turbines, when introduced into a natural or pastoral or agrarian setting, alter the character of a landscape. Where observed in closer proximity, the character of the scene will change. The pastoral agrarian landscape is culturally valued however is a highly modified landscape character in itself. It is a character that has been created by land clearing and framing practices.





Mitigation measures are limited as contemporary kinetic structures in a broad open landscape will be a feature that attracts viewing. The location and layout of the turbines are placed in a manner that has a moderate impact on the broader landscape character when observed.

The proposed installation could be considered as a feature of interest within the landscape when seen and as such become an element of interest to visitors and tourists as has proven to be the case in other areas of southwest of the state.



## 6. REFERENCES

Blackman Fabrications, 2022, 'About', About, <https://blackmanfabrications.com.au/about>.

CALM, 1994, Reading the Remote - Landscape Characters of Western Australia, Government of Western Australia.

Resoft, n.d., 'WindFarm' (Version 4) [Windows 10], ReSoft Ltd, London, SW13 0BE, United Kingdom.

WAPC, 2007, Visual landscape planning in Western Australia : a manual for evaluation, assessment, siting and design, November 2007, Western Australian Planning Commission.

'Wheatbelt Region Parks and Reserves Management Plan', 2021, Department of Biodiversity, Conservation and Attractions, Retrieved from <https://www.dpaw.wa.gov.au/>

References for windfarms and distance seen:

Sullivan, Robert G., et. al., "Offshore Wind Turbine Visibility and Visual Impact Threshold Distances", Environmental Practice 15(01):33-49, March 2013

Sullivan, Robert G., et. al., 2012. Wind Turbine Visibility and Visual Impact Threshold Distances in Western

Landscapes. Argonne National Laboratory and the U.S. Department of the Interior, Bureau of Land Management. USA

APPENDIX I - Photos







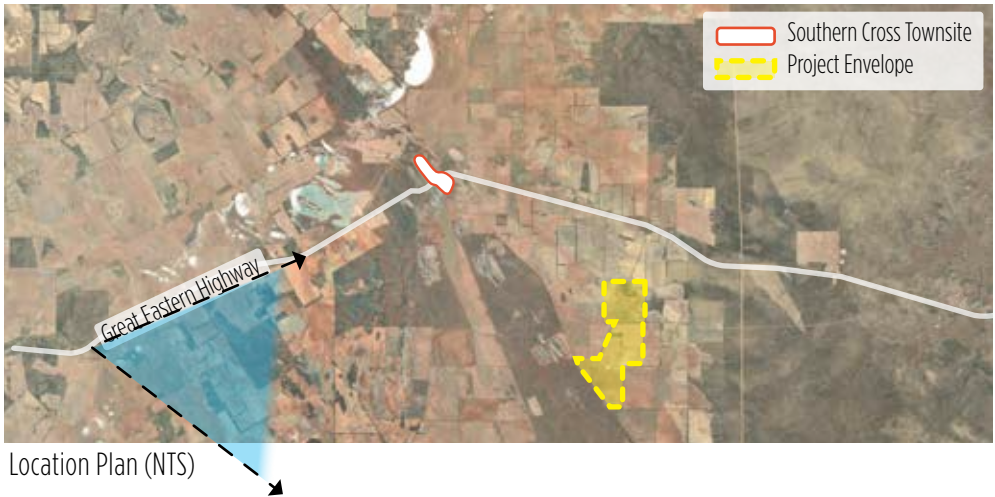
**View Direction:**  
East

**Distance From Site:**  
31.6km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from within LCU 2 (Rural Townsite) is taken looking east along the Great Eastern Highway towards the site from the townsite of Moorine Rock. The flat, straight bitumen road does not have formal pedestrian footpaths. There are areas of dirt verges which appear frequently used by traffic to pull off the main Highway and park short term. There is a petrol service station, several residential buildings, sheds, a motel and picnic areas. There is a modest amount of local signage, billboards, fencing and lightpoles typical of a small township. Vegetation is sparse and spread out with small groups of trees.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road or statically from pedestrians within the town.







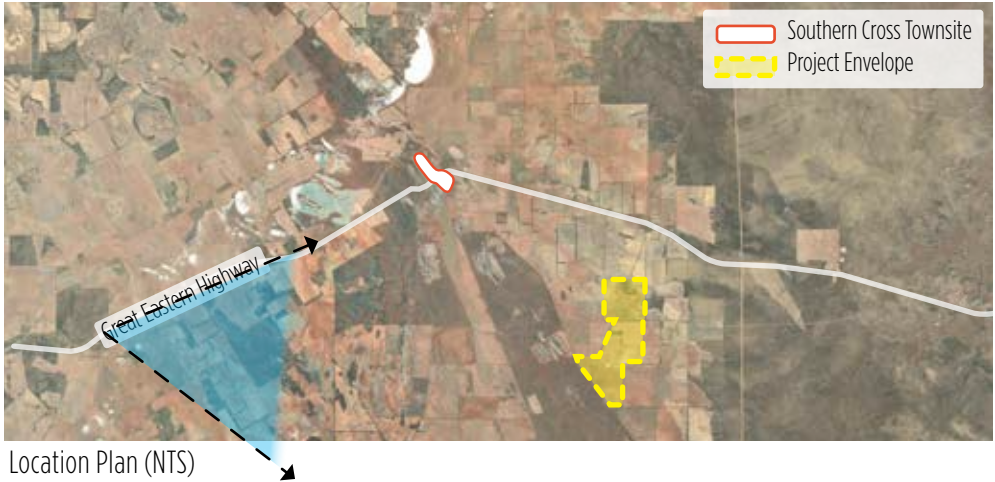
**View Direction:**  
East

**Distance From Site:**  
31.6km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from within LCU 1 (Broad Agrarian Plain) is taken looking east along the Great Eastern Highway towards the site leaving Moorine Rock. The flat, straight bitumen road does not have formal pedestrian footpaths. There are areas of dirt verges which appear frequently used by traffic to pull off the main Highway and park short term. Vegetation is sparse and spread out with bands of trees on the horizon.

Views from this location are mostly experienced from within moving vehicles travelling north-east or south-west along the road and are oblique to the site.





## Location 2 - Great Eastern Highway



### View Direction:

East

### Distance From Site:

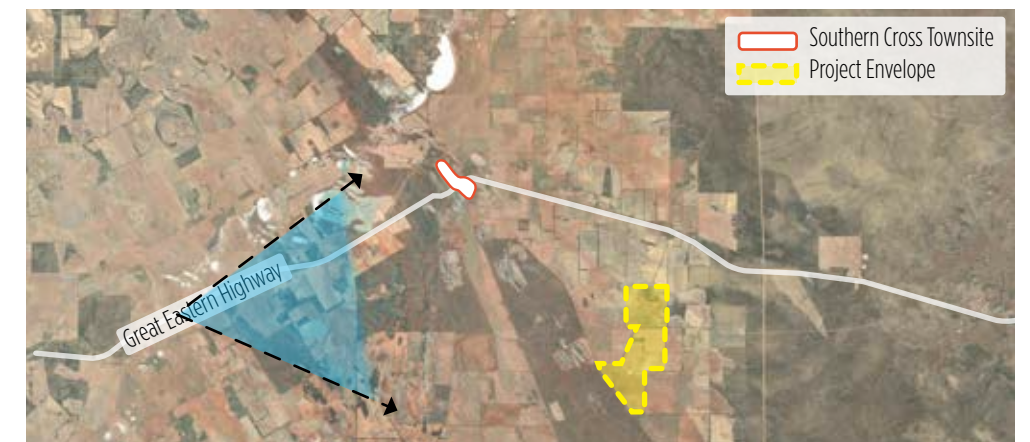
27.3km

### Estimated Visibility of Proposed Windfarm:

Low

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken looking east along the Great Eastern Highway towards the site. The flat, straight road is flanked on the left hand side by an above ground concrete pipeline. The pipeline is a continuous element in the landscape which remains at the same height for the majority of this section of the Great Eastern Highway. The vegetation is a little denser in places but is still overall fairly sparse.

Views from this location are mostly experienced from within moving vehicles travelling north-east or south-west along the road and are oblique to the site.



Location Plan (NTS)



## Location 3 - Great Eastern Highway



### View Direction:

East

### Distance From Site:

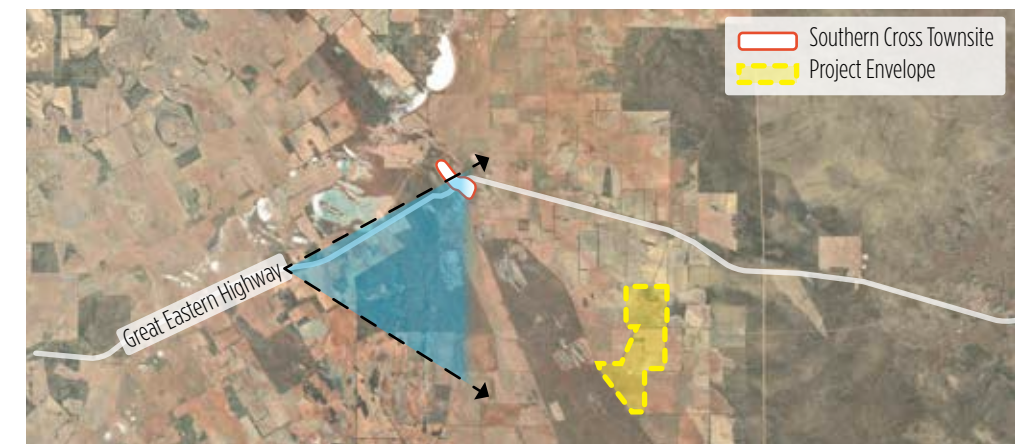
21.9km

### Estimated Visibility of Proposed Windfarm:

Low

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken looking east along the Great Eastern Highway towards the site. The flat, straight road is flanked on the left hand side by an above ground concrete pipeline. The pipeline is a continuous element in the landscape which remains at the same height for the majority of this section of the Great Eastern Highway. The vegetation is a little denser in places but is still overall fairly sparse.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road.



Location Plan (NTS)



## Location 4 - Great Eastern Highway



### View Direction:

East

### Distance From Site:

19.32km

### Estimated Visibility of Proposed Windfarm:

Low - Moderate

This view from within LCU 1 (Broad Agrarian Plain) is taken looking east along the Great Eastern Highway towards the site. The bitumen road gently changes direction and has a gradual incline with open views across the plain. There are no formal pedestrian footpaths and infrequent small road signs. There is little to no foreground vegetation with bands of trees on the horizon.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road and are oblique to the site.



Location Plan (NTS)



## Location 5 - Great Eastern Highway



### View Direction:

East

### Distance From Site:

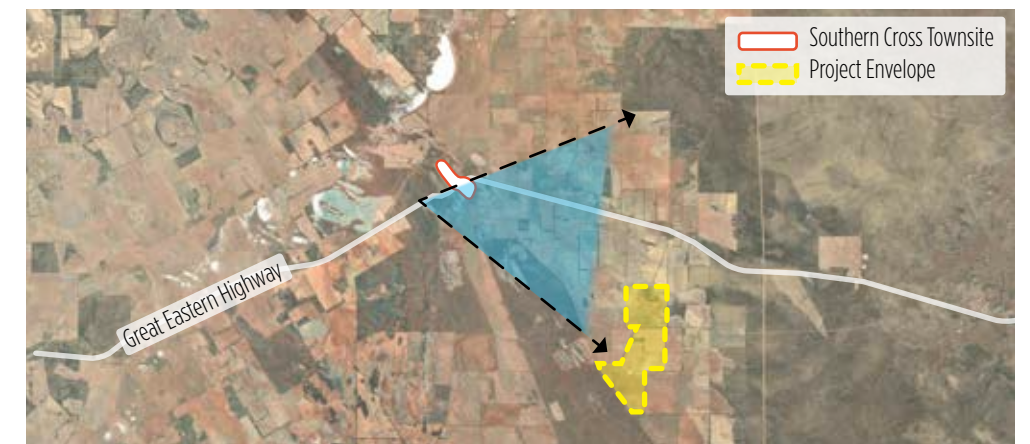
15.15km

### Estimated Visibility of Proposed Windfarm:

Low - Moderate

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken looking east from the Great Eastern Highway towards the site. There are no formal pedestrian footpaths and signage is small and infrequent. The gently undulating road has a more continuous, unbroken matrix of roadside vegetation.

Views from this location are mostly experienced from within moving vehicles travelling north-east or south-west along the road and are oblique to the site.



Location Plan (NTS)





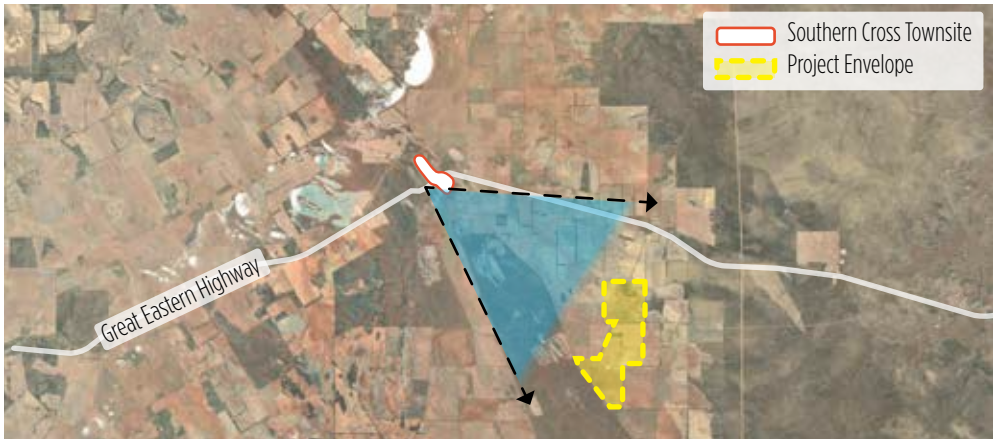
**View Direction:**  
South-East

**Distance From Site:**  
13.9km

**Estimated Visibility of Proposed Windfarm:**  
High

This scenic view from the Wimmera Hill Lookout presents a broad, elevated panorama across Southern Cross and the view comprises all four character units. The foreground of gently undulating hills, valleys and trees gives way to a broad flat plain beyond which extends to the horizon line. Numerous building roofs, a telecommunications tower and power lines connecting the town are visible amongst the trees. Several sheer faces are visible which are cut into the landform from various open mine operations. Also present are their associated spoil heaps, machinery and buidlings.

Views from this location are mostly experienced from within vehicles parking at the lookout or statically on foot from visitors.



Location Plan (NTS)





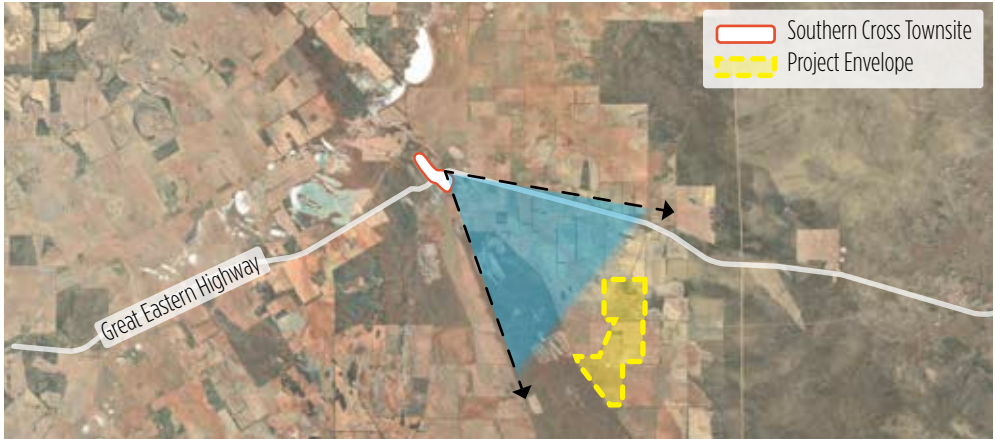
**View Direction:**  
South-East

**Distance From Site:**  
13.52km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from within LCU 2 (Rural Townsite) is taken looking south-east towards the site from the township of Southern Cross. There are some pedestrian footpaths typically only on one side of the road, areas of gravel verge to allow vehicles to pull over and stop and overhead power lines on either side of the street. Single storey residential properties are grouped together and divided by fencing of various colours and materials. Linear rows of trees run along property boundaries and within gardens.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road or statically from pedestrians and residential properties within the town.



Location Plan (NTS)





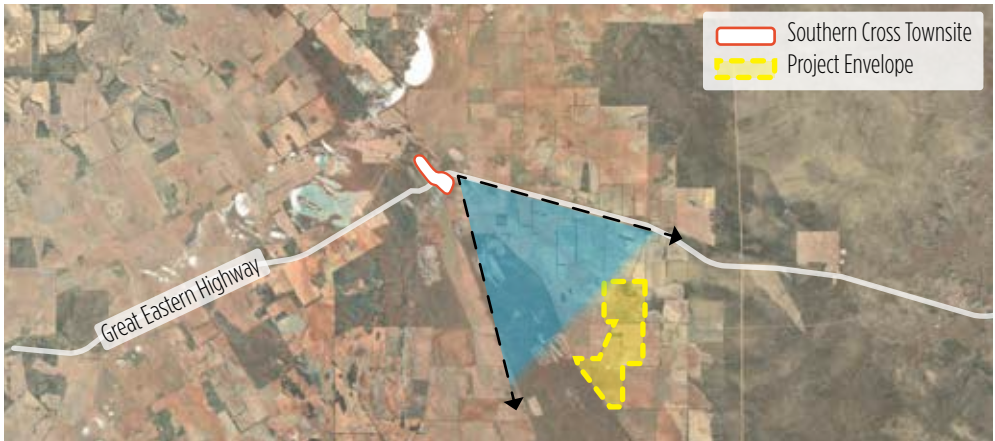
**View Direction:**  
South-East

**Distance From Site:**  
13km

**Estimated Visibility of Proposed Windfarm:**  
Low - Moderate

This view from within LCU 1 (Broad Agrarian Plain) is taken looking south-east towards the site from the Great Eastern Highway. The bitumen road is straight and flat. There are no pedestrian footpaths with areas of gravel verge to allow vehicles to pull over and stop. Vegetation is sparse with the occasional group of trees. An above ground concrete pipeline runs along the road on the northern side.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road and are oblique to the site.



Location Plan (NTS)



## Location 9 - Great Eastern Highway



### View Direction:

South-East

### Distance From Site:

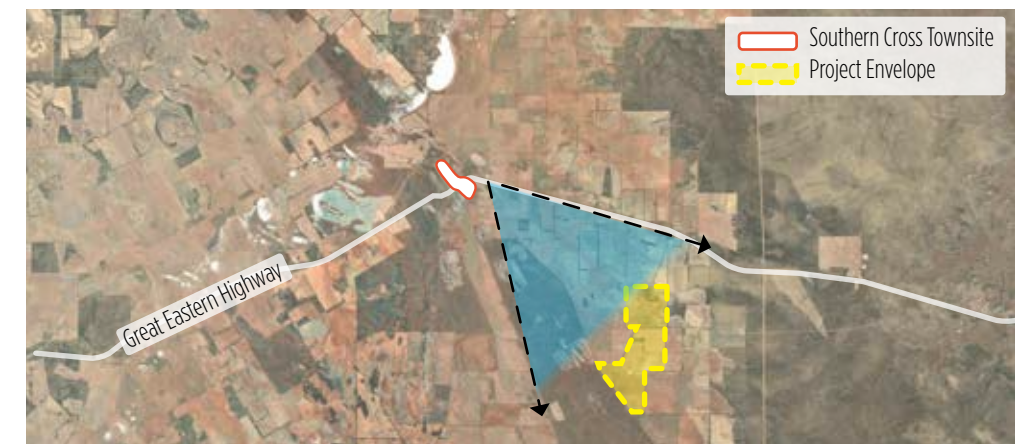
12.3km

### Estimated Visibility of Proposed Windfarm:

Low - Moderate

This view from within LCU 1 (Broad Agrarian Plain) is taken looking south-east from the Great Eastern Highway towards the site. There are no formal pedestrian footpaths, signage is small and infrequent and there is a gravel verge on one side for vehicles to pull over and stop. An above ground concrete pipeline runs along the road on the northern side. The flat open landscape offers long distant views with very little vegetation of significant height. Low post and wire fencing is present on lot boundary.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road and are oblique to the site.



Location Plan (NTS)





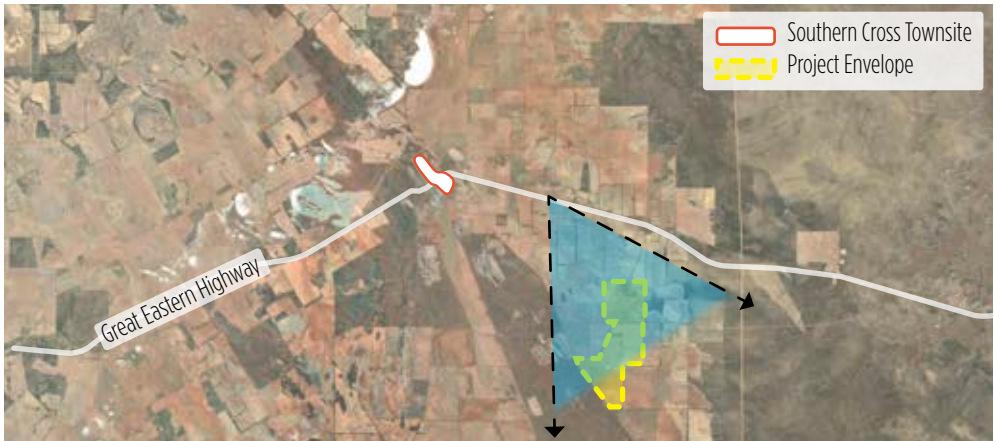
**View Direction:**  
South-East

**Distance From Site:**  
8.00km

**Estimated Visibility of Proposed Windfarm:**  
Moderate - High

This view from within LCU 1 (Broad Agrarian Plain) is taken looking south-east towards the site from the Great Eastern Highway. The bitumen road is straight and flat. There are no pedestrian footpaths with only a thin gravel verge. Vegetation is sparse with the occasional group of trees. An above ground concrete pipeline runs along the road on the northern side.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road and are oblique to the site.



Location Plan (NTS)





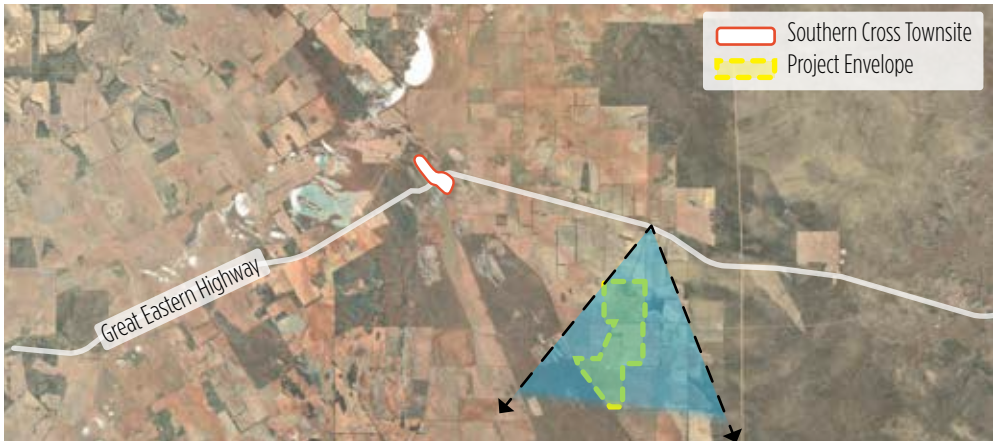
**View Direction:**  
South

**Distance From Site:**  
4.45km

**Estimated Visibility of Proposed Windfarm:**  
Low - Moderate

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken looking south east from the Great Eastern Highway and Ghooli N & S Road Intersection. There are no pedestrian footpaths with wide gravel verges and post and wire fencing. On both sides of the Great Eastern Highway there is low shrub vegetation with the occasional small road sign. Several large storage tanks and associated buildings are set back from the Great Eastern Highway on it's north side. There is a group of residential properties to the south of Great Eastern Highway along Ghooli S Road hidden behind the roadside vegetation.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road and are oblique to the site.



Location Plan (NTS)





**View Direction:**  
South-West

**Distance From Site:**  
19km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken from the Yellowdine Roadhouse on the Great Eastern Highway looking west towards the site. There are no pedestrian footpaths but there is a large area of gravel for vehicles to turn into the petrol filling station. There are several large signs, overhead power poles, lightpoles and communications mast along the road next to the roadhouse. Some groups of semi-mature trees are situated around the perimeter of the roadhouse buildings.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road or statically from visitors to the roadhouse.





## Location 13 - Great Eastern Highway



### View Direction:

West

### Distance From Site:

16.2km

### Estimated Visibility of Proposed Windfarm:

Low

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken looking west from the Great Eastern Highway towards the site. The bitumen road slightly elevates at this point. There are no formal pedestrian footpaths, signage is small and infrequent and there is a gravel verge on one side for vehicles to pull over and stop. An above ground concrete pipeline runs along the road on the northern side. Overhead power lines and towers are dominant in the skyline. There are occasional groups of trees amongst smaller shrub which line the roadside.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road.



Location Plan (NTS)





**View Direction:**  
West

**Distance From Site:**  
10.3km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken from the Great Eastern Highway looking west towards the site. The bitumen road is straight and flat with slight undulations. There are no pedestrian footpaths. Large areas of cleared land and wide gravel verges house thin lines of trees. An above ground concrete pipeline runs along the road on the northern side.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road.



Location Plan (NTS)





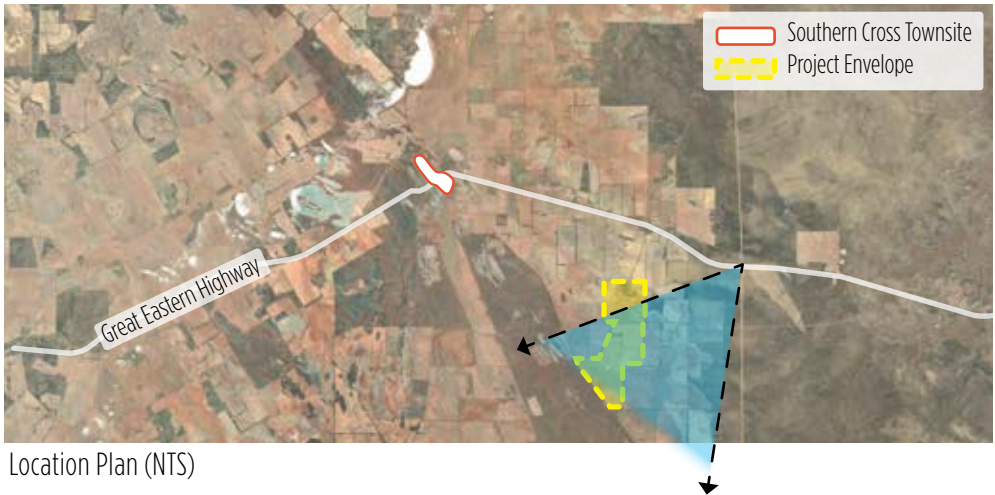
**View Direction:**  
South-West

**Distance From Site:**  
6km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken from Emu Fence Road looking south-west towards the site. The gravel road continues until it reaches the Great Eastern Highway where it crosses and continues as a bitumen surfaced road. Various communications masts present dominant features in the skyline. Vegetation is typically low scrub.

Views from this location are mostly experienced from within moving vehicles travelling north or south along the road and are oblique to the site.





## Location 16 - Intersection of Emu Fence Road / Great Eastern Highway



### View Direction:

South-West

### Distance From Site:

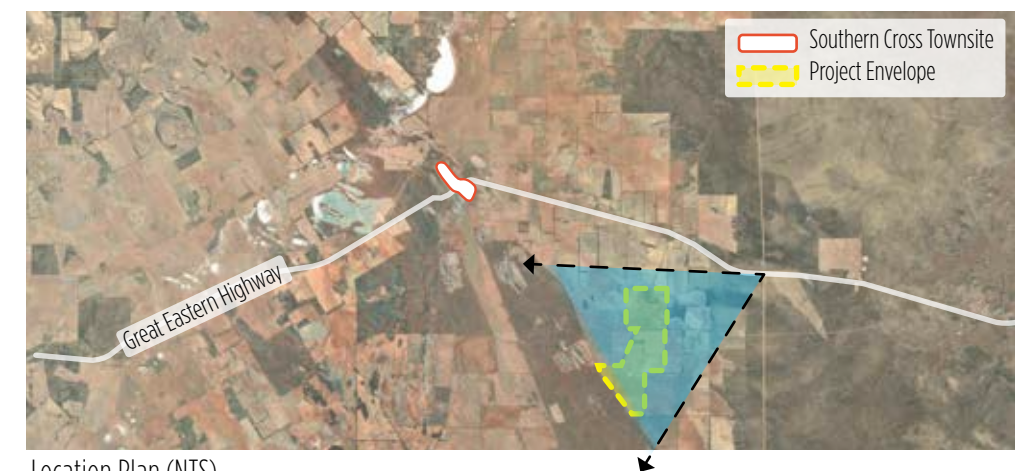
5.8km

### Estimated Visibility of Proposed Windfarm:

Low - Moderate

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken from Emu Fence Road looking south-west towards the site. The bitumen road is straight and flat with a wide gravel verge and occasional road signage. A communications mast presents a dominant feature in the skyline. Vegetation is typically low scrub.

Views from this location are mostly experienced from within moving vehicles travelling north or south along the road and are oblique to the site.



Location Plan (NTS)



**View Direction:**

North-West

**Distance From Site:**

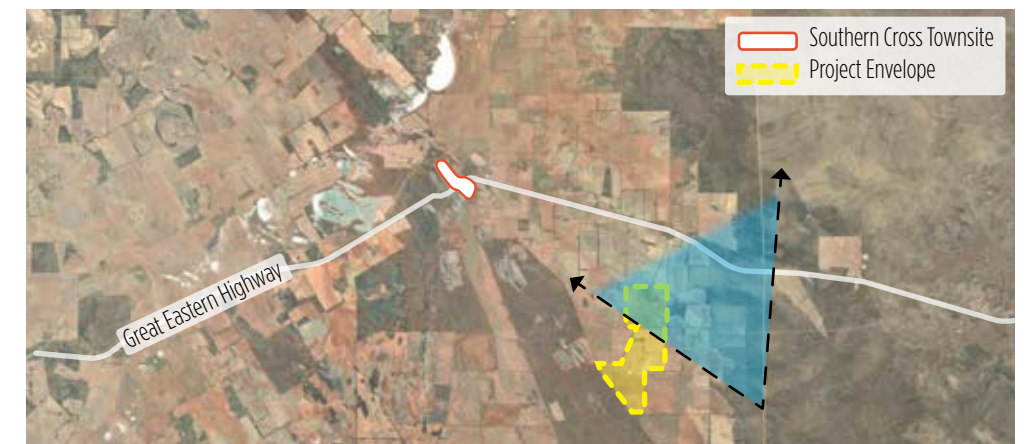
7.5km

**Estimated Visibility of Proposed Windfarm:**

Low - Moderate

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken looking north-west from Emu Fence Road towards the site. The bitumen road slightly elevates at this point. There are no formal pedestrian footpaths, signage is small and infrequent and there are gravel verges either side of the road. Vegetation is typically medium to low scrub.

Views from this location are mostly experienced from within moving vehicles travelling north or south along the road and are oblique to the site.



Location Plan (NTS)





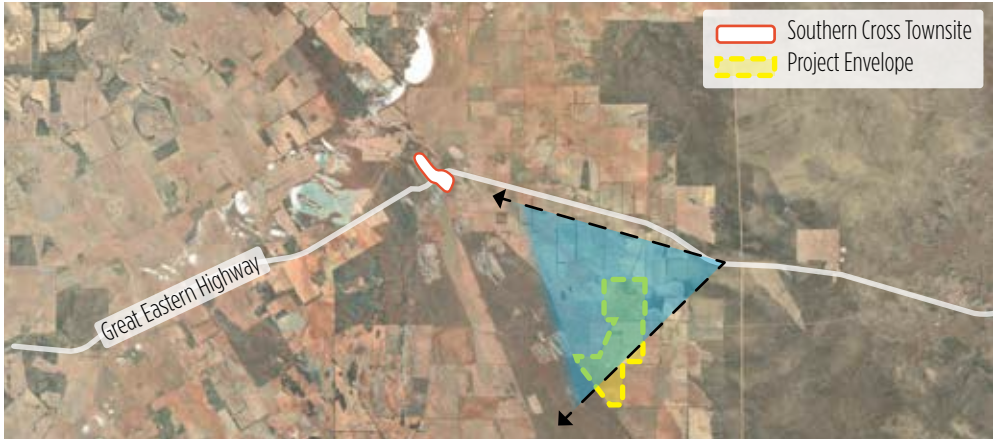
**View Direction:**  
South-West

**Distance From Site:**  
4.3km

**Estimated Visibility of Proposed Windfarm:**  
Moderate - High

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken from the Great Eastern Highway looking south-west towards the site. The bitumen road is straight and flat with a wide gravel verge and occasional road signage. Overhead power line poles are spaced regularly along the southern side of the road. Vegetation is typically low scrub.

Views from this location are mostly experienced from within moving vehicles travelling east or west along the road and are oblique to the site.



Location Plan (NTS)





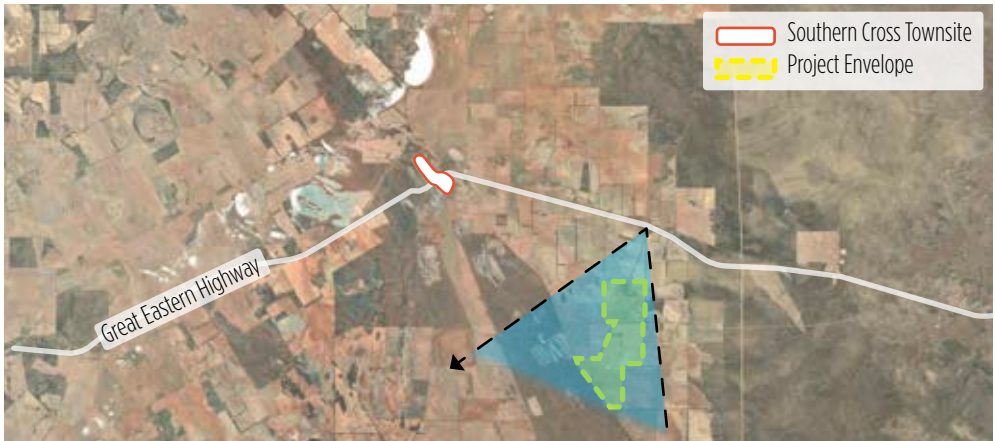
**View Direction:**  
South

**Distance From Site:**  
1.2km to closest turbine

**Estimated Visibility of Proposed Windfarm:**  
Low - Moderate

This view from within LCU 1 (Vegetated Kalgoorlie Plain) is taken from a property situated on Ghooli S Road looking south towards the site. The dirt road is straight and flat with no signage. Vegetation is sparse and typically low scrub with occasional trees.

Views from this location are mostly experienced from within moving vehicles travelling south on the road directly towards the site and statically by residents at the property.



Location Plan (NTS)





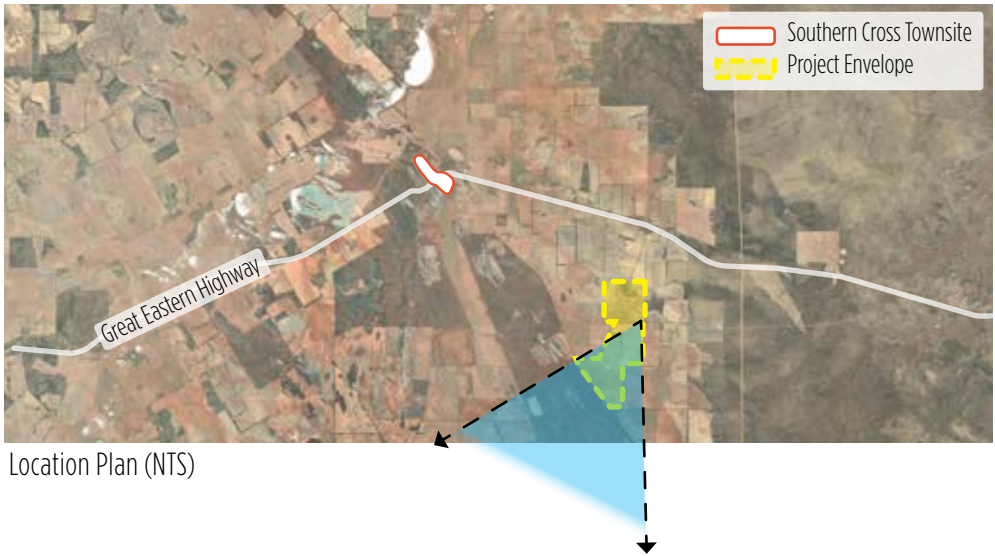
**View Direction:**  
South

**Distance From Site:**  
1km to closest turbine

**Estimated Visibility of Proposed Windfarm:**  
Moderate - High

This view from within LCU 1 (Broad Agrarian Plain) is taken from Ghooli S Road looking south towards the southern portion of the site. Wide open views across arable land are divided by rows of trees running along property boundaries. Post and wire fencing typical of a rural scene also defines property boundaries.

Views from this location are mostly experienced from within moving vehicles travelling north and south directly towards the site.





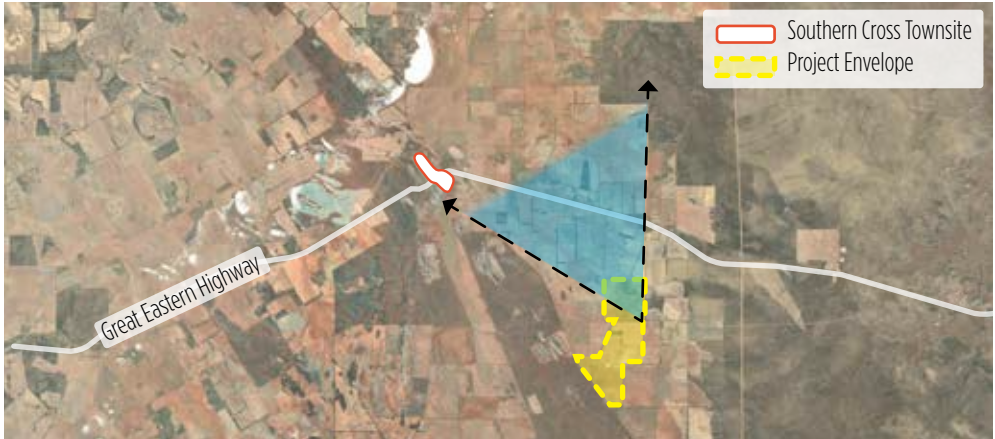


**View Direction:**  
North

**Distance From Site:**  
700m to closest turbine

**Estimated Visibility of Proposed Windfarm:**  
High

This view from within LCU 1 (Broad Agrarian Plain) is taken from Ghooli S Road looking north towards the northern portion of the site. Breaks in larger more mature vegetation offer distant views of the site and beyond. Overhead powerlines are visible in the sky with the occasional road sign and fence post.



Location Plan (NTS)



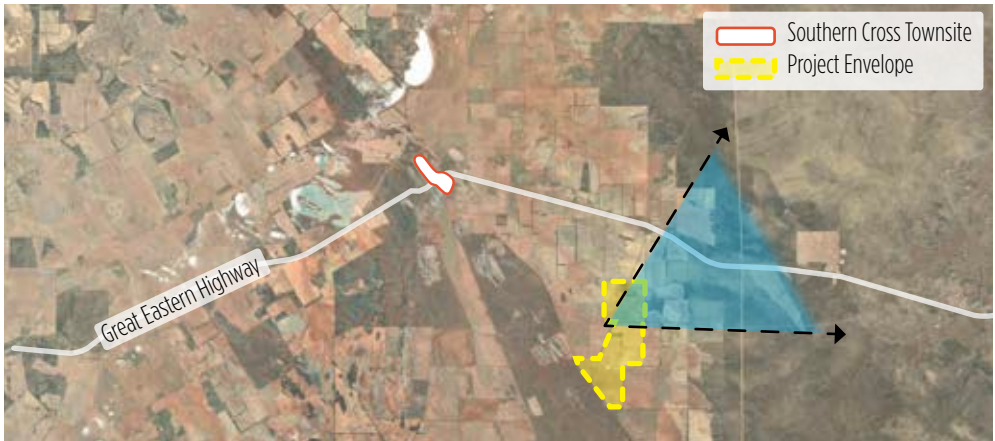


**View Direction:**  
East

**Distance From Site:**  
850m to closest turbine

**Estimated Visibility of Proposed Windfarm:**  
High

This view from within LCU 1 (Broad Agrarian Plain) is taken from Blair Road looking East towards the northern portion of the site. Breaks in larger more mature vegetation offer distant views of the site and beyond.







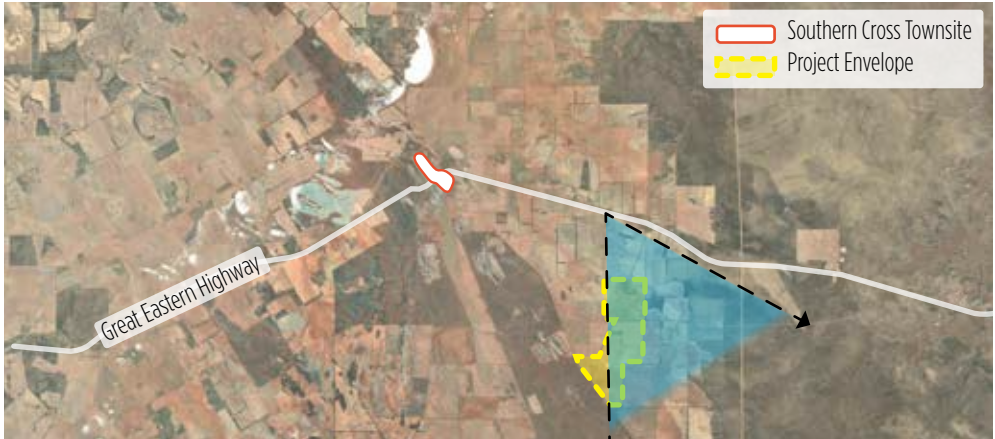
**View Direction:**  
South-East

**Distance From Site:**  
2.3km to closest turbine

**Estimated Visibility of Proposed Windfarm:**  
Moderate - High

This view from within LCU 1 (Broad Agrarian Plain) is taken from Blair Road looking south-east towards the site. The gravel road is straight and flat and is fringed with low vegetation. There is the occasional break in the vegetation with offers wide open views across pastoral land.

Views from this location are mostly experienced from within moving vehicles travelling north and south and are oblique to the site.



Location Plan (NTS)





**View Direction:**  
South

**Distance From Site:**  
4.4km to closest turbine

**Estimated Visibility of Proposed Windfarm:**  
Moderate - High

This view from within LCU 1 (Broad Agrarian Plain) is taken from Blair Road looking south towards the site. The gravel road is straight, gradually undulating and is fringed with low vegetation. There is the occasional break in the vegetation which offers wide open views across pastoral land.

Views from this location are mostly experienced from within moving vehicles travelling north and south. The site is faced directly when travelling south.



Location Plan (NTS)





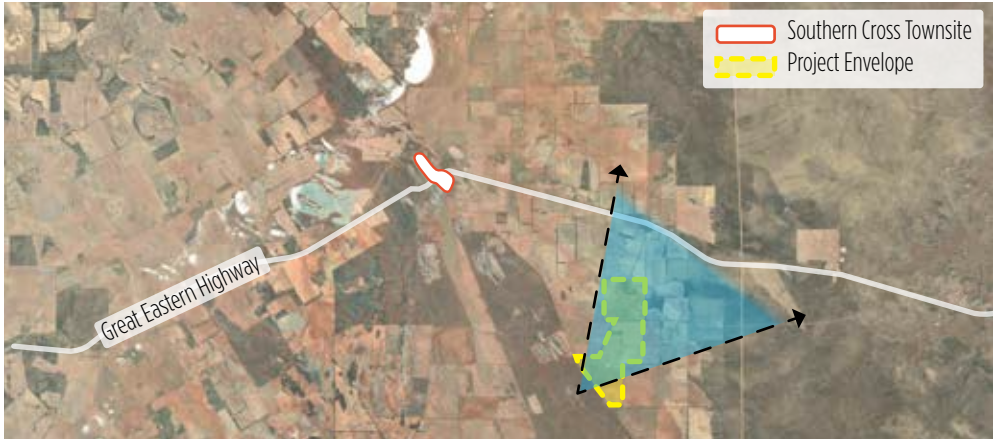
**View Direction:**  
North-East

**Distance From Site:**  
2.4 km to closest turbine

**Estimated Visibility of Proposed Windfarm:**  
Low - Moderate

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken looking north-east from Glendower Road towards the site. Disturbed ground and soil mounds (LCU 4 - Industrial) are evident within the trees but are largely screened. There are no formal pedestrian footpaths. The gravel road is fringed by woodland with no distant open views to the site.

Views from this location are mostly experienced from within moving vehicles travelling east and west.



Location Plan (NTS)



## Location 25 - Southern Cross-Marvel Loch Road



### View Direction:

North-East

### Distance From Site:

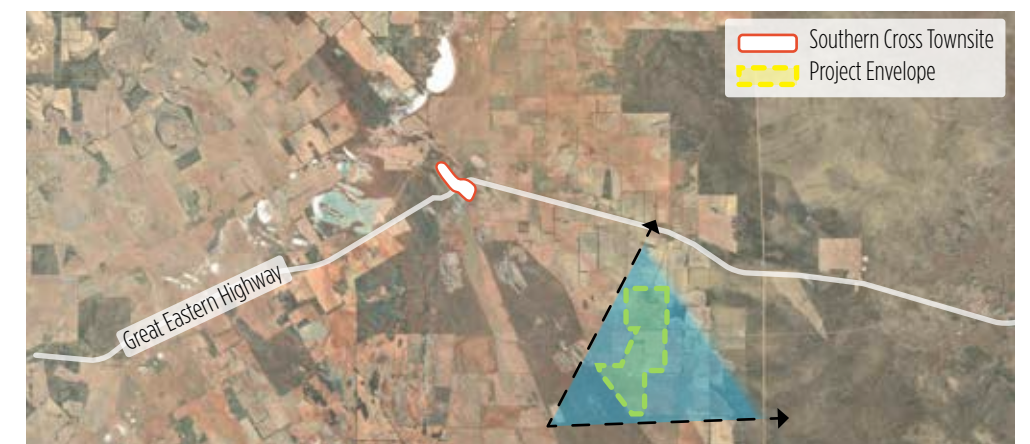
5.6km to closest turbine

### Estimated Visibility of Proposed Windfarm:

Low

This view from the fringe of LCU1 (Broad Agrarian Plain) and LCU 3 (Vegetated Kalgoorlie Plain) is taken from a residential property on Southern Cross-Marvel Lock Road looking north-east towards the site. The bitumen road is straight and flat with groups of trees spaced along the eastern side of the road. Large spoil heaps from local mining operations (LCU 4 - Industrial) and power lines can be glimpsed through the trees.

Views from this location are mostly experienced from residents at the property looking directly at the site and from within moving vehicles travelling north and south where views are oblique to the site.



Location Plan (NTS)





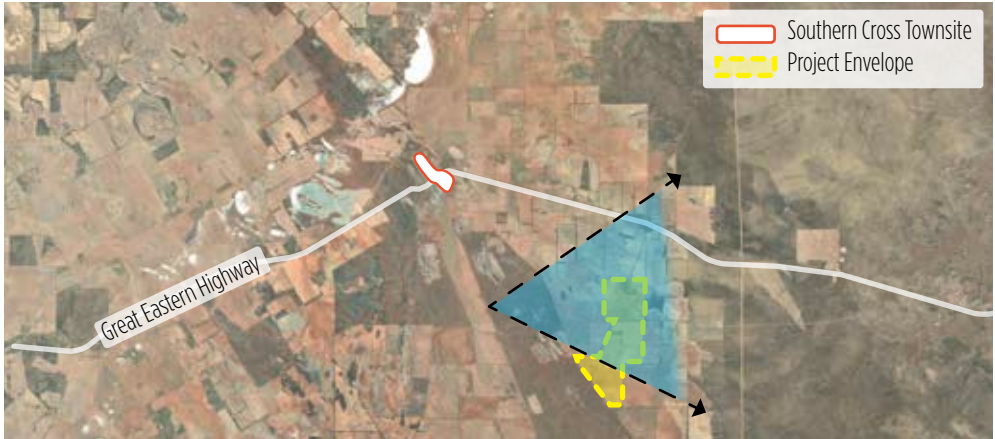
**View Direction:**  
East

**Distance From Site:**  
6.8km

**Estimated Visibility of Proposed Windfarm:**  
Low - Moderate

This view from the fringe of LCU1 (Broad Agrarian Plain) and LCU 3 (Vegetated Kalgoorlie Plain) is taken from Southern Cross-Marvel Lock Road looking east towards the site. The bitumen road is straight and flat with groups of trees spaced along the eastern side of the road. Power lines can be glimpsed through the trees.

Views from this location are mostly experienced from within moving vehicles travelling north and south and are oblique to the site.



Location Plan (NTS)



**View Direction:**

South-East

**Distance From Site:**

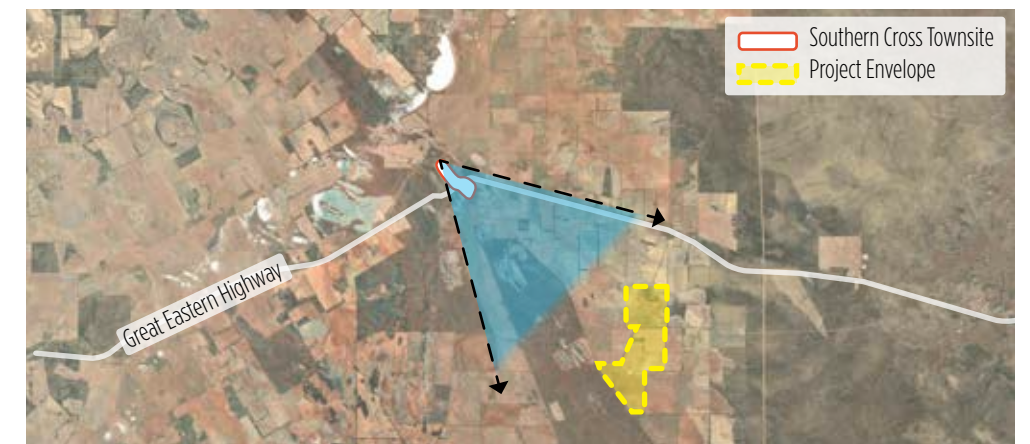
14.8km

**Estimated Visibility of Proposed Windfarm:**

Low - Moderate

This view from within LCU2 (Rural Townsite) is taken from Antares Street looking south-east towards the site. The bitumen road is narrow, straight and flat with semi-mature trees spaced along the verges. Overhead power lines cross the road leading to one storey residential properties on the western side of the road. Properties are spaced apart and lot boundaries are defined by coloured metal fencing and low stone walls, spaced along the eastern side of the road.

Views from this location are mostly experienced from within moving vehicles travelling south east along the road or statically from pedestrians and residential properties within the town.



Location Plan (NTS)





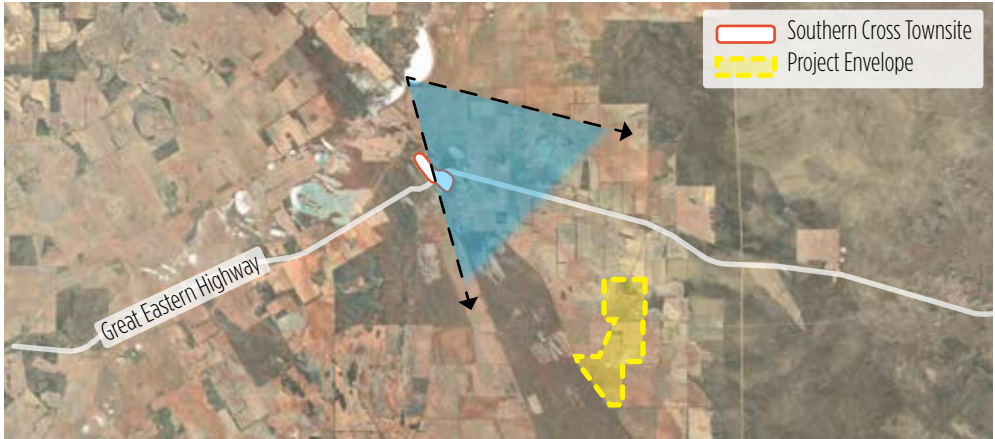
**View Direction:**  
South-East

**Distance From Site:**  
18.05km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from within LCU 1 (Broad Agrarian Plain) taken from Bullfinch Road looking south-east towards the site. The meandering bitumen road is narrow with powerlines running along the western side. Uninterrupted broad open views stretch across the flat flood plain and canola fields.

Views from this location are mostly experienced from within moving vehicles travelling north and south.



Location Plan (NTS)





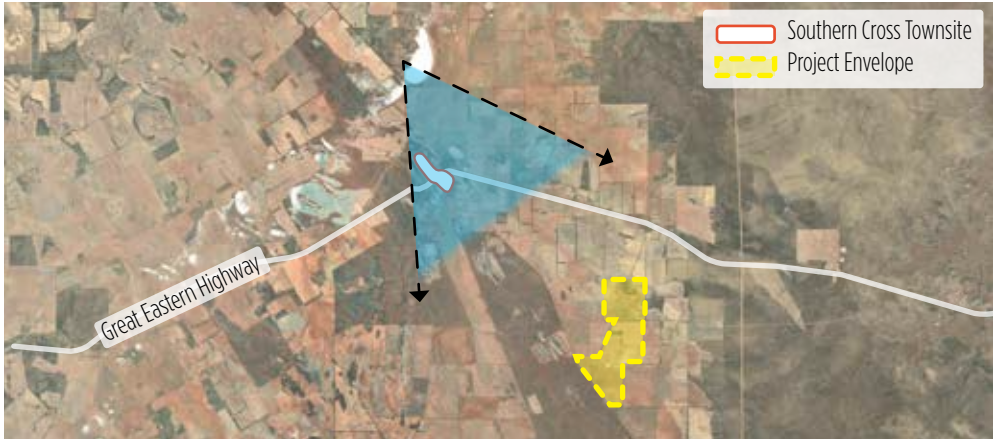
**View Direction:**  
South-East

**Distance From Site:**  
19.6km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from within LCU 3 (Vegetated Kalgoorlie Plain) is taken from the Southern Cross Golf Course looking south-east towards the site. Broad open views stretch across the distant flood plain to the horizon. Small trees and elements of built form associated with the club house provide occasional vertical elements in this otherwise horizontal scene.

Views from this location are mostly experienced from visitors using the golf club facilities and from vehicles arriving and leaving the course.



Location Plan (NTS)





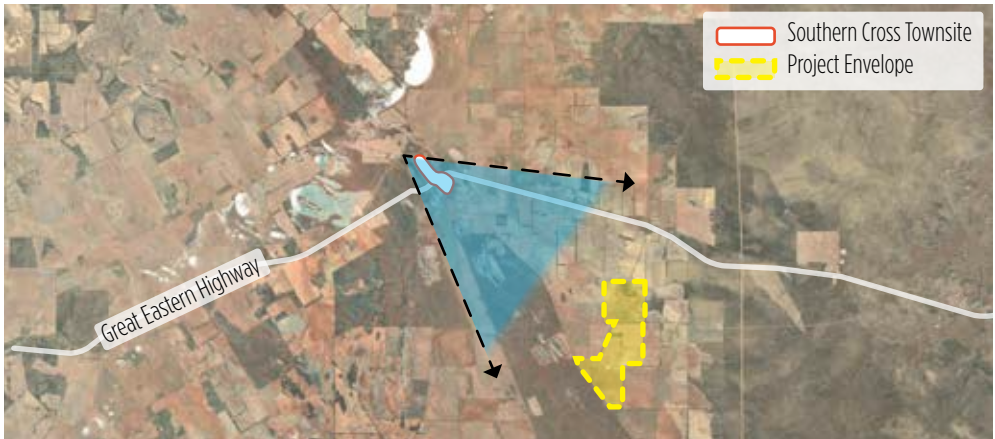
**View Direction:**  
South-East

**Distance From Site:**  
15.9km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from within LCU 1 (Broad Agrarian Plain) is taken from Southern Cross Train Station looking south-east towards the site. The terrain is flat and open with distant band of semi-mature trees on the horizon. Train tracks run along the side of a narrow road which has a rough bitumen surface. Features include infrastructure such as powerlines, small buildings and a large mast associated with the railway station.

Views from this location are mostly experienced from travellers using the station, from trains and vehicles arriving and departing the station.



Location Plan (NTS)



## Location 31 - Southern Cross Cemetery



### View Direction:

South-East

### Distance From Site:

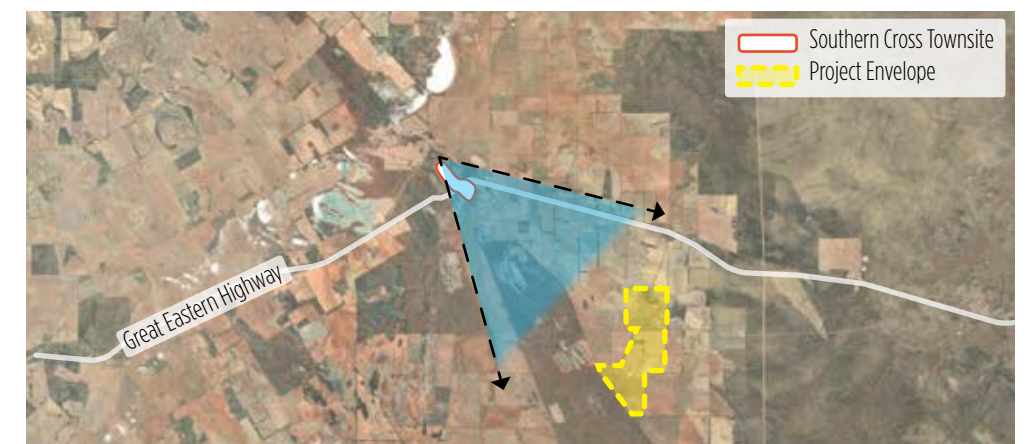
15.6km

### Estimated Visibility of Proposed Windfarm:

Low

This view from within LCU 1 (Broad Agrarian Plain) is taken from the Southern Cross Cemetery looking south-east towards the site. Gravel paths, scattered semi-mature trees, small buildings and cemetery signage occupy the immediate foreground. The horizon is flat and lined with low scrub and groups of taller trees.

Views from this location are mostly experienced by visitors on foot in the the cemetery and arriving and leaving in vehicles.



Location Plan (NTS)





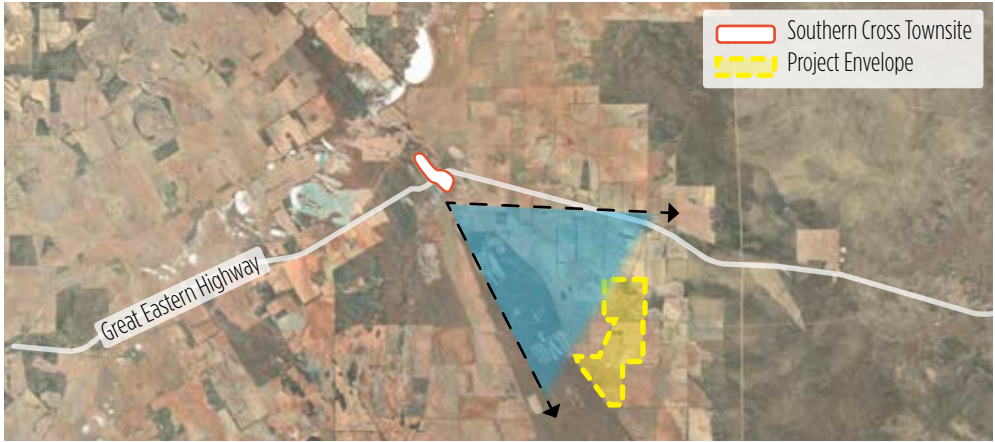
**View Direction:**  
East

**Distance From Site:**  
12.7km

**Estimated Visibility of Proposed Windfarm:**  
Low

This view from the fringe of LCU 1 (Broad Agrarian Plain) and LCU 2 (Rural Townsite) is taken from Polaris Street looking south-east towards the site. The bitumen road is narrow with overhead powerlines running along the eastern side. There are a number of properties and driveways leading onto the road with minimal fencing at front of properties.

Views from this location are mostly experienced from residential properties and from within moving vehicles travelling north and south oblique to the site.



Location Plan (NTS)



## Location 33 - Intersection of Leonis Street and Crateris Street



### View Direction:

South-East

### Distance From Site:

12.4km

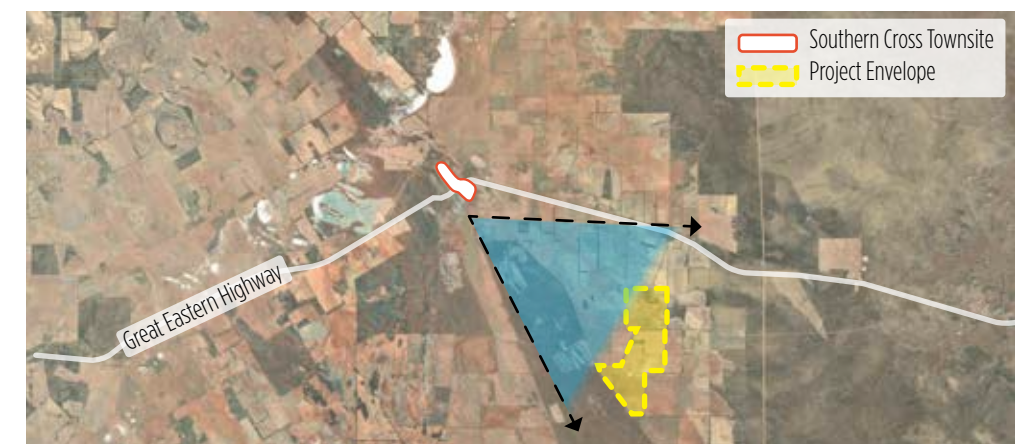
### Estimated Visibility of Proposed Windfarm:

Low - Moderate

This view from the fringe of LCU 1 (Broad Agrarian Plain) and LCU 2 (Rural Townsite) is taken from the intersection of Leonis Street and Crateris Street looking south-east towards the site. The bitumen road is narrow with powerlines running overhead. Broad open views stretch across the flat plain. Fenced properties and groups of trees on property boundary lines.

Views from this location are mostly experienced from residential properties and from local traffic moving slowly on the narrow roads.

Views from this location are mostly experienced from residential properties and from within moving vehicles travelling north and south oblique to the site.



Location Plan (NTS)



## Location 34 - Southern Cross Airport



### View Direction:

South-East

### Distance From Site:

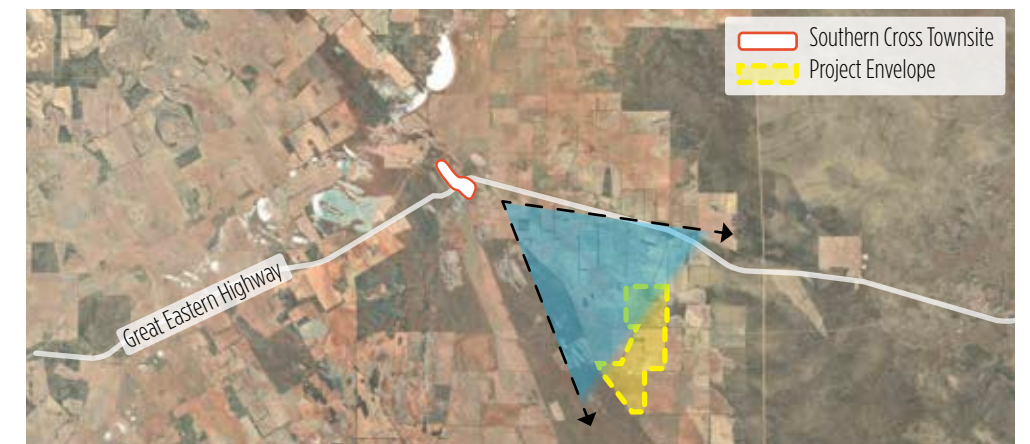
10.9km

### Estimated Visibility of Proposed Windfarm:

Moderate - High

This view from within LCU 1 (Broad Agrarian Plain) is taken from the Southern Cross Airport looking south-east towards the site. The airport is typically open and flat with no trees, various masts and weather reading equipment, large buildings and distant views to the horizon.

Views from this location are mostly experienced from visitors to the airport, waiting for planes, arriving and departing vehicles.



Location Plan (NTS)

## APPENDIX II - Photomontages

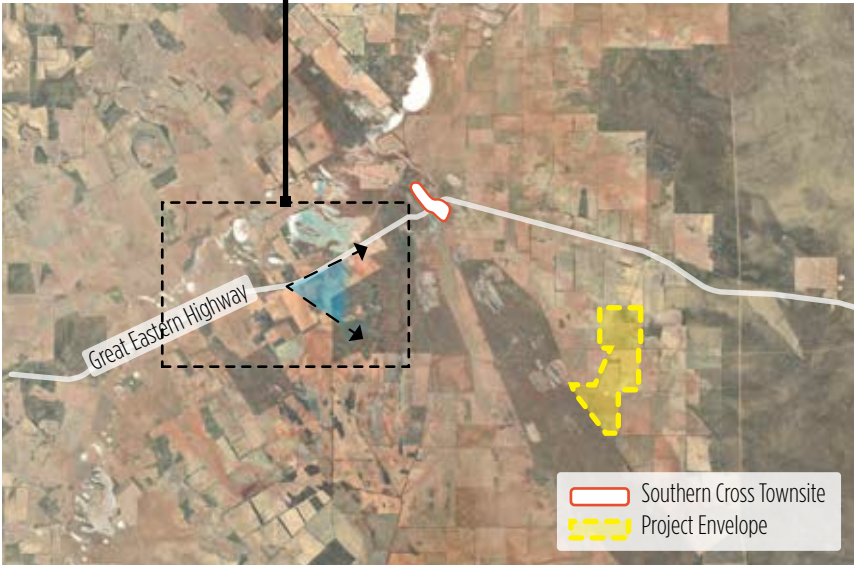




Photomontage 1 : Great Eastern Highway (Photo Location 4)

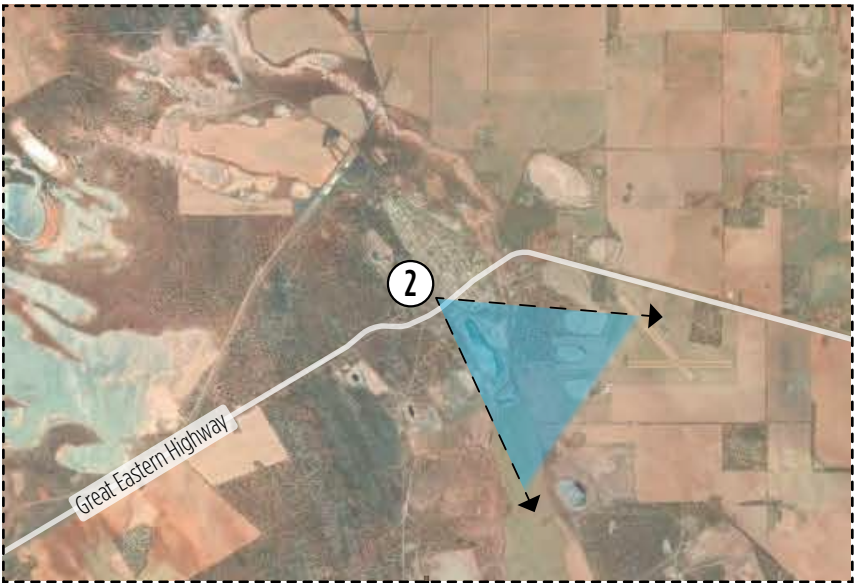


Enlargement Plan (NTS)



Location Plan (NTS)





Enlargement Plan (NTS)



Location Plan (NTS)





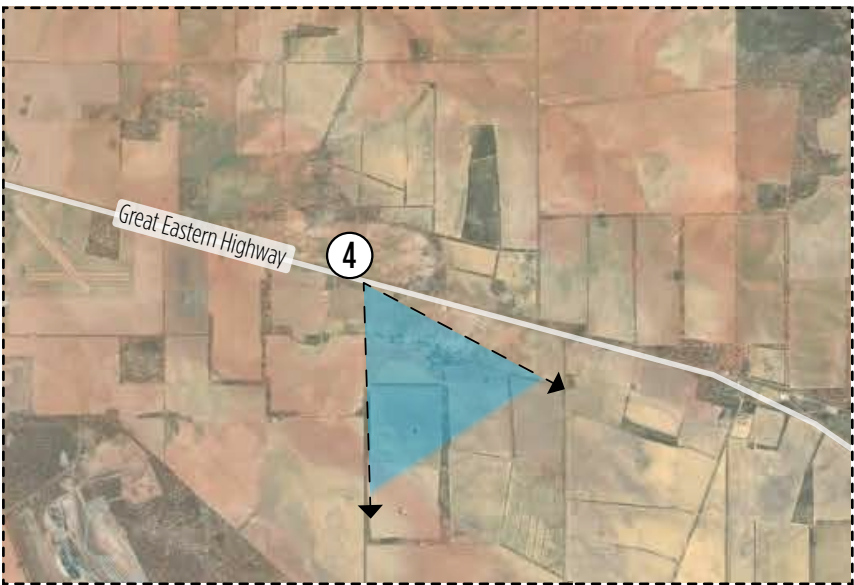
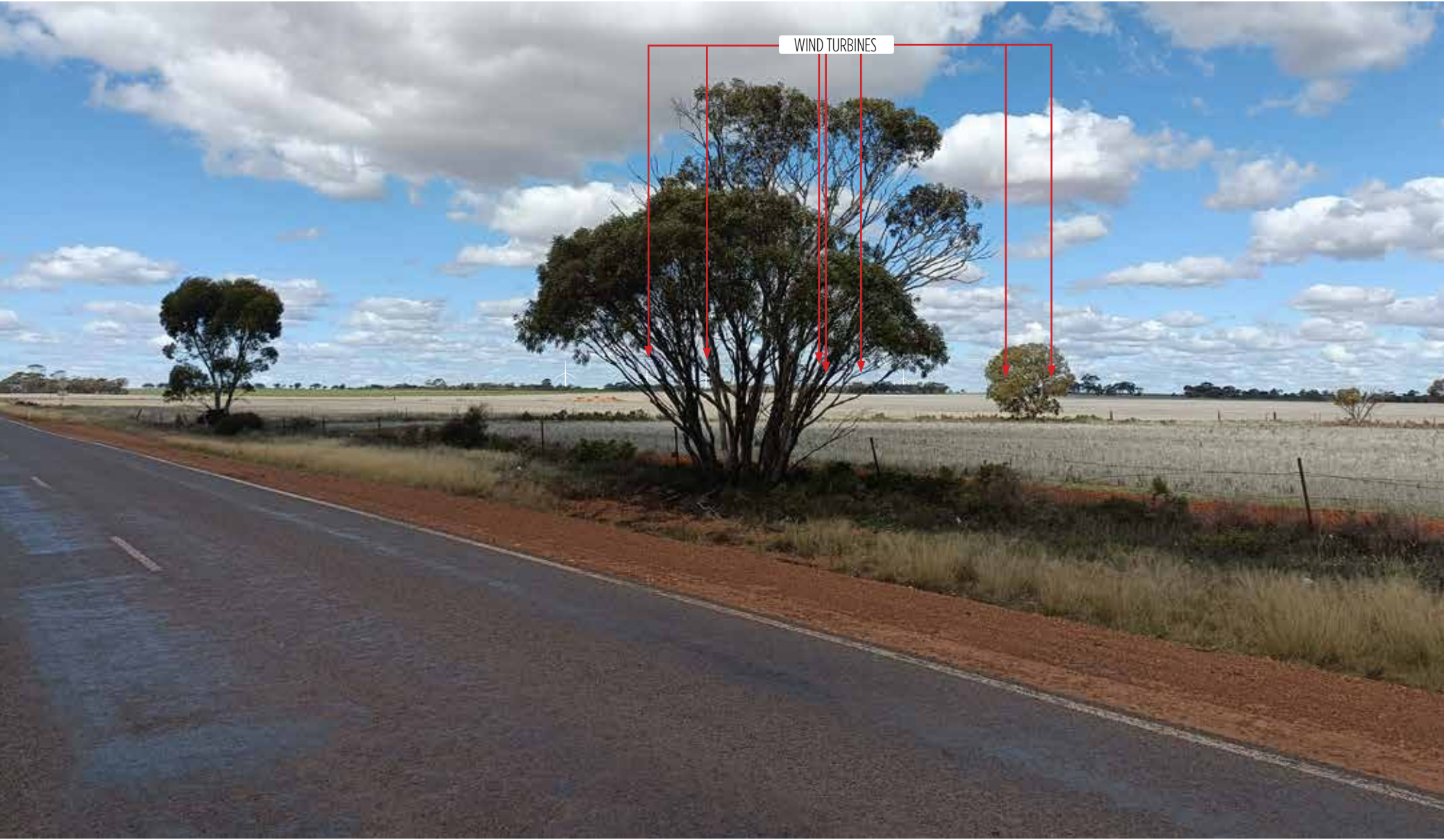
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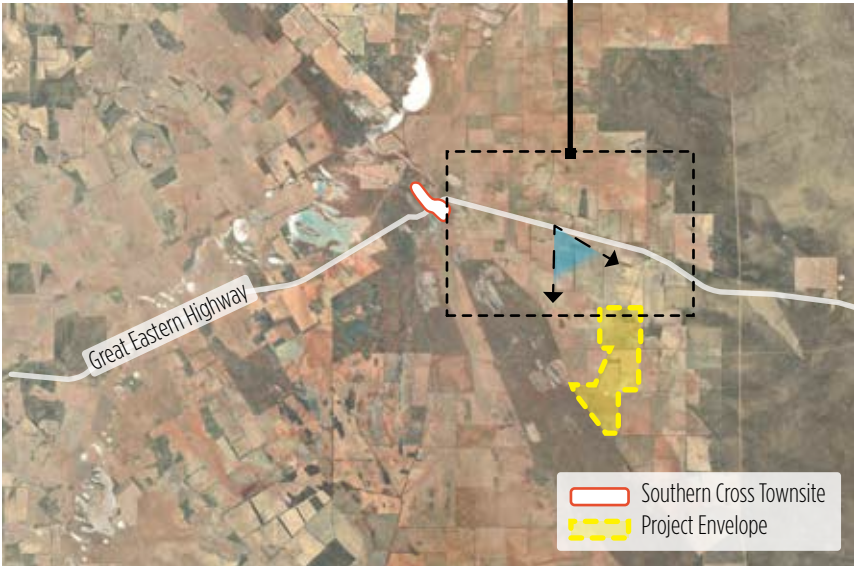
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Photomontage 4 : Great Eastern Highway (Photo Location 10)



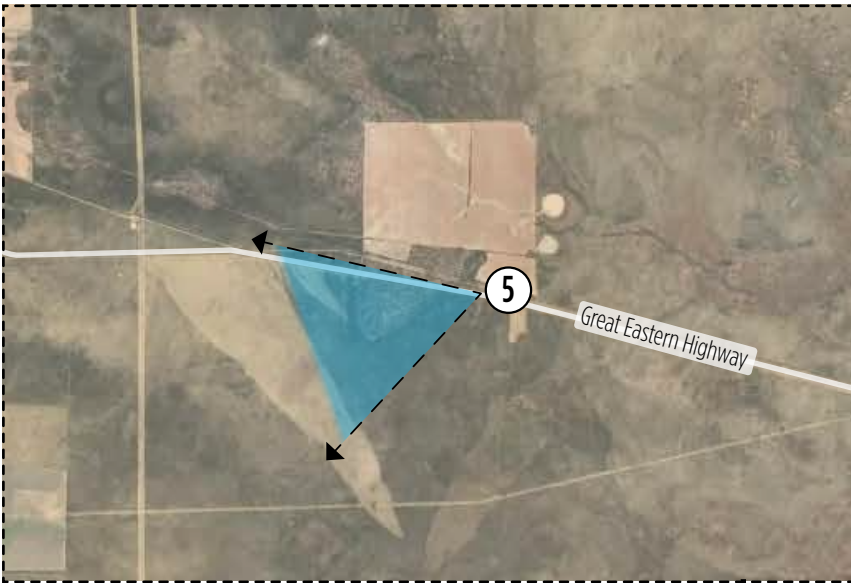
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Location Plan (NTS)



Photomontage 5 : Great Eastern Highway (Photo Location 14)

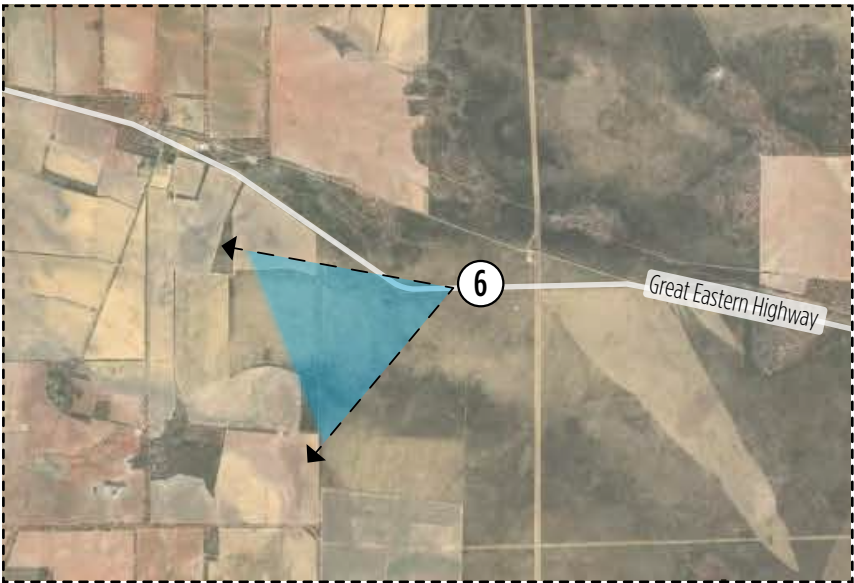


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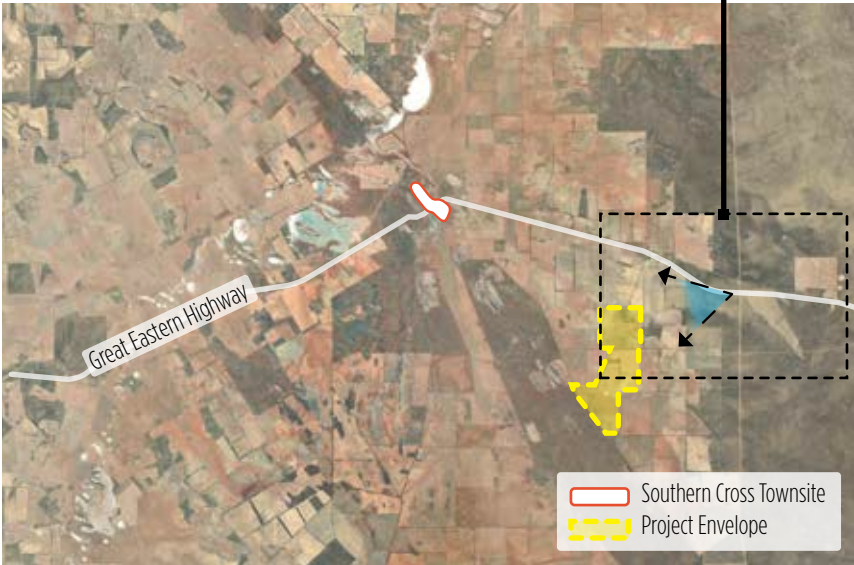


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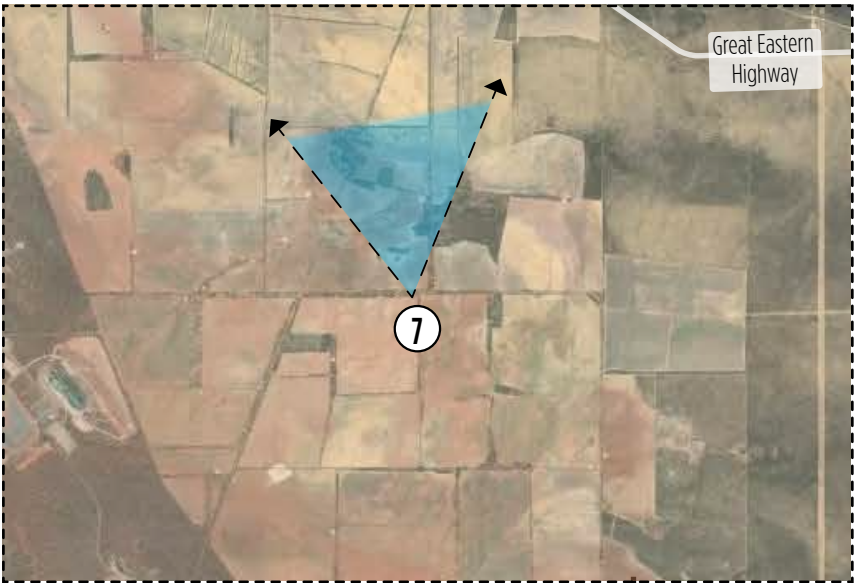


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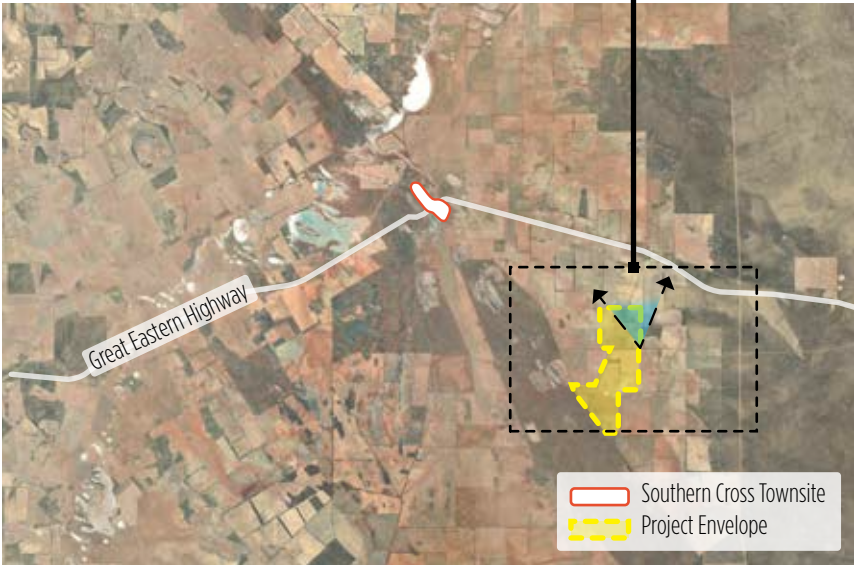


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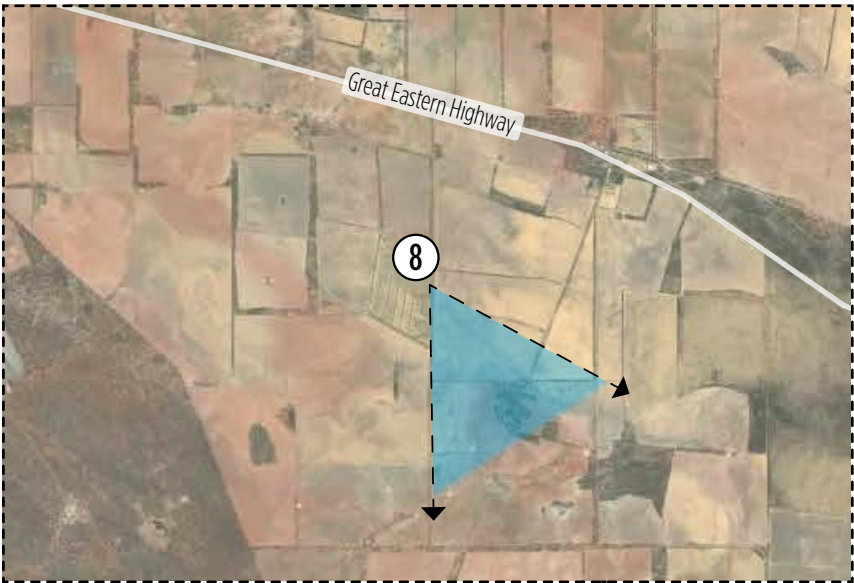
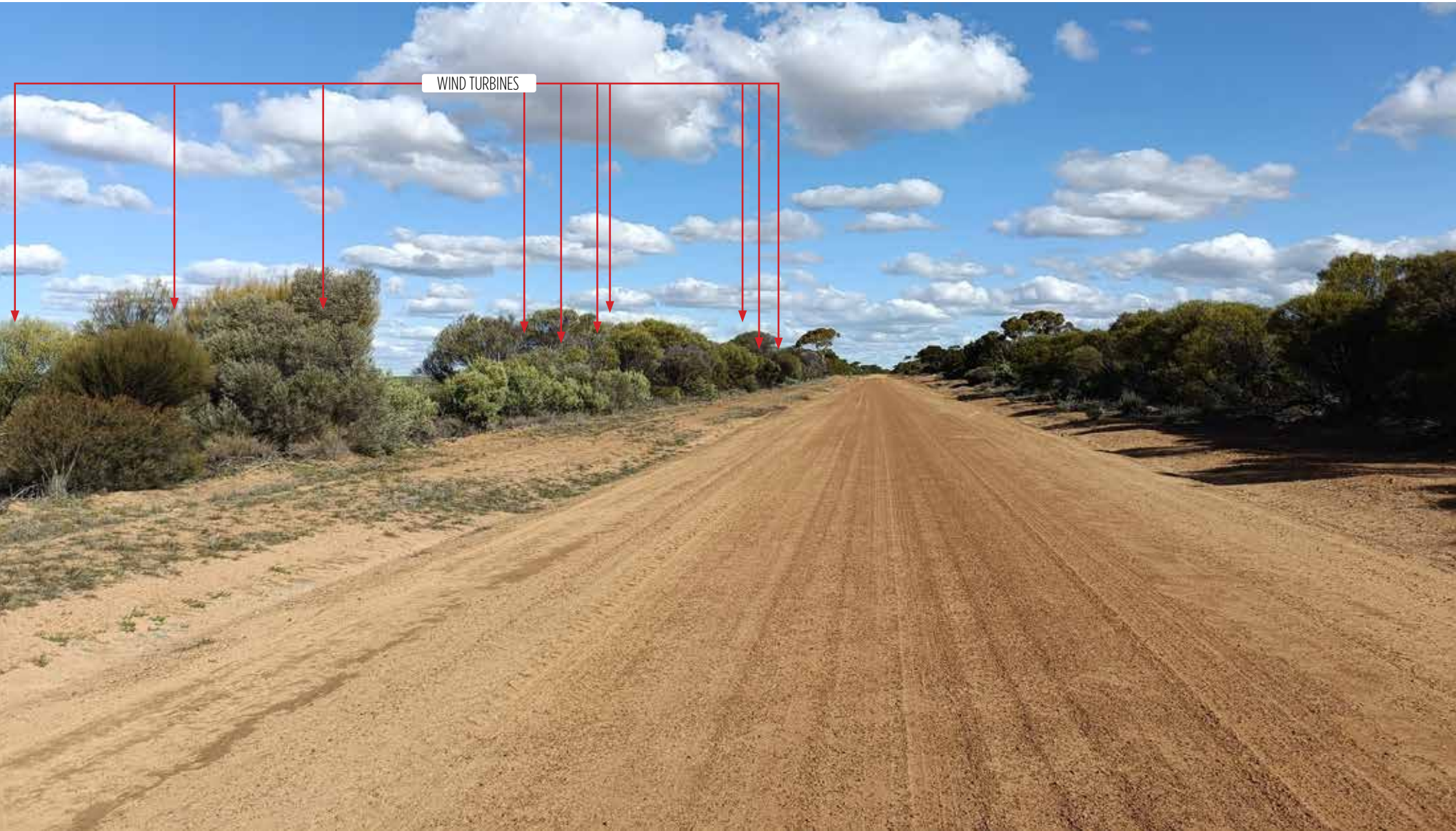


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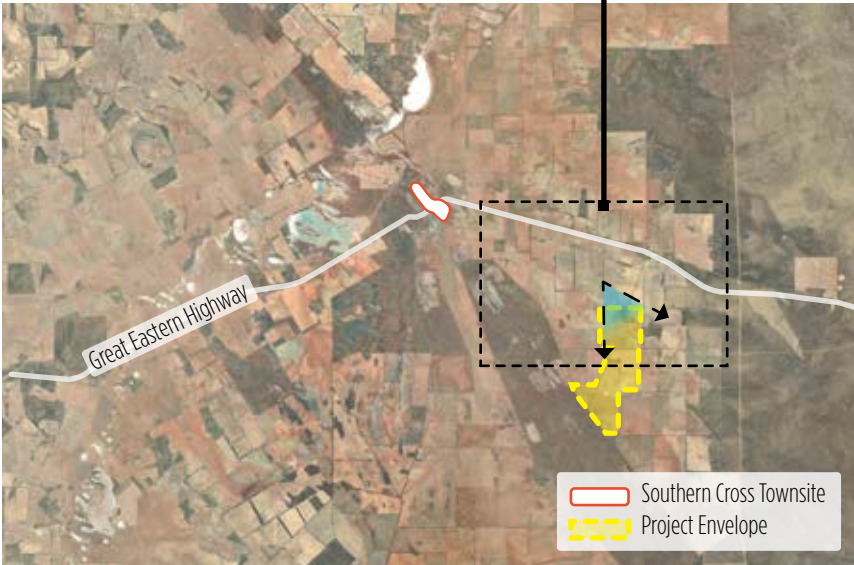


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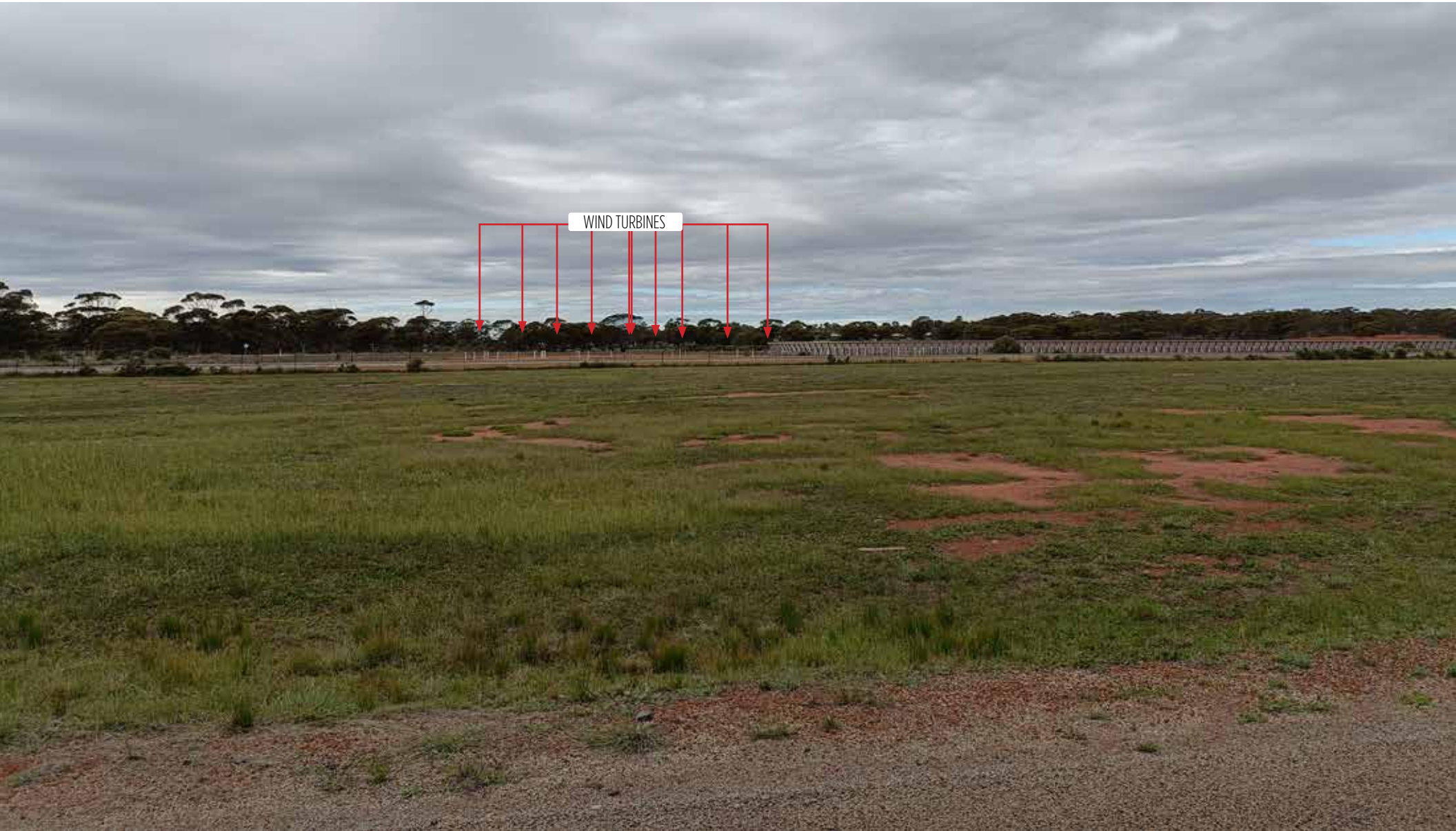
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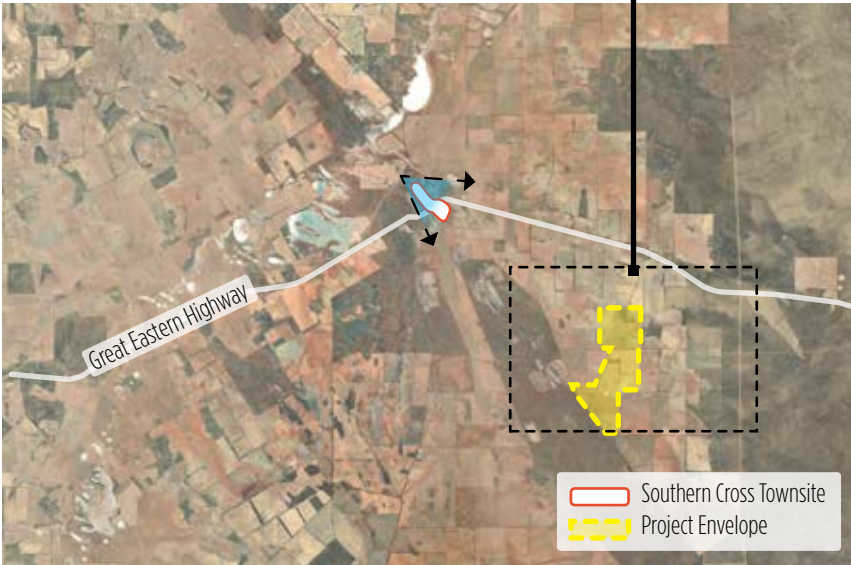
Location Plan (NTS)



Photomontage 9 : Southern Cross Train Station (Photo Location 30)



Enlargement Plan (NTS)

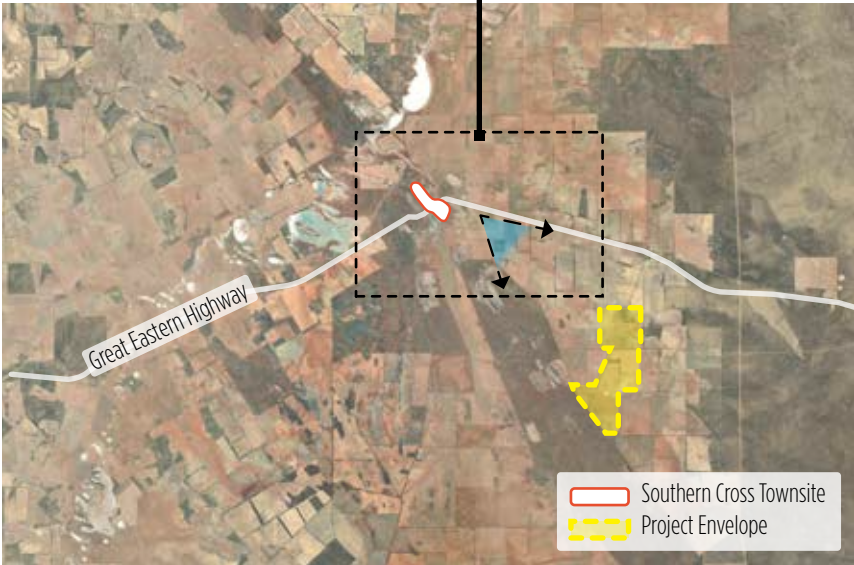


Location Plan (NTS)





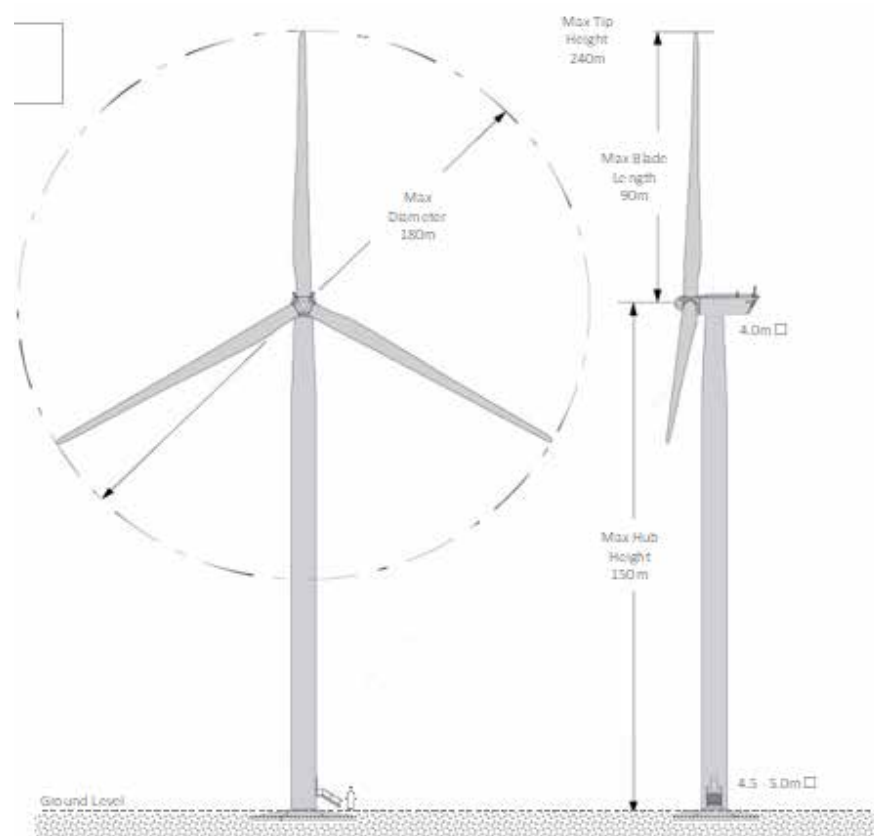
Enlargement Plan (NTS)



Location Plan (NTS)



### APPENDIX III - Typical Wind Turbine Design used in visualisation



TYPICAL WIND TURBINE DESIGN - Extraction of Figure 9 from Application for Development Approval - Southern Cross Windfarm 2023 (By Allering and Associates).

In order to create accurate imagery a 3D computer Sketchup model was created of the wind turbine design. These were based on the graphic elevation of the wind turbine design provided in the Application for Development Approval - Southern Cross Windfarm 2023 (By Allering and Associates).. Appendix 4, Figure 9 relied on google earth imported terrain to determine



TYPICAL REPRESENTATION OF WIND TURBINE - EPCAD created 3D sketchup file created using Figure 9 as reference.





# Southern Cross Windfarm

## Appendix 3

# Visual Impact Assessment



for Yilgarn Holdings Pty Ltd

By Thomas Sounness, BSc, GDipPD & Andrew Woodroffe, BE (Aero), PgDipScTechPol

February 2023

V 3.1 Final

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## 2 INTRODUCTION

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This Visual Impact assessment has been prepared for Yilgarn Holdings Pty Ltd. It supports the proposed development of a wind energy facility within the Shire of Yilgarn, in Western Australia.

## 3 PROPOSAL

---

The proposed development is located to the south east of the Southern Cross townsite between 8 and 15 kilometres from the town. Southern Cross is located ~370 kilometres east of the City of Perth. Refer Figure 1 – Location and study area for wind energy facility south of Southern Cross in the Shire of Yilgarn. The envelope within which development is proposed is ~1,800 ha.

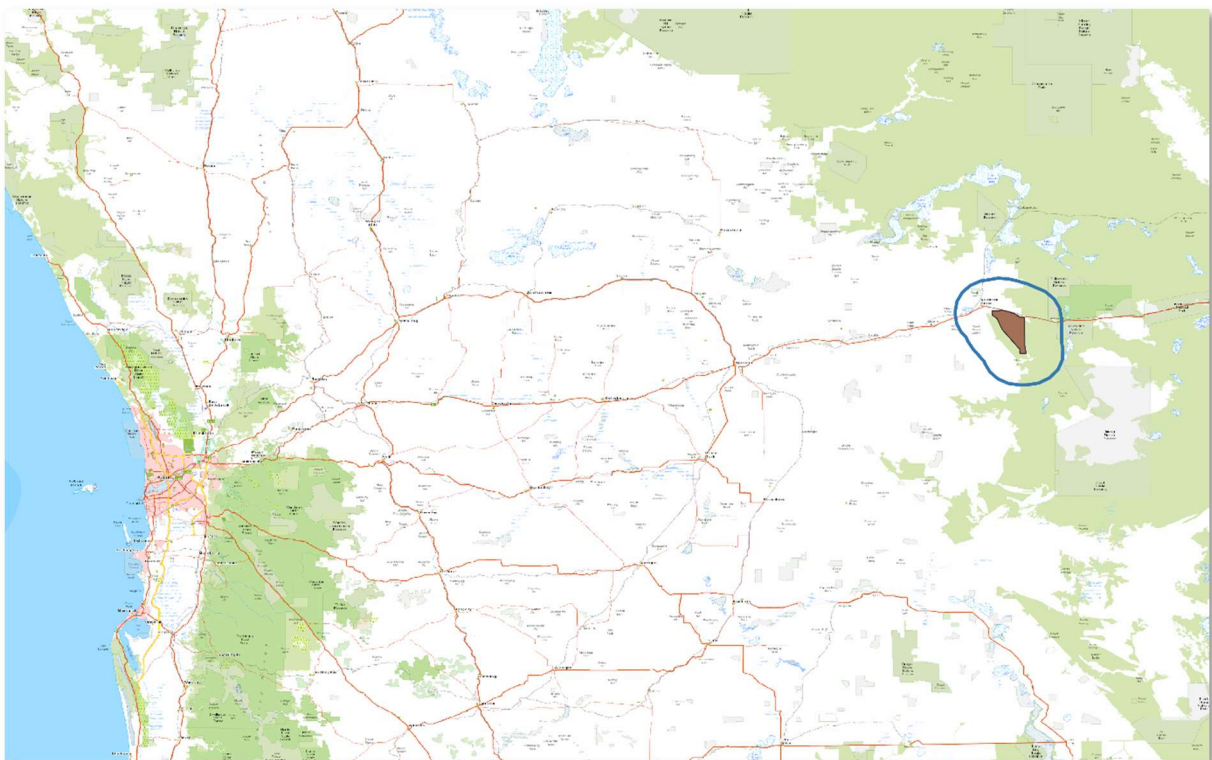


Figure 1 – Location and study area for wind energy facility south of Southern Cross in the Shire of Yilgarn

The land proposed for development is currently used for agricultural purposes. The development proposed comprises a wind farm component and an energy storage component, as follows:

- The wind farm component comprises up to 10 horizontal axis, three blade wind turbines, with a maximum blade tip height up to 240 metres above ground level. The wind turbines will have a maximum tower height up to 150 metres above ground level and maximum blade length up to 90 metres.
- The energy storage component is proposed to be up to 10 MW/10 MWh of battery storage modules installed adjacent to the switch room. These will be commercially available modular equipment. In operation, the battery storage footprint will occupy approximately 0.015 ha of the 1,800 ha Project Envelope.

As is common for these types of projects, the final make, model of turbine, the tower height and number of turbines is yet to be finalised. The project will also have additional incidental infrastructure, including underground and overhead cabling, electrical transformers, access roads, hardstand areas for crane operations plus the installation of appropriate communications equipment.

The project will be subject to a commercial and procurement process following approval. While there will be some variability with the project in terms of turbine and micro-siting, the overall size and space occupied by the project will remain relatively unchanged. Refer turbine layout and allocated turbine numbers in Figure 2.

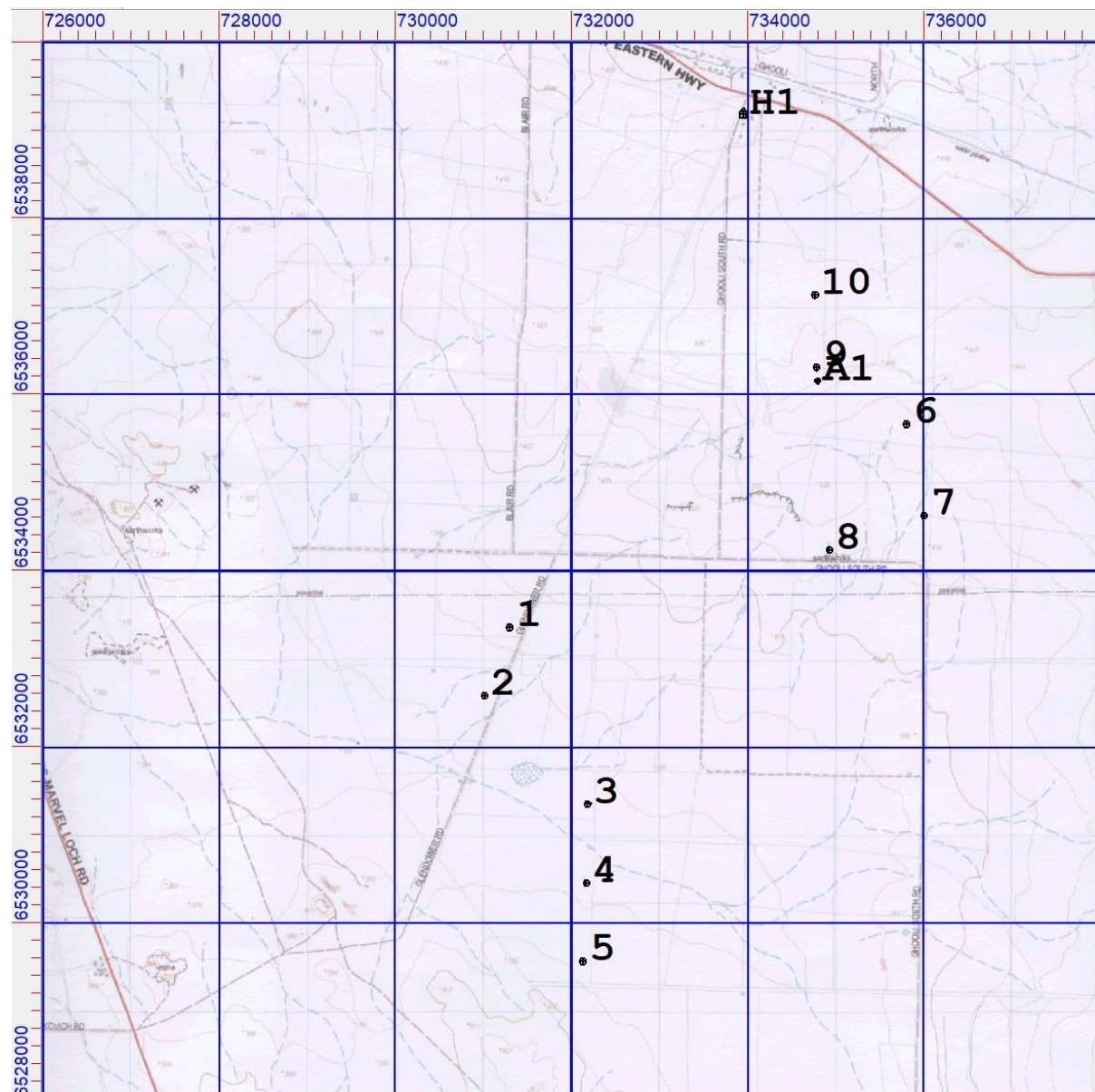


Figure 2 - Location of 10 turbines, and their number from 1 to 10 used through this document.

The proponent notes that the Civil Aviation Authority may require lighting to be installed to warn aircraft of the structures and their possible impact on low level flight.



## 4 INVESTIGATION AREA

The investigation area, within which the project has been shaped, is shown in Figure 3. It comprises cleared parcels of land currently used for agricultural purposes. Remnant vegetation lines the roads and property boundaries. The investigation area is bounded to the east by *Emu Fence Road*, to the north by the *Great Eastern Highway* and to the west by a line between 4km to 7km to the east of, and parallel, to the *Southern Cross - Marvel Loch Road*.

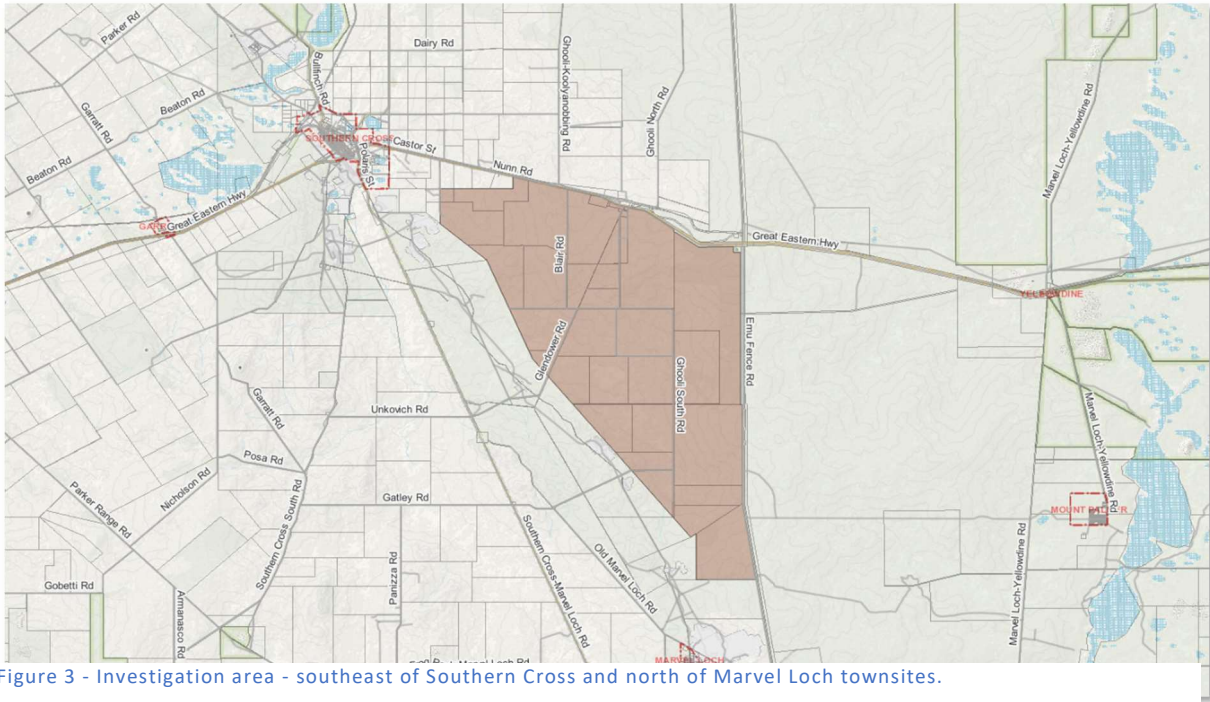


Figure 3 - Investigation area - southeast of Southern Cross and north of Marvel Loch townsites.

The investigation area was selected for the proximity to a substation, well-formed road network, strong electrical connectivity lines and actively farmed lands. There are two residences within the investigation area and several residences within 4km of the investigation area. The Mundaring – Kalgoorlie water pipeline travels along Great Eastern Highway to the north of the site, and one of the past steam powered water pumping stations, Ghooli, is to the north of the site.

## 5 APPROACH AND METHODOLOGY

The accepted guide for assessing potential impacts to landscape and landforms, where visual amenity is a consideration, is the Western Australian Planning Commission's (WAPC) *Visual Landscape Planning in Western Australia; a manual for evaluation, assessment, siting and design* (2007). This document provides a framework methodology and has been used in numerous other wind farm and renewable energy development proposals.

The framework recommended for assessing scenic quality in situations like this is to use the visual classification system from 'Reading the Remote' and placing in within an assessment system from 'Visual Landscape Planning in Western Australia'. The scale of the assessment will move from the regional through the local, then to the site within a study area.

The approach to assessment under this methodology has been to:

- 1) Broadly consider the proposal in terms of siting, and broad visual landscape criteria,
- 2) Review regulatory and legislator requirements applicable to the proposal,
- 3) Describe the existing landscape and visual character using desktop sources, online material and site inspections,
- 4) To identifying key vantage points of the proposal,
- 5) Prepare visual rendering images from these vantage points, and
- 6) Assess the potential for impact on landscape and on visual amenity.

The assessment of the proposed developments impact on landscape and visual amenity is formed from the following framework.

- 1) Determine visual management objectives,
- 2) Describe proposed development,
- 3) Describe potential visual impacts,
- 4) Develop visual management measures,
- 5) Prepare final recommendations and monitoring options, and
- 6) Implementation.

This report assesses the environment the impacts of the development and makes recommendations on the proposal.

## 6 EXISTING LANDSCAPE AND VISUAL ENVIRONMENT

---

Western Australia's image has been shaped and defined by its rural and remote landscapes. However, these landscape areas have been somewhat undervalued as their inherent visual, aesthetic character, and landscape quality tends to be overlooked in statutory processes in rural areas. Instead the perception of the land has primarily been in terms of economic return. In recent years there has been some indication that community attitudes toward rural landscapes are changing; with a greater priority being placed on action to address landscape values and changes to rural character, as well as other environmental concerns such as land degradation, loss of biodiversity, and declining water quality. (WAPC 2007).

The existing landscape is formed from the natural environment of vegetation, land, rocks, soil, and climate. The visual environment is impacted by human interventions in the form of clearing, roads, mining, and buildings. The composition of this presents a visual environment which is experienced by residents & visitors and documented in many ways.

The broad visual landscape elements are described below and were compiled from original source material, as well as a site inspection on 17 September 2022.

### 6.1 Regional Context – Kalgoorlie Plain type

The subject land is within the Kalgoorlie Plain landscape character type. This landscape lies between the Wheatbelt plateau subtypes to the west, and the Nullarbor plan landform to the east, the Esperance plains that extend south towards the coast, and to the north is the extensive plateau rich with Mulga called the Meekatharra Plateau.



## 6. Kalgoorlie Plain

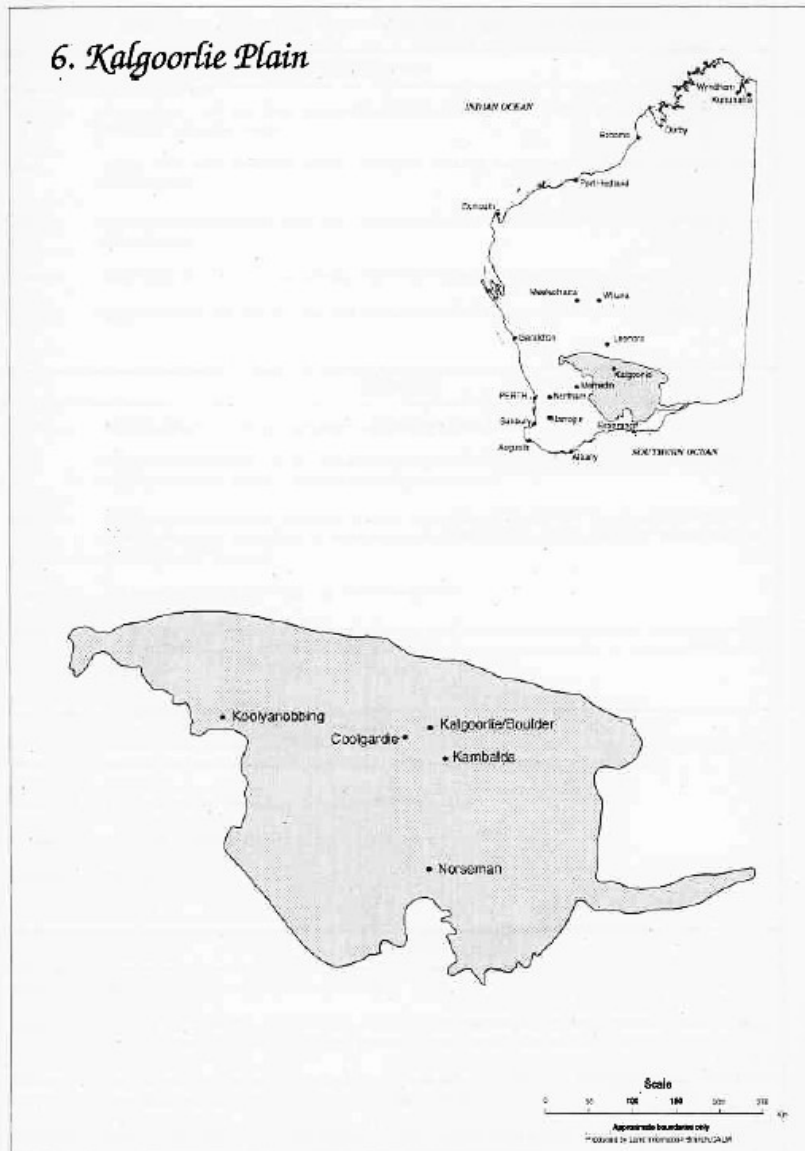


Figure 4 – Landscape Character Types – Kalgoorlie Plain - Taken from 'Reading the Remote' CALM (1994)

### 6.1.1 REGIONAL DESCRIPTION

The Kalgoorlie Plain topography is classified as 'very gentle' with salt lakes and conspicuous hills being separated by low ranges, granting extensive views of a wide horizon. The landscape is ancient and eroded. Chalky red and yellow soils support open Salmon Gum woodlands with scrubby heath. Native vegetation has been substantially removed in the areas where agriculture is the dominant use. There are hills which are visible on horizons, with deep views between outcrops of vegetation available. (CALM 1994)

Notable features are Mt Jackson to the north, Yellowdine Nature reserve to the east and Jilbadji Nature Reserve to the south. These are all considered part of the Great Western Woodlands. (*Wheatbelt Region Parks and Reserves Management Plan 2021*)

Farming extends through the western portion with grazing on pastoral leases taking place to the centre and east of the character type. There are some rocky outcrops through the area with lines of salt lake beds following drainage lines. Some outcrops head north-south towards the coastal plains. Other outcrops lie scattered through the gently undulating terrain. (CALM 1994)

## 6.2 Local Area Context

The study area is the 15km area surrounding the development site. It contains the townsite of Southern Cross (population ~700), where the land uses include agricultural, rural or mining services, including the offices for the Shire of Yilgarn. The town of Marvel Loch (population ~140) is situated to the south of the study area.

The study area is entirely within Shire of Yilgarn.

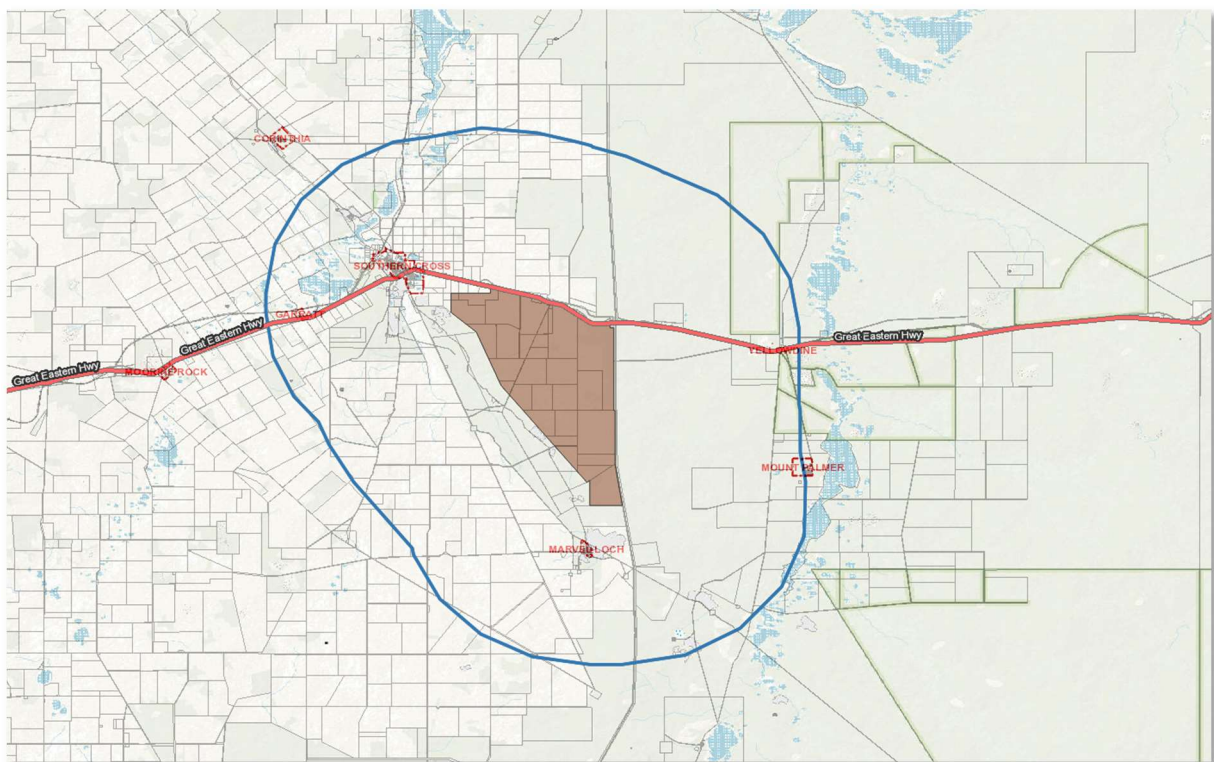


Figure 5 - Study area, being the area 15km from the boundaries of the Investigation Area (area in brown).

The Shire of Yilgarn is at the western edge of the Kalgoorlie Plain landform and covers an area of 30,720 square kilometres. Here the landscape is transitioning from low scrubby vegetation to spacious cropping land. The region has an extensive mining history that continues to the present day. It is likely mining activity will continue to grow the future given the rich mining opportunities that exist in the area. The local economy is strongly connected to the current mines operating in the area and past mines that have been closed. These are visible from the roadside and air as open cut pits, tailings heaps and/or mullock piles.

The Shire of Yilgarn has a combination of open wheatbelt agriculture land, which is somewhat marginal in terms of rainfall, on the western margins, and low-lying scrubby vegetation interspersed with dry creek beds and salt pans, through the mid-east. Toward the eastern



margins, native vegetation low lying scrub extends over pastoral leases, unclaimed crown land and mining tenements.

### 6.2.1 LOCAL AREA DESCRIPTION

A large portion of the study area is cleared farmland, a smaller portion of native vegetation and a still smaller portion comprise large open cut mines. From Wimmera Hill a mostly farming and open cut mining view is visible. From roadside stop, Yellowdine, the low vegetation and sparse woodland trees are dominant. Refer to Figure 6 and Figure 7 below.



Figure 6 - Wimmera Hill lookout showing view to the South East. Mullock piles are visible in picture, as are rooflines of Southern Cross townsite. Further to the distance are a line of native vegetation extending towards Marvel Loch and extensive cleared farmland. (Image by author)



Figure 7 - Roadside parking near Yellowdine Roadhouse in the Study Area. Shrubs and low sparse trees are common. (Image by author)

The built environment is primarily represented within the townsites of Southern Cross and Marvel Loch with interconnecting highway and local roading infrastructure. Marvel Loch typical features that provide for a small town, such as a school and local store/post office plus accommodation for workers of nearby mining activity. There are sports grounds, significant heritage buildings and a local pool at Southern Cross as well as services consistent with a regional town centre. Refer Figure 8 and Figure 9 below.



Figure 8 - Antares Street, Southern Cross - facing north. Wide streets with single story buildings showing ample verandas. (Image by author)



Figure 9 - Antares Street facing south east - showing The Palace Hotel, shops and wide streets. Streetscape character is open and spacious. (Image by author)

The study area and surrounds possess very gently undulating terrain. Spoil heaps from mines and roadside vegetation characterise the broader landscape. Figure 10 below demonstrates typical character of the uncleared land to the east of the study area.





Figure 10 - Emu Fence Road - a transmission tower is visible to the left - clear horizons showing little undulation and low-lying native grasses and shrubs. (Image by author)

Beyond the townsites, views of the horizon are distant. The few outcrops of rock or ranges are at such a distance that they are not easily visible from the study area.

### 6.3 Investigation Area

Within the investigation area, the landscape character is simpler, being roads, remnant vegetation along lot boundaries and cleared farmland.

Roadsides contain limited remnant vegetation and are often so sparse that clear views through to farming land are common. Occasional stands of roadside trees screen views. To the west are taller trees and shrubs that provide more screening of lines of sight. To the east, shown below in Figure 11, there is more visibility through these roadside stands which shows the cleared farmland past the property line.



Figure 11 - Roadside verge plants ranging from stands of trees to open views clear of any vegetation for kilometres. Both views are from Emu Fence Road facing west/southwest towards the investigation area. (Image by author)

Within the investigation area, most of the land that is used for agricultural purposes is almost entirely cleared to allow cropping. Stands of remnant vegetation, screening mine sites, roads and townsites take up the balance. These open spaces are vast, only interspersed by stands of remnant roadside vegetation at road verges.

Crops are generally low, reflecting the low rainfall levels of the district. The land is very gently undulating. Refer Figure 12 below.





Figure 12 - Farming land within study area where the cleared land is used for cropping, facing south west towards Marvel Loch. (Image by author)

The landscape character of the development site within the investigation area is very gently undulating cleared land, being used in a manner consistent with broadacre cropping agricultural use. It presents a commonly found wheatbelt rural character.

## 7 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

---

The subject land is situated within the **Kalgoorlie Plain**, a landscape unit that sits within the complex and diverse geology of the Yilgarn Craton.

### 7.1 Local Landscape Character

The land subject to this proposal is cleared farmland. There are limited portions of remnant vegetation on site. The land has been cleared, is farmed for broadacre cropping, and has barely visible undulations and contours.

*'Reading the Remote'* (CALM et al 1994) describes the Kalgoorlie Plain Character Type as follows:

*"... expansive, gently included landform which appears level in many areas. Views over this landscape often enclosed and interrupted by the dominant woodland vegetation, and from high points such as Mt Charlotte in Kalgoorlie or the craggy summit of Peak Charles, the broad far-reaching views over the landscape extend to the distant, hazy, blue grey horizon.*

*...*

*"Dissecting this subdued terrain are a series of shallow to almost imperceptible depressions which act as floodway's, linking the excessive scattered chains of salt lakes after heavy rains. These shallow lakes are found in broad, indistinct valleys with the eastern and southern peripheral margins occasionally fringed by low-lying dunes.*

*...*

*The extensive, ancient drainage lines which have been reduced to torturous linear strings of saline lakes are the characteristic waterform of the Kalgoorlie Plain. ... Scattered, glistening white salt flats often form part of a salt lake chain and after period of heavy rain, the saline water bodies flow into one another by linked drainage. channels ..." (CALM 1994)*

Figure 13 - Excerpt from *Reading the Remote* on the characteristics of the Kalgoorlie landform unit (CALM (1994)).

Regionally the landforms of the Kalgoorlie Plain are distinguished by wide open landscape. Occasionally trees, machinery and sheds dot the landscape. Adjacent and within the site, there is remnant vegetation scattered alongside roadside corridors, including Salmon Gum (*Eucalyptus salmonophloia*) mallee timber (*Eucalyptus gross sp.*), smokebush (*Conospermum stocechadis*) and Red Beared Hopbush (*Dodonea lobulate*).

Specific to the study area there are very few points in the landscape that offer views similar that of Wimmera Lookout. The land is at best gently undulating along road, minimal vegetation on site. What has remained is of poor and isolated condition. Much of the land is farmed, grazed, or cropped.

From many points within the study area, views of the environment are open, spacious and very gently undulating. Due to the flat plain, views are consistently broad, encompassing much of the horizon in all directions.

The Kalgoorlie Plain aesthetic character, developed in *Reading the Remote*, is given below:

Aesthetic Character Summary	
Landform	
Form	level to gently inclined landform; conspicuous low hills and ranges; low wind-formed dunes; block and conical mullock hills.
Line	level horizon
Colour	blue grey horizon; rust; and blue grey streaked granite; soils from soft peach to warm rosy pink reds to vivid coppers; burnt red ironstone.
Texture	craggy summits; stony hills with rock peppered surfaces; rugged peaks; rocky edges
Scale	Long, mostly uninterrupted views under big skies over the almost level terrain.
Vegetation	
Form	slender; whippy trunks; flat topped trees; rounded broombushes; sheaths of discarded bark; low bushy heath
Line	strong diagonal line of mallees and salmon gum trunks and branches; strong horizontal layer from three definite vegetation layers; fluid lines of trunks.



Colour	shimmering; glossy leaves; silver grey, cream to pale salmon pink and warm peach of salmon gum trunks; olive bronze to copper trunks; light silvery brown; dark leaved mallees; dull greens; grey discarded twigs and branches; soft silver and gold grasses; dull red; profusion of vividly coloured wildflowers; bright yellow wattle blossoms; pale grey Smokebush; bright tangerine Grevilleas
Texture	scrubby undergrowth; smooth glossy trunks; flaking bark; dusty and furry leaves; soft grasses and Smokebush; spiky Honeymyrtle.
Scale	mallee and salmon gum woodland encloses and channels long views, and depth of view into woodland extensive; heath vegetation channels views and visual penetration into heath is minimal.
<b>Waterform</b>	
Form	shallow depressions and floodways; rock pools; salt flats
Line	tortuous linear chains of salt lakes
Colour	silver; blue; milky; transparent
Texture	smooth mirrored surface
<b>Land Use</b>	
Form	pyramid mullock heaps; corrugated iron; form of historic buildings
Line	horizontal flat-topped man-made hills; angular poppetheads and headframes; tall slender funnels of nickel smelter; waterpipe; geometric line of roofing and building materials.
Colour	red dust; silver grey waterpipe; rusting metal; shades of roofing and building materials; greying fence posts; iron railings.
Texture	rough, scaly, rusting metal; mullock heaps and rubble strewn ground; roofing and building materials; flaking paint.

Table 1 - Kalgoorlie Plains Aesthetic Character summary (Source: *Reading the Remote* (CALM, 1994))

### 7.1.1 ASSESSING SCENIC QUALITY

The recommended framework for assessing scenic quality is to adopt the visual classification system from *Reading the Remote* and placing it within the assessment system from *Visual Landscape Planning in Western Australia*. (CALM 1994; WAPC 2007)

The Visual Quality Classification frame of reference, giving **High**, **Moderate** and **Low** scenic qualities for the Kalgoorlie Plain landform is given in *Reading the Remote* is as follows:

<b>Visual Quality Classification – frame of reference</b>			
<b>SCENIC QUALITY</b>	<b>LANDFORM</b>	<b>VEGETATION</b>	<b>WATERFORM</b>
<b>HIGH</b>	<ul style="list-style-type: none"> <li>Rock outcrops or piles of large boulders</li> <li>Isolated peaks or low ranges which become focal points by contrasting with the surrounding landscape e.g., Peak Charles</li> </ul>	<ul style="list-style-type: none"> <li>Stands of vegetation which create distinctive forms, colours or spacing in comparison to surrounding vegetation e.g. Gimlet Trees.</li> <li>Strongly defined patterns of vegetation resulting from combinations of tall woodland, heath and</li> </ul>	<ul style="list-style-type: none"> <li>All lakes, clay pans and rock pools e.g. Lake Hope</li> </ul>

		treeless areas e.g. heath and woodland combinations. <ul style="list-style-type: none"> <li>• Dramatic displays of seasonal colour e.g. Flame Grevillea</li> </ul>	
<b>MODERATE</b>	<ul style="list-style-type: none"> <li>• Broad, shallow valleys and drainage associated depressions.</li> <li>• Slightly undulating country which are not visually dominant but surrounded by similar landforms.</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetation stands that exhibit the range of size, form, colour, texture and spacing found commonly in the surrounding landscape.</li> </ul>	<ul style="list-style-type: none"> <li>• Waterforms absent</li> </ul>
<b>LOW</b>	<ul style="list-style-type: none"> <li>• Expanses of virtually flat landform which provide few landmarks with which to orient.</li> </ul>	<ul style="list-style-type: none"> <li>• Extensive areas of similar vegetation with limited variation in colour and texture.</li> </ul>	<ul style="list-style-type: none"> <li>• Waterforms Absent</li> </ul>

Table 2 - Visual Quality Classification (Source: Reading the Remote (CALM 1994))

This classification framework will be used to assess the project.

#### 7.1.1.1 Scenic Landform Values

The land within the study area does not contain any sites which fit the criteria for High value landform sites. The country is slightly undulating and is consistent with the landforms surrounding it, with few landmarks around which can be used to orientate.

Conclusion: Scenic landform values in the study area are **Low to Moderate**.

#### 7.1.1.2 Scenic Vegetation Values

The vegetation complexes within the study area fall into three forms.

- 1) The native vegetation that comprises the land lying between Southern Cross townsite and Marvel Loch townsite – within which are several open cut mines. These mines are screened by the vegetation. These trees are well defined and form a heath and/or woodland environment. The vegetation appears to be quite intact.
- 2) The second form is the low heath mostly found to the east of Emu Fence Road. Here the vegetation is between 0.3m high and 0.75m high with occasional stands which are around a metre in height. These are on low undulating dunes or landforms.
- 3) The third is the land within the investigation area which is predominantly cleared farmland. Some remnant vegetation lies along roads and at the margins of properties.

Of the three forms, the first may be considered to be of moderate value as the vegetation is commonly found in the locality with common forms, size, shaping and coloration to other stands in the locality and wider district. The other two forms of vegetation are of low value, being similar in character to much vegetation in the locality and wider district.

Conclusion: Scenic vegetation values in the study area are **Low to Moderate**.

#### 7.1.1.3 Scenic Waterforms Values

There are no directly identifiable waterforms within the investigation area. Some waterforms are found at the very edges of the study area.



Conclusion: Scenic waterform values in the study area are **Non-existent** to **Low**

#### *7.1.1.4 Visual Impacts on Landscape Character*

This chapter assesses potential impacts on each of the representative public vantage points identified. This is in accordance with the methodology discussed in Section 5.

The Visual Impact Assessment area shows several landform types within the study area:

- Native Vegetation, both low lying trees and scrub
- Mine Sites with mullock heaps
- Salt lake pans
- Roadside environments including truck stops
- The Mundaring - Kalgoorlie water line
- Agricultural lands with cropping and rural infrastructure
- Low lying undulating hills

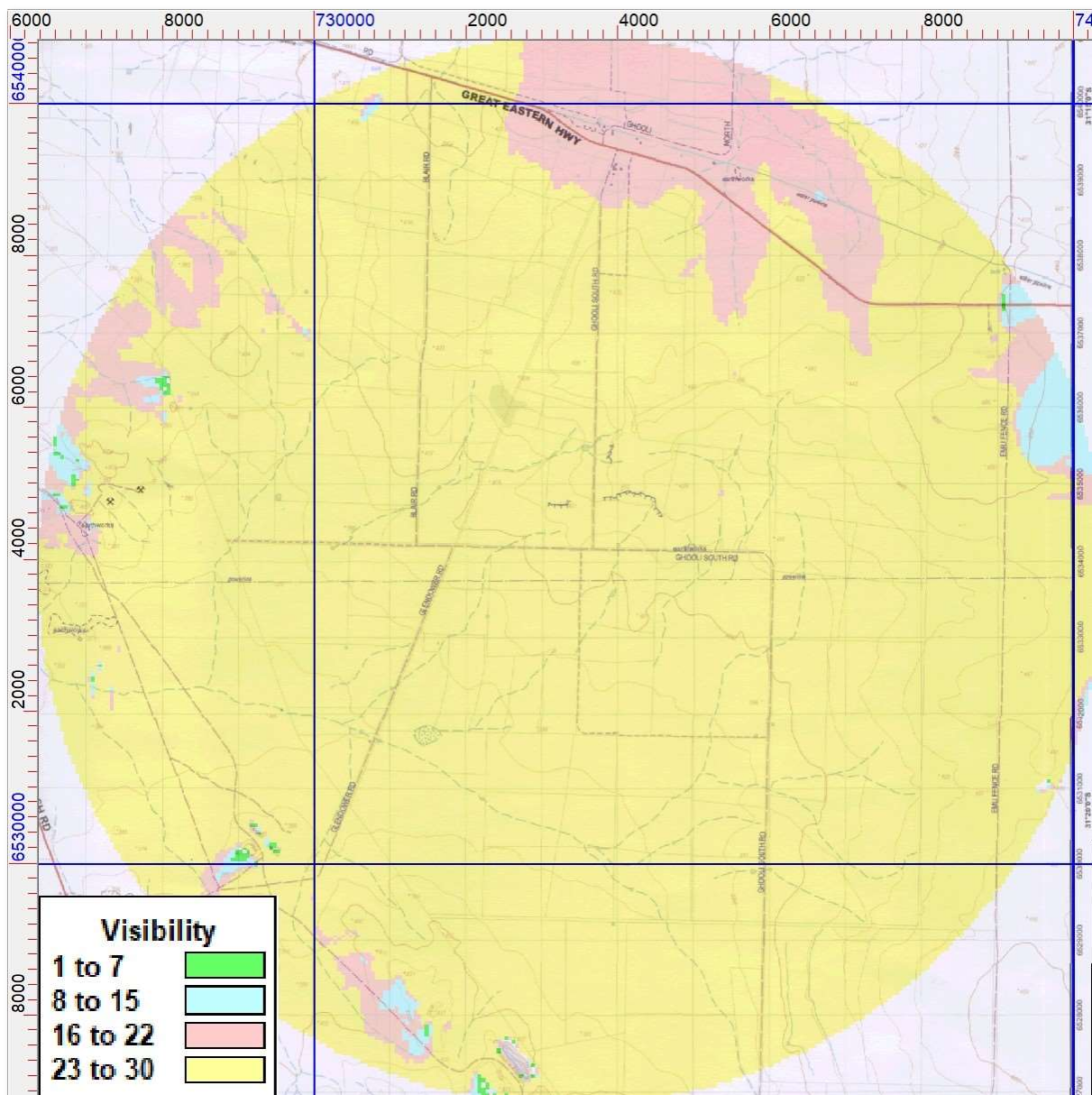
These features are all part of the overall character of the Kalgoorlie Plains type and are all within the Visual Impact Assessment study area.

#### **7.1.2 VISUAL ZONE OF INFLUENCE**

An additional tool is the Visual Zone of Influence. It shows the visibility of the turbines in an environment based on the contours of the land. It presumes no intervening vegetation or screening buildings. Because the land is gently undulating towards being flat, much of the locality shows strong visibility to the proposed development.

Figure 14 (following) shows the zone of visual influence within a 7km radius. This zone of visual influence shows the visibility within the landscape of the proposal and the degree to which it is visible. All 10 proposed turbines were used to develop this image.

One point is allocated for the highest blade tip, the nacelle and tower if more than half of height of the tower is visible, so 3 points are given for full visibility of one turbine. Maximum visibility of all 10 turbines would give a figure of 30. For example, a view of a single blade tip would give a number of 1, and a number of 3 may indicate visibility of a whole turbine or of three turbine blade tips.



An analysis of this Zone of Visual Influence highlights the minor screening of the vicinity of the proposal behind mine tailings, mullock heaps, and in depressions at the far periphery of the project. Past 7km, from the furthest turbine, while the structures are visible, they are much closer to the horizon and appear very distant. The calculation of the Zone of Visual influence has not been extended past the 7km radius from the centre of the proposed development.

### 7.1.3 RENDERING OF PHOTOMONTAGES

The choice of locations used for visual impact assessment with rendering of turbines were based on the visibility to the turbines from this site and the significance of the site for vistas within the public realm. Wimmera hill is a site that was chosen because of its significance for views around Southern Cross townsite. The airport was chosen as it is a gateway to arrivals, and it has uninterrupted views towards the investigation area.



Other vantage points were chosen because of their relative elevation, granting views of the development site with an expectation that there would be views of turbines at these locations.

From these vantage points, photographic images of the project site were taken during a site inspection. Using Resoft's *WindFarm* software these images were processed to render photomontage images of the turbines in place. In some of these views, the turbines are clear. In others, views were blocked by screening both vegetation and structures. Many photomontages show turbines at a great distance, further reducing turbine visibility in some cases to being almost unable to be seen.

Frequently, on-site screening or local site conditions reduced visual impacts. In some locations, such as Marvel Loch townsite or Yellowdine Service Station – the proposed development was too far away, or with too much intervening vegetation, to allow views. For others, intervening mullock heaps and native vegetation blocked views such that, at best, only blade glimpses were visible.

Where a significant site was assessed, and there was no turbine structure visibility available (or only glimpses of blade tips) there was no assessment, as there would be nothing to render.

For example, for houses 10 and 11 (refer Figure 28 on page 33) the turbines were not visible above the tree line, and only occasional blade tips glimpses possible between trees limbs. This site was excluded as these possible glimpses were screened by trees.

#### 7.1.4 VISUAL ANALYSIS

The following points were selected for closer analysis, where visibility of the turbines is likely and the public accessibility of these sites by car is frequent (along Great Eastern Highway) or likely (along Emu Fence Road). This is shown in Figure 15 below.

- VP 1 – Wimmera Hill Lookout – viewing south east
- VP 2 – Southern Cross Airport – viewing south east
- VP 3 – Blair Road – view south
- VP 4 – Blair Road – view south west
- VP 5 – South of Ghooli Locality – view south-south west
- VP 6 – Emu Fence Road – view west north west
- VP 7 – Emu Fence Road –view west south west

Photographs were taken from an elevation 1.7m above ground level where relatively clear views of the investigation area, such as on the sides of roads, could be achieved.

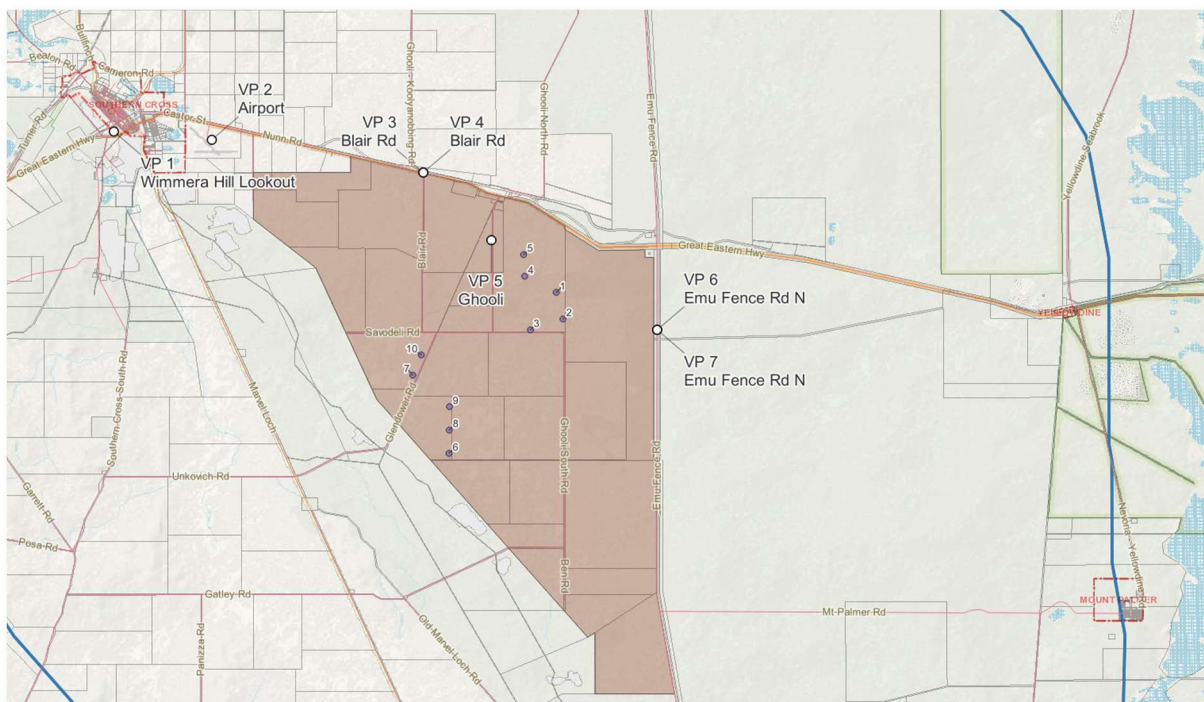


Figure 15 - Viewpoints selected for visual impact investigation.

### 7.1.5 IMAGE RENDERING CRITERIA

The rendered images are provided in two forms:

- 1) Rendered view - showing as near a real world view as possible of how the turbines would look on construction.
- 2) RAW view - showing settings, outline of turbines and/or the contoured ground mesh used by the *WindFarm* software.

Not all views have been rendered. Where the structures are visible, the image has been rendered. Where the structures are so small and minor as to be barely visible, the rendering has been set aside.



7.1.6 VP 1 - WIMMERA HILL LOOKOUT – SOUTH EAST



Figure 16 - VP 1 from Wimmera Hill Lookout - view towards south east showing turbines.



Figure 17 - VP 1 - View from Wimmera Hill Lookout - facing south east - turbines outlined and numbered for easy identification.

<b>Location: VP 1 - WIMMERA HILL LOOKOUT - SOUTHEAST</b>
Distance to closest structure: 13 kilometres
Furthest distance: 16.5 kilometres

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### Visual Quality Classification

The vantage point is considered to be of high sensitivity due to the broad aspect views of the site, its status as a lookout over and around Southern Cross. Views from this site are of the close proximity townsite buildings, middle distance mine site pits and mullock heaps, then of farmland plus native vegetation remnants towards that of the wider horizon.

This vista to the southeast is of low significance - without landscape, vegetation or waterform features of high significance to the Kalgoorlie Plain landform, but of moderate significance to the social values of Southern Cross townsite residents.

### Magnitude of Change

The development of the turbines will be clearly visible from this site, although the turbines will be relatively low/small against the horizon. There will be no screening from vegetation.

The magnitude of change at this vantage point is considered to be **Moderate**.

**ZVI Rating – no rating** (*greater than 7km distance*)

### Impact Summary

Due to the 13+ km distance from the lookout to the development site and the resultingly small sized structures against the horizon, impact is assessed as being **Low to Moderate**.



## 7.1.7 VP 2 - SOUTHERN CROSS AIRPORT – SOUTH EAST



Figure 18 – VP 2 - Southern Cross airport facing south east - this shows the number and location of the turbines as proposed against the horizon. Most turbines are below the horizon at this distance, with only blades and nacelles visible. The turbines are rendered here under normal lighting conditions.



Figure 19 – VP 2 - Southern Cross Airport facing south east - the turbines are visible against the horizon where there is clear lines of sight. The turbine have been outlined and numbered to improve visibility.

### Location: VP 2 - SOUTHERN CROSS AIRPORT – SOUTH EAST

Distance to closest structure: 10km

Furthest Distance: 14.4km

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### Visual Quality Classification

The vantage point is of medium sensitivity. The airport is a gateway arrival point for arrivals to Southern Cross, and the vista around the site shows wide open expanses where the development will be of higher visibility and sensitivity than other locations.

The landscape is uniform to the east showing farming land uses. To the south and east are with a range of features that are common in the locality, with mine site mullock heaps visible through the remnant vegetation.

This view to the south east is of low significance - without landscape, vegetation or waterform features recognised of high significance to the Kalgoorlie Plain landform.

### Magnitude of Change

The magnitude of change at this vantage point is considered to be **Moderate**, given the existing vista having multiple features with visible impact caused from human activity.

**ZVI Rating – no rating** (*greater than 7km distance*)

### Impact Summary

**Moderate** due to the distance from the proposed sites of development and the surrounding impacted vistas of farm land and evidence of mining. The structures will be low on the horizon.



7.1.8 VP 3 - BLAIR ROAD – SOUTH



Figure 20 – VL 3 - Blair Road - South - the turbines are visible against the horizon where there is clear lines of sight. The turbine have been numbered and mesh contours of the land have been outlined to improve visibility.

<p><b>Location: VP 3 – BLAIR ROAD - SOUTH</b></p>
<p>Distance to closest structure: 4.5km</p> <p>Distance to furthest structure: 10.1km</p>
<p><b>Visual Quality Classification</b></p> <p>The vantage point is considered to be of low sensitivity due to the views of the landscape along this road being of low vegetation and farmland. The landscape is uniform with a range of features that are common in the locality.</p> <p>This view to the south is of low significance - without landscape, vegetation or waterform features recognised of high significance to the Kalgoorlie Plain landform.</p>
<p><b>Magnitude of Change</b></p> <p>The magnitude of change at this vantage point is considered to be <b>Moderate</b> due to the capacity for the closest turbines to be visible within landscape. However, the height compared to the relative heights of the trees lining the roadside reduces the impacts of the structures.</p> <p><b>ZFI rating – 2 points</b> (two blade tips visible)</p>
<p><b>Impact Summary</b></p> <p>Impact is considered to be <b>Low</b>, with the turbines being visible against the horizon but lower in height, relatively, to the vegetation lining the roadside resulting in the turbines being screened.</p>

7.1.9 VP 4 - BLAIR ROAD – SOUTH EAST



Figure 21 – VP 4 - Blair Road - South East - a rendered view of the proposed turbines from the roadside edge where they will be seen by passing traffic under normal lighting conditions.

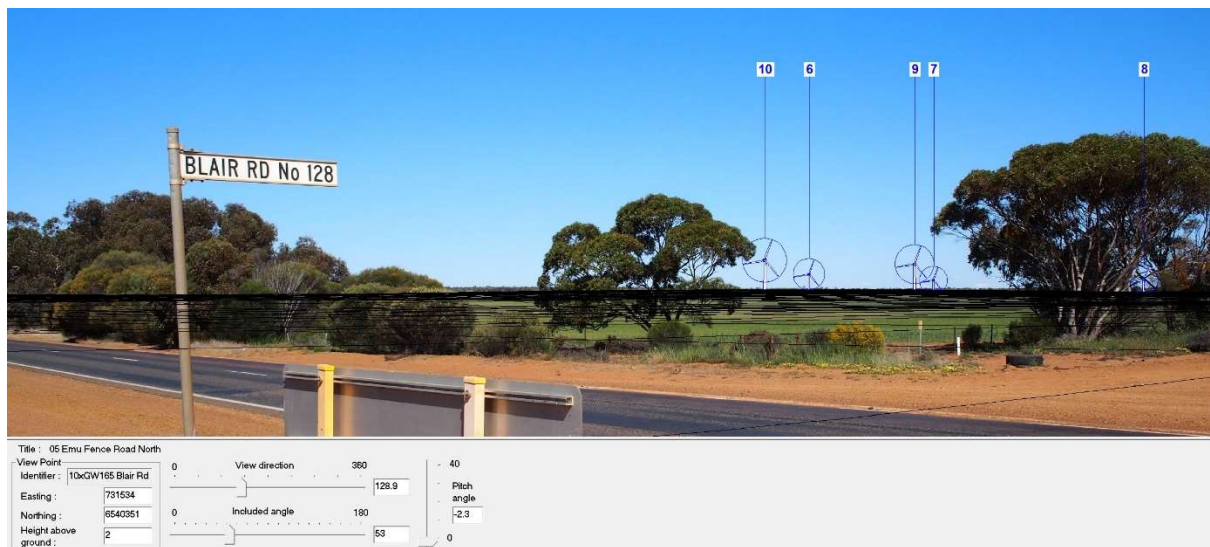


Figure 22 – VP 4 - Blair Road - South East - the turbines are visible against the horizon where there is clear lines of sight. The turbine have been numbered and mesh contours of the land have been outlined to improve visibility.

**Location: VP 4 - BLAIR ROAD – SOUTH EAST**

Distance to closest structure: 4.4km

Distance to furthest structure: 10.1km



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### Visual Quality Classification

The vantage point is considered to be of Low sensitivity. The landscape is uniform with a range of features that are common in the locality such as farm land, low to medium roadside vegetation and gravel kerb. These are not recognised as being locally significant.

This view to the south east is of low significance - without landscape, vegetation or waterform features recognised of high significance to the Kalgoorlie Plain landform.

### Magnitude of Change

The magnitude of change at this vantage point is considered to be **Low to Moderate**. The height compared to the relative heights of the trees lining the roadside reduces the impacts of the structures however they will be at the same or lesser height than the existing roadside trees.

**ZVI impact – 11 points** (4 blade tips, 4 nacelles, 3 towers)

### Impact Summary

Impact is considered to be **Low to Moderate**, with the turbines being visible against the horizon but lower in height, relatively, to the vegetation lining the roadside affording screening of the structures.

### 7.1.10VP 5 – SOUTH OF GHOOOLI LOCALITY – SOUTH SOUTH WEST



Figure 23 – VP 5 - South of Ghooli locality – this render depicting the view of the turbines at this location under normal light conditions.

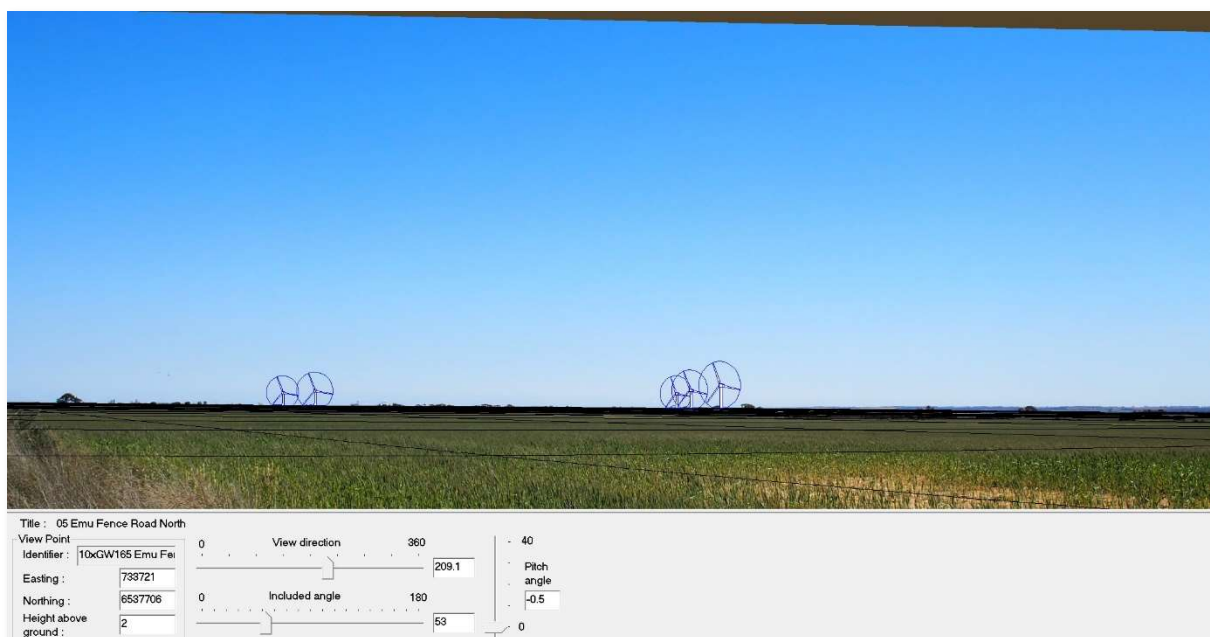


Figure 24 – VP 5 - South of Ghooli locality – RAW image showing view from south of Ghooli location, facing SSW. The farmland will have clear visibility of the turbines. The turbine and mesh contours of the land have been outlined to improve visibility.

#### Location: VP 5 – SOUTH OF GHOOOLI LOCALITY – SOUTH SOUTH WEST

Distance to closest structure: 4.9km

Furthest Distance: 8.2km



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### Visual Quality Classification

The landscape is uniform agricultural land that is consistent with farming land in the locality. The horizon is uniform in feature showing gentle undulations tending towards flat land. The significance of this site for the imaging is because the road is likely to be trafficked for those seeking to view the project. The traffic at this location would be almost entirely for local residents.

This view to the south east is of low significance - without landscape, vegetation or waterform features recognised of high significance to the Kalgoorlie Plain landform.

### Magnitude of Change

The magnitude of change at this vantage point is considered to be **Moderate** to **High**, as the turbines will be the largest features in the landscape. They do not have screening vegetation and will be clearly visible.

The location is not a significant one in terms of traffic, tourism or significant vistas, with the road being a service road for nearby farming properties.

**ZVI impact – 15** (5 blades, 5 nacelles and 5 towers)

### Impact Summary

While the impact could moderate for this location, the low regional significance of this site just off the gravel road, low landscape values within the locality and the study area brings the impact to being **Low**.

7.1.11 VP 6 - EMU FENCE ROAD - WEST NORTH WEST



Figure 25 – VP 6 - View facing WNW over Emu Fence Road of the turbines.



Figure 26 – VP 6 - Emu Fence Road - WNW - This view shows screening from roadside vegetation and relative height of turbines compared to nearby transmission towers. The turbine have been numbered and mesh contours of the land outlined to improve visibility.

<b>Location: VP 6 - EMU FENCE ROAD - WEST NORTH WEST</b>
Distance to closest structure: 3.1km
Furthest Distance: 8.2km



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### Visual Quality Classification

The vantage point is considered to be of low sensitivity due to the uniform low lying undulating nature of the landscape and consistent low lying uniformity of vegetation. The significance of this road for its particular landscape values of the locality's visual character within the study area and the locality is considered to be low.

This view to the south east is of low significance - without landscape, vegetation or waterform features recognised of high significance to the Kalgoorlie Plain landform.

### Magnitude of Change

The magnitude of change at this vantage point is considered to be **Low** due to the turbines being screened in part or in whole by the roadside vegetation and the existing impact of the transmission tower infrastructure.

**ZVI Impact – 9** (6 blade tips, 3 nacelles, 0 towers)

### Impact Summary

Low due to the screening of the turbines by the vegetation and the landform.

Where there is no screening, the turbines will be relatively low against the horizon and the impact will be **Low to Moderate**.

7.1.12 VP 7 - EMU FENCE ROAD – WEST SOUTH WEST

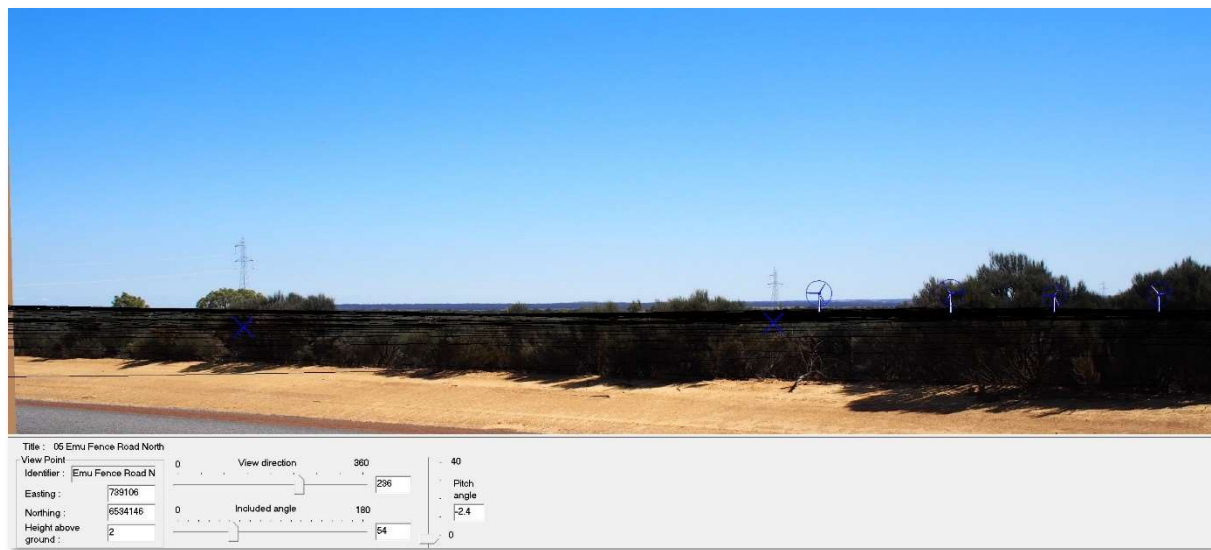


Figure 27 – VP 7 - Depiction of the turbines in the horizon for the study area. Overhead powerline poles are visible. Turbines are more likely to be screened from the vegetation on the roadside verge. The turbine and mesh contours of the land have been outlined to improve visibility.

**Location: VP 7 - EMU FENCE ROAD – WEST SOUTH WEST**

**Distance to closest structure: 3.0km**

Furthest Distance: 8.2km

**Visual Sensitivity**

The vantage point is considered to be of Low sensitivity due to the uniform low lying undulating nature of the landscape and consistent low lying uniformity of vegetation. The significance of this road for its particular landscape values of the locality’s visual character within the study area and the locality is considered to be low.

This view to the south east is of low significance - without landscape, vegetation or waterform features recognised of high significance to the Kalgoorlie Plain landform.

**Magnitude of Change**

The magnitude of change at this vantage point is considered to be **Low** due to the turbines being screened in part or in whole by the roadside vegetation and the existing impact of the transmission tower infrastructure.

**ZVI Impact – 3** (two blade tips, 1 nacelle, 0 towers)

**Impact Summary**

Low due to the screening of the turbines by the vegetation and the landform.

Where there is no screening, the turbines will be relatively low against the horizon and the impact will be **Low to Moderate**.



## 7.2 Assessing Impacts on viewers

The viewer groups potentially affected by the proposed developments comprise mainly residents of the region, traffic on the Great Eastern highway and visitors to the local attractions. Community appreciation of scenery (both landscape) is based largely on the extent, diversity, integrity and naturalness of landscape features and characteristics visible from public viewpoints (such as lookouts and reserves), tourist or recreation sites, or while travelling. Tourists are guided to routes to the west of the townsite and not through the study area.

Landscape impacts of the proposal on housing is also important. The location of the proposed turbines (refer Figure 27) when seen from nearby occupied and/or abandoned houses have been assessed.

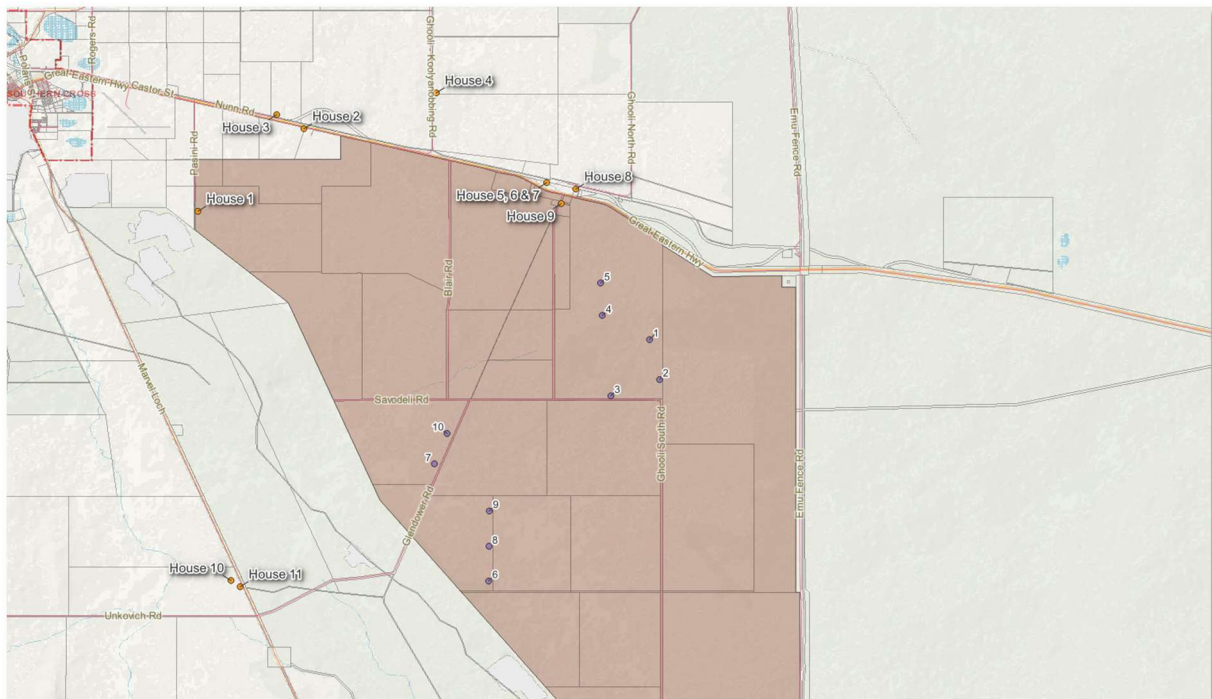


Figure 28 - Location of houses (occupied and abandoned) and of proposed turbine locations.

The assessment, including proximity of dwellings to proposed turbines, and comments on each location, are outlined in the table below.

No	Description	Comments
1	House on Lot 615 on Plan 204376 at 34558 Great Eastern Highway, Southern Cross	Closest turbine #7 is 7.6km from the dwelling. Visibility is likely to be moderate showing the full height of tower and blades. View will be very similar to that of the airport view.
2	House at Lot 38 of DP 233686 at 183 Nunn Road (near Great Eastern Highway), Southern Cross	Closest turbine #5 is 8.2km from the dwelling. Visibility is likely to be moderate showing much of the height of the tower and much of the blades, over the intervening vegetation and agricultural sheds.

<b>3</b>	House on Lot 39 of Plan 233686 at 34808, Great Eastern Highway, Southern Cross.	Closest turbine #5 is 7.5km from the dwelling. Visibility is likely to be moderate to high, with the full height of the towers and blades for many of the turbines being likely visible behind the limited on-site vegetation and agricultural sheds.
<b>4</b>	House on Lot 420 on Plan 202695 at 236 Ghooli-Koolyanobbing Road, Ghooli	Closest turbine #5 is 5.9km from the dwelling. Visibility is likely to be moderate to high, with full height of the towers and blades for many of the turbines likely to be visible behind the limited on-site vegetation and agricultural sheds.
<b>5, 6 &amp; 7</b>	Abandoned buildings on crown reserves, being Lot 51 on Transfer of Land Act (Type 1); Reserve (Type 3 R), land ID number 3107615 at the locality of Ghooli.	Three abandoned dwellings between 2.7km and 2.8km from the closest turbine #5, located south and south west from these buildings.
<b>8</b>	House on Lot 101 on Plan 029329, being 35425 Great Eastern Highway, Ghooli.	Closest turbine #5, is 2.4km south of the building. From this structure there will be relatively high visibility of the turbines to the south, which may be screened by some vegetation to the south and other built structures such as sheds.
<b>9</b>	House on Lot 4 on Plan 075791, being 25 Ghooli South Road, Ghooli	Closest turbine #5 is 2.1km south of the building. From this dwelling there will be relatively high visibility of the turbines with some screening vegetation occluding the view of the turbines. The turbine tower and blades will be mostly visible.
<b>10</b>	Houses at Lot 368 on Plan 203770 at 1364 Southern Cross - Marvel Loch Road – currently occupied by an Engineering Works enterprise (Blackman Fabrications). (Blackman Fabrications, 2022)	Closest turbine #7 is 4.8km from these structures. Second closest turbine, #6, is 5km from these buildings.
<b>11</b>		The path to these turbines is over a native vegetation corridor ~3.7km wide. The path also contains two open cut mine sites with mullock piles rising up to 15m in height that may also provide screening.  Visibility of turbines is next to zero, with some likelihood of blade tip glimpses only.

Table 3 - Houses near and within investigation area: consideration of visual impact of proposal.

The visibility of the proposed project has been assessed by analysing the viewsheds of selected viewpoints, such as from important view corridors, scenic route sections or sensitive locations.

Recommendations to mitigate or ameliorate impacts are outlined in the conclusion to this report.

## 8 DISCUSSION OF LANDSCAPE AND VISUAL IMPACTS

The Kalgoorlie Plan has numerous high aesthetic value landscape features to be found north and west of the study area. These are mountains, natural landscape filled with native vegetation or waterforms of wide lakes and salt plains. Of the Kalgoorlie Plain landscape



features found within the study area, those identified have moderate significance. The uniformity of the landscape locally within the study area possess moderate to low levels of significance. Further, the impacts of mining have presented significant impacts to the natural environment and demonstrate quite visible levels of human intervention. The proposed development would introduce additional built features into the landscape.

Highest impact factors relate to the proximity to the development and the alteration of rural character within the viewshed of Great Eastern Highway. Traffic along this highway will see part of or the whole of the development. Reducing both visibility and impact factors are the scattered roadside vegetation, providing screening of the site, and the high transit speeds which serve to reducing the duration in which the proposal is in view.

The view from the Wimmera Hill lookout and from the Airport show higher levels of project visibility within the landscape than many other areas of scenic value within the study area.

These views are considered to be of moderate importance and the impact of the turbines on the predominantly rural landscape is considered to be low to moderate.

Within Southern Cross town centre itself, the city buildings themselves and the uniform nature of town centre facing the main shopping strip prevent unobstructed viewing the turbines from street level. Views of the turbines from the town centre would be occasional, with distant glimpses between buildings.

The identified visual character values of the study area is not high, given the weighting description in 'Reading the Remote'. There are no highly significant rural character aspects within the viewshed looking eastward, whereas to the west, outside of the study area, there are more significant views of landform and vegetation demonstrating significant aesthetic features of the Kalgoorlie Plain.

## 8.1 Mitigation Measures

It is noted the proponent has incorporated the following measures to mitigate visual impacts:

- 1) Exterior finishes to be matt in colour decreasing reflectivity or visibility.
- 2) Exterior finishes to be toned towards neutral colours reflective of the landscape colours through the seasons.
- 3) Adopted greater than required setbacks from residential dwellings to reduce the visual scale and dominance of the turbines relative to the nearest dwellings.
- 4) Increased separation distances between turbines to reduce visual overlap and clutter of turbines against the viewshed backdrop.
- 5) Adjusted turbine layouts for the northern grouping, to follow land contours and minimise linear 'row' or 'fence' aesthetic sightlines in the landscape as seen from Great Eastern Highway.

It is recommended that for House 1, an offer be made for landscaping within 100m of the house to form screening landscaping, if desired, within the first 2 years of the development.

## 9 CONCLUSION

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The wheatbelt and the Kalgoorlie Plain holds wide horizon views, and these wide views are common features through the region.

The potential visual impact of the development area to Southern Cross and the number of residents/visitors who will be able to see the proposal, is moderate to high. The somewhat lower value of landscape character values for the development site, given the study area's regional and local context, reduces the impact of the proposal to **Moderate**.

Due to the landscape and vegetation screening views of the turbines from roadsides, the distance of the turbines from the major viewpoints and the spacing between the turbines to be installed, the visual impact upon this landscape character is considered to be **Low**, apart from the Wimmera Hill and Southern Cross Airport views where the visual impact is **Low to Moderate**.

As such, further mitigation measures are not considered to be necessary past that which is provided for section 8.1 Mitigation Measures.

## 10 REFERENCES

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- Blackman Fabrications, 2022, 'About', About, <https://blackmanfabrications.com.au/about>.
- CALM, 1994, *Reading the Remote - Landscape Characters of Western Australia*, Government of Western Australia.
- Resoft, n.d., 'WindFarm' (Version 4) [Windows 10], ReSoft Ltd, London, SW13 0BE, United Kingdom.
- WAPC, 2007, *Visual landscape planning in Western Australia: a manual for evaluation, assessment, siting and design*, November 2007, Western Australian Planning Commission.
- 'Wheatbelt Region Parks and Reserves Management Plan', 2021, Department of Biodiversity, Conservation and Attractions, Retrieved from <https://www.dpaw.wa.gov.au/>



## **Annexure 6:**

# **Aboriginal Cultural Heritage**

## Appendix 4.

# Aboriginal Cultural Heritage Desktop Assessment of the Southern Cross Wind Farm Project

Prepared for Yilgarn Holdings Pty Ltd

By Aaron Rayner, Principal

A J Rayner Consulting, Aboriginal Heritage & Native Title

September 2023



## Disclaimers

The analysis and recommendations contained within this report are based on information made available at the time of its preparation. The author takes no responsibility for omissions and/or inconsistencies that may result from information becoming available after the report's completion.

This report offers independent heritage advice and recommendations to assist Yilgarn Holdings Pty Ltd and its partners. This advice is based on the author's own opinions, interpretations, knowledge, and experience of the Aboriginal regulatory heritage system in Western Australia and does not constitute legal advice. This advice is provided under the current statute that governs Aboriginal heritage protection – the *Aboriginal Heritage Act 1972*.

Any future compensation liabilities that may arise under the *Native Title Act 1993* do not form part of this advice.

## Author

Aaron Rayner conducted the research and analysis and prepared this report for Yilgarn Holdings Pty Ltd. Aaron is the former Chief Heritage Officer and Deputy Director General at the Department of Aboriginal Affairs in Western Australia. In these roles Aaron was responsible for managing the *Aboriginal Heritage Act 1972* and its regulations and for providing advice to executive government and industry proponents. For five years Aaron was a member of the Aboriginal Cultural Material Committee (ACMC) the statutory body that provides advice to the Minister for Aboriginal Affairs on all Aboriginal heritage matters. Aaron is a cultural anthropologist and has significant experience and expert understanding of the Aboriginal Heritage regulatory framework in WA and is routinely called upon to provide expert evidence in the National Native Title Tribunal.

## Glossary of Terms

ACMC	Aboriginal Cultural Material Committee
ACH Act	<i>Aboriginal Cultural Heritage Act 2021</i>
AH Act	<i>Aboriginal Heritage Act 1972</i>
DPLH	Department of Planning, Lands and Heritage
Minister	Minister for Aboriginal Affairs
NT Act	<i>Native Title Act 1993</i> (Cth.)
NNTT	National Native Title Tribunal
Register	Register of Aboriginal Sites
Registrar	Registrar of Aboriginal Sites
YHL	Yilgarn Holdings Pty Ltd

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## Assessment summary

Yilgarn Holdings Pty Ltd (**YHL**) has commissioned this Aboriginal cultural heritage desktop assessment to inform a feasibility study of a proposed wind farm development located approximately 13km southeast of the town of Southern Cross in the local government area of Yilgarn in Western Australia (**the Project**). The project is planned in four Lots: Lot 231, Lot 622, Lot 622, and Lot 640 (**Project Area**). The Lots are in the rural location of Ghooli situated south of the Great Eastern Highway. The areas of land have been heavily disturbed by decades of mining and intensive farming practices. There are no natural permanent or semi-permanent water sources evident in the landscape.

The project area is wholly within the Marlinyu Ghoorlie native title claim (*Brian Champion & Ors v State of WA* WC 2017/007). YHL does not have an Aboriginal heritage agreement with the Marlinyu Ghoorlie native title claimants that prescribe processes to comply with the *Aboriginal Heritage Act 1972* (**AH Act**).

In carrying out this desktop assessment a search of the Aboriginal Heritage Inquiry System (**AHIS**), the Register of Aboriginal Sites (**Register**) and National Native Title Tribunal (**NNTT**) databases were undertaken to establish if any Aboriginal heritage sites and heritage surveys have been recorded within the project area. The search found that Aboriginal heritage surveys were undertaken in some parts of the project area – see **Appendix 1**. 16 Aboriginal heritage survey reports relevant to the project area were considered as part of this assessment.

The heritage surveys were undertaken with different Aboriginal families with an interest in the area. The surveys were for mining and exploration activities around Marvel Loch and for road and telecommunications infrastructure along the Great Eastern Highway. An examination of the reports shows that large parts of the project area were inspected by the Aboriginal families during these different survey field trips. Several Aboriginal sites of significance were identified within approximately 20km of the project area by the Aboriginal people involved in the surveys, but no sites were identified within the project area – see **Appendix 2**.

Importantly, the Aboriginal people who participated in the heritage surveys advised that the sacred sites in the area are found in the outcropping granites and the lakes/claypans around the Southern Cross area and in two areas near Yellowdine, approximately 11km east of the project area. The identified Aboriginal sites are mostly related to specific Dreamtime stories that continue to feature in contemporary Aboriginal traditions.

The key finding of the historical survey reports is that significant parts of the project area have been surveyed for the presence of Aboriginal sites and none were identified within the project area. The remaining unsurveyed areas of land are mainly in areas that have been subject to intensive crop rotation and therefore the potential to identify unrecorded Aboriginal sites is extremely low. The sites identified in the previous heritage surveys are found where there is granite outcrop and claypans and lakes. The aerial imagery reviewed for this desktop assessment indicates that these topographical features are not present in the project area. If these topographical features do exist within the project area, then YHL should avoid these places as a precautionary measure until field-based can be facilitated.

## Recommendations

It is recommended that Yilgarn Holdings Pty Ltd:

- Note the findings of this desktop assessment.
- Note that there are no recorded Aboriginal sites within the project area, which is the subject of the feasibility study currently being undertaken.
- Note that a large portion of the project area has already been inspected for the presence of Aboriginal sites by Aboriginal people with a cultural interest in the area.
- Note that the potential for unrecorded sites being present in the remaining part of the project area is considered extremely low due to the historic land uses and lack of suitable lithic materials.



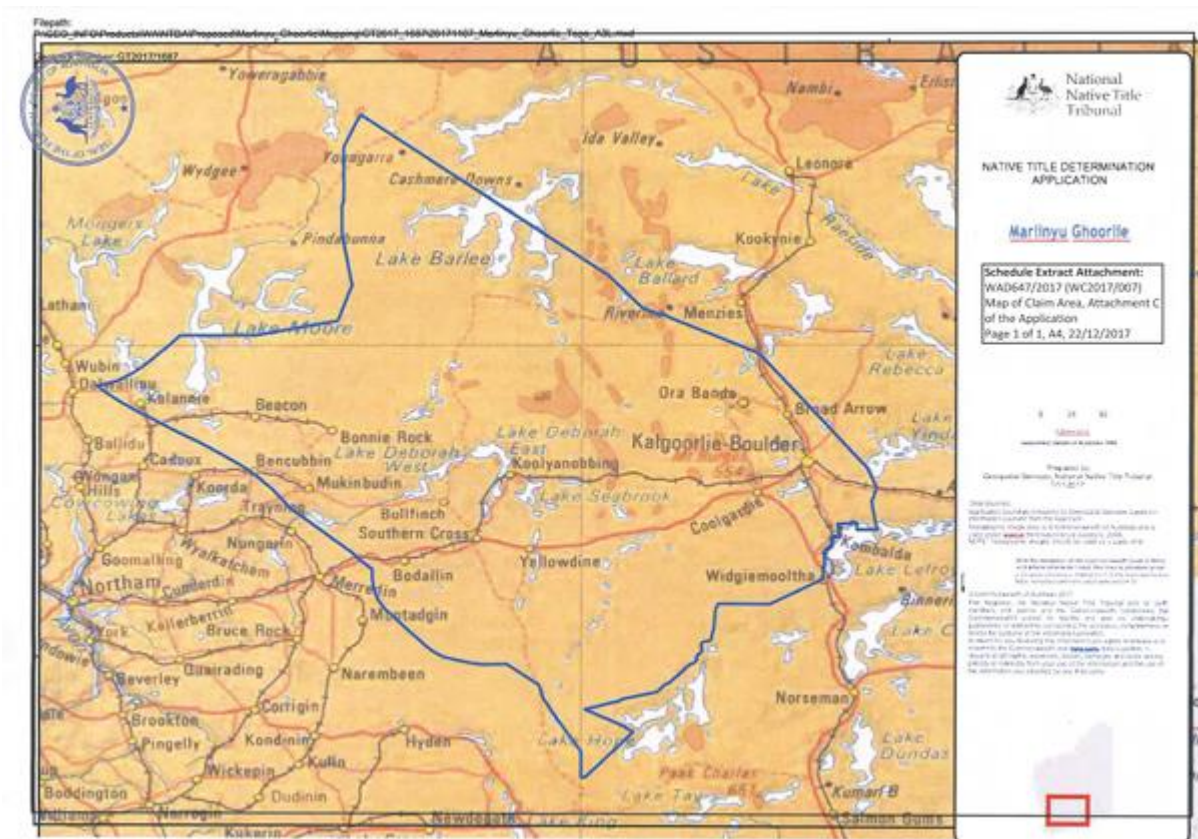
## Methodology

The methodology used to conduct this Aboriginal cultural heritage desktop assessment included:

- A search of the AHIS database to identify relevant historic site recordings and heritage survey reports within the project area and close to it;
- A search of the NNTT databases for section 29<sup>1</sup> decisions relevant to the tenement and native title determination materials;
- Retrieval, review and analysis of the relevant Aboriginal heritage survey reports and site file materials from the Department of Planning, Lands and Heritage (DPLH);
- Consideration of the historic land use and aerial imagery; and
- Preparation of this report and recommendations.

## Native Title

The project area is within the Marlinyu Ghoorlie native title claim area - see **Figure 1**.



**Figure 1. Marlinyu Ghoorlie Native Title Claim Area**

<sup>1</sup> Section 29 of the *Native Title Act 1993* (Cth.)

### *Marlinyu Ghoorlie People*

On 28 March 2019 the NNTT decided to accept the Marlinyu Ghoorlie claim be entered on the NNTT Register. This followed two previous decisions by the NNTT where the claim was rejected on procedural grounds.

The lead claimant is Brian Champion. Other applicants are Henry Richard Dimer, Maxine Dimer, James Champion, Raelene Peel, Darren Indich, Simon Champion, Tania Champion, Darryl Trott and Leechelle Hammat. The applicants are claiming native title rights for an area of some 95,024 square km that includes the City of Kaaloorlie and the Shires of Coolgardie, Dalwallinu, Dundas, Kondinin, Koorda, Menzies, Merredin, Mount Magnet Mount Marshall, Mukinbudin, Narembeen, Nungarin, Sandstone, Trayning, Westonia, Wongan-Ballidu and Yilgarn.

The native title rights and interests that the Marlinyu Ghoorlie People are seeking to have recognised by the Federal Court of Australia include the right to:

- a) Enter and remain on the land, camp, erect temporary shelters, and travel over and visit any part of the land and waters;
- b) Hunt, fish, gather or take and to use, share and exchange the resources of the land and waters such as food, water and medicinal plants and trees, timber, charcoal, ochre, stone and other traditional resources;
- c) Engage in ritual and ceremony on and in relation to the land and waters; and
- d) Care for, maintain and protect from physical harm particular objects, sites and areas of significance to the Marlinyu Ghoorlie people.

## **Ethnographic background**

### *Dreamtime*

The Dreaming is fundamental to an understanding of Aboriginal land use and land ownership. In the Dreaming, ancestral beings, in primordial travels, created the world from the formless void. These mythical beings made all creatures, the plants, the seas and the stars in the sky. They defined the moral and territorial division of the world. The sacred memorials: objects, stories and dance, the ritual paraphernalia and natural cathedrals continue as repositories and originators of sacred power.

Their divine power remains imminent in significant sites, animating living forms.

The model journeys of creation beings provided the moral basis of social institutions and the classification of the human and natural world. The guardianship of lifeforces or spiritual essence in spiritual places is the basis of the Aboriginal social construction of ownership. Land ownership is based on ritual ownership. Successive generations of Aboriginal people are linked to the Dreaming and to the eternal nature of the spiritual presence. Berndt (1988:140-01) comments on the Dreaming and the way it tied people to country, in Aboriginal society:

*There was a mythic patterning. Sites were linked one to another: mythic beings moved across wide stretches of country, so that local descent groups were mythically and ritually linked with one another, just as their personnel were interconnected genealogically. At the same time, each local descent group was conceptually a sperate land holding unit.*



### *Regional mythology*

In the Coolgardie, Southern Cross, Kalgoorlie region there are four mythic epics celebrated in song and story:

1. The *Yina Kutjara*, two mythic human ancestors who brought law and religion to the region and travelled from Southern Cross region through Ora Band, Broad Arrow and Menzies towards Lake Carey
2. The *Tjilkamarta* or echidna ancestor, a topography-creating being who travelled through Kalgoorlie to a final resting place near Goongarrie
3. The *Nganamarra* or mallee fowl ancestor, another topography-creating being who appears to have circled the region
4. The *Kungarangkara* or Pleiades, who created sacred areas of specific significance to women.

## **Regulatory Framework**

### *State Aboriginal heritage legislation*

In December 2021 the ACH Act was passed by the Western Australia Parliament. The ACH Act came into effect on 1 July 2023, but the government has subsequently announced that it would repeal the new legislation and replace it with an amended version of the AH Act 1972. A Bill is being debated in the WA Parliament and the new laws are expected to go live before the end of 2023.

The AH Act protects all Aboriginal heritage sites of significance whether the sites are registered or not, and whether they are known or unknown. Section 5 defines the places the Act protects. The legislative regime is expansive as it protects both cultural material places and sacred sites of importance and significance to Aboriginal people.

*Section 5* of the AH Act applies to:

- (a) Any place of importance and significance where persons of Aboriginal descent have, or appeared to have, left any object, natural or artificial, used for, or made or adapted for use for, any purpose connected with traditional cultural life of the Aboriginal people, past or present;
- (b) Any sacred, ritual or ceremonial site, which is of importance and special significance to persons of Aboriginal descent;
- (c) Any place which, in the opinion of the Committee, is or was associated with the Aboriginal people and which is of historical, anthropological, archaeological or ethnographical interest and should be preserved because of its importance and significance to the cultural heritage of the State; and
- (d) Any place where objects to which this Act applies are traditionally stored, or to which, under the provisions of this Act, such objects have been taken or remove.

*Section 6* of the AH Act protects Aboriginal objects.

Section 17 of the AH Act provides that it is a criminal offence to excavate, destroy, damage, conceal or in any way alter any Aboriginal site. Penalties include fines up to \$100,000 and or 2 years imprisonment for a breach of section 17.

Section 18 of the AH Act provides the only means whereby a landowner can use land where an Aboriginal site might exist, and where a site can be altered or damaged in any way without the activity being an offence.

Section 28 establishes the ACMC as an advisory body to the Minister for Aboriginal Affairs.

Section 38 provides for a Register of Aboriginal Places and Objects.

Section 39 prescribes the functions of the ACMC to evaluate on behalf of the community the importance of places and objects alleged to be associated with Aboriginal persons and to recommend to the Minister places and objects which, in the opinion of the ACMC, are, or have been, of special significance to persons of Aboriginal descent and should preserved. Associated sacred beliefs, and ritual or ceremonial usage, in so far as such matters can be ascertained, are regarded as the primary considerations to be considered in the evaluation of any place or objects for the purposes of this Act.

Section 62 provides that it is a defense if the charged person did not know and could not reasonably be expected to have known, that the place or object to which the charge relates was a place or object to which the Act applies.

#### *State Aboriginal heritage guidance*

The State's Cultural Heritage Due Diligence Guidelines contain a Risk Matrix designed to assist land users determine risk of damage to an Aboriginal heritage site and appropriate course of action to mitigate that risk and comply with the AH Act – see **Figure 2**. The State encourages land users to determine risk of damage to Aboriginal heritage sites by using the Guidelines and take appropriate action to obtain further information where appropriate.

The construction of a wind farm with its associated infrastructure is considered a **significant** disturbance. The project area is properly described as a **significantly altered environment** and according to the Guidance there is a **medium** risk to Aboriginal heritage. In the context of the proposed development footprint, the risk to Aboriginal heritage is considered **low**. It is advised that this risk is best managed by applying the precautionary principle and consultation with the native title claimants is a risk management strategy worth adopting prior to construction.



**Figure 2.****SCHEDULE 2 – THE ABORIGINAL HERITAGE RISK MATRIX**

Previous Land Use	LAND ACTIVITIES – CATEGORIES 1-5					
		1. Negligible disturbance	2. Minimal disturbance	3. Moderate disturbance	4. Significant disturbance	5. Major disturbance
	Built Environment - e.g. urban environment, towns, metropolitan region.	Low	Low	Low	Low	Medium
	Significantly Altered Environment - e.g. cultivated and cleared land.	Low	Low	Low	Medium	High
	Moderately Altered Environment - e.g. partially cleared lands, re-vegetated landscape.	Low	Low	Medium	Medium	High
	Minimally Altered Environment - e.g. urban bush land, regrowth areas	Low	Medium	Medium	High	High
	Unaltered Environment - e.g. protected areas or pristine environment.	Low	Medium	High	High	High
Risk Assessment		Actions				
Low Risk (Review)		Review the landscape and proposed activity (see sections 2.4 - 2.8 - assessing the landscape and the activity). Refer to the AHIS.				
Medium Risk (Review /Exercise Caution)		Review the landscape and proposed activity (as above). The precautionary principle (see page 2) applies. Refer to the AHIS and contact the DAA. A range of actions may be recommended, including: no action, consultation with the relevant Aboriginal people, an Aboriginal heritage survey or modification of the proposed activity to avoid or minimise site impact.				
High Risk (Consult / Survey / Approvals)		Refer to the AHIS. Consult with the DAA and the relevant Aboriginal people. Dependent on consultation outcomes you may need to include: an Aboriginal heritage survey, modification of the proposed activity to avoid or minimise (see sections 2.24 - 2.28) impact to the site and/or other heritage management strategies. The land user may also need to apply for approval or consent (see section 2.26) to the activity.				
For major development projects refer to sections 2.10 - 2.12 for further advice.						

*Register of Sites*

The State categorises Aboriginal heritage sites into two categories; *Registered sites* and *Other Heritage Places*. Registered sites have been assessed by the Aboriginal Cultural Material Committee (**ACMC**) as meeting the threshold tests for registration under section 5 of the AH Act. 'Other Heritage Places' have either been assessed as not meeting the threshold test to be entered in the Register (*not a site*), or that the site is awaiting a formal assessment by the ACMC (*lodged*).

While the State's Register of Sites is mandated under section 28 of the AH Act, it does not represent a complete list of Aboriginal sites in WA. Because of this, the AH Act protects all Aboriginal sites whether they have been registered or not and whether they are known or unknown.

A search of the AHIS found no Aboriginal sites recorded in the project area – see **Appendix 1 and 2**. The search listed several sites within a 20km radius of the area. Details of these sites are in Table 1 below.

**Table 1.**

Site ID	Site Name	Type
4783	Daladgin Rock <i>Registered</i>	Granite dome with gnamma hole
4430	Marvel Loch 1 <i>Registered</i>	Artefact scatter (unremarkable)
4431	Marvel Loch 2 <i>Registered</i>	Artefact Scatter (unremarkable)
4937	Nevria Mine <i>Registered</i>	Manmade structure – stone arrangement
20843	SX14 <i>OHP</i>	Natural feature: large low outcrop of granite
20842	SX13 <i>OHP</i>	Twin Rock Domes. Site extends for some 200m
20841	SX12 <i>OHP</i>	Low granite outcrop
20844	SX15 <i>OHP</i>	Claypan
20845	SX16 <i>OHP</i>	Claypan
22815	SX06 <i>OHP</i>	Artefacts
19588	SX01b <i>OHP</i>	Rockhole
21814	Isolated artefacts <i>OHP</i>	Artefact scatter
38837	MRL-HR-03 <i>OHP</i>	Painting, Rock-shelter

The 16 heritage survey reports that intersect with the project area and that were reviewed for this assessment are listed in Table 2.

**Table 2.**

Report Title	Author & Year	Type
Final report on numerous cultural heritage surveys between Kalgoorlie and Perth to clear a route for fibre optic cable installation	E. Webb 2002	Archaeological
Report on an archaeological survey of the Nevoria, Burbidge, Cornishman, Polaris project areas – Marvel Loch to Southern Cross	T. O'Reilly 2002	Archaeological
Reports on an archaeological survey of the Greenmount, Redwing and Starfish project area, Southern Cross/Marvel Loch	T. O'Reilly 2002	Archaeological
Anthropological survey for Aboriginal sites for Sons of Gwalia tenement holdings between Marvel Loch and Southern Cross	B. Machin <i>Undated</i>	Ethnographic



Report of an archaeological and ethnographic survey of the Lenneberg and Polaris tenement, Southern Cross	P. Veth & P. Thorley 1990	Archaeological & Ethnographic
Site avoidance survey under the Aboriginal Heritage Act 1972 of the 184 KM of highway between Southern Cross and Coolgardie in the Yilgarn & Goldfields regions of WA – Volume 1	S. Parker 2001	Ethnographic
Site avoidance survey under the Aboriginal Heritage Act 1972 of the 184 KM of highway between Southern Cross and Coolgardie in the Yilgarn & Goldfields regions of WA – Volume 1	S. Parker 2001	Archaeological
Site avoidance survey under the Aboriginal Heritage Act 1972 of tenements in the Southern Cross and Marvel Loch areas of the Yilgarn region of WA – Volume 2	S. Parker 2002	Ethnographic
Site avoidance survey under the Aboriginal Heritage Act 1972 of tenements in the Southern Cross and Marvel Loch areas of the Yilgarn region of WA – Volume 2	S. Parker 2002	Archaeological
Site avoidance survey under the Aboriginal Heritage Act 1972 of the 184 KM of highway between Southern Cross and Coolgardie in the Yilgarn & Goldfields regions of WA – Volume 2	S. Parker 2002	Ethnographic
Site avoidance survey under the Aboriginal Heritage Act 1972 of the 184 KM of highway between Southern Cross and Coolgardie in the Yilgarn & Goldfields regions of WA – Volume 2	S. Parker 2002	Archaeological
Site avoidance survey under the Aboriginal Heritage Act 1972 of the 184 KM of highway between Southern Cross and Coolgardie in the Yilgarn & Goldfields regions of WA – Volume 3	S. Parker 2002	Archaeological & Ethnographic
Site avoidance survey under the Aboriginal Heritage Act 1972 of the 184 KM of highway between Southern Cross and Coolgardie in the Yilgarn & Goldfields regions of WA – Volume 3	S. Parker 2002	Archaeological & Ethnographic
Site avoidance survey under the Aboriginal Heritage Act 1972 of the 184 KM of highway between Southern Cross and Coolgardie in	S. Parker 2002	Ethnographic

the Yilgarn & Goldfields regions of WA – Volume 4		
Ethnographic site avoidance survey under the Aboriginal Heritage Act 1972 of mining and exploration projects in the Southern Cross area of WA	R. Parker 2002	Ethnographic
Report of an ethnographic survey Southern Cross to Ghooli	L. Huxtable 2019	Archaeological & Ethnographic

## Section 29 decisions

Decision are made under section 29 of the *Native Title Act 1993* to grant or not grant a mining title using the State Government's expedited procedure process. When an entity applies for a mining title the State Government always assert the title (licence) should be granted using the expedited procedure. Native title groups can object to the use of the expedited procedure on the grounds that there are important heritage sites in the area of the mining title. The native title group is then required to put on evidence to substantiate the presence of important cultural heritage.

This process played out recently for an area of land within the project area – tenement E77/2806. In August 2021, the Marlinyi Ghoorlie's legal representative was notified that this exploration licence application was being considered under the expedited procedure and the group was invited to object on the grounds that important cultural heritage sites could be present. The group and their lawyer were given four months to lodge an objection. They did not object and the exploration licence was granted to Kula Gold Ltd on 19 July 2022. It is reasonable to infer that they did not object to the grant of the exploration licence because there are no sites in the area of the exploration tenement land.

## Assessment

The AH Act does not mandate that land users consult with Aboriginal people prior to commencing ground disturbing activities. By operation of section 17 the AH Act makes it an offence to impact an Aboriginal site without the written consent of the Minister of Aboriginal Affairs under section 18.

The region where the project area is located is underlain by the Yilgarn Craton, a vast expanse of deeply weathered shield rocks: mineral-rich granites and gneisses with intrusive greenstone belts, of Archean age (>2500M years old); overlain by unconsolidated weathering products, mainly of Cainozoic age (<60M years old) (Myers and Hocking 1988). The antiquity of this landscape explains the lack of topographic relief, the disorganised drainage patterns and the poverty of soils (Beard 1990). It also helps to explain the distribution of archaeological sites in this region. Aboriginal people living in and around the Southern Cross area in the distant past are most likely to have left traces of their presence that can be recognised now at places where they camped for lengthy periods, usually close to reasonably reliable and relatively



durable supplies of fresh water, or at outcrops of flakeable rock, which they quarried to make artefacts.

The main factor limiting Aboriginal numbers and movements on the Yilgarn Craton would have been the scarcity of potable water, except after rain. Most of the 'rivers' east of Merrdein only flow after heavy rain, while precipitation that collects in claypans rapidly evaporates, becomes stagnant or turns saline. Rainwater collects in holes in impermeable rock (gnamma holes).

The survey reports reviewed for this assessment consistently noted Aboriginal people commenting that the land between Kalgoorlie and Southern Cross and beyond would never have been occupied intensively by their ancestors due to the lack of potable water and paucity of easily exploited outcrops of suitable flakeable stone (Webb 2002). Furthermore, the unconsolidated sediments that blanket the surface of the Yilgarn Craton restrict the likelihood of finding other traces of past human usage of the area, apart from the occasional stone artefact discarded on the surface. There are few rock shelters or other protected environments in which cultural material might be preserved for millennia.

The findings of numerous heritage surveys conducted throughout the area found that important and significant Aboriginal sites were limited to those areas where granite outcrop and claypans were present. The granite outcrop hosts gnamma holes and rock holes where water is stored. Some granite formations were also found to be places of ethnographic significance related to Dreamtime events. For instance, R. Parker (2002) describes site ID 20843 (SX14) as where one of the spiritual ancestors created a site during a violent encounter. The site now forms part of contemporary Aboriginal custom and tradition and is especially important to initiated Aboriginal men in the region.

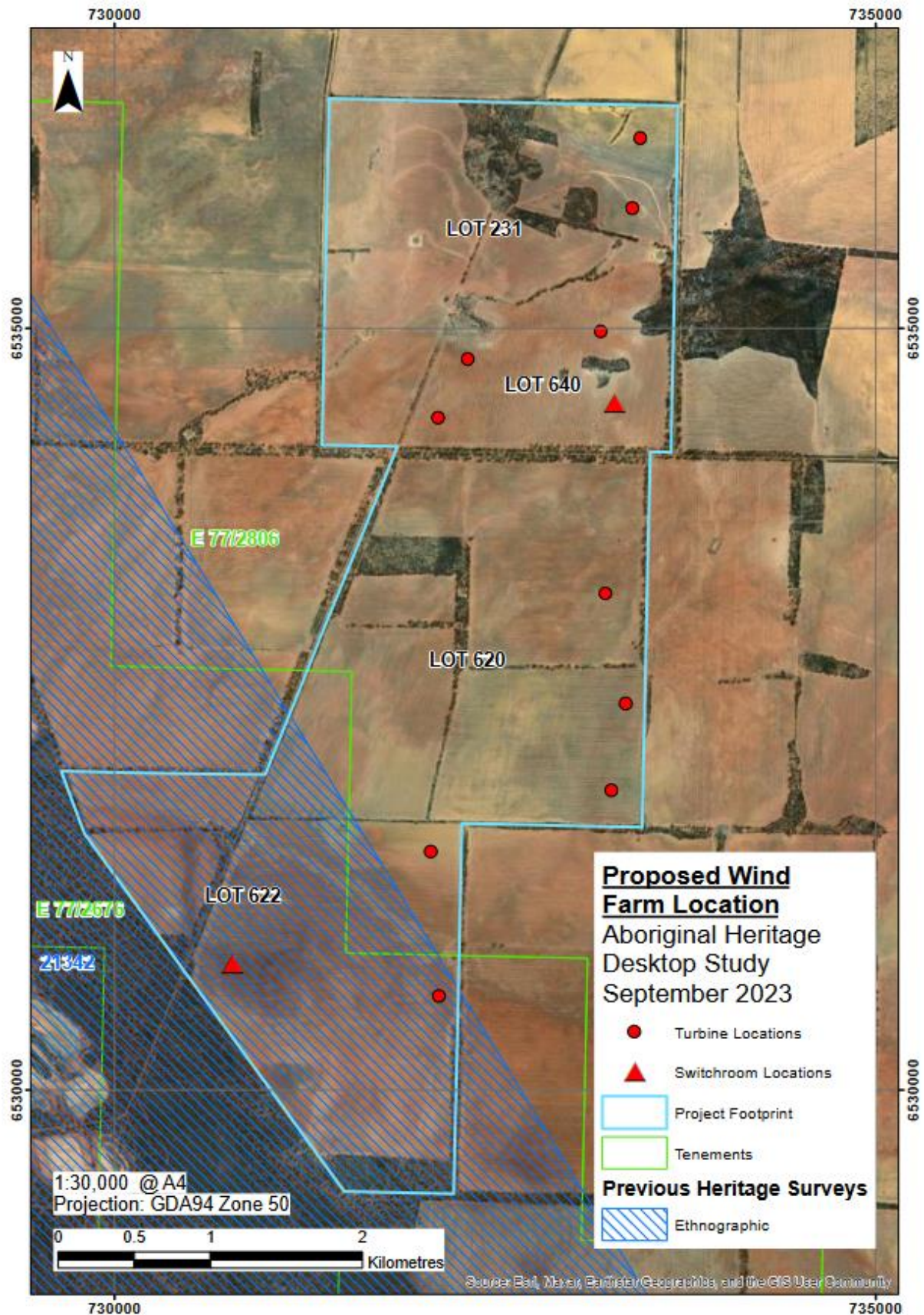
YHL can be confident that the previous heritage surveys have identified all the ethnographic sites in and around the project area that are important in Aboriginal custom and tradition. The geological and environmental conditions when coupled with the recent mining, exploration, and intensive farming land use activities over large parts of the project area mean that the potential for identifying unrecorded Aboriginal sites is extremely low.

## Recommendations

It is recommended that Yilgarn Holdings Pty Ltd:

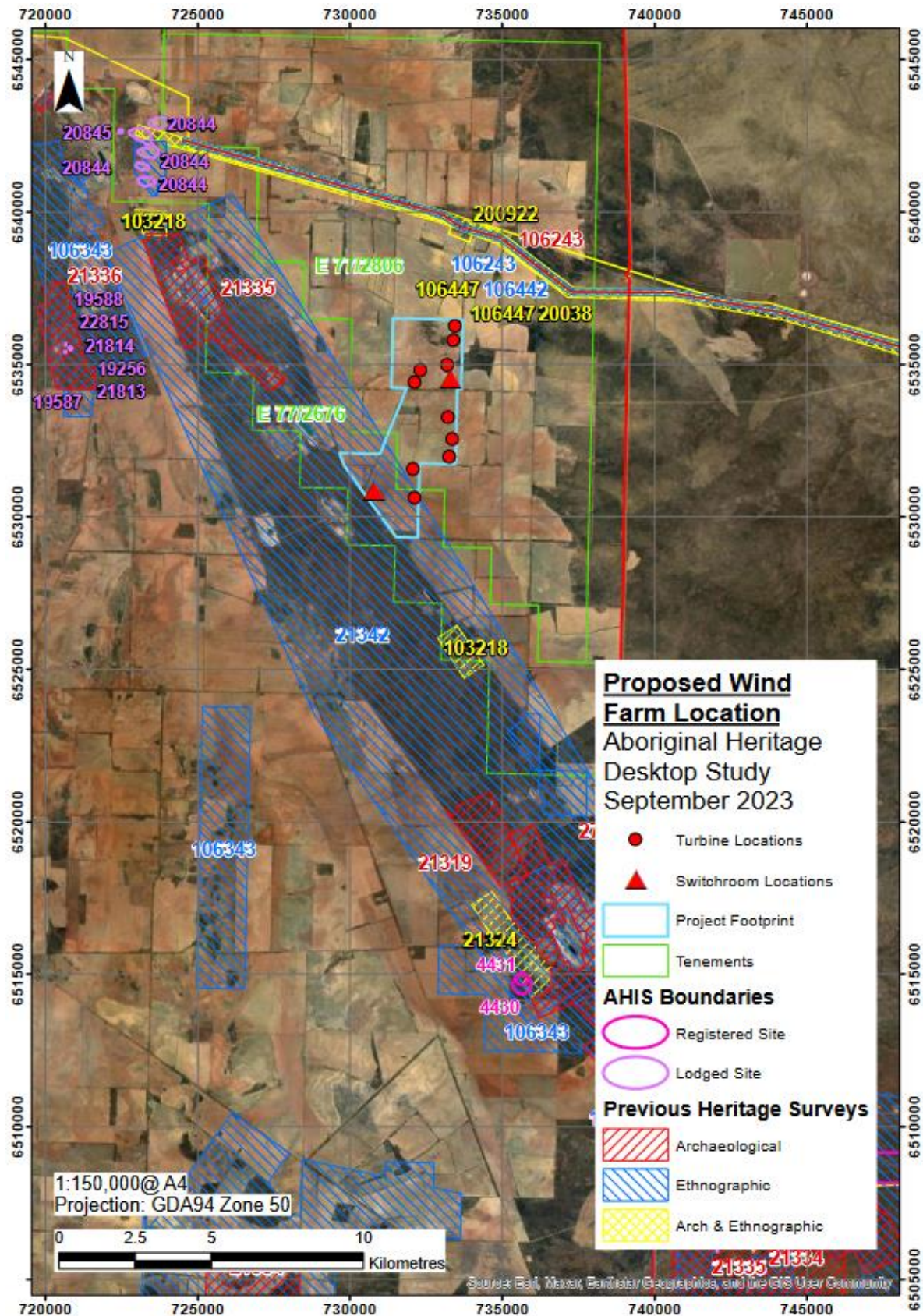
- Note the findings of this desktop assessment.
- Note that there are no recorded Aboriginal sites within the project area, which is the subject of the feasibility study currently being undertaken.
- Note that a large portion of the project area has already been inspected for the presence of Aboriginal sites by Aboriginal people with a cultural interest in the area.
- Note that the potential for unrecorded sites being present in the remaining part of the project area is considered extremely low due to the historic land uses and lack of suitable lithic materials.

## Appendix 1. Aboriginal Heritage Surveys for Project Area





## Appendix 2. Aboriginal Heritage Sites Near Project Area



# **Annexure 7:**

## **Western Heritage Assessment**



# Southern Cross Wind Farm

## Western Heritage Assessment

### For Yilgarn Holdings Pty Ltd

## Technical Report 2

By Thomas Sounness BSc GDipPD

Version : Final

February 2023

Author	Date	Version	Comments
T Sounness	12 Feb 2023	1.1	Draft
T Sounness	24 March 2023	1.2	Second Draft
T Sounness	28 March 2023	Final	Final

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## Introduction

This Western Heritage Assessment has been prepared for Yilgarn Holdings Pty Ltd to support the proposed development of a wind energy facility within the Shire of Yilgarn, in Western Australia.

The proponents have provided an Investigation Area within which a renewable energy project is being proposed. The site is east of Perth and west of Kalgoorlie, as shown in Figure 1.

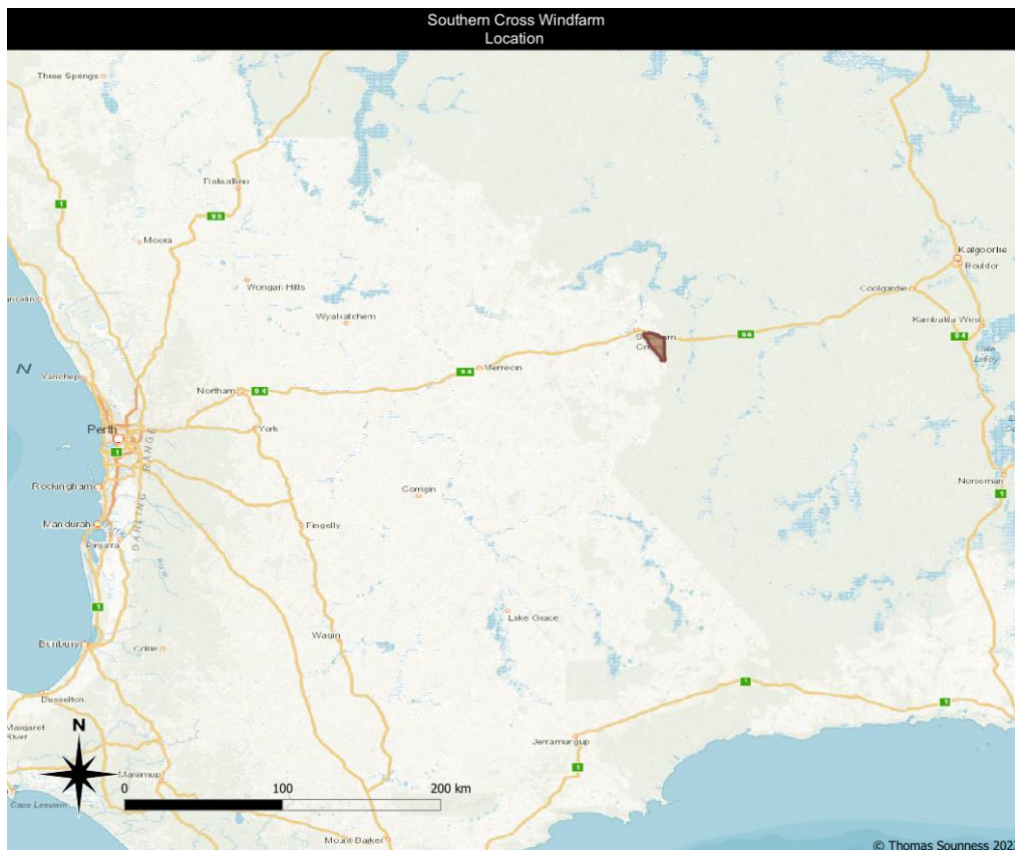


FIGURE 1 - LOCATION PLAN

The proposed development is located to the south east of the Southern Cross townsite between 8 and 15 km from the town and more than 2 km from the Southern Cross townsite boundary.

The Investigation Area subject to this heritage assessment is shown in Figure 2.

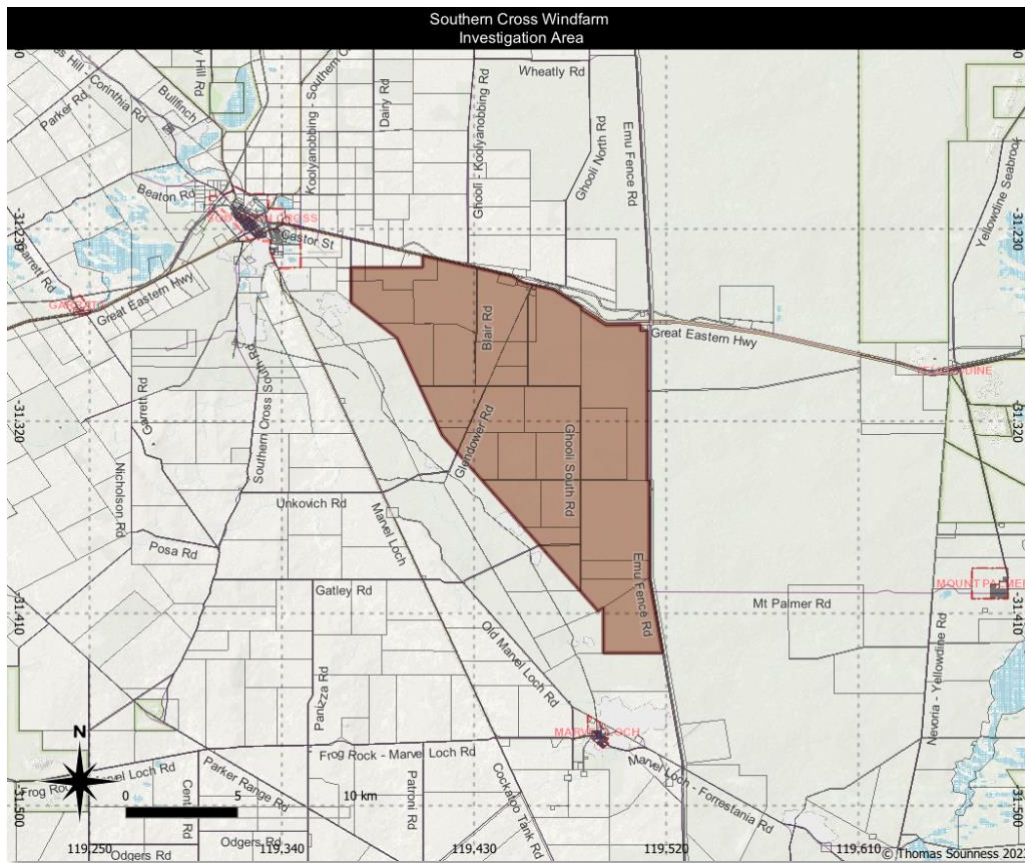


FIGURE 2 - INVESTIGATION AREA

## Proposal

The proposal is for the development of a wind energy facility comprising approximately 10 wind turbines on land currently being used for rural purposes.

The final make and model of turbine, the height of tower and number of turbines is yet to be finalised by the proponent and is expected to be determined following approval of the project. The reference turbine used in this assessment is a horizontal axis three bladed turbine, with a hub height of 150 m above ground level, and a rotor diameter up to 165 m.

The proposal would also consist of additional infrastructure, including underground and above ground cabling, access roads, hardstand areas for cranes and communications equipment.

## Access

Access to the site by equipment during Project construction will be via Great Eastern Highway. Access will be from Great Eastern Highway right onto Ghooli South Road, then via Glendower Road. Roads may be upgraded to accommodate the weight of turbines, electrical equipment, and cranes to perform the installation.



While there would be variability with the project in terms of foundation placement and turbine micro-siting, the overall size and space occupied by the project within the Investigation Area remains relatively unchanged.

## Study Area

The assessment Study Area includes up to 10 km outside of the Investigation Area. Refer Figure 3.

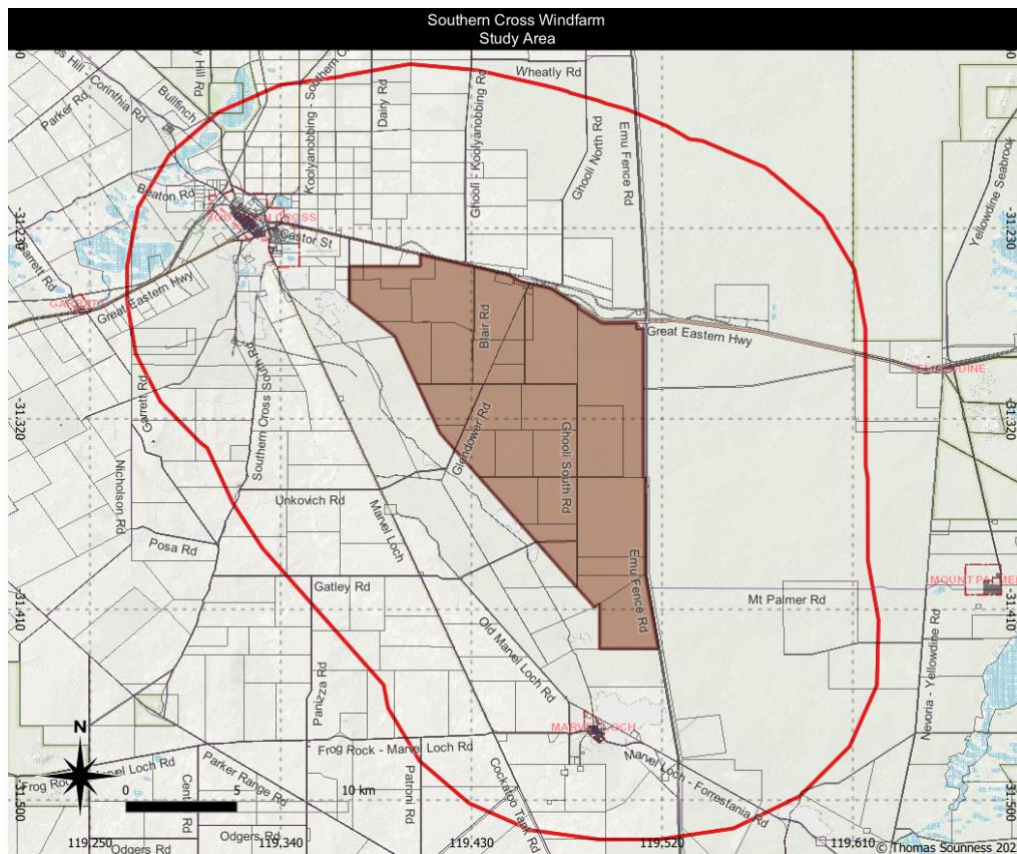


FIGURE 3 - STUDY AREA

This report will assess western heritage sites within and immediately adjacent to the Study Area and consider potential impacts of the proposal on these sites. Some Heritage items of national significance within 100 km of the site will also be mentioned for completeness.

## Methodology

The assessment was undertaken using relevant online tools to identify any western heritage features on or near the proposed development area and included a site visit. A list of heritage sites was prepared as an appendix to this report and an analysis conducted on sites that are contained within the Study Area.

Should new sites be found within the Study Area or in close to it, a further assessment may be undertaken.

## Heritage Frameworks

The National Heritage register is managed by the Department of Climate Change, Energy, the Environment and Water and can be accessed through the Protected Matters Search Tool.

State Heritage is generally addressed by the Heritage Council of Western Australia, a statutorily independent entity associated with the Department of Planning, Lands and Heritage. (*Heritage Council WA - State Register (DPLH-006)* 2019). A list of recognised Heritage Council sites is accessible via the online *InHerit* database tool.

Local Heritage Survey is now administered at the State level. This incorporates the Shire of Yilgarn Municipal Heritage Register. While this register has limited statutory weight, it supports the creation of a list identifying places that can be protected under a local planning scheme (WAPC 2007). This register is also able to be accessed by the State Heritage Register via the online *InHerit* database tool.

## Local Context – Southern Cross and Surrounds

The Study Area for this assessment encompasses a 10 km distance beyond the Project Investigation Area. The Study Area contains the townsite of Southern Cross and Marvel Loch where the majority of the land is used for either agricultural or mining/mining services. A significant proportion of the land is also set aside as undisturbed native vegetation with state oversight. Refer Figure 3

The Shire of Yilgarn is one of several local districts that have a combination of open wheatbelt agriculture land on one side, and a transition of striking, then undulating landforms heading towards the flat lands of the goldfields.

Native forests are low and scrub like. Outcrops of rock and barren sheet land have provided rich mineral resources.

To the north is a major highway, the Great Eastern Highway which runs between Perth and the cities of Kalgoorlie-Boulder. To the south and west of the Study Area is a large tract of land where a number of gold mines have operated or continue to operate. To the east is relatively undisturbed native vegetation, much of which, is recognised with state parks status or heritage protection.

Southern Cross has a number of buildings reflective of Western Australia mining heritage, demonstrating many architectural and structural elements that were prominent at that time.

## Identification of Heritage Matters

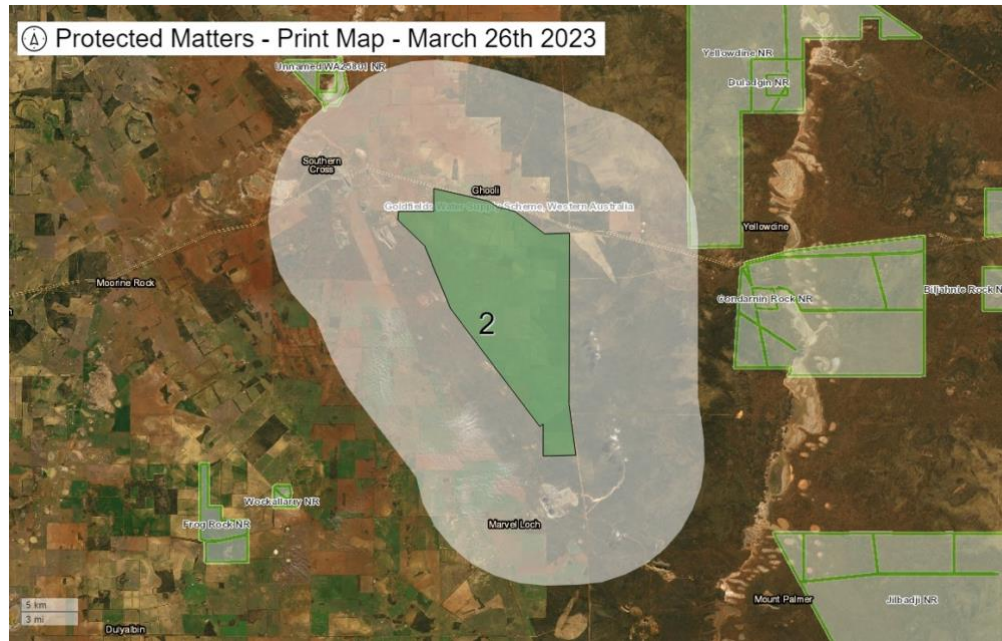
The Department of Climate Change, Energy, the Environment and Water has developed a Protected Matters investigation tool which extracts items of protection under the Environmental Protection and Biodiversity Conservation act 1999, which includes heritage matters. The tool reveals one item within the Study Area that traverses the Study Area, and two items that encroach the Study Area. These include:



- 1) Goldfields Water Supply Scheme (travelling along Great Eastern highway)
- 2) Yellowdine Nature Reserve
- 3) Unnamed WA item WA25801 Nature Reserve.

The first item, the Goldfields Water Supply Scheme, will be discussed in more detail below.

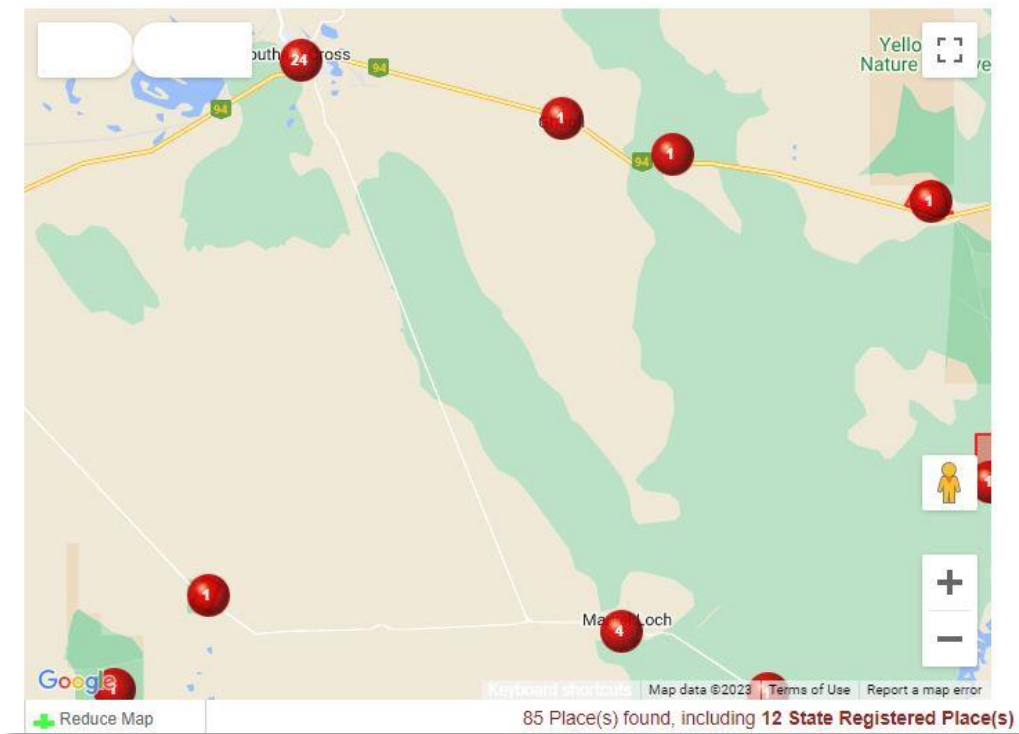
The second and third items are nature reserves which have minor encroachments on the periphery of the Study Area. Refer to Figure 4.



**FIGURE 4 - PROTECTED HERITAGE MATTERS UNDER THE ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999.**

The Western Australian Governments Heritage Council has developed a comprehensive register of State heritage values. The Heritage Council's *InHerit* database was used to create a list of heritage places of interest in the Shire of Yilgarn. A total of 113 places were found, including 12 state registered places. A screen capture from the website is shown below as Diagram 1. (Heritage Council of Western Australia n.d.)

The types of places registered range from wells to buildings to mines and ovens. The highest level of record are the items listed permanently in the National Estate.



**DIAGRAM 1 – INHERIT REPORT OF HERITAGE PLACES IDENTIFIED CLOSE TO AND SURROUNDING THE INVESTIGATION AREA NORTH OF MARVEL LOCH AND SOUTH-EAST OF SOUTHERN CROSS TOWNSITES. (SOURCE – INHERIT FROM HERITAGE COUNCIL OF WESTERN AUSTRALIA.)**

A more detailed map has been generated and identifies heritage sites within the Study Area, but outside of the Investigation Area. Refer to Figure 5. Brown coloured polygons outside the Investigation Area are places containing State Heritage values, whereas green polygons indicate items listed in the Municipal Heritage Inventory of the Shire of Yilgarn and are of lesser significance.



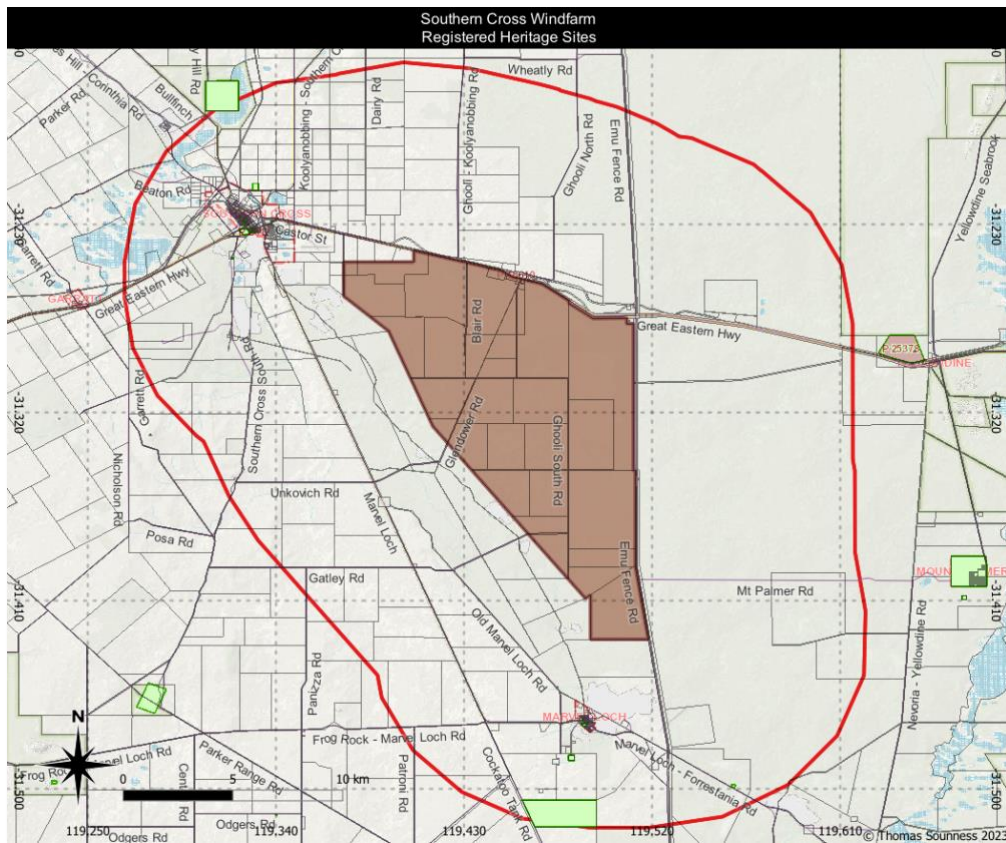


FIGURE 5 - REGISTERED HERITAGE SITES

BROWN – NATIONAL LISTING | PURPLE: STATE LISTING | GREEN: FORMER MUNICIPAL INVENTORY

## Heritage Assessment

### National Heritage Records

Further to the Protected Matters Tool in Figure 4, the identified places were assessed using the Australian Heritage Database. (Department of Climate Change, Energy, the Environment and Water n.d.) One listed place was identified, alongside one nominated place and three registered places within or close to the Study Area but outside the Investigation Area.

- Listed Place No 1: Goldfields Water Supply Scheme

The Australian Heritage Database listed the *Goldfields Water Supply Scheme*, running from Mundaring to Kalgoorlie, WA. Which runs to the north of the Study Area. The site reflects the significance of the pipeline of freshwater commissioned in 1896, completed in 1903 and remains in use today.

Pumping stations were placed along the pipeline to enable the water to be pumped from Mundaring Weir to the Eastern Goldfields towns of Kalgoorlie and Coolgardie. Ghooli contains the remains of a pumping station, and the existing pipeline is to the north of the Study Area running parallel to the Great Eastern Highway. This place passes along the north of the Investigation area, to the north of the Great Eastern Highway.

*Comment:* The pipeline runs north of Great Eastern Highway and the Investigation Area. The pipeline extends past towns and settlements between its origin at Mundaring Weir to its destination at Kalgoorlie.

The pipeline is a feature of the road's passage and the place of the pipeline alongside the north of the highway is not impacted by the development of wind turbines to the south. The character of the pipeline is one of an engineering feat connecting water to an inland site. The values are of the pipeline extending through roadside and settlements to reach its destination. The impact of the Project is assessed as negligible as the wind turbines are not associated with the water scheme, are proposed to be some kilometres from the pipeline, and are not visually connecting with each other being entirely different engineering structures performing different utility roles.

*Conclusion :* the impact of the proposed development upon the heritage values of the pipeline would be negligible. The Goldfields Water Supply Scheme Water Pipeline is not physically being impacted by the development and the development is different in character, type, engineering, and form from the pipeline.

- Registered Place No 1: Lisignolis Store – ID 9915

The *Lisignolis Store* (former) located at 10 Andres Street, Southern Cross, is a historical registered building showing a bullnose veranda and balcony decorated with iron lace, rare in this region. This place was registered in 1978. This place is over 5 km from the Investigation Area.

*Comment:* The store is remote from the site, with buildings, vegetation, and landform screening one from the other. The store will not have views of the proposed development, nor will the store be impacted by the development being within view of the store.

*Conclusion:* There is no identifiable impact to the store's heritage values from the proposed development.

- Registered Place No 2: No 6 Steam Pumping Station - ID 9914

The *No 6 Steam Pumping Station*, Great Eastern Highway, Ghooli, is a virtually original condition brick building containing boilers and machinery which is understood to be a unique example of a Goldfields water supply scheme pumping station. It is located in the former townsite of Ghooli along the Great Eastern Highway. It is located outside and to the north of the Investigation Area adjacent to the current water pipeline route. The place was registered in 1977. This site is located close to the Investigation Area Northern Boundary within the Study Area and contains the former settlement as well as the pumphouse.

*Comment:* This building is relatively close to the northern boundary of the Investigation Area, but some distance from wind farm equipment. The impacts of



the development on this building relate to visibility of structures. Refer to Appendix 3 - Visual Impact Assessment.

The development of wind turbines would not materially impact the historical elements that are preserved on this site. Both the steam pumping station and the turbines are engineering developments and have related characteristics of industry and engineering fabrication, but are entirely different in technology and function.

*Conclusion:* the proposed development would not impact the heritage values of this place.

- Registered Place No 3: Yellowdine Proposed Reserve – ID 9917

The *Yellowdine Proposed Reserve*, is located approximately 30 km east of Southern Cross. The reserve contains biogeographically significant flora and fauna representing transitions between two distinct botanical provinces. The place has about 5000 ha of land and was registered in 1978.

*Comment:* The *Yellowdine Proposed Reserve* marginally encroaches the east boundary of the Study Area. The impact of the Project is turbines may be seen from within the nature reserve. However, this is highly unlikely given the vegetation screening and distance between wind farm equipment and reserve. Further, there were no identified locations of significance, such as a formal entranceway or park information stop, where visitors to the Yellowdine Nature Reserve would place themselves, which would be impacted by the proposed development.

*Conclusion:* heritage impacts of the development on the character of the Yellowdine Nature Reserve are unlikely.

## State Heritage

The *InHerit* database shows 116 places found of which 15 are state registered places. The majority are in the townsites of Southern Cross, Marvel Loch, Bullfinch and Moorine Rock.

Of those State Heritage places, a number are in close proximity to the Study Area, including:

- *No 6 Steam Pumping Station* - Ghooli (Place No 2789), In addition to being listed as of National Heritage, this place is also listed as being of state significance for similar reasons . This site is within 150 m of the Investigation Area Northern most boundary and within the Study area.
- *Bronti Tank* - Emu Fence Road, Ghooli (Place No 10869). This listing has limited information associated with it. Listed values being related to the Goldfields Water Supply Scheme. The tank is located approximately 350 m north of the Great Eastern Highway and is within the Study area.
- *Second Pumping Station* - Ghooli (Place No 8196), is listed as a Historic Site under 'other listings'. It is unclear where this site is exactly in relation to the Investigation Area and is presumed to be in close proximity to the former Ghooli settlement which is outside the Investigation Area.

## Southern Cross Townsite

Of the places listed in Southern Cross, there are three which have heritage values related to their landscape value and or, natural values, such as being a water source. They are:

- Wimmera Hill Lookout – Heritage Place No. 10070 (From Municipal Inventory)
- Koorkoordine Soak (Well) No 14 – Heritage Place No 10074 (From Municipal Inventory)
- New Zealand Gully Dam – Heritage Place 2790 (From Municipal Inventory)

The balance of sites are within the townsite, reflecting dwellings, mansions or commercial buildings. None are in close proximity to the Investigation Area.

## Marvel Loch Townsite

Of those places listed in and around Marvel Loch, there are none that are in close proximity to the Investigation Area.

Of those in the Study Area the following are of a form or type that have landscape or natural values a feature of it's heritage character.

- Marvel Loch Dam - Place No 10064 (from Municipal Inventory)
- Marvel Loch Cemetery - Heritage Place 10031 (from Municipal Inventory)
- Marvel Loch School - Heritage Place 10032 (from State Register and Municipal Inventory)
- Cockatoo Tank - Heritage Place 10056 (from Municipal Inventory)

## Discussion

The heritage values within the Study Area are related to the Goldfields boom period, the water pipeline servicing the goldfields and associated mining histories. There is no heritage values linked to agriculture within the locality.

There were no Western Heritage sites identified within the Investigation Area.

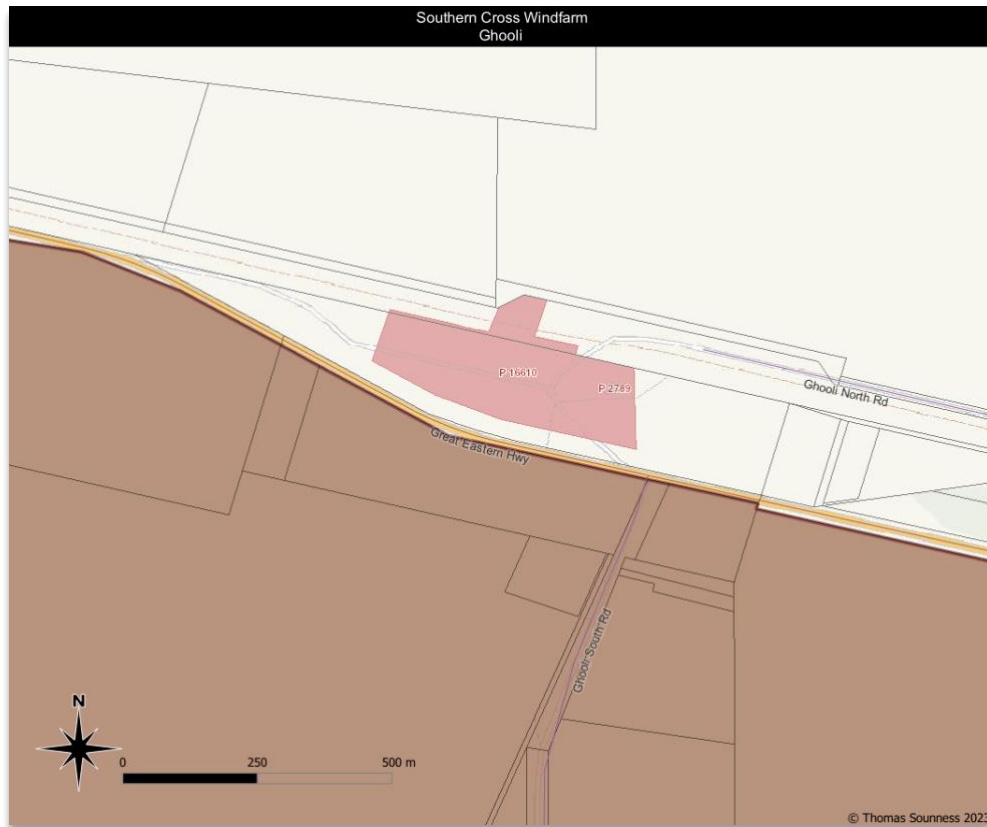
There were sites identified close to or adjacent to the Investigation Area as follows:

- *Goldfields Water Supply Scheme* - Mundaring to Kalgoorlie (Place No 106003)
- *No 6 Steam Pumping Station* - Ghooli (Place No 2789)
- *Bronti Tank* - Emu Fence Road, Ghooli - (Place No 10869)
- *Second Pumping Station* - Ghooli (Place No 8196)

## Ghooli

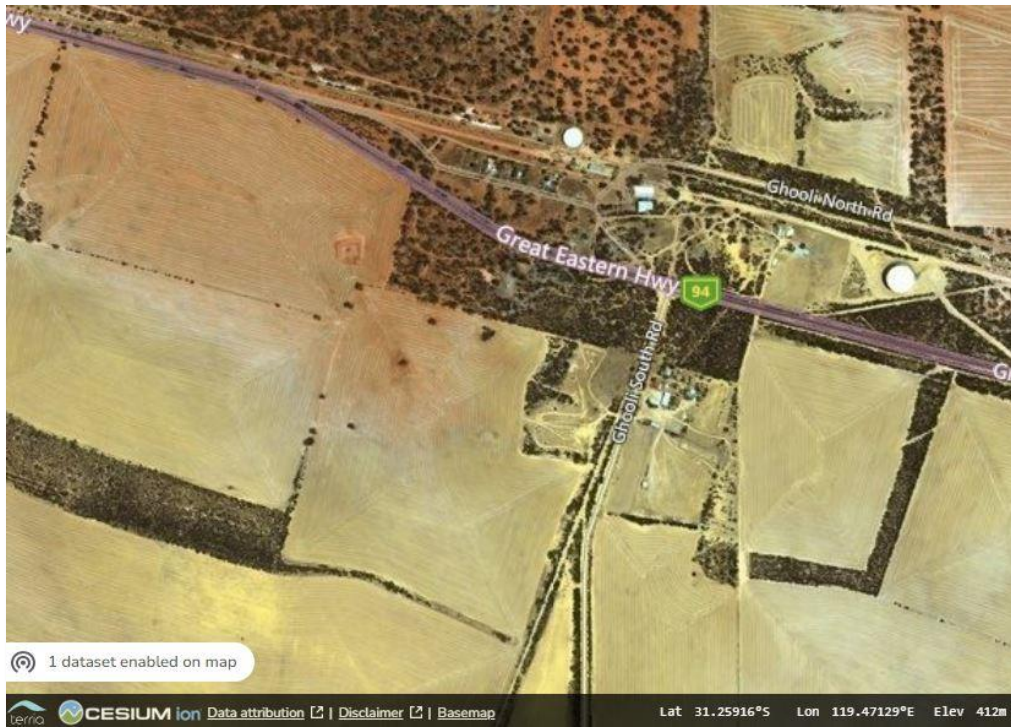
The former settlement of Ghooli has significant heritage values. This includes the Goldfields Water Supply Scheme which runs through it and Water Pump Station No 6, which helped move water hundreds of kilometres from Mundaring Weir to the Goldfields.





**FIGURE 6 – FORMER SETTLEMENT OF GHOOli – DETAIL**

*Discussion:* The former settlement of Ghooli, and the associated Water Pumping Station No 6, is close to the Ghooli South Road intersection with Great Eastern Highway which is an existing main transportation route for Over Size Over Mass equipment traveling to and from Kalgoorlie Boulder.



**DIAGRAM 2 – FORMER SETTLEMENT OF GHOOOLI– SATELLITE IMAGERY SHOWING LOCATION OF BUILDINGS. SOURCE: NATIONALMAP PROJECT © GOVERNMENT OF WESTERN AUSTRALIA**

*Conclusion:* The protection of these sites is important . Wind farm construction will not introduce any risk to these sites and will utilise Great Eastern Highway to transport wind farm construction equipment to the Project site avoiding the Water Pumping Station.

### Bronti Tank

The Bronti Tank is located to the north of the Great Eastern Highway and off Emu Fence Road. The details of this heritage site are limited compared to the extensive heritage values identified in the former settlement of Ghooli.



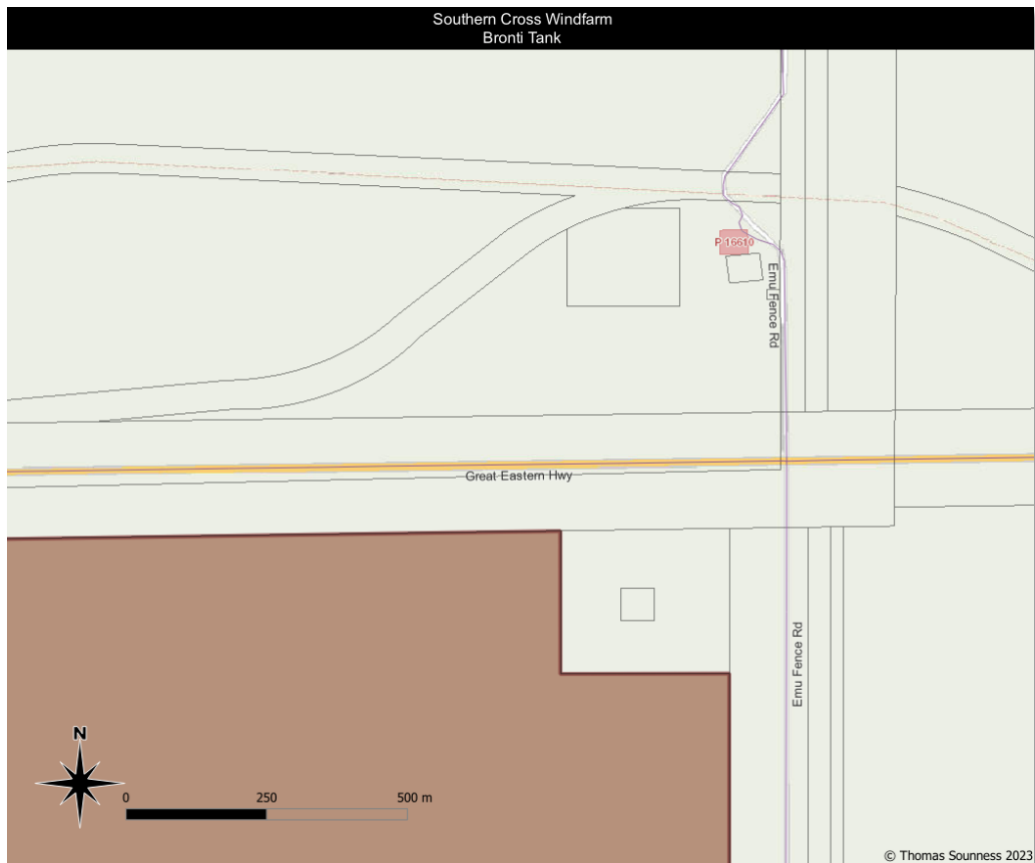


FIGURE 7 - BRONTI TANK – DETAIL

Discussion: Bronti Tank is not on any paths of travel to and from potential development sites given its location outside the Investigation Area.

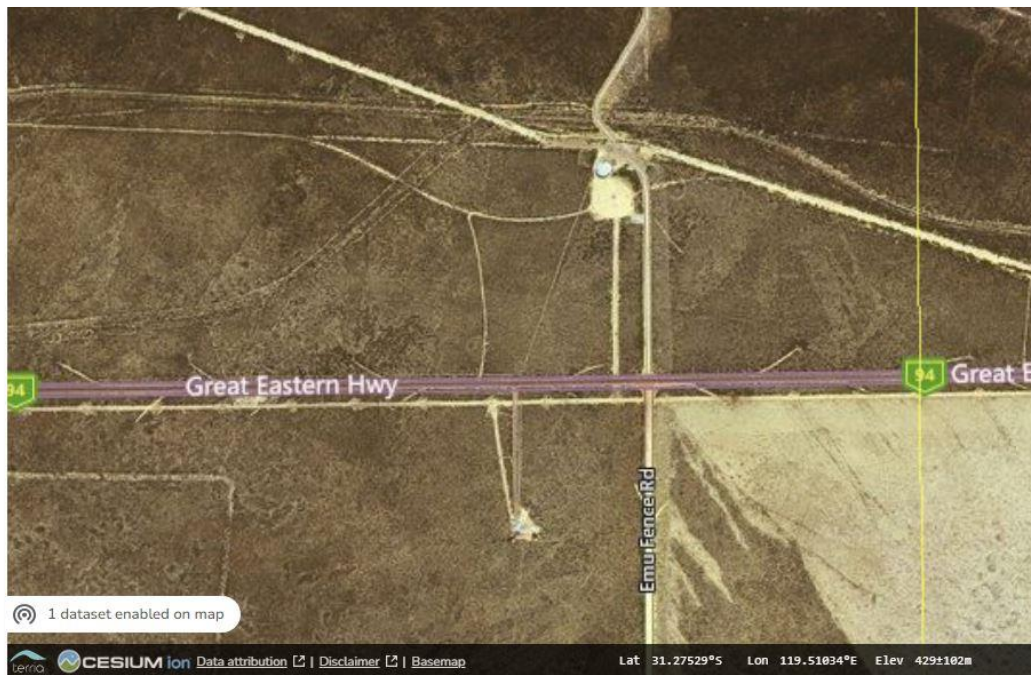


DIAGRAM 3 - BRONTI TANK NEAR THE INTERSECTION OF GREAT EASTERN HIGHWAY AND EMU FENCE ROAD - SOURCE CESIUM AND NATIONAL MAP PROJECT : IMAGERY TAKEN 12 FEB 2022

*Conclusion:* No impact is possible to this site given its remote location outside the Investigation Area.

### Western Heritage Revealed During Development

It is possible during construction of the wind farm that features may be found which relate to the mining or agricultural history of the region. Unless of great significance, it is felt that these features will be common and consistent with the pattern of land use. These include historical mining debris or signs of agricultural activities or equipment which are unlikely to be of residual value.

Should a heritage item be revealed during construction, it is recommended that a heritage assessment be performed to assess the significance and value of any features discovered.

### Conclusion

An assessment of the heritage record within the Study Area concluded the following:

- There are no registered heritage places within the Investigation Area.
- Two places with identified with heritage values immediately adjacent to, but outside of the Investigation Area, - Ghooli and Bronti tank.
- Ghooli, being close to the intersection where equipment could travel to development sites, could warrant special mention in any traffic management plan or operations plan to ensure protection is part of any operational procedure for equipment entering and exiting the site.



## References

Department of Climate Change, Energy, the Environment and Water, n.d., 'Australian Heritage Database' [Database], Australian Heritage Database, viewed 12 February 2023, [https://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=search\\_results&place\\_name=.](https://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=search_results&place_name=)

Heritage Council of Western Australia, n.d., 'InHerit', Database, Heritage Council of Western Australia, Retrieved from <http://inherit.stateheritage.wa.gov.au/Public/>.

'Heritage Council WA - State Register (DPLH-006)', 2019, December 13, [GCS\_GDA\_1994], Department of Planning, Lands and Heritage, Retrieved from <https://catalogue.data.wa.gov.au/dataset/heritage-council-wa-state-register>.

WAPC, 2007, May 29, 'SPP 3.5 - Historic Heritage Conservation', Western Australian Planning Commission.

## Appendix 1 – Heritage Register

Place No	Place Name	Other Names	Street Number	Street Name	Suburb or Town	LGA Name	State Registered	Statutory Listings	Other Listings
16610	Goldfields Water Supply Scheme	Golden Pipeline					TRUE	State Register Registered 08 Dec 2022	
25378	Railway Rock Catchment Dam Group, Yilgarn			Stephens Rd	Bodallin	Yilgarn	TRUE	State Register Registered 30 Aug 2016	
2806	Police Lock-up (fmr)	School Photographic Laboratory		Antares St	Southern Cross	Yilgarn	TRUE	Heritage List Adopted 07 Aug 1998 (Shire of Yilgarn)	Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn)
10062	Karalee Reservoir, Rock Catchment & Aqueduct			about 50 km E of	Southern Cross	Yilgarn	TRUE	State Register Registered 14 Dec 2001	Statewide Lge Timber Str Survey Completed 11 Dec 1998, Classified by the National Trust Classified 12 Mar 2001, Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn)
16795	Stone Bread Oven				Yerbillon	Yilgarn	TRUE		Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn)
2804	Court House & Registrar's Office (fmr)	Yilgarn History Museum	26	Antares St	Southern Cross	Yilgarn	TRUE	Heritage List Adopted 07 Aug 1998 (Shire of Yilgarn), State Register Registered 24 Nov 2000	Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn), Register of the National Estate Indicative Place , Classified by the National Trust Recorded 07 Feb 1972
2812	Palace Hotel, Southern Cross	Anniversary Hostel	6	Orion St	Southern Cross	Yilgarn	TRUE	Heritage List Adopted 07 Aug 1998 (Shire of Yilgarn), State Register Registered 01 May 2012	Statewide Hotel Survey Completed 01 Nov 1997, Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn)
5977	Koorarawalyee Tank	Koorarawalyee Summit Tank		Great Eastern Hwy	Koorarawalyee	Yilgarn	TRUE		
2808	Southern Cross Post Office		24	Antares St	Southern Cross	Yilgarn	TRUE	Heritage List Adopted 07 Aug 1998 (Shire of Yilgarn), State Register Registered 09 Feb 1996	Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn), Classified by the National Trust Classified 08 Mar 1994, Statewide Post Office Survey Completed 01 Mar 1992
2789	No. 6 Steam Pumping Station (fmr), Ghooli			Great Eastern Hwy	Ghooli	Yilgarn	TRUE	Heritage List Adopted 07 Aug 1998 (Shire of Yilgarn), State Register Registered 14 Jun 2021	Classified by the National Trust Classified 15 Jan 1976, Register of the National Estate Permanent 21 Mar 1978, Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn)
10069	Yellowdine Catchment & Dams			Res 3229	Yellowdine	Yilgarn	TRUE		Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn)
2815	Masonic Hall (fmr), Southern Cross	Masonic Temple	14	Spica St	Southern Cross	Yilgarn	TRUE	Heritage List Adopted 07 Aug 1998 (Shire of Yilgarn), State Register Registered 15 May 2012	Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn)
10022	Old Primary School, Southern Cross	Forrester Resource Centre, Old State School	28	Antares St	Southern Cross	Yilgarn	TRUE	Heritage List Adopted 07 Aug 1998 (Shire of Yilgarn), State Register Registered 15 Jan 2013	Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn), Register of the National Estate Indicative Place
10055	Bodallin Railway Dam			4 km W of Bodallin	Bodallin	Yilgarn	TRUE		Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn)
2801	Our Lady of Montserrat, Southern Cross	Domus Di, St Joseph's Catholic Church	50	Altair St	Southern Cross	Yilgarn	TRUE	Heritage List Adopted 07 Aug 1998 (Shire of Yilgarn), State Register Registered 17 Aug 2012	Art Deco Significant Bldg Survey Completed 30 Jun 1994, Catholic Church Inventory Adopted 01 Jul 1998, Municipal Inventory Adopted 16 May 1997 (Shire of Yilgarn)



## **Annexure 8:**

# **Flora and Fauna Desktop Assessment**

21 February 2023

Our ref: 4794-22 Southern Cross Wind Farm Desktop Assessment Rev1

Thomas Sounness  
Yilgarn Holdings Pty Ltd  
7 Samson St  
Fremantle WA 6160

Dear Thomas

## **SOUTHERN CROSS WIND FARM DESKTOP ASSESSMENT**

### **PROJECT CONTEXT**

Ecoscape was requested to undertake a desktop assessment on the environmental aspects of a proposed wind farm installation in the locality of Southern Cross. The proposed wind farm project area (the survey area) is approximately 7 km east of Southern Cross in the WA eastern Wheatbelt region.

The desktop assessment provided the following results:

- The proposed design layout for tracks and turbines does not intersect native vegetation areas and as such no significant impacts to conservation listed flora or fauna species are expected
- The survey area is within a known conservation listed fauna species (Malleefowl) breeding and foraging habitat
- There are conservation listed flora species that are recorded within the survey area as determined by database searches
- There are no conservation listed ecological communities intersecting the survey area.

It is Ecoscape's opinion that should existing native vegetation be disturbed the project may require assessment by either/both the State and/or Commonwealth regulators for the level of impact to conservation listed flora and fauna species, in particular the Malleefowl (listed as Vulnerable under both the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and Western Australian *Biodiversity Conservation Act 2016*).

Please let me know if you have any questions.

Yours sincerely

**Ecoscape (Australia) Pty Ltd**



Bruce Turner  
Principal Zoologist



# APPENDIX 5 - FLORA AND FAUNA DESKTOP ASSESSMENT

Yilgarn Holdings PL

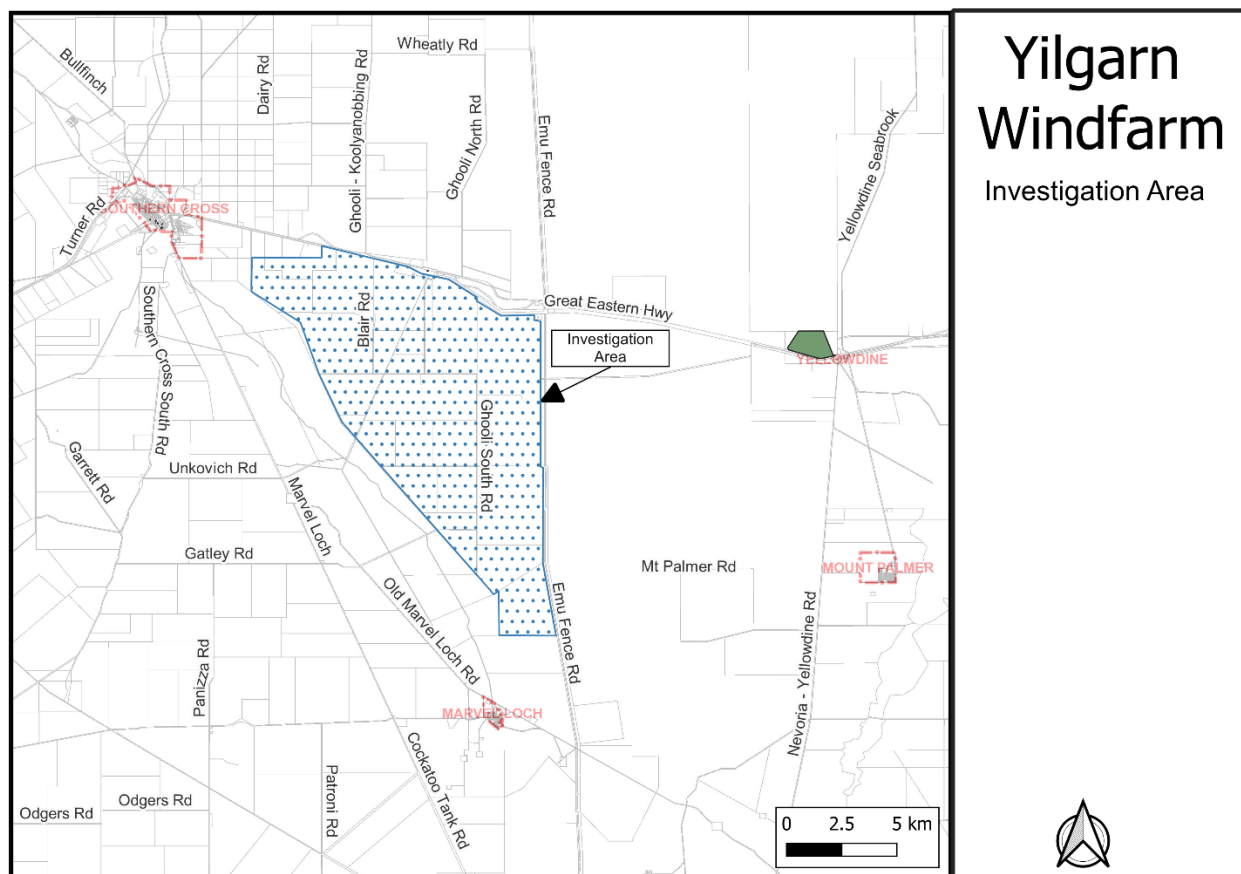
**ecoscape**

## METHOD

Ecoscape used existing publicly available and Department of Biodiversity Conservation and Attractions (DBCA) database searches of environmental spatial data to overlay the proposed wind farm site to determine potential environmental impacts from the installation and operation of infrastructure.

### Survey Area

The wind farm site (the survey area) is located approximately 7 km east of the Southern Cross town site in the eastern Wheatbelt of Western Australia and is approximately 14,760 ha in extent (**Figure 1**).



**Figure 1: Survey area location**

The survey area is predominantly under agricultural production with numerous scattered native vegetation remnants, including roadside vegetation, of various aerial extents. The remnants are connected by narrow roadside vegetation corridors, and both have potential to harbour conservation listed species. The survey area is poorly surveyed, as evident in the lack of records from the DBCA threatened and priority species database (**Map 5**).

Spatial data applied to the desktop assessment included:

- Department of Primary Industries and Regional Development (DPIRD 2020) soil landscape mapping
- Environmentally Sensitive Areas (ESAs) (Landgate 2021)
- Pre-European Vegetation Complexes as mapped by DBCA
- DBCA legislated lands and waters (DBCA 2021)
- DBCA database search results for;
  - Threatened and priority ecological communities
  - Threatened and priority flora species, including WA Herbarium records
  - Threatened and priority fauna species.



## PROJECT DESIGN

The project team has provided an indicative layout for the location of turbines (**Figure 2**).

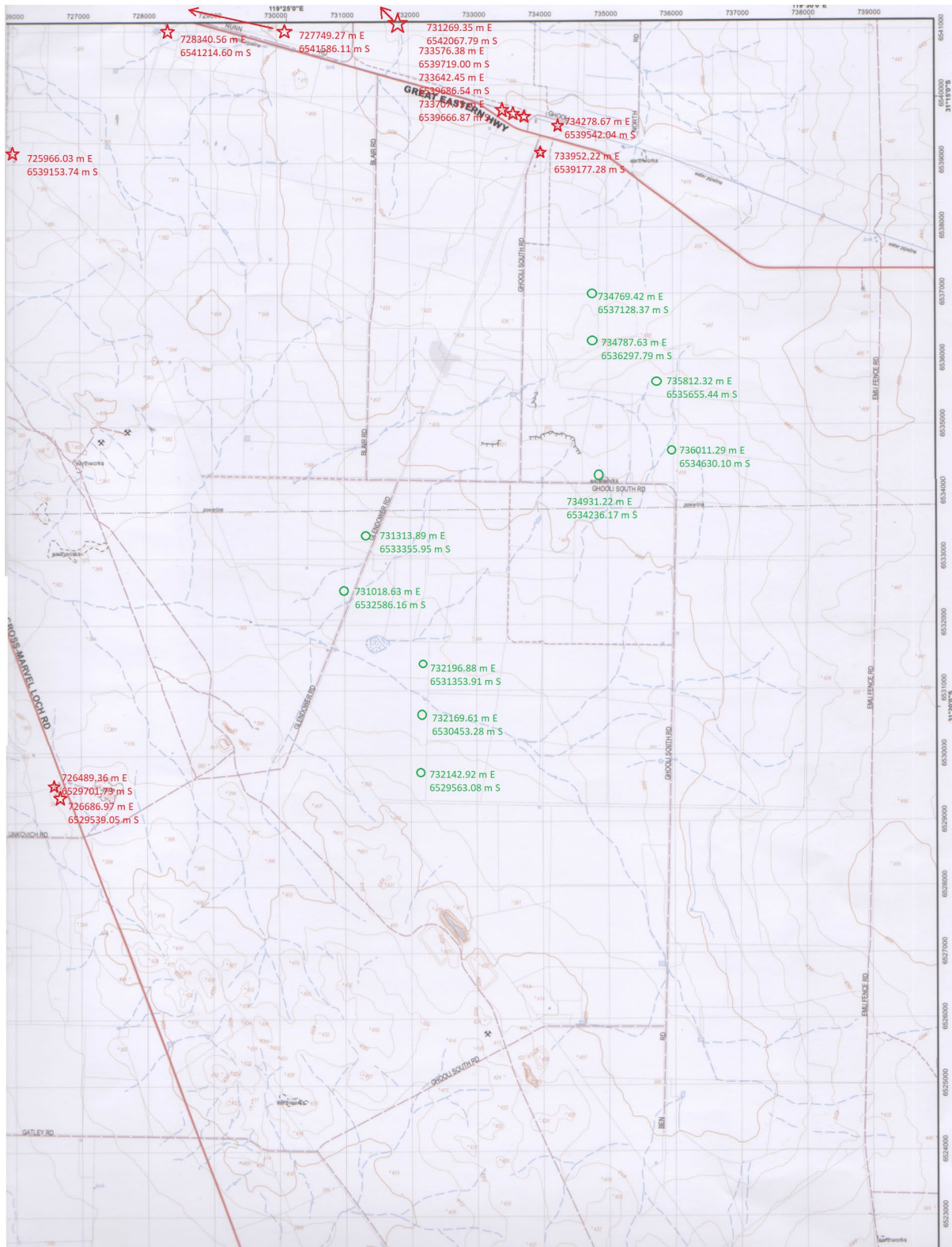


Figure 2: Indicative project design. Turbine locations (green circles) and adjacent housing locations (red stars)

## RESULTS

### SOIL SYSTEMS

According to the Department of Primary Industries and Regional Development (DPIRD 2020) soil landscape mapping, the following land systems intersect the area of interest (**Table 1**) (**Map 1**).

**Table 1: Land systems (DPIRD 2020)**

Mapping unit	Land system	Description
261Bd_1	Buladagie 1 Sandplain subsystem	Gently undulating upland plains and subdued rises in the Eastern Zone of Ancient Drainage. 'Fresh' red rocky loams, yellow sands and sandy earths and shallow duplexes.
261Bd_2	Buladagie 2 Sandplain subsystem	Gently undulating yellow lateritic sandplain interspersed with red alkaline duplexes
261Bd_3ge	Buladagie 3 with mafic or schist influence phase	Areas of rocky heavy soils associating with mafic schist and phyllite geology
261Bd_3u	Buladagie 3 Undifferentiated phase	Undifferentiated
261GrPE	Greenmount, Perilya subsystem	Tributary valley floors on greenstone, in the Southern Cross Zone. Calcareous loamy earths and shallow duplex
261Gr_3	Greenmount 3 subsystem	Rolling low hills in the eastern Zone of Ancient Drainage. Loamy earth (mostly calcareous) and clay
261Gr_3l	Greenmount 3l phase	Rolling low hills in the eastern Zone of Ancient Drainage. Loamy lateritic earths
261Gt_1Qa	Garratt 1Qa phase	Alluvial flats adjacent to salt lakes in the eastern Zone of Ancient Drainage. Loamy earth (mostly calcareous), hard cracking clay and alkaline shallow duplex
261Gt_1Qc	Garratt 1Qc phase	Lower slopes and footslopes adjacent to salt lakes in the eastern Zone of Ancient Drainage
261d3	AC1 atlas system	Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps
261i3	DD15 atlas system	Undulating plains with some low dunes, seasonal lakes, and clay pans

### ENVIRONMENTALLY SENSITIVE AREAS

The survey area does not intersect any mapped Environmentally Sensitive Areas (ESAs) (Landgate 2021) or DBCA legislated Nature Reserves (DBCA 2021). The nearest ESA is 9 km east of the survey area, corresponding with Yellowdine Nature Reserve (**Map 2**).

### CONSERVATION LANDS

The nearest legislated conservation lands to the survey area are listed as (**Map 2**):

- Nature Reserve R 25801 (8 km northwest)
- Yellowdine Nature Reserve (9 km east)
- Wokallarry Nature Reserve 19 km southwest).



## LAND USE HISTORY

The IBRA Southern Cross Subregion (COO2), is 7,041,232 ha in extent. The dominant land uses, as reported in the *Biodiversity Audit of Western Australia* (2001), are stated as:

- Grazing – native pastures (17%)
- UCL & Crown Reserves (66.74%)
- Cultivation -Dry Land agriculture (2.27%)
- Conservation reserves (11.53%).

The region comprises a mixture of; dry lands agriculture and grazing; improved pastures; with lesser areas of conservation, crown reserves and rural residential land (Cowan, Graham & McKenzie 2001).

## BIOLOGICAL ENVIRONMENT

### Biogeographic Region

Biogeographic regions are delineated on the basis of similar climate, geology, landforms, vegetation and fauna and are defined in the Interim Biogeographical Regionalisation for Australia (IBRA) (Department of Agriculture Water and the Environment 2020).

The survey area is located in the Coolgardie IBRA region (COO2 Southern Cross subregion) (**Map 2**), described as (Cowan, Graham & McKenzie 2001);

*The subregion has subdued relief, comprising gently undulating uplands dissected by broad valleys with bands of low greenstone hills. It lies on the 'Southern Cross Terrains' of the Yilgarn Craton. The granite strata of Yilgarn Craton are interrupted by parallel intrusions of Archaean Greenstone. Drainage is occluded. It has an arid to semi-arid Warm Mediterranean climate with 250-300 mm of mainly winter rainfall.*

### Pre-European Vegetation

During the 1970s, John Beard and associates conducted a systematic survey of native vegetation, describing the vegetation systems in Western Australia at a scale of 1:250,000 in the south-west and at a scale of 1:1,000,000 in less developed areas.

Beard's vegetation maps attempted to depict the native vegetation as it was presumed to be at the time of settlement and is known as the pre-European vegetation type and extent. Beard's vegetation maps have since been developed in digital form by Shepherd, Beeston & Hopkins (2002) and updated by DPIRD (2019).

The pre-European vegetation association/s identified from the survey area (DPIRD 2019) and its pre-European and current extents are listed in **Table 2** (DBCA 2019a) (**Map 3**).

**Table 2: Pre-European vegetation association representation** (DBCA 2019a)

Region	Vegetation association	Original extent (ha)	Current extent (ha)	% remaining
Western Australia	141	1,158,760.28	960,755.60	82.91
	511	700,692.60	520,615.26	74.30
	1068	268,900.45	142,088.42	52.84
	1148	260,383.60	258,227.40	99.17
	1413	1,679,916.32	1,286,855.48	76.60
IBRA biogeographic region (Coolgardie)	141	883,085.75	858,525.10	97.22
	511	464,423.62	435,177.21	93.70
	1068	193,988.20	104,804.17	54.03
	1148	254,931.80	252,775.60	99.15
	1413	1,061,212.28	1,042,553.77	98.24
	141	883,085.75	858,525.10	97.22

Region	Vegetation association	Original extent (ha)	Current extent (ha)	% remaining
IBRA biogeographic sub-region (COO2)	511	464,423.62	435,177.21	93.70
	1068	193,988.20	104,804.17	54.03
	1148	254,931.80	252,775.60	99.15
	1413	953,237.73	934,825.95	98.07
LGA (Shire of Yilgarn)	141	711,450.38	690,599.08	97.07
	511	161,933.75	135,457.48	83.65
	1068	268,900.45	142,088.42	52.84
	1148	79,301.07	77,149.48	97.29
	1413	538,791.10	395,458.48	73.40

### Threatened and Priority Fauna

The DBCA threatened and priority fauna species database search provided the following 17 conservation listed fauna species that are likely to occur within the survey area and an applied 70 km buffer (**Map 4**), definitions of conservation code can be found in **Table 4** and **Table 5** in **Appendix one**:

- *Calidris ferruginea* (Curlew Sandpiper), MI - EPBC Act; CR - BC Act
- *Calidris ruficollis* (Red-necked stint), MI - EPBC Act; MI - BC Act
- *Dasyurus geoffroyi* (Chuditch, Western Quoll), VU - EPBC Act; VU - BC Act
- *Falco peregrinus* (Peregrine Falcon), OS – BC Act
- *Idiosoma castellum* (Tree-stem Trapdoor Spider), DBCA P4
- *Idiosoma intermedium* (Coolgardie Shield-backed Trapdoor Spider), DBCA P3
- *Leipoa ocellata* (Malleefowl), VU - EPBC Act; VU - BC Act
- *Leporillus conditor* (Greater Stick-nest Rat), VU - EPBC Act; CD - BC Act
- *Macrotis lagotis* (Bilby), VU - EPBC Act; VU - BC Act
- *Myrmecobius fasciatus* (Numbat), EN - EPBC Act; EN - BC Act
- *Notamacropus irma* (Western Brush Wallaby), DBCA P4
- *Nyctophilus major tor* (Central Long-eared Bat), DBCA P3
- *Paroplocephalus atriceps* (Lake Cronin Snake), DBCA P3
- *Petrogale lateralis lateralis* (Black-flanked Rock-wallaby), EN - EPBC Act; EN - BC Act
- *Phascogale calura* (Red-tailed Phascogale), VU - EPBC Act; CD - BC Act
- *Thinornis rubricollis* (Hooded Plover, Hooded Dotterel), DBCA P4
- *Tringa nebularia* (Common Greenshank), MI - EPBC Act; MI - BC Act.

From the list above the following species were the only species to be recorded within 20 km of the survey area and within the previous 20 years, increasing their likelihood of occurrence to likely to occur:

- *Leipoa ocellata* (Malleefowl), VU - EPBC Act; VU - BC Act
- *Tringa nebularia* (Common Greenshank), MI - EPBC Act; MI - BC Act.

### Threatened and Priority Flora

The DBCA threatened and priority flora species database and the WA Herbarium database searches identified 58 species (**Table 6 Appendix One**), as having been recorded from within 25 km of the study area. Five TF, 16 P1, eight P2, 24 P3, and five P4 species were identified from the database searches.

Four P3 species were identified as the only listed species intersecting the survey area as follows (**Map 5**):

- *Acacia desertorum* var. *nudipes*
- *Balaustion grandibracteatum* subsp. *grandibracteatum*
- *Stylidium choreanthum*



- *Verticordia mitodes*.

### Threatened and Priority Ecological Communities

According to the DBCA threatened communities database search (**Map 5**), no TECs or PECs were recorded as occurring within the study area.

Six TECs were identified (or more likely their 2 km buffers) as occurring within the 50 km buffer applied to the database search. These TECs are listed as P1 and P3 under the Western Australian BC Act with one of the P3 TECs, Eucalypt woodlands of the Western Australian Wheatbelt, also listed as Critically Endangered under the Commonwealth EPBC Act:

- *Eucalypt woodlands of the Western Australian Wheatbelt*
- *Koolyanobbing vegetation complex (banded ironstone formation)*
- *Duladgin Quartzite Ridge*
- *Granite outcrop pools with endemic aquatic fauna*.

### EPBC Protected Matters Search Tool (PMST)

The Commonwealth EPBC PMST resource (DCCEEW 2022) provided the results as shown in Table 3.

**Table 3: PMST results (species known to occur are highlighted)**

Scientific Name	Common Name	Presence Text	Threatened Category
<b>Plants</b>			
<i>Banksia sphaerocarpa</i> <i>var. dolichostyla</i>	Ironcap Banksia	Species or species habitat may occur	Vulnerable
<i>Dasymalla axillaris</i>	Native Foxglove	Species or species habitat may occur	Critically Endangered
<i>Daviesia microcarpa</i>	Norseman Pea	Species or species habitat known to occur	Endangered
<i>Eremophila resinosa</i>	Resinous Eremophila	Species or species habitat likely to occur	Endangered
<i>Eremophila viscida</i>	Varnish Bush	Species or species habitat likely to occur	Endangered
<i>Frankenia parvula</i>	Short-leaved Frankenia	Species or species habitat likely to occur	Endangered
<i>Gastrolobium graniticum</i>	Granite Poison	Species or species habitat may occur	Endangered
<i>Isopogon robustus</i>	Robust Coneflower	Species or species habitat known to occur	Critically Endangered
<i>Ricinocarpos brevis</i>	null	Species or species habitat may occur	Endangered
<i>Roycea pycnophylloides</i>	Saltmat	Species or species habitat may occur	Endangered
<b>Animals</b>			
<i>Calidris ferruginea</i>	Curlew Sandpiper	Species or species habitat may occur	Critically Endangered
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	Species or species habitat may occur	Vulnerable
<i>Egernia stokesii badia</i>	Western Spiny-tailed Skink	Species or species habitat may occur	Endangered
<i>Falco hypoleucos</i>	Grey Falcon	Species or species habitat may occur	Vulnerable
<i>Leipoa ocellata</i>	Malleefowl	Species or species habitat may occur	Vulnerable
<i>Pezoporus occidentalis</i>	Night Parrot	Species or species habitat may occur	Endangered

Two flora species; *Daviesia macrocarpa* and *Isopogon robustus*, identified as species or species with habitat known to occur, are listed as critically endangered or endangered species.

## CONCLUSIONS

The desktop assessment results indicate that the potential clearing of native vegetation remnants within the survey area will likely impact on threatened and priority flora and fauna species listed under both Commonwealth and State environmental legislation and will require assessment by Commonwealth and most likely state environmental authorities. The proposed project design indicates that no native vegetation areas will be proposed for clearing and therefore impacts to conservation listed flora and fauna species is expected to minor to negligible.

There were no listed TEC or PEC types intersecting the survey area, however it is unlikely that the native vegetation remnants have been suitably investigated for TEC composition. The desktop assessment did not identify any concerns with respect to vegetation community, conservation reserve, ESA, or important wetlands.

Wind farms are now well understood to impact native bird populations, particularly the raptors, microbats, and migratory waterbirds, in that the operation of turbines have potential to cause mortality by turbine strike (Brett Lane and Associates 2005, 2008; NGH Environmental 2009, 2008, 2012, 2016). This is of concern to the environmental regulators for species that are known to have low population numbers and low rates of breeding success, e.g. Wedge-tail Eagles.

The survey area is close to known records of Malleefowl, listed as vulnerable under both the EPBC and BC Acts. The likelihood of occurrence of Malleefowl is high and the impact is also potentially high should existing native vegetation be cleared. Malleefowl usually fly only to escape and often at vegetation height or less (Benshemesh 2007), therefore the potential impact from turbine strike is likely to be low especially if turbines are sited well away from native vegetation areas.

The information provided herein meets the requirements as a desktop investigation for native vegetation clearing permit approvals, however it is Ecoscape's opinion that should native vegetation be proposed for clearing, on ground field survey and investigation will be a requirement for project approval.

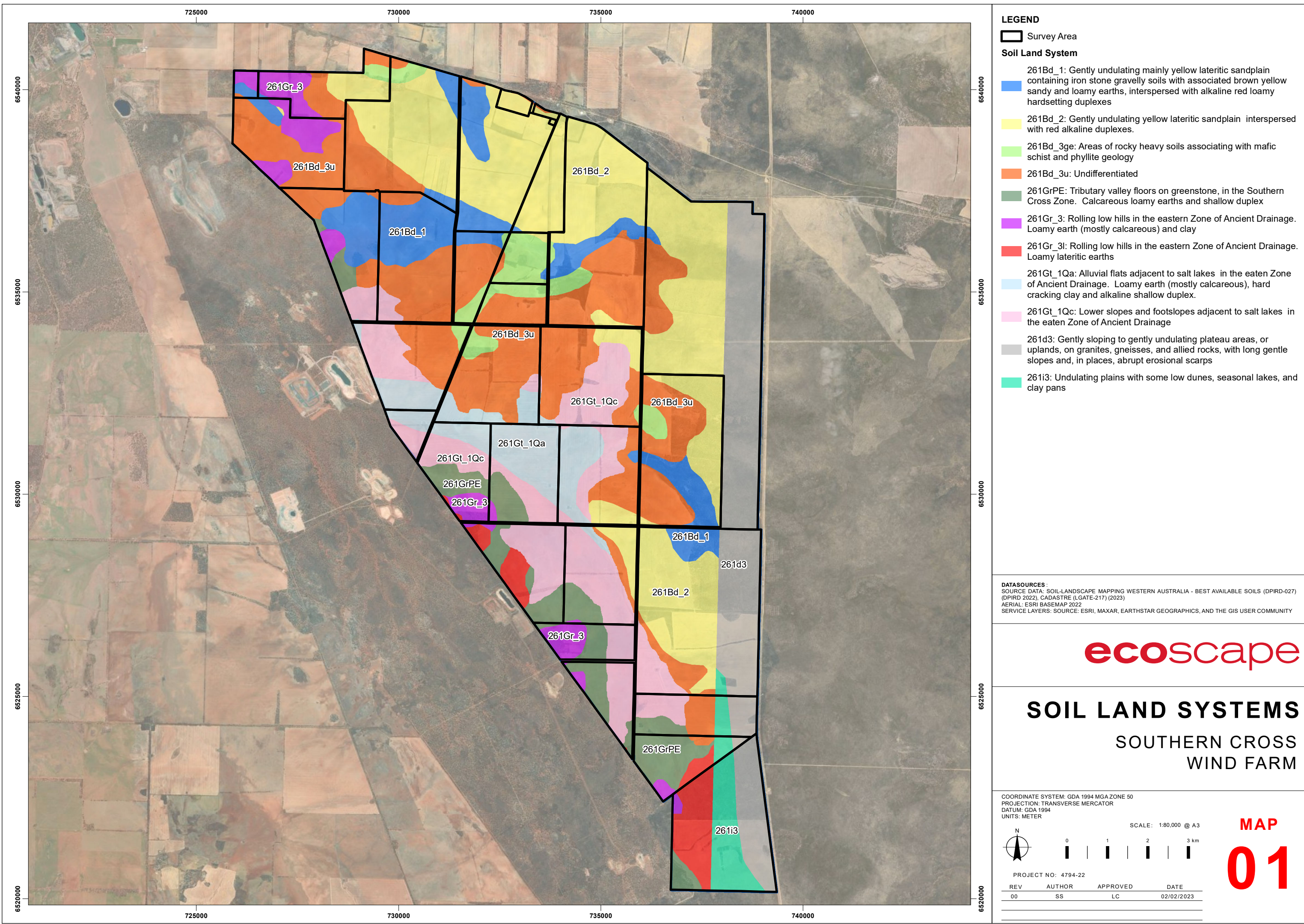


## REFERENCES

- Benshemesh, J 2007, *National Recovery Plan for Malleefowl *Leipoa ocellata**. Available from: [file:///X:/02\\_References/Fauna/Fauna species info/Birds/Malleefowl - Bustard - Curlew/Benshemesh2005\\_Malleefowl\\_Recovery-Plan.pdf](file:///X:/02_References/Fauna/Fauna%20species%20info/Birds/Malleefowl%20-%20Bustard%20-%20Curlew/Benshemesh2005_Malleefowl_Recovery-Plan.pdf).
- Brett Lane and Associates 2005, *Wind Farms and Birds: Interim standards for risk assessment, Australian Wind Energy Association Report, AusWEA (Australian Wind Energy Association)*.
- Brett Lane and Associates 2008, *Proposed Badgingarra Wind Farm Flora and Fauna Assessment*.
- Cowan, M, Graham, G & McKenzie, N 2001, "Coolgardie 2 (COO 2 – Southern Cross Subregion)." in *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*, eds. JE May & NL McKenzie, Department of Conservation and Land Management, Department of Conservation and Land Management.
- Department of Agriculture Water and the Environment 2020, *Australia's bioregions (IBRA)*. Available from: <http://www.environment.gov.au/land/nrs/science/ibra>.
- Department of Biodiversity Conservation and Attractions 2019a, *DBCA Statewide Vegetation Statistics*. Available from: <https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>.
- Department of Biodiversity Conservation and Attractions 2019b, *Conservation codes for Western Australian Flora and Fauna (3 January 2019)*. Available from: [https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation code definitions.pdf](https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation%20code%20definitions.pdf).
- Department of Biodiversity Conservation and Attractions 2021, *DBCA - Legislated Lands and Waters (DBCA-011)*. Available from: <https://catalogue.data.wa.gov.au/dataset/dbca-legislated-lands-and-waters>.
- Department of Climate Change Energy the Environment and Water 2022, *Protected Matters Search Tool*. Available from: <https://pmst.awe.gov.au/#/map?lng>.
- Department of Primary Industries and Regional Development 2019, *Pre-European Vegetation (DPIRD-006)*. Available from: <https://catalogue.data.wa.gov.au/dataset/pre-european-dpird-006>.
- Department of Primary Industries and Regional Development 2020, *Soil Landscape Mapping - Rangelands (DPIRD-063)*. Available from: <https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-rangelands>.
- Landgate 2021, *Shared Land Information Platform (SLIP)*. Available from: <https://maps.slip.wa.gov.au/landgate/locate/>.
- NGH Environmental 2008, *Proposed development of Stage 1, Silverton Wind Farm, far western NSW – final Biodiversity Assessment, March 2008*.
- NGH Environmental 2009, *Proposed Yass Wind Farm - Windfarm Risks to Birds and Microbats*.
- NGH Environmental 2012, *Rye Park Wind Farm Biodiversity Constraints Analysis*.
- NGH Environmental 2016, *Bird and Bat Risk Assessment: Silverton Wind Farm*.
- Shepherd, DP, Beeston, GR & Hopkins, AJM 2002, 'Native Vegetation in Western Australia: Extent, Type and Status', *Resource Management Technical Report 249*.

# MAPS





**LEGEND**

Survey Area

**Soil Land System**

261Bd\_1: Gently undulating mainly yellow lateritic sandplain containing iron stone gravelly soils with associated brown yellow sandy and loamy earths, interspersed with alkaline red loamy hardsetting duplexes

261Bd\_2: Gently undulating yellow lateritic sandplain interspersed with red alkaline duplexes.

261Bd\_3ge: Areas of rocky heavy soils associating with mafic schist and phyllite geology

261Bd\_3u: Undifferentiated

261GrPE: Tributary valley floors on greenstone, in the Southern Cross Zone. Calcareous loamy earths and shallow duplex

261Gr\_3: Rolling low hills in the eastern Zone of Ancient Drainage. Loamy earth (mostly calcareous) and clay

261Gr\_3l: Rolling low hills in the eastern Zone of Ancient Drainage. Loamy lateritic earths

261Gt\_1Qa: Alluvial flats adjacent to salt lakes in the eaten Zone of Ancient Drainage. Loamy earth (mostly calcareous), hard cracking clay and alkaline shallow duplex.

261Gt\_1Qc: Lower slopes and footslopes adjacent to salt lakes in the eaten Zone of Ancient Drainage

261d3: Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps

261i3: Undulating plains with some low dunes, seasonal lakes, and clay pans

**DATASOURCES :**  
SOURCE DATA: SOIL-LANDSCAPE MAPPING WESTERN AUSTRALIA - BEST AVAILABLE SOILS (DPIRD-027) (DPIRD 2022), CADASTRE (LGATE-217) (2023)  
AERIAL: ESRI BASEMAP 2022  
SERVICE LAYERS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY



SOIL LAND SYSTEMS

SOUTHERN CROSS

WIND FARM

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
PROJECTION: TRANSVERSE MERCATOR  
DATUM: GDA 1994  
UNITS: METER

N

0

1

2

3 km

SCALE: 1:80,000 @ A3

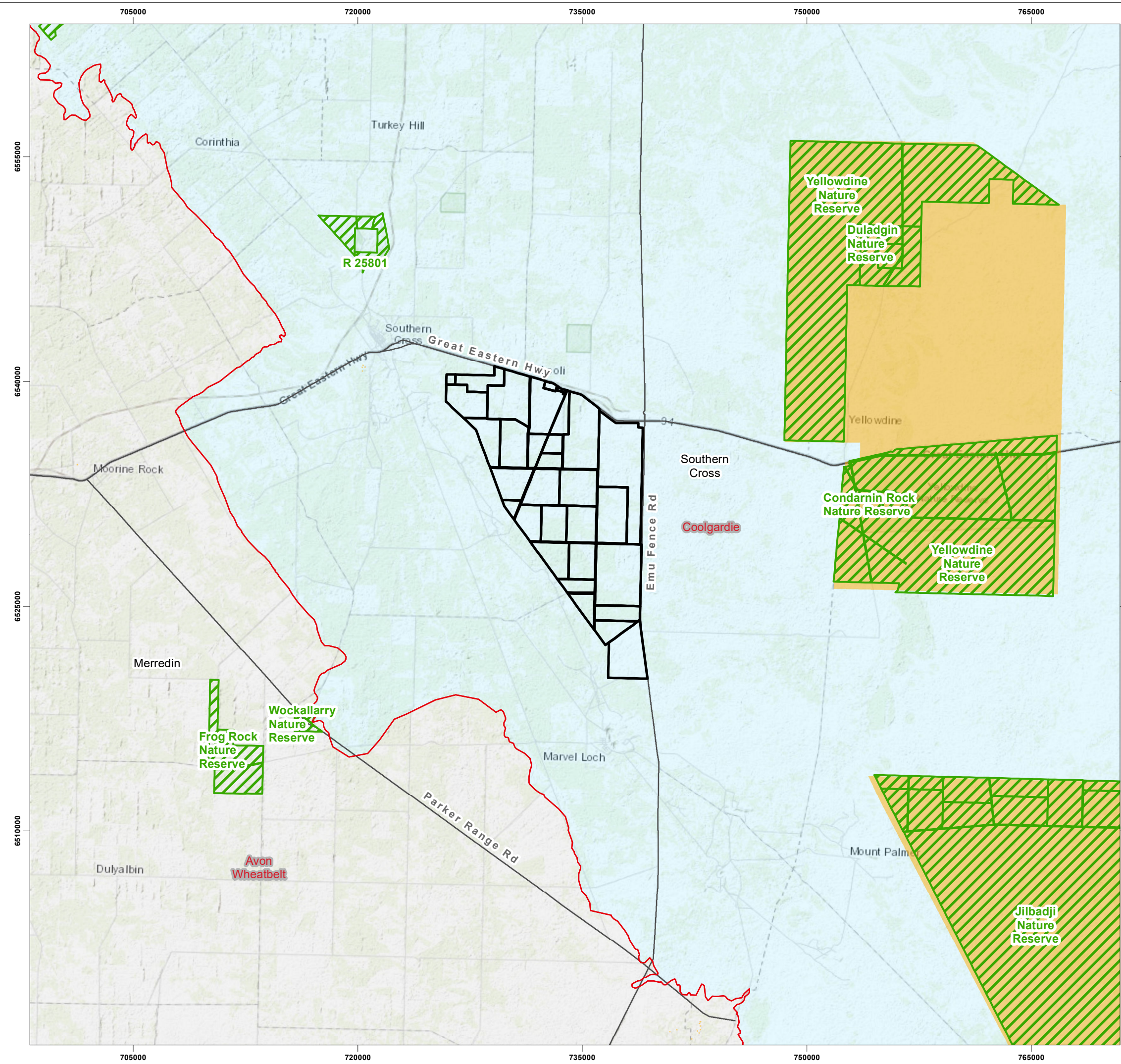
PROJECT NO: 4794-22

MAP

01

REV	AUTHOR	APPROVED	DATE
00	SS	LC	02/02/2023





LEGEND

- Survey Area
- IBRA Region
- IBRA Subregion**
  - Merredin
  - Southern Cross
  - DBCA Reserve
  - Environmentally Sensitive Area
- Road

**DATASOURCES :**  
SOURCE DATA: CADASTRE (LGATE-217) (2023), IBRA REGIONS (DAWE 2020), CLEARING REGULATIONS - ENVIRONMENTALLY SENSITIVE AREAS (DWER-046) (DWER 2021), DBCA - LEGISLATED LANDS AND WATERS (DBCA-011) (DBCA 2022), ROAD NETWORK (MRWA 2020)  
AERIAL: ESRI TOPOGRAPHIC BASEMAP  
SERVICE LAYERS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY



**DBCA RESERVES &  
ENVIRONMENTALLY SENSITIVE  
AREAS**  
**SOUTHERN CROSS  
WIND FARM**

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
PROJECTION: TRANSVERSE MERCATOR  
DATUM: GDA 1994  
UNITS: METER

SCALE: 1:250,000 @ A3

N

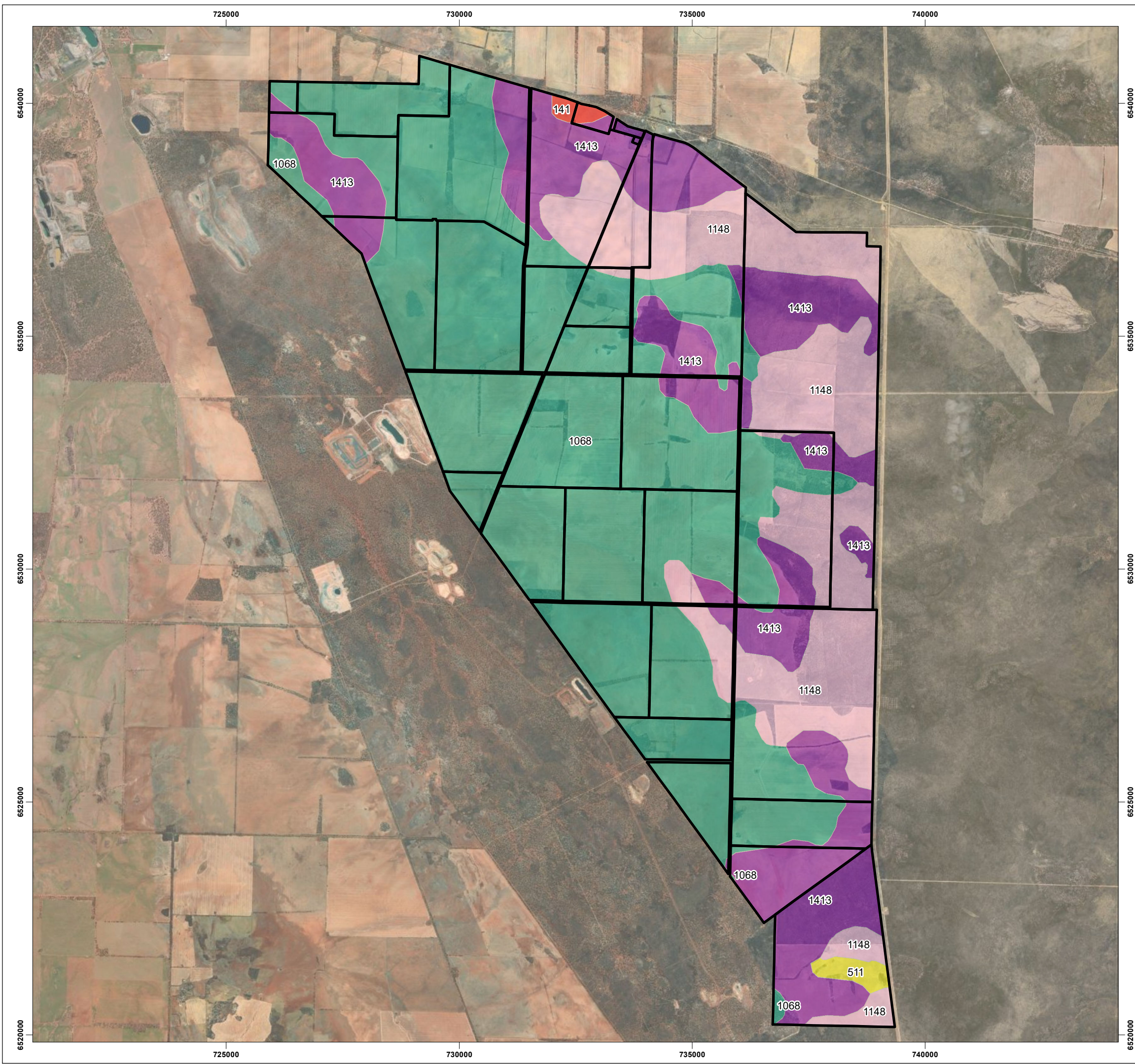
0 4 8 km

PROJECT NO: 4794-22

REV	AUTHOR	APPROVED	DATE
00	SS	LC	02/02/2023

**MAP  
02**





**LEGEND**

Survey

**Pre-European Vegetation Unit**

141: Woodland other: Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba*, *E. salmonophloia*. Goldfields; gimlet, redwood etc. *E. salubris*, *E. oleosa*. Riverine; rivergum *E. camaldulensis*. Tropical; messmate, woolyb

511: Woodland other: Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba*, *E. salmonophloia*. Goldfields; gimlet, redwood etc. *E. salubris*, *E. oleosa*. Riverine; rivergum *E. camaldulensis*. Tropical; messmate, woolyb

1068: Woodland other: Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba*, *E. salmonophloia*. Goldfields; gimlet, redwood etc. *E. salubris*, *E. oleosa*. Riverine; rivergum *E. camaldulensis*. Tropical; messmate, woolyb

1148: Scrub-heath: Mixed heath with scattered tall shrubs *Acacia* spp., PROTEACEAE and MYRTACEAE.

1413: Thicket: Wattle, *Casuarina* and teatree *Acacia-allocasuarina-Melaleuca* alliance.

**DATASOURCES :**  
SOURCE DATA: CADASTRE (LGATE-217) (2023), PRE-EUROPEAN VEGETATION (DPIRD-006) (DPIRD 2019)  
AERIAL: ESRI BASEMAP 2022  
SERVICE LAYERS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

# PRE-EUROPEAN VEGETATION

## SOUTHERN CROSS WIND FARM

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
PROJECTION: TRANSVERSE MERCATOR  
DATUM: GDA 1994  
UNITS: METER

SCALE: 1:80,000 @ A3

N

0

1

2

3 km

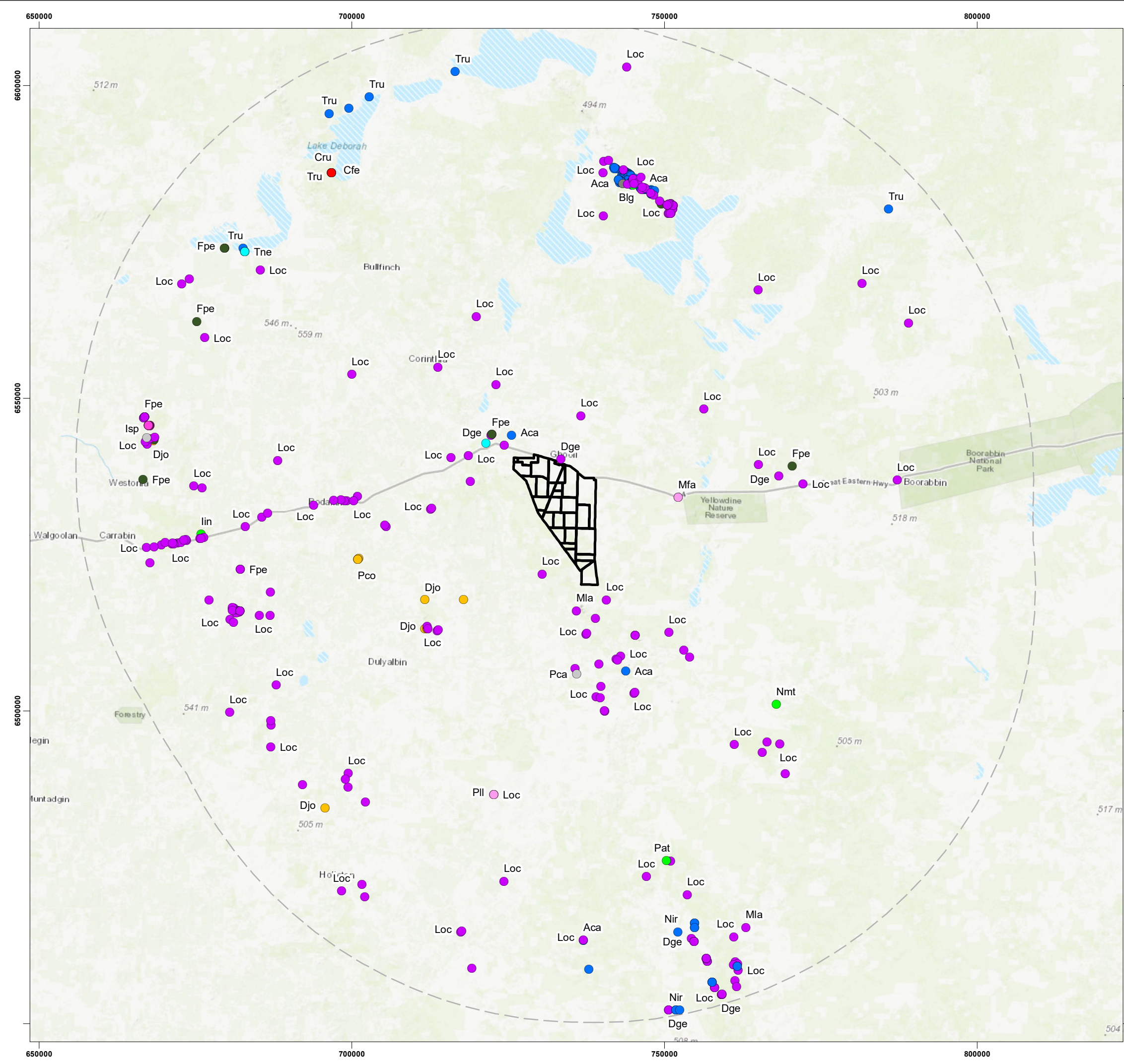
PROJECT NO: 4794-22

REV	AUTHOR	APPROVED	DATE
00	SS	LC	02/02/2023

MAP

03





LEGEND

- Survey Area
- Buffer (70km)

Conservation-listed Fauna

- Critically Endangered
- Endangered
- Endangered or Priority 3
- Vulnerable
- Extinct
- Migratory Species
- Conservation Dependent
- Other Specifically Protected
- Priority 1
- Priority 3
- Priority 4

Code	Taxon	Status
Aca	<i>Aganippe castellum</i>	P4
Blg	<i>Bettongia lesueur graii</i>	EX
Cfe	<i>Calidris ferruginea</i>	CR
Cru	<i>Calidris ruficollis</i>	MI
Djo	<i>Daphnia jollyi</i>	P1
Dge	<i>Dasyurus geoffroi</i>	VU
Fpe	<i>Falco peregrinus</i>	OS
Iin	<i>Idiosoma intermedium</i>	P3
Isp	<i>Idiosoma</i> sp.	EN or P3
Loc	<i>Leipoa ocellata</i>	VU
Lco	<i>Leporillus conditor</i>	CD
Mla	<i>Macrotis lagotis</i>	VU
Mfa	<i>Myrmecobius fasciatus</i>	EN
Nir	<i>Notamacropus irma</i>	P4
Nmt	<i>Nyctophilus major tor</i>	P3
Pco	<i>Parartemia contracta</i>	P1
Pat	<i>Paraplocephalus atriceps</i>	P3
Pll	<i>Petrogale lateralis lateralis</i>	EN
Pca	<i>Phascogale calura</i>	CD
Tru	<i>Thinornis rubricollis</i>	P4
Tne	<i>Tringa nebularia</i>	MI

**DATA SOURCES:**  
SOURCE DATA: CADASTRE (LGATE-217) (2023), FAUNA DATA (DBCA 2023)  
BASEMAP: ESRI TOPOGRAPHIC BASEMAP  
SERVICE LAYERS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY



DBCA DATABASE SEARCH  
RESULTS - FAUNA  
SOUTHERN CROSS WIND FARM

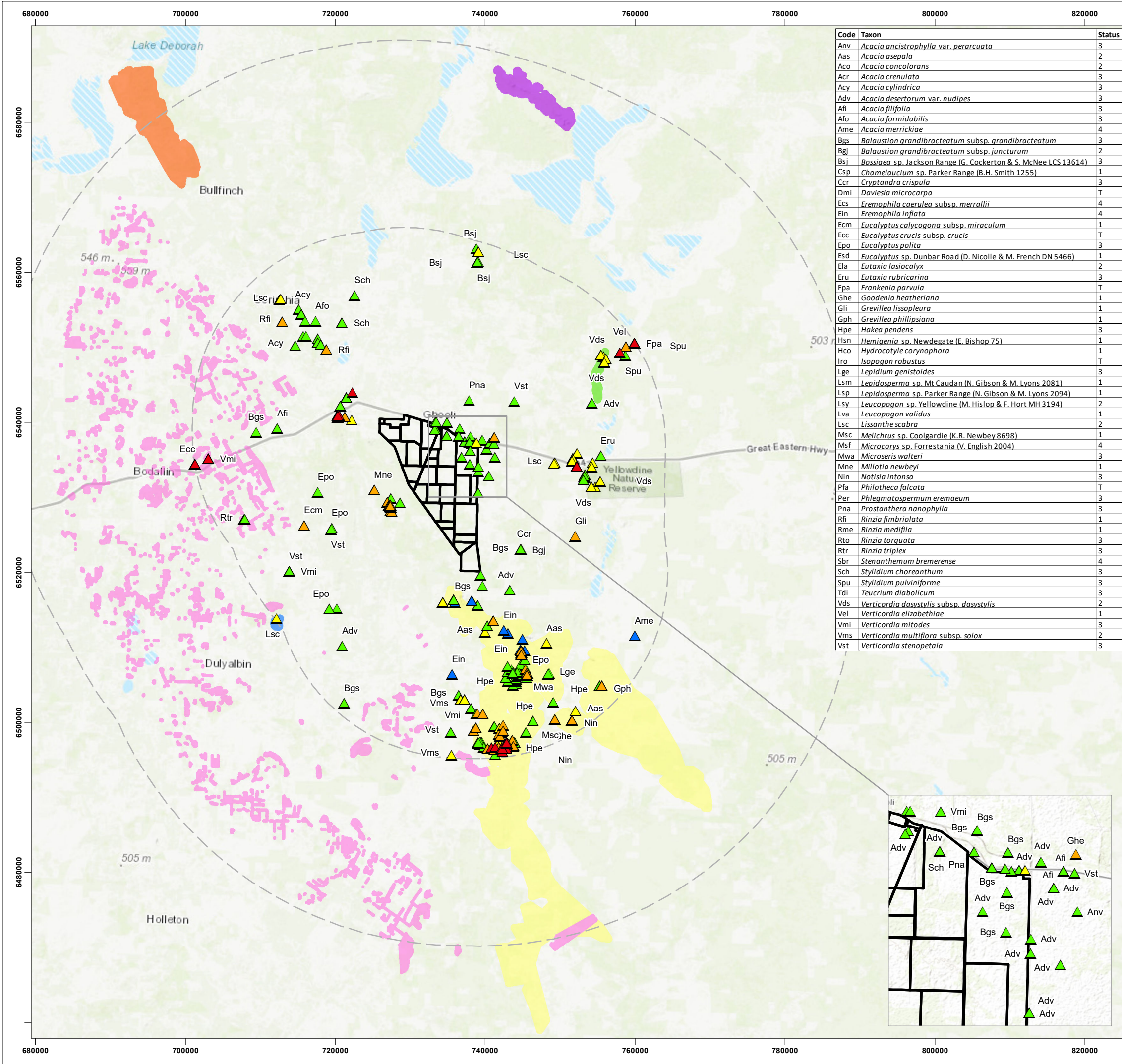
COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
PROJECTION: TRANSVERSE MERCATOR  
DATUM: GDA 1994  
UNITS: METER

SCALE: 1:600,000 @ A3

PROJECT NO: 4794-22

REV	AUTHOR	APPROVED	DATE
00	SS	LC	02/02/2023





**LEGEND**

Survey Area

Buffer (25km & 50km)

**Conservation-listed Flora**

Threatened

Priority 1

Priority 2

Priority 3

Priority 4

**Threatened and Priority Ecological Communities**

Highclere Hills (Mayfield) vegetation complex (banded ironstone formation) (P1)

Koolyanobbing vegetation complex (banded ironstone formation) (P1)

Duladgin Quartzite Ridge (P3)

Eucalypt woodlands of the Western Australian Wheatbelt (P3)

Granite outcrop pools with endemic aquatic fauna (P3)

Plant assemblages of the Parker Range System (P3)

**DATA SOURCES:**  
SOURCE DATA: CADASTRE (LGATE-217) (2023), COMMUNITIES AND FLORA DATA (DBCA 2023)  
BASEMAP: ESRI WORLD TOPOGRAPHIC MAP  
SERVICE LAYERS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

ecoscope

DBCA DATABASE SEARCH

RESULTS - FLORA AND

COMMUNITIES

SOUTHERN CROSS WIND FARM

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

PROJECTION: TRANSVERSE MERCATOR

DATUM: GDA 1994

UNITS: METER

SCALE: 1:500,000 @ A3

0

10

20 km

PROJECT NO: 4794-22

REV

AUTHOR

APPROVED

DATE

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LC

02/02/2023

MAP

05

# APPENDIX ONE

Table 4: EPBC Act categories for flora, fauna, and ecological communities

Category	Threatened species	Threatened Ecological Communities
<b>Extinct</b>	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.	n/a
<b>Extinct in the wild</b>	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.	n/a
<b>Critically Endangered (CE)</b>	A native species is eligible to be included in the <i>critically endangered</i> category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the <i>critically endangered</i> category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria
<b>Endangered (EN)</b>	A native species is eligible to be included in the <i>endangered</i> category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the <i>endangered</i> category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
<b>Vulnerable (VU)</b>	A native species is eligible to be included in the <i>vulnerable</i> category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.	An ecological community is eligible to be included in the <i>vulnerable</i> category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.



Category	Threatened species	Threatened Ecological Communities
Conservation Dependent	<p>A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:</p> <p>(a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or</p> <p>(b) the following subparagraphs are satisfied:</p> <p>(i) the species is a species of fish;</p> <p>(ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long-term survival in nature are maximised;</p> <p>(iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory;</p> <p>(iv) cessation of the plan of management would adversely affect the conservation status of the species.</p>	n/a

**Table 5: Conservation codes for Western Australian flora and fauna (DBCA 2019b)**

Conservation Codes for Western Australian Flora and Fauna	
Threatened, Extinct and Specially Protected fauna or flora <sup>1</sup> are species <sup>2</sup> which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.	
<b>The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the Biodiversity Conservation Act 2016.</b>	
<b>Categories of Threatened, Extinct and Specially Protected fauna and flora are:</b>	
<b>T</b>	<p><b>Threatened species</b></p> <p>Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the <i>Biodiversity Conservation Act 2016</i> (BC Act).</p> <p>Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for Threatened Fauna.</p> <p>Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for Threatened Flora.</p> <p>The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.</p>
<b>CR</b>	<p><b>Critically endangered species</b></p> <p>Threatened species considered to be "<i>facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines</i>".</p> <p>Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for critically endangered fauna or the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for critically endangered flora.</p>
<b>EN</b>	<p><b>Endangered species</b></p> <p>Threatened species considered to be "<i>facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines</i>".</p> <p>Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for endangered fauna or the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for endangered flora.</p>
<b>VU</b>	<p><b>Vulnerable species</b></p> <p>Threatened species considered to be "<i>facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines</i>".</p> <p>Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for vulnerable fauna or the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for vulnerable flora.</p>

## Conservation Codes for Western Australian Flora and Fauna

### Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

**EX**

#### Extinct species

Species where “*there is no reasonable doubt that the last member of the species has died*”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

**EW**

#### Extinct in the wild species

Species that “*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

### Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

**MI**

#### Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

**CD**

#### Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

**OS**

#### Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

**P**

#### Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

**1**

#### Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.



Conservation Codes for Western Australian Flora and Fauna	
<b>2</b>	<b>Priority 2: Poorly-known species</b> Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
<b>3</b>	<b>Priority 3: Poorly-known species</b> Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
<b>4</b>	<b>Priority 4: Rare, Near Threatened and other species in need of monitoring</b> (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
<sup>1</sup> The definition of flora includes algae, fungi and lichens. <sup>2</sup> Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).	

**Table 6: Conservation listed flora species records (DBCA; WA Herbarium) within a 25 km buffer around the survey area (Map 5), Threatened flora highlighted**

Taxon	DBCA Priority Status	BC Act Status	EPBC Act Status
<i>Acacia ancistrophylla</i> var. <i>perarcuata</i>	P3	-	-
<i>Acacia asepala</i>	P2	-	-
<i>Acacia concolorans</i>	P2	-	-
<i>Acacia crenulata</i>	P3	-	-
<i>Acacia cylindrica</i>	P3	-	-
<i>Acacia desertorum</i> var. <i>nudipes</i>	P3	-	-
<i>Acacia filifolia</i>	P3	-	-
<i>Acacia formidabilis</i>	P3	-	-
<i>Acacia merrickiae</i>	P4	-	-
<i>Balaustion grandibracteatum</i> subsp. <i>grandibracteatum</i>	P3	-	-
<i>Balaustion grandibracteatum</i> subsp. <i>juncturum</i>	P2	-	-
<i>Bossiaea</i> sp. Jackson Range (G. Cockerton & S. McNee LCS 13614)	P3	-	-
<i>Chamelaucium</i> sp. Parker Range (B.H. Smith 1255)	P1	-	-
<i>Cryptandra crispula</i>	P3	-	-
<i>Daviesia microcarpa</i>	T	T	EN
<i>Eremophila caerulea</i> subsp. <i>merrallii</i>	P4	-	-
<i>Eremophila inflata</i>	P4	-	-
<i>Eucalyptus calycogona</i> subsp. <i>miraculum</i>	P1	-	-
<i>Eucalyptus crucis</i> subsp. <i>crucis</i>	T	T	VU
<i>Eucalyptus polita</i>	P3	-	-
<i>Eucalyptus</i> sp. Dunbar Road (D. Nicolle & M. French DN 5466)	P1	-	-
<i>Eutaxia lasiocalyx</i>	P2	-	-
<i>Eutaxia rubricarina</i>	P3	-	-

Taxon	DBCA Priority Status	BC Act Status	EPBC Act Status
<i>Frankenia parvula</i>	T	T	EN
<i>Goodenia heatheriana</i>	P1	-	-
<i>Grevillea lissopleura</i>	P1	-	-
<i>Grevillea phillipsiana</i>	P1	-	-
<i>Hakea pendens</i>	P3	-	-
<i>Hemigenia</i> sp. Newdegate (E. Bishop 75)	P1	-	-
<i>Hydrocotyle corynophora</i>	P1	-	-
<i>Isopogon robustus</i>	T	T	CE
<i>Lepidium genistoides</i>	P3	-	-
<i>Lepidosperma</i> sp. Mt Caudan (N. Gibson & M. Lyons 2081)	P1	-	-
<i>Leucopogon</i> sp. Yellowdine (M. Hislop & F. Hort MH 3194)	P2	-	-
<i>Lepidosperma</i> sp. Parker Range (N. Gibson & M. Lyons 2094)	P1	-	-
<i>Leucopogon validus</i>	P1	-	-
<i>Lissanthe scabra</i>	P2	-	-
<i>Melichrus</i> sp. Coolgardie (K.R. Newbey 8698)	P1	-	-
<i>Microcorys</i> sp. Forrestania (V. English 2004)	P4	-	-
<i>Microseris walteri</i>	P3	-	-
<i>Millotia newbeyi</i>	P1	-	-
<i>Notisia intonsa</i>	P3	-	-
<i>Philothea falcata</i>	T	T	CE
<i>Phlegmatospermum eremaeum</i>	P3	-	-
<i>Prostanthera nanophylla</i>	P3	-	-
<i>Rinzia fimbriolata</i>	P1	-	-
<i>Rinzia torquata</i>	P3	-	-
<i>Rinzia medifila</i>	P1	-	-
<i>Rinzia triplex</i>	P3	-	-
<i>Stenanthemum bremerense</i>	P4	-	-
<i>Stylidium choreanthum</i>	P3	-	-
<i>Stylidium pulviniforme</i>	P3	-	-
<i>Teucrium diabolicum</i>	P3	-	-
<i>Verticordia dasystylis</i> subsp. <i>dasystylis</i>	P2	-	-
<i>Verticordia elizabethiae</i>	P1	-	-
<i>Verticordia mitodes</i>	P3	-	-
<i>Verticordia multiflora</i> subsp. <i>solox</i>	P2	-	-
<i>Verticordia stenopetala</i>	P3	-	-



## **Annexure 9:**

# **Aviation Impact Assessment**

**AVIATION PROJECTS: AVIATION IMPACT ASSESSMENT****SOUTHERN CROSS WIND FARM**

*Prepared for Yilgarn Holdings Pty Ltd*





## DOCUMENT CONTROL

Document Title: Southern Cross Wind Farm – Aviation Impact Assessment

Reference: 107801-02

Release Date: 01 February 2024

Prepared by: P White/J Bell

Reviewed by: P White

Released by: J Bell

## REVISION HISTORY

<i>Version</i>	<i>Description</i>	<i>Transmitted</i>	<i>Reviewed by</i>	<i>Date</i>
<b>0.1</b>	First Draft	15 September 2023	Yilgarn	17 September 2023
<b>0.2</b>	Second Draft – minor amendments	18 September 2023	Yilgarn	18 September 2023
<b>0.3</b>	Third draft – inclusion of Southern Cross aerodrome future operations	19 September 2023	Yilgarn	
<b>1.0</b>	Consultation results GAS feasibility study	01 February 2024		

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## ACRONYMS

AAAA	Aerial Agricultural Association of Australia
AC	Advisory Circular
AFAC	Australasian Fire and Emergency Services Council
AGL	above ground level
AHD	Australian Height Datum
AIA	aviation impact assessment
AIP	Aeronautical Information Package
AIS	aviation impact statement
ALA	aircraft landing area
ALARP	as low as reasonably practicable
AMSL	above mean sea level
ARP	Aerodrome Reference Point
AS	Australian Standards
AsA	Airservices Australia
ATSB	Australian Transport Safety Bureau
BoM	Bureau of Meteorology
CAAP	Civil Aviation Advisory Publications
CAO	Civil Aviation Orders
CAR	Civil Aviation Regulation (1988)
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation (1998)
CFIT	controlled flight into terrain
CNS	communications, navigation and surveillance
CTAF	common traffic advisory frequency
DAH	Designated Airspace Handbook
EIS	environmental impact statement
ERC-H	en-route chart high
ERC-L	en-route chart low
ERSA	En Route Supplement Australia
GA	general aviation



ICAO	International Civil Aviation Organization
IFR	instrument flight rules
IMC	instrument meteorological conditions
LGA	local government area
LSALT	lowest safe altitude
MOC	minimum obstacle clearance
MOS	Manual of Standards
MSA	minimum sector altitude
NASAG	National Airports Safeguarding Advisory Group
NASF	National Airports Safeguarding Framework
NDB	non-directional (radio) beacon
OLS	obstacle limitation surface
PANS-OPS	Procedures for Air Navigation Services - Aircraft Operations
PSR	primary surveillance radar
RAAF	Royal Australian Air Force
RFDS	Royal Flying Doctor Service
RPT	regular public transport
RSR	route surveillance radar
SSR	secondary surveillance radar
TIFP	terminal instrument flight procedures
VFR	visual flight rules
VFRG	visual flight rules guide
VMC	visual meteorological conditions
WMTs	wind monitoring towers
WTGs	wind turbine generators

## UNITS OF MEASUREMENT

ft	feet	(1 ft = 0.3048 m)
km	kilometres	(1 km = 0.5399 nm)
m	metres	(1 m = 3.281 ft)
nm	nautical miles	(1 nm = 1.852 km)

## DEFINITIONS

Definitions of key aviation terms are included in **Annexure 2**.



## EXECUTIVE SUMMARY

### Introduction

Yilgarn Holdings Pty Ltd (Yilgarn) is proposing to develop the Southern Cross Wind Farm (the Project), located approximately 12 km southeast of the outskirts of Southern Cross township and approximately 10 km southeast of Southern Cross aerodrome to the closest part of the Project Area, in Western Australia's Wheatbelt region.

Yilgarn is currently undertaking detailed planning and environment investigations for the Project and has engaged Aviation Projects to prepare an Aviation Impact Assessment (AIA) for the Project.

The Project is proposed to consist of a maximum of 10 wind turbine generators (WTGs).

The configuration of ancillary infrastructure including transmission lines and the Project substation is currently under investigation and not specified for this assessment.

This AIA has been prepared to support a development application by the Proponent for submission to the Shire of Yilgarn and for approval by the relevant Development Approval Assessment Panel (DAP) in accordance with the Western Australian planning framework.

This AIA assesses the potential aviation impacts associated with the Project and provides aviation safety advice in respect of relevant requirements of air safety regulations and procedures and informs and documents consultation with relevant aviation agencies.

This AIA report includes an Aviation Impact Statement (AIS) and a qualitative risk assessment to determine the need for obstacle lighting and marking for client review and acceptance before submission to external aviation regulators.

### Project description

The Southern Cross wind farm will comprise the following infrastructure relevant to this aviation impact assessment:

- up to 10 wind turbines with a maximum (worst-case) overall height (tip height) of up to 240 m above ground level (AGL)
- the highest proposed wind turbine generator (WTG) is WTG#1 with a ground elevation of 438 m Australian Height Datum (AHD) and overall height of 678 m AHD (2224.41ft AMSL)
- Associated power storage and transmission infrastructure (not yet specified).

### Conclusions

Based on a comprehensive analysis and assessment detailed in this report, the following conclusions were made:

#### *Certified airports*

1. The Project is within 30 nm of Southern Cross aerodrome and will affect the Procedures for Air Navigation Services - Aircraft Operations PANS-OPS surfaces.

The Project will not constrain the proposed implementation of instrument flight procedures aligned with runway 09/27 at Southern Cross aerodrome.

#### *Aircraft Landing Areas (ALAs)*

2. There are no verified ALAs in the vicinity of the Project.

#### *Obstacle Limitation Surfaces*

3. The Project will not infringe the obstacle limitation surface of any certified aerodrome.

#### *Air Routes and Lowest Safe Altitude*

4. The Project will impact the grid LSALT of 3000 ft (by 224.41 ft).

#### *Aviation Facilities*

5. The Project will not infringe any protection areas associated with aviation facilities.

#### *Radar*

6. The Project site is located outside the stated ranges of ATC Surveillance Radar Systems located in the Perth area.

#### **Aviation Impact Statement (AIS)**

7. Based on the Project WTG layout and maximum blade tip height of up to 240 m AGL, the blade tip elevation of the highest WTG associated with both proposed WTG configurations, will not exceed 678 m AHD (2224.41 ft AMSL) and:
  - will not infringe Southern Cross aerodrome (YSCR)'s obstacle limitation surfaces
  - infringes the PANS-OPS surfaces of Southern Cross aerodrome and will require amendments to both instrument approach procedures
  - the infringements to the YSCR PANS-OPS surfaces will not create an impact to the existing flight paths for runway 14/32
  - will not constrain the implementation of instrument flight procedures aligned with runway 09/27 at Southern Cross aerodrome – refer section 6.5
  - will require an increase to the LSALT for air route V242
  - will require an increase to the Grid LSALT to 2100 ft AMSL
  - will not have an impact on operational airspace
  - is wholly contained within Class G airspace
  - is outside the clearance zones associated with civil aviation navigation aids and communication facilities.

#### **Obstacle lighting risk assessment**

8. Aviation Projects has undertaken a safety risk assessment of the Project and concludes that WTGs don't require obstacle lighting to maintain an acceptable level of aviation safety. The use of obstacle lights are not specifically required by Part 139 MOS 2019 but may be recommended by CASA and should be considered as an additional safety measure. The Shire of Yilgarn have requested that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.



## Consultation

9. Refer to Section 5 for detailed responses from relevant aviation stakeholders.

## Summary of key recommendations

A summary of the key recommendations of this AIA is set out below.

The full list of recommendations and associated details are provided in Section 11 'Recommendations' at the end of this report.

1. 'As constructed' details of the coordinates and elevations of the WTGs should be provided to Airservices Australia, using the Vertical Obstruction Data form ([https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085\\_Vertical\\_Obstruction\\_Data\\_Form.pdf](https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf)) to the following email address: [vod@airservicesaustralia.com](mailto:vod@airservicesaustralia.com)
2. The proponent should liaise with the Shire of Yilgarn and plan for the implementation of terminal instrument flight procedures at Southern Cross aerodrome that are aligned with runway 09/27.
3. Details of the final wind farm layout should be provided to local and regional aircraft operators prior to construction so they can plan their operations accordingly, including the RFDS, RAAF, Maroomba Airlines and any other known IFR air transport operators to YSCR.
4. Details of the wind farm layout should be provided to the Shire of Yilgarn (as operator of Southern Cross aerodrome) so the wind farm location can be reported in En Route Supplement Australia (ERSA).
5. The turbines identified as T1, T6 and T7 on the 'Development Layout Plan' approved under Condition 7 are to be provided with 2000cd aviation hazard lighting that meets international standards, as required by the Shire of Yilgarn.
6. The rotor blades, nacelles and towers of the WTGs should be painted in white, typical of most wind turbines operational in Australia to ensure they are visible to pilots during the day.
7. Overhead transmission lines and/or supporting poles associated with the Project that are located where they could adversely affect aerial application operations should be identified in consultation with local aerial agriculture operators and marked in accordance with Part 139 Manual of Standards (MOS) Chapter 8 Division 10 section 8.110 (7) and section 8.110 (8) where applicable.

## 1. INTRODUCTION

### 1.1. Situation

Yilgarn Holdings Pty Ltd (Yilgarn) is proposing to develop the Southern Cross Wind Farm (the Project), located approximately 12 km southeast of the outskirts of Southern Cross township and approximately 10 km southeast of Southern Cross aerodrome to the closest part of the Project Area, in Western Australia's Wheatbelt region.

Yilgarn is currently undertaking detailed planning and environment investigations for the Project and has engaged Aviation Projects to prepare an Aviation Impact Assessment (AIA) for the Project.

The Project is proposed to consist of a maximum of 10 wind turbine generators (WTGs).

The configuration of ancillary infrastructure including transmission lines and the Project substation is currently under investigation and not specified for this assessment. This AIA assesses the potential aviation impacts, provides aviation safety advice in respect of relevant requirements of air safety regulations and procedures, and informs and documents consultation with relevant aviation agencies.

This AIA report includes an Aviation Impact Statement (AIS) and a qualitative risk assessment to determine the need for obstacle lighting and other applicable mitigation for client review and acceptance before submission to external aviation agencies.

The AIA and supporting technical data will provide evidence and analysis supporting the development application to demonstrate that appropriate risk mitigation strategies have been identified.

### 1.2. Purpose and Scope

The purpose and scope of work is to prepare an AIA for consideration by Airservices Australia, CASA and Department of Defence and support a development application to be submitted to the Shire of Yilgarn.

The AIA specifically responds to the following key legislation, approvals, and guidance material:

- WA Government Department of Planning, Lands and Heritage, Position Statement: Renewable energy facilities, March 2020
- Civil Aviation Safety Authority, Civil Aviation Safety Regulations 1998 (CASR) and associated material
- NASF Guideline D: Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers
- Other specific requirements as advised by Airservices Australia.

Assistance will be provided in support of stakeholder consultation and engagement in preparing the assessment and negotiating acceptable mitigation to identified impacts.

### 1.3. Methodology

Aviation Projects conducted the task in accordance with the following methodology:

1. Confirm the scope and deliverables with the Proponent (or representative)
2. Review client material
3. Review relevant regulatory requirements and information sources



4. Prepare a draft AIA and supporting technical data that provides evidence and analysis for the planning application to demonstrate that appropriate risk mitigation strategies have been identified
5. Prepare an AIS and a qualitative risk assessment to determine need for obstacle lighting and marking
6. Identify risk mitigation strategies that provide an acceptable alternative to night lighting. The risk assessment was completed following the guidelines in *ISO 31000:2018 Risk Management – Guidelines*
7. Consult with relevant Councils (if required), Part 173 procedure designers (if required) and aerodrome operators of the nearest aerodrome/s to seek endorsement of the proposal to change instrument procedures (if applicable)
8. Consult/engage with stakeholders to negotiate acceptable outcomes (if required)
9. Finalise the AIA report for client acceptance when responses received from stakeholders for client review and acceptance.

#### **1.4. Aviation Impact Statement (AIS)**

The AIS included in this report (see Section 6) includes the following specific requirements as advised by Airservices Australia:

##### **Aerodromes:**

- Specify all certified aerodromes that are located within 30 nm (55.56 km) of the project site
- Nominate all instrument approach and landing procedures at these aerodromes
- Review the potential effect of the Project operations on the operational airspace of the aerodrome(s)

##### **Air Routes:**

- Nominate air routes published in ERC-L & ERC-H which are located near/over the project site and review potential impacts of Project operations on aircraft using those air routes
- Specify two waypoint names located on the routes which are located before and after the obstacles

##### **Airspace:**

- Nominate the airspace classification – A, B, C, D, E, G etc where the project site is located

##### **Navigation/Radar:**

- Nominate radar navigation systems with coverage overlapping the site.

#### **1.5. Material reviewed**

Material provided by the Proponent for preparation of this assessment include:

- SCWF Aviation AHD Info 240 m.xlsx
- SCWF Aviation AHD Info 250m.xlsx
- SCWF Layout 230912.jpg
- SCWF North Updated Layout Aug 2023.jpg

- SCWF South Updated Layout Aug 2023.jpg
- Southern Cross Location Plan.pdf
- Southern Cross Wind Farm Layout.pdf
- WTG Config.jpg.
- Instrument flight procedure feasibility study, *GLOBAL-24-185 - Feasibility Study Southern Cross Aerodrome RNP APCH RWY 09-27 v0.1*



## 2. BACKGROUND

### 2.1. Site overview

The closest township to the wind farm is Southern Cross, approximately 12 km northwest from the closest part of the Project Area. The City of Perth is located approximately 330 km west of the Project Area.

The Project is located in the Shire of Yilgarn Local Government Area (LGA).

An overview of the Project Area is provided in Figure 1 (source: Yilgarn, Google Earth).

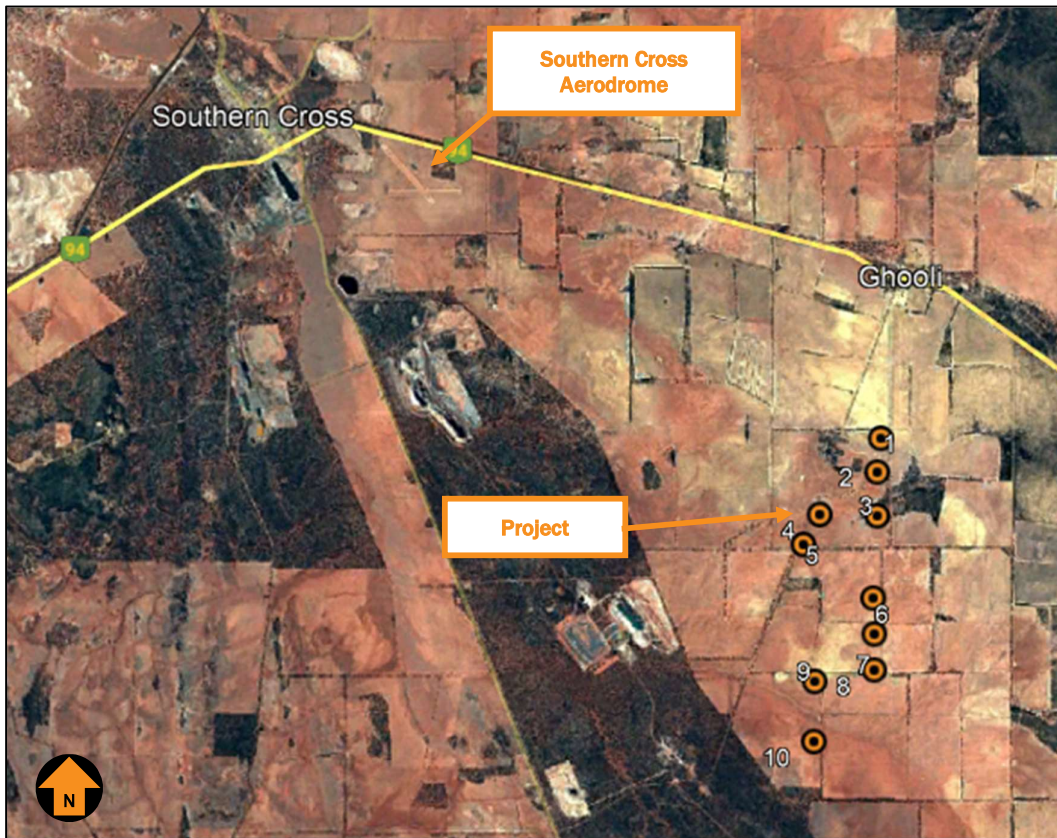


Figure 1 Project Site Overview

### 2.2. Project description

The Southern Cross wind farm is proposed to include the development of wind turbines with a hub height of 150 m AGL, 180 m rotor diameter and maximum tip height of 240 m AGL.

The configuration WTGs is shown relative to the location of Southern Cross aerodrome (YSCR) in Figure 2 (Source, Yilgarn, Google Earth).

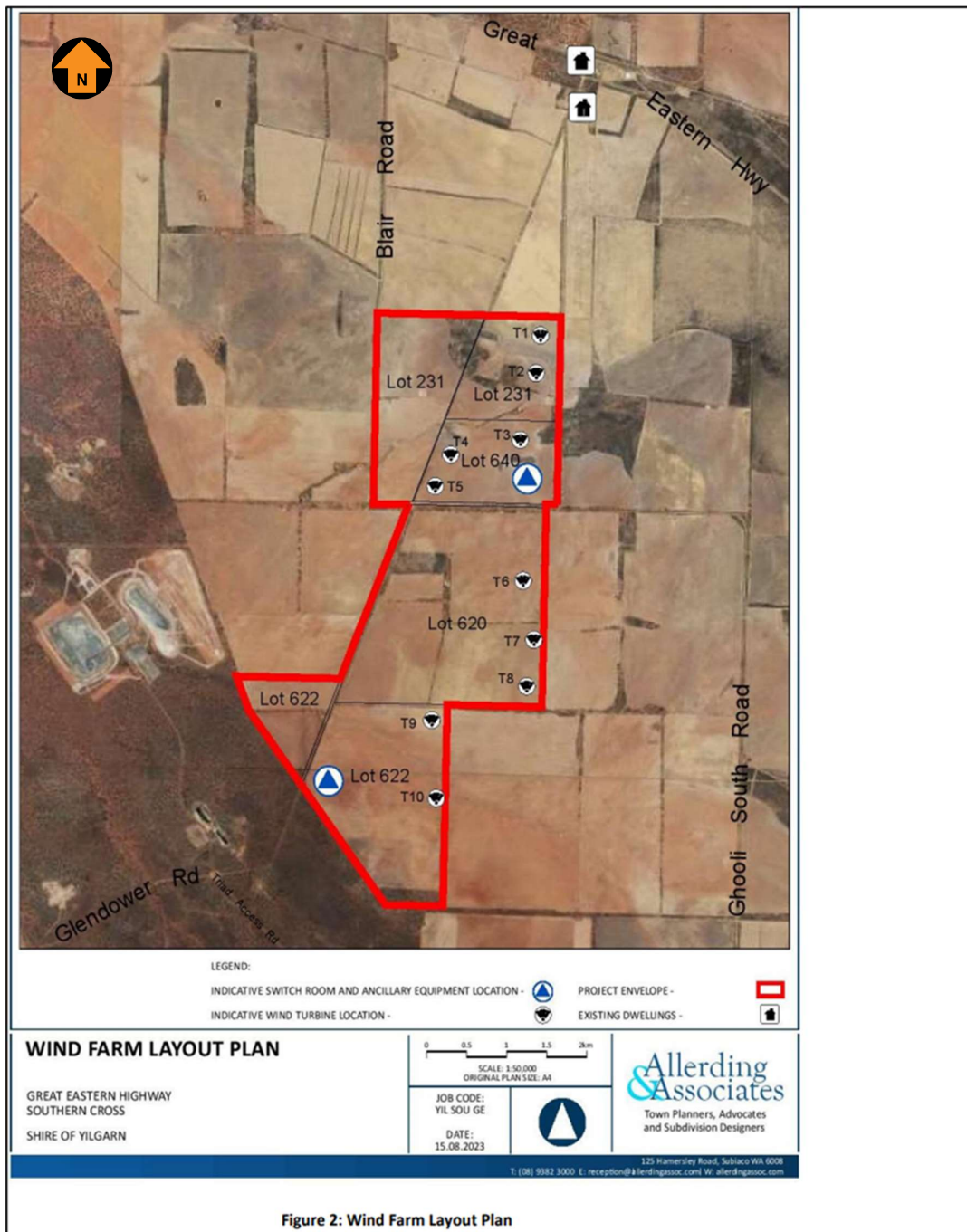


Figure 2 WTG Layout

The configuration of the transmission lines and substation is still under investigation and not specified for this assessment.

Table 1 shows the location(s) and site elevation(s) for each proposed WTG site (Source, Yilgarn)

The WTG location responsible for the maximum Project height is highlighted.

The maximum Project height is identified as:

- WTG1, with a maximum tip height of 678 m AHD (2224.41 ft AMSL)

Table 1 WTG location and elevation

<i>WTG #</i>	<i>Easting</i>	<i>Northing</i>	<i>Terrain Elevation (m AHD)</i>	<i>WTG Max Height (m AGL)</i>	<i>WTG Tip Height (m AGL)</i>	<i>WTG Tip Height (ft AMSL)</i>
<b>1</b>	<b>733567.00</b>	<b>6536327.00</b>	<b>438</b>	<b>240</b>	<b>678</b>	<b>2224.41</b>
<b>2</b>	733483.00	6535674.00	424	240	664	2178.48
<b>3</b>	733468.00	6534828.00	422	240	662	2171.92
<b>4</b>	732349.00	6534880.00	408	240	648	2125.98
<b>5</b>	732019.00	6534307.00	400	240	640	2099.74
<b>6</b>	733357.00	6533235.00	398	240	638	2093.18
<b>7</b>	733367.00	6532536.00	393	240	633	2076.77
<b>8</b>	733351.00	6531837.00	387	240	627	2057.09
<b>9</b>	732184.00	6531641.00	379	240	619	2030.84
<b>10</b>	732142.00	6530471.00	381	240	621	2037.40

### 2.3. Wind monitoring tower description

A wind monitoring tower (WMT) will be installed in the central part of the Project Area with a maximum height of 120 m AGL.

Aviation Projects conducted a separate aviation impact assessment for the proposed WMT on 8 September 2023 (Reference 107801-01).

Table 2 provides the full details of the WMT.

Table 2 WMT Details

<i>Item</i>	<i>WMT</i>
<b>Location (Lat, Lon)</b>	31°18'18"S 119°26'23"E
<b>Ground elevation at site (approximate)</b>	393 m AHD
<b>Height of WMT AGL</b>	120 m AGL
<b>Height of tower</b>	513 m AHD (1683 ft AMSL)
<b>Reported to Aircservices Australia?</b>	TBA when final location is determined



### 3. EXTERNAL CONTEXT

This chapter explores the federal, state, and local planning context that may impact the Project. Each section will explore and respond to the planning context to identify any conflict between the Project and applicable planning requirements.

#### 3.1. Western Australia Planning Commission

The Western Australian Planning Commission normally administers responsibility for approving renewable energy facilities through local councils.

The Department of Planning, Lands and Heritage has published Position Statement: Renewable energy facilities (March 2020) on behalf the Western Australia Planning Commission. These guidelines provide advice to inform planning decisions about a wind energy facility proposal.

The intent of this position statement is to:

- outline the Western Australian Planning Commission (WAPC) requirements to support the consistent consideration and provision of renewable energy facilities within Western Australia
- identify assessment measures to facilitate appropriate development of renewable energy facilities.

The position statement applies to the preparation and assessment of planning instruments including regional and local planning schemes and strategies.

The position statement supersedes Planning Bulletin 67 Guidelines for Wind Farm Development (2004).

Section 5.3.1 *Community consultation* and Section 5.3.5 *Public and aviation safety* are relevant to this AIA and are extracted below:

##### **Section 5.3.1 Community consultation**

*Early consultation with the community and stakeholders by the proponents is encouraged to ensure that the proposal is compatible with existing land uses on and near the site. The local government should be consulted with respect to the community consultation program. Relevant stakeholders may include:*

- Air Services Australia
- Australian Wind Alliance
- Civil Aviation Safety Authority

##### **5.3.5 Public and aviation safety**

*Proponents of wind turbine proposals should refer to the National Airports Safeguarding Framework (NASF) Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installation (Wind Farms) / Wind Monitoring Towers to determine any potential aviation safety risks and possible mitigation measures.*

*Any potential aviation safety risks identified require consultation with Civil Aviation Safety Authority (CASA), Air Services Australia and/or the Commonwealth Department of Defence.*

The position paper defines renewable energy facility as premises used to generate energy from a renewable energy source and includes any building or other structure used in, or relating to, the generation of energy by a renewable resource. It does not include renewable energy electricity generation where the energy produced principally supplies a domestic and/or business premises and any on selling to the grid is secondary.

It is considered that the intent of the Position Paper is met through the completion of this aviation impact assessment, including consultation with key aviation stakeholder and reference to (NASF) Guideline D and other specific requirements for Airservices Australia and CASA.

### **3.2. National Airports Safeguarding Framework**

The National Airports Safeguarding Advisory Group (NASAG) was established by Commonwealth Department of Infrastructure and Transport to develop a national land use planning framework called the National Airports Safeguarding Framework (NASF). The purpose of the NASF is to enhance the current and future safety, viability, and growth of aviation operations at Australian airports through:

- the implementation of best practice in relation to land use assessment and decision making in the vicinity of airports
- assurance of community safety and amenity near airports
- better understanding and recognition of aviation safety requirements and aircraft noise impacts in land use and related planning decisions
- the provision of greater certainty and clarity for developers and landowners
- improvements to regulatory certainty and efficiency
- the publication and dissemination of information on best practice in land use and related planning that supports the safe and efficient operation of airports.

NASF Guideline D: *Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers*, provides guidance to State/Territory and local government decision makers, airport operators and developers of wind farms to jointly address the risk to civil aviation arising from the development, presence and use of wind farms and WMTs.

The methodology for preparing the risk assessment is contained in the NASF Guideline D *Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation*.

The risk assessment will have regard to all potential aviation activities within the vicinity of the Project site including recreation, commercial, civil (including for agricultural purposes) and military operations.

NASF Guideline D strongly encourages consultation with aviation stakeholders in the early stages of wind farm development planning, including with aerodrome owners and operators, regional aircraft operators and CASA and Airservices.

### **3.3. Aircraft operations at non-controlled aerodromes**

Advisory Circulars (ACs) provide advice and guidance from CASA to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements. Advisory Circular (AC) 91-10 v1.1 *Operations in the vicinity of non-controlled aerodromes* provides guidance for pilots flying at or in the vicinity of non-controlled aerodromes, with respect to CASR 91.

A conventional circuit pattern and heights are provided in AC 91-10 v1.1. The standard circuit consists of a series of flight paths known as *legs* when departing, arrival or when conducting circuit practice. Illustrations of the standard aerodrome traffic circuit procedures provided in AC 91-10 v1.1. are shown in Figure 3 and Figure 4.

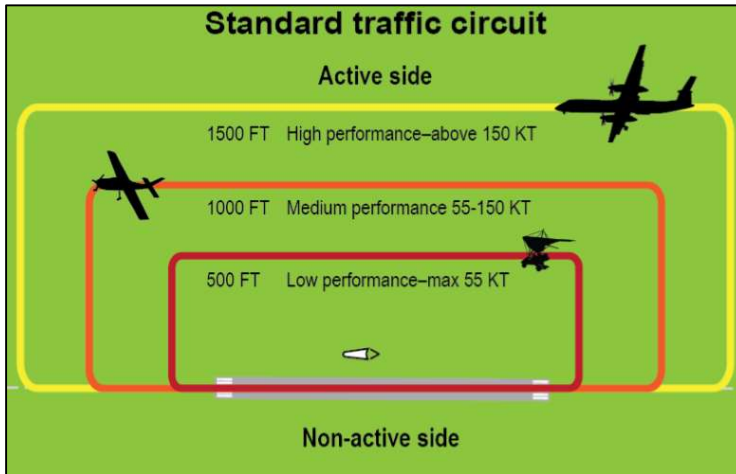


Figure 3 Lateral and vertical separation in the standard aerodrome traffic circuit

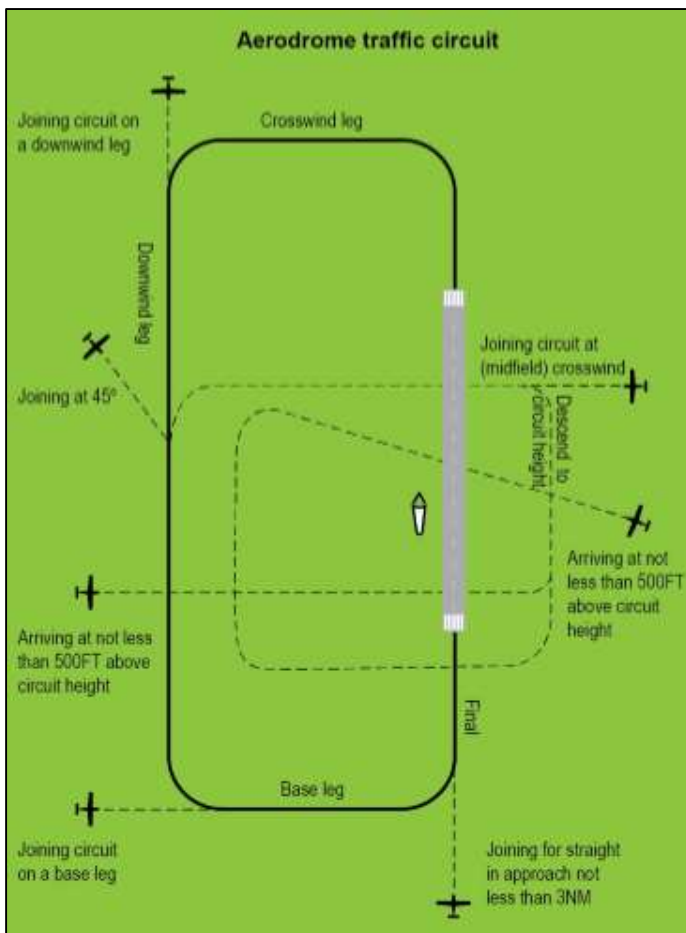


Figure 4 Aerodrome standard traffic circuit, showing arrival and joining procedures



AC 91-10 v1.1. paragraph 7.10 makes reference to a distance that is “normally” well outside the circuit area and where no traffic conflict exists, which is at least 3 nm (5556 m). The paragraph is copied below:

*7.10 Departing the circuit area*

*7.10.1 Aircraft should depart the aerodrome circuit area by extending one of the standard circuit legs or climbing to depart overhead. However, the aircraft should not execute a turn to fly against the circuit direction unless the aircraft is well outside the circuit area and no traffic conflict exists. This will normally be at least 3 NM from the departure end of the runway, but may be less for aircraft with high climb performance. In all cases, the distance should be based on the pilot’s awareness of traffic and the ability of the aircraft to climb above and clear of the circuit area.*

### **3.4. Rules of flight**

#### **3.4.1. Flight under Day Visual Flight Rules (VFR)**

According to Aeronautical Information Publication (AIP) the meteorological conditions required for visual flight in the applicable (Class G) airspace at or below 3000 ft AMSL or 1000 ft AGL whichever is the higher are: 5000 m visibility, clear of clouds and in sight of ground or water.

Civil Aviation Safety Regulation (1998) 91.267 (Minimum height rules—other areas) prescribes the minimum height for flight. Generally speaking, and unless otherwise approved, aircraft are restricted to a minimum height of 500 ft AGL above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas, and 1000 ft AGL over built up areas (within a horizontal radius of 600 m of the point on the ground or water immediately below the aeroplane).

These height restrictions do not apply if through stress of weather or any other unavoidable cause it is essential that a lower height be maintained.

Flight below these height restrictions is also permitted in certain other circumstances.

#### **3.4.2. Night VFR**

With respect to flight under the VFR at night, Civil Aviation Safety Regulations (1998) 91.277 requires that the pilot in command of an aircraft flying VFR at night must not fly below the following heights (unless during take-off and landing operations, within 3 nm of an aerodrome, or with an air traffic control clearance):

- a) *the published lowest safe altitude for the route or route segment (if any);*
- b) *the minimum sector altitude published in the authorised aeronautical information for the flight (if any);*
- c) *the lowest safe altitude for the route or route segment;*
- d) *1,000 ft above the highest obstacle on the ground or water within 10 nautical miles ahead of, and to either side of, the aircraft at that point on the route or route segment;*
- e) *the lowest altitude for the route or route segment calculated in accordance with a method prescribed by the Part 91 Manual of Standards for the purposes of this paragraph.*

#### **3.4.3. Instrument Flight Rules ( IFR) (Day or night)**

According to CASR 91, flight under the instrument flight rules (IFR) requires an aircraft to be operated at a height clear of obstacles that is calculated according to an approved method.

### **3.5. Aircraft operator characteristics**

Aircraft operations in the vicinity of the Project area may include private, air transport, flight training and aerial work operations. High-capacity air transport operations will also occur at Southern Cross aerodrome associated with chartered aircraft servicing nearby mining operations.

There may be some aerial application and aerial firefighting operations conducted in the vicinity of the Project Area.

Air transport operations are generally conducted under the instrument flying rules (IFR), while aerial work and private and recreational activities are likely to be conducted under visual flying rules (VFR).

Operations conducted under VFR are required to remain in visual meteorological conditions (VMC) (at least 5,000 m horizontal visibility at a similar height of the wind turbines) and clear of the highest point of the terrain by 500 ft vertical distance and 300 m horizontal distance. In visual meteorological conditions (VMC), the wind turbines will likely be sufficiently conspicuous to allow adequate time for pilots to avoid the obstacles. VFR operators will most likely avoid the Project Area once wind turbines are erected.

IFR and Night VFR (which are required to conform to IFR applicable altitude requirements) aircraft operations are addressed in Section 6.

### **3.6. Private operations**

Private operations are generally conducted under day or night VFR, with some IFR. Flight under day VFR is conducted above 500 ft AGL.

There is likely to be private operations conducted in the vicinity of the Project, associated with approach and departure procedures from Southern Cross aerodrome.

### **3.7. Military operations**

There may be some high-speed low-level military jet aircraft and helicopter operations conducted in the area.

### **3.8. Aerial application operations**

Aerial application operations including such activities as fertiliser, pest and crop spraying are generally conducted under day VFR below 500 ft AGL; usually between 6.5 ft (2 m) and 100 ft (30.5 m) AGL.

The standard response from the Aerial Application Association of Australia in relation to wind farms has been included in Section 3.12 (below) for reference. Objections to windfarms are generally related to large scale wind farm projects in active areas of agriculture located in the vicinity of aerial agriculture operations.

There may be aerial application operations associated with fertiliser, pest and crop spraying in the area.

### **3.9. Aerial Application Association of Australia (AAAA)**

In previous consultation with the AAAA, Aviation Projects has been directed to the AAAA Windfarm Policy (dated March 2011) which states in part:

*As a result of the overwhelming safety and economic impact of wind farms and supporting infrastructure on the sector, AAAA opposes all wind farm developments in areas of agricultural production or elevated bushfire risk.*

*In other areas, AAAA is also opposed to wind farm developments unless the developer is able to clearly demonstrate they have:*

- 1. consulted honestly and in detail with local aerial application operators;*
- 2. sought and received an independent aerial application expert opinion on the safety and economic impacts of the proposed development;*
- 3. clearly and fairly identified that there will be no short or long term impact on the aerial application industry from either safety or economic perspectives;*
- 4. if there is an identified impact on local aerial application operators, provided a legally binding agreement for compensation over a fair period of years for loss of income to the aerial operators affected; and*
- 5. adequately marked any wind farm infrastructure and advised pilots of its presence.*

AAAA had developed National Windfarm Operating Protocols (adopted May 2014). These protocols note the following comments:

*At the development stage, AAAA remains strongly opposed to all windfarms that are proposed to be built on agricultural land or land that is likely to be affected by bushfire. These areas are of critical safety importance to legitimate and legal low-level operations, such as those encountered during crop protection, pasture fertilisation or firebombing operations.*

*However, AAAA realises that some wind farm proposals may be approved in areas where aerial application takes place. In those circumstances, AAAA has developed the following national operational protocols to support a consistent approach to aerial application where windfarms are in the operational vicinity.*

The protocols list considerations for developers during the design/build stage and the operational stage, for pilots/aircraft operators during aircraft operations and discusses economic compensation. NASF Guideline D is included in the Protocols document as Appendix 1, and AAAA Aerial Application Pilots Manual – excerpts on planning are provided as Appendix II.

This AIA has been prepared in consideration of the National Windfarm Operating Protocols, noting there are no known aerial application operations associated with fertiliser, pest and crop spraying in the area.

### **3.10. Local aerial application operators**

Aerial application operators consulted in previous studies undertaken by Aviation Projects have stated that a wind farm would, in all likelihood, prevent aerial agricultural operations in that particular area, but that properties adjacent to the wind farm would have to be assessed on an individual basis.

Aerial application operators generally align their positions with the AAAA policies.

Based on previous studies undertaken by Aviation Projects, and subject to the results of consultation with AAAA and any further consultation with local aerial application operators, it is reasonable to conclude that safe aerial application operations would still be possible on properties within the Project site and neighbouring the Project site, by implementing recommendations provided in this report.



The use of helicopters enables aerial application operations to be conducted in closer proximity to obstacles than would be possible with fixed wing aircraft due to their greater manoeuvrability.

It is possible that fixed wing aerial agriculture operations will be conducted in the vicinity of the Project.

### **3.11. Aeromedical services – Royal Flying Doctor Service**

Royal Flying Doctor Service (RFDS) and other emergency services operations are generally conducted under the IFR, except when arriving/departing a destination that is not serviced by instrument approach aids or procedures.

RFDS WA also operates 2 Heli-Med Service EC145 helicopters from their Jandakot airport base, which may also operate directly to/from Southern Cross aerodrome.

Most emergency aviation services organisations have formal risk management programs to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained.

### **3.12. Aerial firefighting**

Aerial firefighting operations (firebombing in particular) are conducted under Day VFR, sometimes below 500 ft AGL. Under certain conditions visibility may be reduced/limited by smoke/haze.

Most aerial firefighting organisations have formal risk management programs to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained. For example, pilots require specific training and approvals, additional equipment is installed in the aircraft, and special procedures are developed.

The Australasian Fire and Emergency Services Council (AFAC) has developed a national position on wind farms, their development and operations in relation to bushfire prevention, preparedness, response and recovery, set out in the document titled *Wind Farms and Bushfire Operations*, version 3.0, dated 25 October 2018.

Of specific interest in this document is the section extracted verbatim from under the 'Response' heading, copied below:

*Wind farm operators should be responsible for ensuring that the relevant emergency protocols and plans are properly executed in an emergency event. During an emergency, operators need to react quickly to ensure they can assist and intervene in accordance with their planned procedures.*

*The developer or operator should ensure that:*

- *liaison with the relevant fire and land management agencies is ongoing and effective*
- *access is available to the wind farm site by emergency services response for on-ground firefighting operations*
- *wind turbines are shut down immediately during emergency operations – where possible, blades should be stopped in the 'Y' or 'rabbit ear' position, as this positioning allows for the maximum airspace for aircraft to manoeuvre underneath the blades and removes one of the blades as a potential obstacle.*

*Aerial personnel should assess risks posed by aerial obstacles, wake turbulence and moving blades in accordance with routine procedures.*

## 4. INTERNAL CONTEXT

### 4.1. Wind farm description

The Southern Cross Wind Farm will comprise of a maximum of 10 WTGs at 240 m AGL tip height, together with associated infrastructure.

The Project is located approximately 12 km southeast of the town of Southern Cross, and approximately 10 km (3.6 nm) southeast of Southern Cross aerodrome.

The Project will be located on rural cropping and pastoral land.

The main permanent wind farm components of the proposed Project will include the following:

- A maximum of 10 WTGs with a maximum tip height of 240 m AGL
- transformer
- hard standing areas for WTG construction
- overhead cabling and unground cabling as required (linking WTGs to site sub-station)
- access roads to WTG sites

Figure 5, Figure 6 and Figure 7 shows the general nature of the Project area. These locations are generally representative of the nature of Project area for all proposed WTG sites.



Figure 5 Northeast Project area



Figure 6 Central Project area



Figure 7 Western Project area



## 4.2. Grid transmission

The configuration of the grid transmission and distribution equipment is still under investigation and not specified for this assessment. It is anticipated that underground cables will be used for connection between the WTGs and the grid. An overhead transmission line exists in the Project Area already.

Figure 8 shows the nature of the existing overhead transmission line travelling east-west located in the Central part of the Project Area.



Figure 8 Transmission line located in central Project Area

## 5. CONSULTATION

The following list of stakeholders were identified as requiring consultation:

- Airservices Australia
- Royal Flying Doctor Service
- Department of Defence
- Shire of Yilgarn
- Aerodrome Management Services
- Regional aircraft operators

Details and results of the consultation activities are provided in Table 3.

Table 3 Stakeholder consultation details

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
Airservices Australia	19 September 2023	19 December 2023, by Alex Blight  Airspace Development & Protection Coordinator	<p><i>I refer to your request for an Airservices assessment of the proposed Southern Cross Wind Farm.</i></p> <p><b>Airspace Procedures</b></p> <p><i>With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Doc 9905, at a maximum height of 678m/2225ft AHD the wind farm will affect the 10nm MSA and 25nm MSA at Southern Cross aerodrome.</i></p> <p><i>The 10nm MSA minimum altitude will need to be raised by 500ft from 2800ft to 3300ft and the 25nm MSA minimum altitude will need to be raised by 400ft from 2900ft to 3300ft over the wind farm.</i></p> <p><i>The maximum height of the wind farm without affecting any procedures in Southern Cross aerodrome is 553.5m/1816ft AHD.</i></p> <p><b>Note:</b> Procedures not designed by Airservices at Southern Cross aerodrome were not considered in this assessment.</p> <p><b>Communications/Navigation/Surveillance (CNS) Facilities</b></p> <p><i>We have assessed the proposed activity to the above specified height for any impacts to Airservices Precision/Non-Precision Navigation Aids, Anemometers, HF/VHF/UHF Communications, A-SMGCS, Radar, PRM,</i></p>	<p>Continue to engage with Shire of Yilgarn and confirm their acceptance of the proposed impacts.</p> <p>Provide written confirmation to Airservices Australia once acceptance is provided.</p>



Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			<p>ADS-B, WAM or Satellite/Links and have no objections to it proceeding.</p> <p><b>Air Traffic Control (ATC) Operations</b></p> <p>There are no additional instructions or concerns from our ATC.</p> <p><b>Summary</b></p> <p>It is our view that the proposed Wind Farm impacts Airservices designed airspace procedures at Southern Cross aerodrome. Please consult with the aerodrome and aviation operators to ensure that they accept the proposed changes. We need confirmation from the aerodrome before we make any changes.</p> <p>All amendments to airspace procedures are on a commercial basis.</p> <p><b>Grid lowest safe altitude (LSALT)</b></p> <p>It is our view that the proposed Wind Farm will impact the published Grid LSALT. The Grid LSALT will need to be increased to 2100 ft.</p> <p>Please advise the Vertical Obstacle Data (VOD) team at <a href="mailto:VOD@airservicesaustralia.com">VOD@airservicesaustralia.com</a> of any need to increase Grid LSALT heights at least two (2) weeks before construction commencing by supplying the below information:</p>	

## AVIATION PROJECTS

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			<ul style="list-style-type: none"> <li>Approved wind turbine locations</li> <li>Elevations at the top of the highest point of the turbine in metres AHD</li> <li>A copy of this email</li> </ul>	
Civil Aviation Safety Authority	Email sent 15 September 2023	18 September 2023 – David Russell, aerodrome inspector	<i>In regard to the wind farm proposal below, the aerodromes inspector team wouldn't be involved in the process as there is no impact on the OLS. The notification from the proponent will go directly to the airspace protection team within CASA and they are the team that would give out any general advice (if any) re wind farm projects. Their email is <a href="mailto:Airspace.Protection@casa.gov.au">Airspace.Protection@casa.gov.au</a></i>	The proponent of the wind farm will need to report the Project to CASA in accordance with CASR Part 139.165.
Royal Flying Doctor Service	19 September 2023	10 January 2024 – Albin Unger, Head of Flying operations	<i>The changes to the MSA will not adversely affect the RFDS operations at YSCR, as we would conduct an IAP as you stated.</i>	N/A
Shire of Yilgarn	Planning Conditions	12 December 2023	<p><i>Prior to commencement of works, an updated Aviation Impact Assessment shall be lodged to the local government for separate written approval, that reflects that the procedures will be changed to implement an 'instrument approach' to runway 09/27.</i></p> <p><i>Prior to commencing any works, the applicant/developer is to advise the following entities regarding the construction of the wind turbines, including estimated dates of installation, details of exact locations and heights</i></p> <ul style="list-style-type: none"> <li>–</li> <li>O Civil Aviation Safety Authority (CASA);</li> <li>O Air Services Australia;</li> </ul>	<p>Aviation Impact Assessment to be updated accordingly (v1.0)</p> <p>Proponent to investigate the implementation of instrument flight procedures for runway 09/27.</p> <p>Proponent to communicate with identified stakeholders prior to construction commencing.</p> <p>Provide obstacle lighting on T1, T6 and T7.</p>

## AVIATION PROJECTS

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			<p>O Royal Flying Doctor Service;</p> <p>O Royal Australian Air Force;</p> <p>O Maroomba Airlines and any known commercial operator using the existing aerodrome.</p> <p>O The Shire of Yilgarn.</p> <p>The turbines identified as T1, T6 and T7 on the 'Development Layout Plan' approved under Condition 7 are to be provided with 2000 cd aviation hazard lighting that meets international standards.</p>	
Maroomba airlines		19 October 2023 (letter to Shire of Yilgarn)	<p>Thank you for giving Maroomba Airlines the opportunity to submit comments regarding the application of the Southern Cross Wind Farm.</p> <p>Maroomba Airlines currently operates four regular passenger services a week to the Southern Cross aerodrome utilising the 50 seat DeHavilland DHC8 aircraft.</p> <p>Although the Southern Cross aerodrome has two runways, only runway 09/27 is available for operations with the DeHavilland DHC8 due to the size of the aircraft and the characteristics of runway 14/32.</p> <p>Operations onto runway 09/27 is under visual conditions only as there is no specific instrument approach on this runway. When operating under visual conditions the lowest our aircraft is permitted to descend prior to being visual with the aerodrome is to the GRID LSALT, once visual or within 10nm of the aerodrome a decent to the MSA is permitted. With the proposed location of the</p>	This assessment was updated to include commentary on implementation of instrument flight procedures to runway 09/27.



## AVIATION PROJECTS

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			<p>Southern Cross Wind Farm its anticipated that the GRID LSALT will be increased by c.300ft, and the MSA will be increased by 500ft. This represents an increase of 10% and 18% respectively.</p> <p>With the above data, Maroomba strongly disagrees with the statements made in 6.6 "An increase to the Grid LSALT should not create an adverse impact to flight operations in the area." And those made in 6.4.3 "An increase to the minimum altitude for the 10 nm MSA to 3300 ft AMSL would not create an adverse impact".</p> <p>The location of the wind farm will have a direct and measurable impact on our operations, particularly in the winter months. This impact will in turn affect the businesses that we supply services to and as such the economic viability of the operations in the area.</p> <p>We welcome further discussions on this topic and are available with appropriate notice.</p>	
Maroomba airlines	10 January 2024 (additional engagement based on proposed mitigation to impacts identified earlier)		<p>Afternoon Jarrod, Appreciate you reaching out for our input. I have answered your queries below:</p> <ul style="list-style-type: none"> <li>Maroomba Operations manual does not permit our pilots to perform circling manoeuvres from the Circling MDA, this is considered too higher risk with a transport category aircraft such as the DHC8. We are unable to land on Rwy 14/32</li> </ul>	Proceed with implementation of RNP non-precision procedures to runway 09/27

## AVIATION PROJECTS

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			<p>due to the runway width which limits our ability to perform a 180deg turn at runway ends.</p> <ul style="list-style-type: none"><li>• If an RNP approach was developed that was runway aligned with 09/27 our pilots are approved to descend to the Circling MDA as this would not require a circling manoeuvre to land.</li></ul>	

## 6. AVIATION IMPACT STATEMENT

### 6.1. Overview

The NASF Guideline D: *Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* provides information to proponents and planning authorities to help identify any potential safety risks posed by WTG and wind monitoring installations from an aviation perspective.

Potential safety risks include (but are not limited to) impacts on flight procedures and aviation communications, navigation, and surveillance (CNS) facilities which require assessment by Airservices Australia.

To facilitate these assessments all wind farm proposals submitted to Airservices Australia must include an Aviation Impact Statement (AIS).

This analysis considered the aeronautical impact of the WTGs on the following:

- The operation of nearby certified aerodromes
- The operation of nearby aircraft landing areas (uncertified aerodromes)
- Grid and air route LSALTS
- Airspace protection
- Aviation facilities
- Radar installations
- Local aircraft operations.

### 6.2. Nearby certified aerodromes

The area of 30 nm (56 km) from a certified airport's aerodrome reference point (ARP) is used to identify possible constraints from the Project.

The 30 nm radius represents the 25 nm minimum sector altitude (MSA) for aerodromes with terminal instrument flight procedures. The 25 nm MSA minimum altitude is determined by assessing obstacles within 30 nm of the reference point.

The Project Area is located within 30 nm (55.56 km) of Southern Cross aerodrome. There are no other certified aerodromes within 30 nm of the Project.

### 6.3. Nearby aircraft landing areas (ALAs)

As a guide, an area of interest within a 3 nm radius of an aircraft landing area (ALA – uncertified aerodrome) is used to assess potential impacts of proposed developments on aircraft operations at or within the vicinity of the ALA.

A search on OzRunways, which sources its data from Airservices Australia (AIP) and Aircraft Owners and Pilots Association (AOPA) Australia Airfield Directory, did not identify any verified ALAs within 3nm from the Project. The aeronautical data provided by OzRunways is approved under CASA CASR Part 175.



## 6.4. Southern Cross aerodrome (YSCR)

Southern Cross aerodrome (YSCR) is a certified aerodrome located approximately 5 nm northwest of the Project Area boundary (to the threshold of runway 32), owned and operated by the Shire of Yilgarn.

A check of Aeronautical Information Package (AIP) via the Airservices Australia website showed that Southern Cross aerodrome is served by non-precision instrument flight procedures (source: AsA, effective 30 November 2023).

Figure 9 shows an excerpt of the published operating profile for Southern Cross Aerodrome (Source: Airservices Australia)

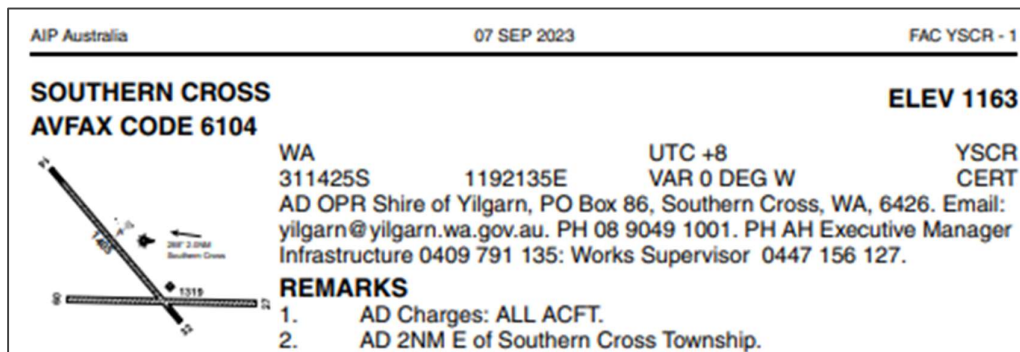


Figure 9 Southern Cross aerodrome published information.

The Project site is located within the lateral limits of the:

- 25 nm Minimum Safe Altitude (MSA) segment
- 10 nm MSA segment
- Intermediate approach segment of the RNP S instrument approach procedure
- Missed approach segment of the RNP N instrument approach procedure.

### 6.4.1. Instrument Approach Procedures

There are two instrument approach procedures published for YSCR:

- RNP N
- RNP S.

### 6.4.2. 25 nm MSA

The 25 nm MSA encompasses an area within a radius of 30 nm from the reference point, in this case the Aerodrome Reference Point (ARP) at YSCR.

It provides IFR pilots with a known safe altitude that they can descend to in conditions where they cannot necessarily see the ground due to cloud or rain, etc, as they position the aircraft to commence an instrument approach to allow them to see the runway at an appropriate safe point prior to landing visually.

The 25 nm MSA determines the altitude at which IFR aircraft commence an instrument approach and also determines the minimum holding altitude for each approach.

The minimum altitude within the 25 nm MSA is determined by adding the appropriate Minimum Obstacle Clearance (MOC) buffer of 984 ft to the highest obstacle within the 30 nm radius area.

The minimum altitude published for the 25 nm MSA is 2900 ft AMSL with a PANS-OPS surface of 1916 ft AMSL.

The WTGs are located within the lateral limits of the 25 nm MSA.

The highest WTG #1 has a maximum height of 2224.41 ft AMSL and therefore infringes the 25 nm MSA by 308.41 ft, necessitating an increase to the 25 nm MSA minimum altitude by 400 ft to 3300 ft AMSL. Subsequent adjustments to all of the instrument approach procedures would also need to be made to ensure consistency with the 25 nm MSA.

An increase to the minimum altitude for the 25 nm MSA by 400 ft would not cause an adverse impact to overall to the efficacy of instrument flight procedures aligned with runway 14/32 due to the distance between the point where the aircraft intercept the final approach path and the Initial approach fix at 15 nm from the Runway 32 threshold.

#### **6.4.3. 10 nm MSA**

The 10 nm MSA encompasses an area within a radius of 15 nm from the reference point, in this case the Aerodrome Reference Point (ARP) at YSCR. The minimum altitude within the 10 nm MSA is determined by adding the appropriate Minimum Obstacle Clearance (MOC) buffer of 984 ft to the highest obstacle within the 15 nm radius area.

The minimum altitude published for the 10 nm MSA is 2800 ft AMSL with a PANS-OPS surface of 1816 ft AMSL.

WTG #1, at a height of 2224.41 ft AMSL will infringe the 10 nm MSA PANS-OPS surface by 408.41 ft necessitating an increase to the 10 nm PANS-OPS surface by 500 ft, subsequently increasing the minimum altitude to 3300 ft, commensurate with the 25 nm MSA.

The majority of the WTGs are located within the 10 nm MSA area. The 10 nm MSA has no relevance to the RNAV approaches at YSCR.

It is relevant to departure planning for IFR aircraft but a 400 ft increase would not create an adverse impact.

An increase to the minimum altitude for the 10 nm MSA to 3300 ft AMSL would not create a significantly adverse impact to IFR aircraft operations at YSCR.

#### **6.4.4. RNP S**

The WTGs are located within the Intermediate Approach Segment of the RNP S instrument approach procedure. This segment has a minimum altitude of 2700 ft and a PANS-OPS surface of 2208 ft AMSL. WTG #1 infringes this PANS-OPS surface by 16.41 ft necessitating an increase of 100 ft to accommodate the wind farm. An increase to the minimum altitude to 2800 ft will not affect the flight path gradient.

Alternatively, WTG#1 could be moved to lower terrain to ensure that it has a maximum height lower than 2208 ft (673 m) AMSL.

Increases to the minimum holding altitude, approach commencement altitude and final missed approach altitude will not create an adverse impact to this procedure as the final approach descent gradient is not affected.

#### **6.4.5. RNP N**

The WTGs are located in the Missed Approach Segment of the RNP N instrument approach procedure.

None of the WTGs infringe the PANS-OPS surface.

Increases to the minimum holding altitude, approach commencement altitude and final missed approach altitude will not create an adverse impact to this procedure as the final approach descent gradient is not affected.

## 6.4.6. IFR Circling Areas

The instrument approach procedures are available for aircraft up to and including Performance Category C. The protection surface is applicable within 7.85 km (4.2 nm) of each runway end. It is understood that air transport operators may utilise the RNP-N and RNP-S procedures and circle to land on runway 09/27.

The Project is located approximately 10 km from the nearest runway end and therefore the Project does not have an impact on the IFR Circling Areas.

Figure 10 shows the relevant Instrument Approach Segment boundaries.

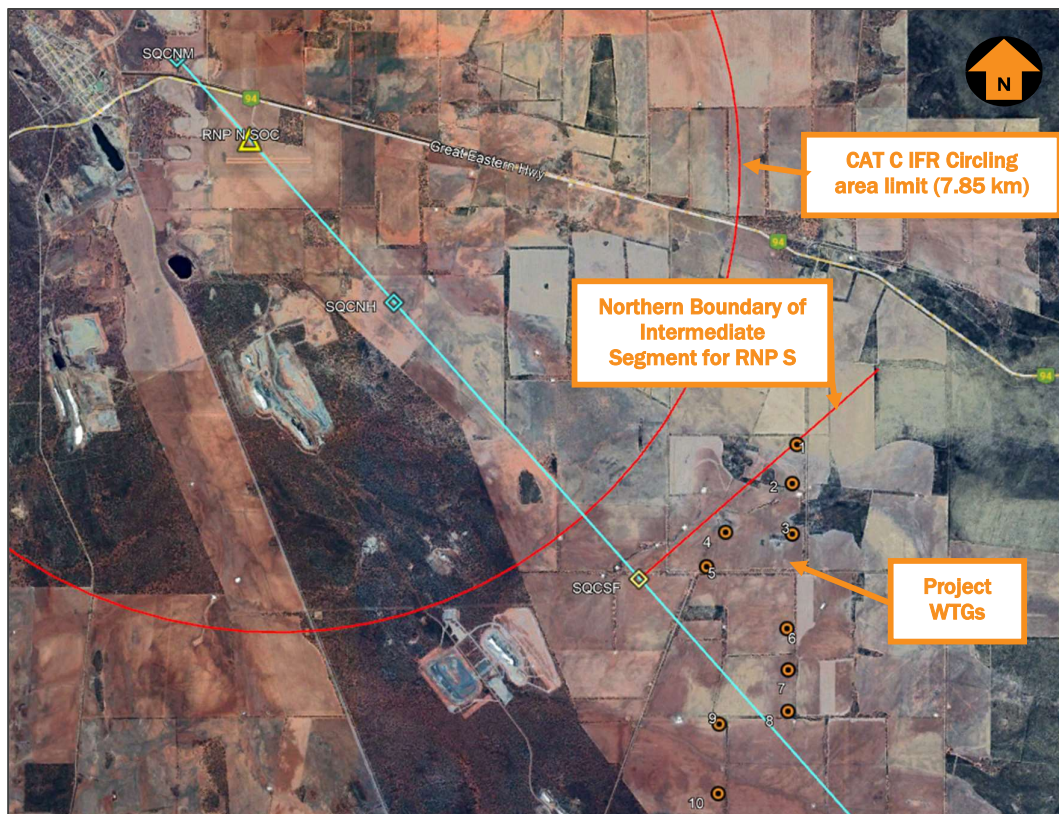


Figure 10 YSCR Instrument Approach data

## Summary – impact to YSCR terminal instrument flight procedures

The Project will result in an impact to the terminal instrument flight procedures established at YSCR. Airservices Australia has technically evaluated the impact to the procedures, which is summarised in Table 3.

The impacts caused to the procedures by the Project is not anticipated to cause any adverse operational impacts to aircraft who use the instrument procedures aligned with runway 14/32 as the final approach



descent gradient is not affected, and the overall efficacy and effectiveness of the procedures is not considered to be impacted.

The permission of the aerodrome operator will be required prior to Airservices Australia making any amendments to the procedures following their review.

#### **6.5. Future Implementation of instrument flight procedures aligned with runway 09/27**

It has been identified that the increase to the 10 nm and 25 nm MSA for the current instrument flight procedures, as well as the grid LSALT, may cause an adverse operational impact to IFR aircraft operations to YSCR by high-capacity air transport operators who require runway 09/27 for landing. The operation of the air transport aircraft is only possible on runway 09/27 due to the runway width. Runway 14/32 is the only runway with terminal instrument flight procedures aligned with the runway, although the procedures are designed to a circling minimum descent altitude only.

An increase to the MSA and grid LSALT caused by the wind farm would mean the aircraft is unable to approach runway 09/27 directly during certain weather conditions, with cloud below the increased MSA and LSALT. The aircraft could still use the instrument flight procedures aligned with runway 14/32 in these conditions, however the aircraft would need to circle to land on runway 09/27 which is not a desirable situation for high-capacity aircraft and in some cases is prevented by the aircraft operator's flight operations procedures.

It has been identified that the implementation of instrument flight procedures on runway 09/27 would mitigate the operational impacts caused by the increased MSA and LSALT required to support the development of the wind farm.

Global Airspace Solutions (GAS – an approved CASR part 173 procedure designer) was engaged to conduct a feasibility study on the potential impact of the wind farm on the implementation of runway aligned instrument flight procedures (to a circling minimum descent altitude) for runway 09/27. GAS completed the study and provided the report *GLOBAL-24-185 - Feasibility Study Southern Cross Aerodrome RNP APCH RWY 09-27 v0.1* to the wind farm proponent on 29 January 2024.

The feasibility study concluded that:

- It is feasible to implement RNP non-precision flight procedures aligned with runway 09/27 with the wind farm developed
- The wind farm will not constrain the design and implementation of effective instrument flight procedures aligned with runway 09/27
- Procedures can be implemented aligned with runway 09/27 with a circling minima of 2040 ft AMSL for Category C aircraft on runway 09, and 2040 ft AMSL for runway 27 (compared with 2070 ft AMSL for the existing procedures aligned with 14/32)
- Implementation of runway aligned instrument flight procedures would result in improved amenity for IFR aircraft using runway 09/27 with the wind farm developed, than the current situation with flight procedures aligned only with runway 14/32
- The wind farm would not constrain the implementation of instrument flight procedures with a straight-in minimum descent altitude for runway 09/27 with the wind farm developed in the future (subject to the aerodrome providing certain aerodrome facilities in accordance with standards for an instrument runway, which are not required with the proposed implementation of procedures to a circling MDA only)
- The feasibility study was conducted using the proposed WTG locations within a radius of 500 m, meaning siting of WTGs within the 500 m radius would not affect the analysis outcome.

## 6.6. Next steps – implementation of instrument flight procedures runway 09/27

Global Airspace Solutions has provided a proposal which outlines the scope for designing and implementing instrument flight procedures for runway 09/27 (following the completion of the feasibility study which has confirmed the procedures can be implemented with the wind farm developed in the proposed configuration).

It is considered that this process would be similar for an alternative instrument flight procedure designer, noting GAS have conducted the feasibility study and initial design.

The scope of validating and publishing flight procedures for runway 09/27 is:

- Produce approach plates for the approaches assessed during the feasibility study
- Environmental (Noise Footprint) assessment
- Obstacle assessment review within 30 Nautical Miles of the aerodrome reference point
- Conduct of ground validation + quality assurance
- Arrange a CASA officer to undertake final flight validation and Global Airspace Solutions Pty Ltd to provide a validation instrument flight procedure designer
- Arrange with Airservices for procedure publication in the AIP DAP
- Maintenance of the Terminal Instrument Flight Procedures as per CASA MOS 173

Once the instrument flight procedure designer is engaged to implement the flight procedures, it is anticipated that the validation and publishing of procedures could be undertaken within 3 months. The schedule is subject to the availability of the CASA flight validation officer and also the aeronautical publication cycle administered by Airservices.

For the publication of Departure and Approach Procedures (DAP), Airservices has to receive the whole publication package, including the flight validation and procedure approval certificate issued by CASA, a minimum of 56 days before the effective date.

### 6.6.1. Obstacle Limitation Surfaces (OLS)

An obstacle limitation surface must be established at certified aerodromes in accordance with the specifications in Part 139 MOS 2019.

The OLS at Southern Cross aerodrome comprise of:

- Inner Horizontal Surface (IHS) within a radius of 3.5 km from each runway strip end and 45 m above the airport's reference elevation datum. This surface is not infringed by the Project.
- Conical Surface from the edge of the IHS rising at 5% to 60 m above the IHS, a distance of 1200 m from the outer edge of the IHS. This surface is not infringed by the Project.
- An Approach Surface of various gradients and a horizontal section for Runway 32 Code 1 runway. The total length of the Approach Surface is 2500 m from the inner edge, which is located 60 m before the landing threshold. There are no WTGs proposed within the Approach Surface for Runway 32.
- A Take-off Climb Surface rising at 5% to 1600 m from near the runway end for runway 14/32. There are no WTGs proposed within the Take-Off Climb Surface for Runway 32.
- A Transitional Surface parallel to the runway which is not relevant to this assessment.

Figure 11 shows the typical OLS (Source: CASR Part 139 Manual of Standards). The Outer Horizontal Surface is not relevant to this assessment.

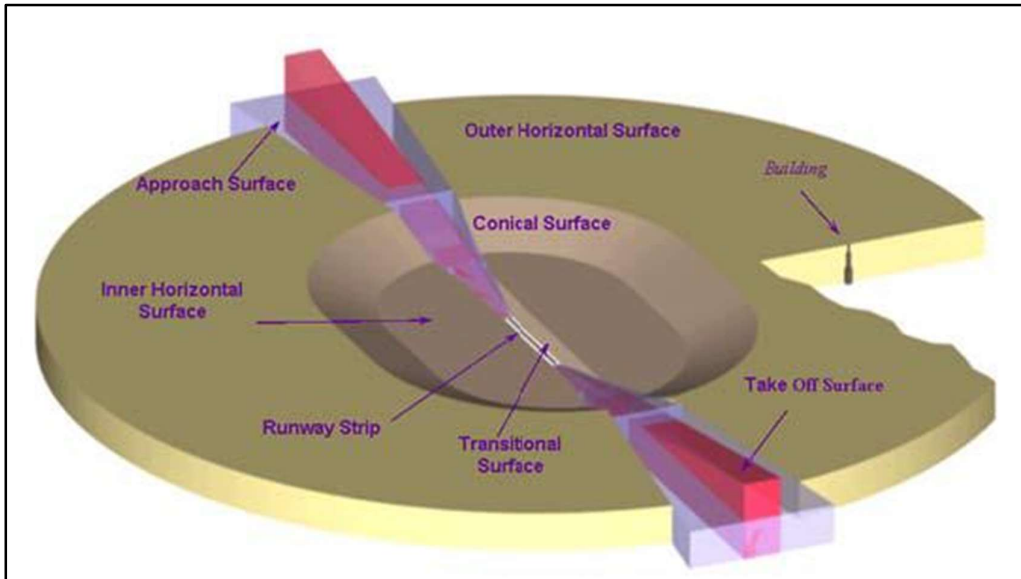


Figure 11 Typical OLS

The Project does not infringe the OLS at Southern Cross aerodrome. Micro-siting of WTGs within a 500 m radius of the proposed locations would not cause any infringement to the OLS of Southern Cross aerodrome.

## 6.6.2. Potential future operations Southern Cross aerodrome

It is understood the Shire of Yilgarn are investigating options to facilitate the operation of larger aircraft to the aerodrome, primarily associated with high-capacity air transport operations for nearby mining operations. These options may include:

- Lengthening, widening, strengthening and sealing of runway 09/27
- Implementing terminal instrument flight procedures to runway 09/27
- Upgrading runway 09/27 to a code 3 runway

The nearest WTG is located more than 9,300 m from the boundary of Southern Cross aerodrome. The Project would not affect the potential upgrade of runway 09/27 to facilitate larger aircraft in the proposed configuration. The Project would be located clear of the obstacle limitation surface for an upgrade to runway 09/27 (as a code 3, instrument non-precision runway).

## 6.7. Wake turbulence impacts

NASF Guideline D states that turbulence created by the rotating blades may be noticeable up to 16 rotor diameters from the turbine. Although the impact of the turbulence on aircraft in the vicinity is relatively unknown, it is accepted that there may be risk to aircraft operating within the 16-rotor blade diameter of the turbine. Light aircraft are most susceptible to impacts of wake turbulence. International studies have indicated that wake turbulence impacts beyond 10 times the rotor diameter are only expected to be minor.

Based on a maximum rotor diameter of 180 m, a distance of 2880 m is the maximum distance where wake turbulence impacts may be experienced by aircraft downwind of a WTG, based on the NASF guidance.



The NASF Guideline D turbulence figure is based on United Kingdom (UK) Civil Aviation Authority (CAA) Civil Aviation Publication (CAP) 764 – CAA Policy and Guidelines on Wind Turbines, which in turn is based on *“research activity or modelling and studying the wake characteristics.....using computational fluid dynamics techniques, wind tunnel tests and on site LIDAR measurements.”*

This CAP recognises that the extent of the turbulence diminishes to less than 10% of what exists immediately behind the turbine within 5 rotor diameters (RD). This study was based on a 30 m diameter turbine.

A study by the European Academy of Wind Energy, - *Do Wind Turbines Pose Roll Hazards to Light Aircraft*, 2018, used large-eddy simulations (LES) to assess wind-generated roll hazards to small aircraft from the wake of a utility-scale wind turbine – a GE 1.5 MW turbine with three bladed rotor of 77 m in diameter and a hub height of 80 m. A typical aircraft was used in the study, which was a Cessna 172.

This study is considered a simple method for quantifying turbine-wake-induced roll hazards on general aviation aircraft. The assessment criteria are based on *the maximum rolling moment that the aileron on a typical aircraft can generate to counteract a moment induced by the wake field.”*

This study determined:

- Turbine wakes tend to diffuse more rapidly in convective conditions as the mechanical mixing of the air erodes the wake (Baker and Walker 1984, Magnusson and Smedman 1994, Mirocha et al., 2015)
- The worst case for longer-persisting wakes exists in stable atmospheric conditions (Bodini et al., 2018)
- 99.99% of all calculations exist within the low hazard threshold
- No moments reached the high hazard threshold
- In stable conditions the largest roll hazards occur most frequently about 5 D downwind of the turbine
- All of the peak hazards are located in the high-shear zone at the edge of the wake between 3 and 7 D downwind from the turbine
- Normal control inputs by pilots when first noticing the roll movement will alleviate the wake impact.

The data and conclusions contained in the above study indicates that any turbulence downwind of a turbine is significantly decreased beyond approximately 7 rotor diameters.

Aviation Projects considers that a conservative distance of 10 rotor diameters would contain any effects from downwind turbulence from the WTGs.

There are no aerodromes within 1800 m of any WTG.

## **6.8. Air routes and LSALT**

MOS 173 requires that the published lowest safe altitude (LSALT), for a particular airspace grid or air route, provides a minimum of 1000 ft clearance above the controlling (highest) obstacle within the relevant airspace grid or air route tolerances.

Grid LSALTs are specified for grid squares formed by the parallels and meridians at 1° intervals for low-level charts and 2° intervals for the high-level chart applicable to the Project Area.

The proposed WTGs are located in a grid identified in the EnRoute Chart – Low. (ERCL 8)

The Project Area is located within a Grid with an LSALT of 3000 ft and associated protection surface of 2000 ft AMSL.

At a maximum height of 2224.41 ft AMSL the highest WTG will infringe this protection surface by 224.41 ft necessitating an increase to the Grid LSALT of 300 ft to 3300 ft AMSL. All WTGs infringe the 2000 ft protection surface.

An increase to the Grid LSALT should not create an adverse impact to flight operations in the area.

Figure 12 provides the low-level air routes and grid LSALTs in proximity to the Project site (source: ERC Low National, Yilgarn).



Figure 12 Grid and Enroute LSALT details

One air route overlies the Project: V242 with a LSALT to the east of GIVEB waypoint of 3200 ft AMSL and 3000 ft AMSL to the west of GIVEB.

At a maximum height of 2224.41 ft AMSL the highest WTG will infringe this protection surface by 224.41 ft necessitating an increase to the LSALT of 300 ft to 3300 ft AMSL. All WTGs infringe the 2000 ft protection surface.

An impact analysis of the LSALTs applicable to the Project Area is provided in Table 4.

Table 4 LSALT analysis

Air route	Waypoint pair	LSALT (ft AMSL)	Protection surface (ft AMSL)	Impact on airspace design	Potential solution	Impact on aircraft ops
V242	YPKG - GIVEB	3200	2200	24.41 ft infringement	Raise LSALT to 3300 ft AMSL	Minor adverse impact for IFR aircraft operations to YSCR

<i>Air route</i>	<i>Waypoint pair</i>	<i>LSALT (ft AMSL)</i>	<i>Protection surface (ft AMSL)</i>	<i>Impact on airspace design</i>	<i>Potential solution</i>	<i>Impact on aircraft ops</i>
<b>V242</b>	GIVEB - KELLA	3000	2000	224.41 ft infringement	Raise LSALT to 3300 ft AMSL	Minor adverse impact for IFR aircraft operations to YSCR
<b>Grid LSALT</b>	N/A	3000	2000	224.41 ft infringement	Raise Grid LSALT to 3300 ft.	Moderate adverse impact for IFR aircraft operations to YSCR (mitigated by TIFP implemented runway 09/27)

Airservices Australia will amend the established grid LSALTs' once notified of the planned construction of the WTGs.

#### **6.9. Airspace Protection**

The Project site is located outside controlled airspace (wholly within Class G airspace) and is not located in any Prohibited or Restricted areas.

The Project will not impact controlled airspace.

#### **6.10. Aviation facilities – Communication, Navigation and Surveillance Systems (CNS)**

NASF Guideline G (Protection Aviation Facilities - Communication, Navigation and Surveillance (CNS)) and Part 139 MOS 2019 specify the area where development of buildings and structures has the potential to cause unacceptable interference to CNS facilities.

There are no aviation CNS located in the vicinity of any WTGs, and the Project will not penetrate any protection areas associated with CNS facilities as specified in Part 139 MOS 2019 and the National Airports Safeguarding Framework.

#### **6.11. ATC Surveillance Radar**

Airservices Australia currently requires an assessment of the potential for wind turbine generators to affect radar line of sight.

With respect to aviation radar facilities, the closest radar is the Kalamunda Route Surveillance Radar (RSR) which is located approximately 176 nm (324 km) west-southwest of the nearest proposed WTG. The Perth Primary Surveillance Radar (PSR) is located approximately 180 nm (334 km) west-southwest of the nearest proposed WTG.

The Project is located outside the stated range for these ATC radar facilities. (90 nm for the PSR and 250 nm for the RSR)

Note: Route Surveillance Radar (RSR) and Secondary Surveillance Radar (SSR) are similar radar system.



EUROCONTROL guidelines for assessing the potential impact on wind turbines on radar surveillance sensors stipulate the following assessment requirements:

#### **Primary Surveillance Radar (PSR)**

- Zone 1 0-500 m: Not permitted
- Zone 2 500 m – 15 km: Detailed assessment
- Zone 3: Further than 15 km but within maximum instrumented range and in radar line of sight: Simple assessment
- Zone 4: Anywhere within maximum instrumented range but not in radar line of sight or outside the maximum instrumented range: No assessment

#### **Secondary Surveillance Radar (SSR)**

- Zone 1: 0-500 m: Not permitted
- Zone 2 500 m – 16 km but within maximum instrumented range and in radar line of sight: Detailed assessment
- Zone 4: Further than 16 km or not in radar line of sight: No assessment

(Zone 3 is not established for secondary surveillance radar)

Due to the distance and intervening terrain between the Project Area and the radar facilities, the proposed Project is not anticipated to affect any radar facility. A simple assessment of the Perth Primary Surveillance Radar may be required by Airservices Australia, however due to the distance and terrain profile between the radar facility and the Project area, there is no impact anticipated.

Airservices Australia will review the potential impact of the Project on these radar facilities once notified of the Project.

### **6.12. Consultation**

An appropriate and justified level of consultation was undertaken with relevant parties. Refer to **Section 5** for details of the stakeholders and a summary of the consultation.

### **6.13. AIS Summary**

Based on the Project WTG layout and maximum blade tip height of up to 240 m AGL, the blade tip elevation of the highest WTG associated with both proposed WTG configurations, will not exceed 678 m AHD (2224.41 ft AMSL) and:

- will not infringe Southern Cross aerodrome's obstacle limitation surfaces
- infringes the PANS-OPS surfaces of Southern Cross aerodrome and will require amendments to both instrument approach procedures
- the infringements to the YSCR PANS-OPS surfaces will not create an impact to the existing flight paths aligned with runway 14/32
- will not constrain the implementation of instrument flight procedures aligned with runway 09/27
- will require an increase to the LSALT for air route V242

- will require an increase to the Grid LSALT
- will not have an impact on operational airspace
- is wholly contained within Class G airspace
- is outside the clearance zones associated with civil aviation navigation aids and communication facilities.

#### **6.14. Assessment recommendations**

Based on the information contained within this section and the analysis conducted, the following recommendations are made:

- Engage with an instrument flight procedure designer to implement flight procedures for runway 09/27 at YSCR
- Seek permission from the operator of Southern Cross aerodrome to make the necessary amendments to instrument flight procedures to accommodate the Project

An appropriate and justified level of consultation was undertaken with relevant parties. Refer to **Section 5** for details of the stakeholders and a summary of the consultation.

## 7. HAZARD LIGHTING AND MARKING

Based on the risk assessment set out in Section 9 it is concluded that aviation lighting is not required for WTGs but should be considered to be installed electively as an additional safety measure. CASA have recommended obstacle lights on certain WTGs in correspondence with the Shire of Yilgarn.

The Shire of Yilgarn have specified that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.

For completeness, relevant lighting standards and guidelines are summarised in **Annexure 3**.



## 8. ACCIDENT STATISTICS

This section establishes the external context to ensure that stakeholders and their objectives are considered when developing risk management criteria, and that externally generated threats and opportunities are properly taken into account.

### 8.1. General aviation operations

The general aviation (GA) activity group is considered by the Australian Transport Safety Bureau (ATSB) to be all flying activities that do not involve commercial air transport (activity group), which includes scheduled (RPT) and non-scheduled (charter) passenger and freight type. It may involve Australian civil (VH-) registered aircraft, or aircraft registered outside of Australia. General aviation/recreational encompasses:

- **Aerial work (activity type).** Includes activity subtypes: agricultural mustering, agricultural spreading/spraying, other agricultural flying, photography, policing, firefighting, construction – sling loads, other construction, search and rescue, observation and patrol, power/pipeline surveying, other surveying, advertising, and other aerial work.
- **Own business travel (activity type).**
- **Instructional flying (activity type).** Includes activity subtypes: solo and dual flying training, and other instructional flying.
- **Sport and pleasure flying (activity type).** Includes activity subtypes: pleasure and personal transport, glider towing, aerobatics, community service flights, parachute dropping, and other sport and pleasure flying.
- **Other general aviation flying (activity type).** Includes activity subtypes: test flights, ferry flights and other flying.

### 8.2. ATSB occurrence taxonomy

The ATSB uses a taxonomy of occurrence sub-type. Of specific relevance to the subject assessment are terms associated with **terrain collision**. Definitions sourced from the ATSB website are provided below:

- **Collision with terrain:** Occurrences involving a collision between an airborne aircraft and the ground or water, where the flight crew were aware of the terrain prior to the collision.
- **Controlled flight into terrain (CFIT):** Occurrences where a serviceable aircraft, under flight crew control, is inadvertently flown into terrain, obstacles, or water without either sufficient or timely awareness by the flight crew to prevent the event.
- **Ground strike:** Occurrences where a part of the aircraft drags on, or strikes, the ground or water while the aircraft is in flight, or during take-off or landing.
- **Wirestrike:** Occurrences where an aircraft strikes a wire, such as a powerline, telephone wire, or guy wire, during normal operations.

### 8.3. National aviation occurrence statistics 2010-2019

The Australian Transport Safety Bureau (ATSB) recently published a summary of aviation occurrence statistics for the period 2010-2019 (AR-2020-014, Final - 29 April 2020).

According to the report, there were no fatalities in high or low capacity RPT operations during the period 2010-2019. In 2019, 220 aircraft were involved in accidents in Australia, and a further 154 aircraft involved in serious incidents (an incident with a high probability of becoming an accident). In 2019 there were 35 fatalities from 22 fatal accidents. There have been no fatalities in scheduled commercial air transport in Australia since 2005.

Of the 326 fatalities recorded in the 10-year period, almost two thirds (175 or 53.68%) occurred in the general aviation segment. On average, there were 1.51 fatalities per aircraft associated with a fatality in this segment. The fatalities to aircraft ratio ranges from 1.09 to 177:1. Whilst it can be inferred from the data that the majority of fatal accidents are single person fatalities, it is reasonable to assert that the worst credible effect of an aircraft accident in the general aviation category will be multiple fatalities.

A breakdown of aircraft and fatalities by general aviation sub-categories is provided in Table 5 (source: ATSB).

Table 5 Number of fatalities by General Aviation sub-category – 2010 to 2019

<i>Sub-category</i>	<i>Aircraft assoc. with fatality</i>	<i>Fatalities</i>	<i>Fatalities to aircraft ratio</i>
<b>Aerial work</b>	37	44	1.18:1
<b>Instructional flying</b>	11	19	1.72:1
<b>Own business travel</b>	3	5	1.6:1
<b>Sport and pleasure flying</b>	53	94	1.77:1
<b>Other general aviation flying</b>	11	12	1.09:1
<b>Totals</b>	115	174	1.51:1

Figure 13 refers to Fatal Accident Rate by operation type per million departures over the 6-year period (source: ATSB). Note the rates presented are not the full year range of the study (2010–2019). This was due to the availability of exposure data (departures and hours flown) which was only available between these years. According to the ATSB report, the number of fatal accidents per million departures for GA aircraft over the 6-year reporting period ranged between 6.6 in 2014 and 4.9 in 2019.

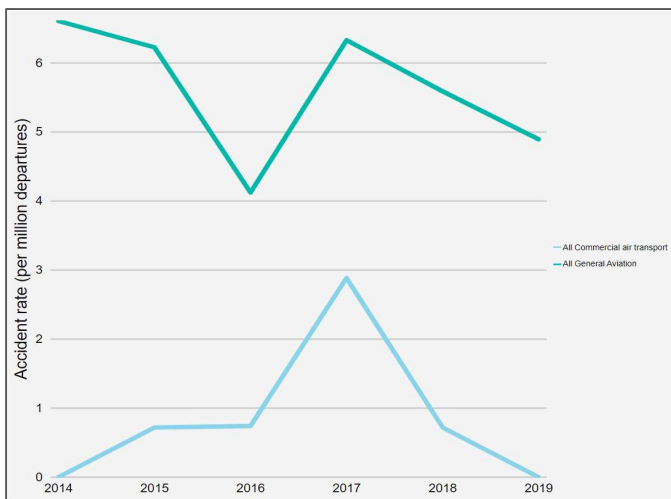


Figure 13 Fatal Accident Rate (per million departures) by Operation Type

In 2018, there were 9 fatal accidents and 9 fatalities involving GA aircraft, resulting in a rate of 5.6 fatal accidents per million departures and 7.7 fatal accidents per million hours flown.

In 2019, there were 1,760,000 landings, and 1,320,000 hours flown by VH-registered general aviation aircraft in Australia, with 8 fatal accidents and 17 fatalities. Based on these results, in 2019 there were 4.9 fatal accidents per million departures and 6.4 fatal accidents per million hours flown. A summary of fatal accidents from 2010-2019 by GA sub-category is provided in Table 6 (source: ATSB).

Table 6 Fatal accidents by GA sub-category – 2010 -2019

<i>Sub-category</i>	<i>Fatal accidents</i>	<i>Fatalities</i>
Agricultural spreading/spraying	13	13
Agricultural mustering	11	12
Other agricultural	1	1
Survey and photographic	5	10
Search and rescue	2	2
Firefighting	2	2
Other aerial work	3	4
Instructional flying	11	19
Own business travel	3	5
Sport and pleasure flying	53	94
Other general aviation flying	11	12
<b>Total</b>	<b>115</b>	<b>174</b>

Over the 10-year period, no aircraft collided with a WTG or a WMT in Australia.

Of the 20,529 incidents, serious incidents and accidents in GA operations in the 10-year period, 1,404 (6.83%) were terrain collisions.

The underlying fatality rate for GA operations discussed above is considered tolerable within Australia's regulatory and social context.

#### **8.4. Worldwide accidents involving wind farms**

Worldwide since aviation accident statistics have been recorded, there have been a total of 4 aviation accidents involving a wind farm (i.e. where WTGs were erected). To provide some perspective on the likelihood of a VFR aircraft colliding with a WTG, a summary of the 4 accidents and the relevant factors applicable to this assessment is incorporated in this section.

Based on the statistics set out in the Global Wind Energy Council (GWEC) report 2016, there were 341,320 WTGs operating around the world at the end of 2016. In 2019, approximately 60.4 GW of wind power had been installed worldwide.

Based on the Australia's Clean Energy Council statistics there were 102 wind farms in Australia at the end of 2019. Aviation Projects has researched public sources of information, accessible via the world wide web,



regarding aviation safety occurrences associated with wind farms. Occurrence information published by Australia, Canada, Europe (Belgium, Denmark, France, Germany, Norway, Sweden and The Netherlands), New Zealand, the United Kingdom and the United States of America was reviewed.

The 4 recorded aviation accidents involving a wind farm are summarised as follows:

- One accident, which resulted in 2 fatalities, occurred in Palm Springs in 2001. This accident involved a wind farm but was not caused by the wind farm. The cause of the accident was the inflight separation of the majority of the right canard and all of the right elevator resulting from a failure of the builder to balance the elevators per the kit manufacturer's instructions. The accident occurred above a wind farm, and the aircraft struck a WTG on its descent and therefore the cause of the accident was not attributable to the wind farm and not applicable to this AIA.
- Two accidents involving collision with a WTG were during the day, as follows:
  - One accident occurred in Melle, Germany in 2017 as the result of a collision with a WTG mounted on a steel lattice tower at a very low altitude during the day with good visibility and no cloud. The accident resulted in one fatality. If the tower was solid and painted white, as is standard on contemporary wind farms, then it more than likely would have been more visible than if it were to be equipped with an obstacle light which in all likelihood would not have been operating during daylight with good visibility conditions.
  - One accident occurred in Plouguin, France in 2008 when the pilot decided to descend below cloud in an attempt to find the destination aerodrome. The aircraft was flying in conditions of significantly reduced horizontal visibility in fog where the top of the WTGs were obscured by cloud. The WTGs became visible too late for avoidance manoeuvring and the aircraft made contact with two WTGs. The aircraft was damaged but landed safely. No fatalities were recorded.
  - In both of the above cases, it is difficult to conclude that obstacle lighting would have prevented the accidents.
- One fatal accident, near Highmore, South Dakota in 2014 occurred at night in Instrument Meteorological Conditions (IMC).

There is one other accident mentioned in a database compiled by an anti-wind farm lobby group (wind-watch.org), which suggests a Cessna 182 collided with a WTG near Baraboo, Wisconsin, on 29 July 2000. The NTSB database records details of an accident involving a Cessna 182 that occurred on 28 July 2000 in the same area. For this particular accident, NTSB found that the probable cause of the accident was VFR flight into IMC encountered by the pilot and exceeding the design limits of the aircraft. A factor was flight to a destination alternate not performed by the pilot. No mention in the NTSB database is made of WTGs or a wind farm.

A summary of the 4 accidents is provided in Table 7.

Table 7 Summary of accidents involving collision with a WTG

<i>ID</i>	<i>Description</i>	<i>Date</i>	<i>Location</i>	<i>Fatalities</i>	<i>Flight rules</i>	<i>WTG height</i>	<i>Obstacle lighting</i>	<i>Cause of accident</i>	<i>Relevant to obstacle lighting at night</i>
1	Diamond DA320-A1 D-EJAR Collided with a WTG approximately 20 m above the ground, during the day in good visibility. The mast was grey steel lattice, rather than white, although the blades were painted in white and red bands.	02 Feb 2017	Melle, Germany	1	Day VFR No cloud and good visibility	Not specified	Not specified	Not specified	Not applicable

## AVIATION PROJECTS

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
2	<p>The Piper PA-32R-300, N8700E, was destroyed during an impact with the blades of a WTG, at night in IMC.</p> <p>The wind farm was not marked on either sectional chart covering the accident location; however, the pilot was reportedly aware of the presence of the wind farm.</p>	27 Apr 2014	10 miles south of Highmore, South Dakota	4	Night IMC Low cloud and rain	420 ft AGL overall	Fitted but reportedly not operational on the WTG that was struck	<p>The NTSB determined the probable cause(s) of this accident to be the pilot's decision to continue the flight into known deteriorating weather conditions at a low altitude and his subsequent failure to remain clear of an unlit WTG.</p> <p>Contributing to the accident was the inoperative obstacle light on the WTG, which prevented the pilot from visually identifying the WTG.</p>	An operational obstacle light may have prevented the accident.



## AVIATION PROJECTS

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
3	<p>Beechcraft B55</p> <p>The pilot was attempting to remain in VMC by descending the aircraft through a break in the clouds. The pilot, distracted by trying to visually locate the aerodrome, flew into an area of known presence of WTGs.</p> <p>After sighting the WTGs he was unable to avoid them. The tip of the left wing struck the first WTG blade, followed by the tip of the right wing striking the blade of a second WTG.</p> <p>The pilot was able to maintain control of the aircraft and landed safely.</p>	04 Apr 2008	Plouguin, France	0	<p>Day VFR</p> <p>The weather in the area of the WTGs had deteriorated to an overcast of stratus cloud, with a base between 100 ft to 350 ft and tops of 500 ft.</p>	328 ft AGL hub height, 393 ft AGL overall	Not specified	<p>This pilot reported having been distracted by a troubling personal matter which he had learned of before departing for the flight.</p> <p>The wind farm was annotated on aeronautical charts.</p>	Not applicable

## AVIATION PROJECTS

<i>ID</i>	<i>Description</i>	<i>Date</i>	<i>Location</i>	<i>Fatalities</i>	<i>Flight rules</i>	<i>WTG height</i>	<i>Obstacle lighting</i>	<i>Cause of accident</i>	<i>Relevant to obstacle lighting at night</i>
4	VariEze N25063 The aircraft collided with a WTG following in-flight separation of the majority of the right canard and all of the right elevator.	20 July 2001	Palm Springs, USA	2	Day VFR	N/A	N/A	The failure of the builder to balance the elevators per the kit manufacturer's instructions. The cause of this accident is not attributable to the wind farm.	Not applicable

## 9. RISK ASSESSMENT

A risk management framework is comprised of likelihood and consequence descriptors, a matrix used to derive a level of risk, and actions required of management according to the level of risk.

The risk assessment framework used by Aviation Projects and risk event description is provided in **Annexure 4**.

### 9.1. Risk Identification

The primary risk being assessed is that of aviation safety associated with the height and location of WTGs and likely WMTs proposed by the Project in relation to Southern Cross aerodrome, and for regional aviation operations. The risk of collision with the Project WMT is not included in this assessment as it has already been installed with marking and lighting as recommended in a separate assessment and as approved in separate development application by the Shire of Yilgarn.

Based on an extensive review of accident statistics data (see summary in Section 8 above) and analysis of the potential impact of the Project on aviation operations, 4 identified risk events related to aviation safety or potential visual impact, and are listed as follows:

1. potential for an aircraft to collide with a WTG, controlled flight into terrain (CFIT) (related to aviation safety).
2. potential for a pilot to initiate manoeuvring in order to avoid colliding with a WTG resulting in collision with terrain (related to aviation safety).
3. potential for the hazards associated with the Project to invoke operational limitations or procedures on operating crew (related to aviation safety).
4. Potential effect of obstacle lighting on neighbours (related to potential visual impact).

It should be noted that according to guidance provided by the Commonwealth Department of Infrastructure and Regional Development, and in line with generally accepted practice, the risk to be assessed should primarily be associated with passenger transport services.

The four risk events identified here are assessed in detail in the following section.

### 9.2. Risk Analysis, Evaluation and Treatment

For the purpose of considering applicable consequences, the concept of worst credible effect has been used. Untreated risk is first evaluated, then, if the resulting level of risk is unacceptable, further treatments are identified to reduce the residual level of risk to an acceptable level.

A summary of the level of risk associated with the Project, under the proposed treatment regime, with specific consideration of the effect of obstacle lighting, is provided in Table 8 through to Table 11.



Table 8 Aircraft collision with wind turbine generator (WTG)

Risk ID:	1. Aircraft collision with wind turbine generator (WTG) (CFIT)
<p><b>Discussion</b></p> <p>An aircraft collision with a WTG would result in harm to people and damage to property. Property could include the aircraft itself, as well as the WTG.</p> <p>There have been 4 reported occurrences worldwide of aircraft collisions with a component of a WTG structure since the year 2000 as discussed in Section 8. These reports show a range of situations where pilots were conducting various flying operations at low level and in the vicinity of wind farms in both IMC and VMC. No reports of aircraft collisions with wind farms in Australia have been found.</p> <p>In consideration of the circumstances that would lead to a collision with a WTG:</p> <ul style="list-style-type: none"> <li>GA VFR aircraft are likely to operate in the vicinity of the Project Area associated with arrival and departure procedures from Southern Cross aerodrome</li> <li>RFDS aircraft are likely to operate in the vicinity of the aerodrome, including at night, while conducting visual approach and departure procedures from Southern Cross aerodrome</li> <li>Aircraft operations at night at Southern Cross aerodrome are likely to be limited only to emergency services aircraft with the provision of runway lighting only provided for emergency use</li> <li>There is a very small chance that a pilot, suffering the stress of weather, will continue into poor weather conditions (contrary to the rules of flight) rather than divert away from it, is not aware of the wind farm, will not consider it or will not be able to accurately navigate around it.</li> <li>If the aircraft was flown through the wind farm, there is still a very small chance that it would hit a WTG.</li> </ul> <p>Refer to the discussion of worldwide accidents in Section 8.</p> <p>There are no known aerial application operations conducted at night in the vicinity of the Project site.</p> <p>If a proposed object or structure is identified as likely to be an obstacle, details of the relevant proposal must be referred to CASA for CASA to determine, in writing:</p> <p>(a) whether the object or structure will be a hazard to aircraft operations</p> <p>(b) whether it requires an obstacle light that is essential for the safety of aircraft operations</p> <p>The Project site is clear of the obstacle limitation surfaces (OLS) of any aerodrome.</p>	
<p><b>Consequence</b></p> <p>If an aircraft collided with a WTG, the worst credible effect would be multiple fatalities and damage beyond repair. This would be a Catastrophic consequence.</p>	
	<p><b>Consequence</b> Catastrophic</p>
<p><b>Untreated Likelihood</b></p> <p>There have been 4 reports of aircraft collisions with WTGs worldwide, which have resulted in a range of consequences, where aircraft occupants sustained minor injury in some cases and fatal injuries in others (see Section 8). Similarly, aircraft damage sustained ranged from minor to catastrophic. One of these accidents resulted from structural failure of the aircraft before the collision with the WTG. Only two relevant accidents occurred during the day, and only one resulted in a single fatality. It is assessed that collision with a WTG</p>	

resulting in multiple fatalities and damage beyond repair is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.	
<i>Untreated Likelihood</i>	Possible
<p><b>Current Treatments (without lighting)</b></p> <ul style="list-style-type: none"> <li>The Project site is clear of the obstacle limitation surfaces (OLS) of any certified aerodrome.</li> <li>Aircraft flying at night are required to maintain at least the established LSALT with at least 1000 ft clearance over the highest obstacle except within 3 nm of the aerodrome during landing and take-off operations. There is no proposed WTG located within 3 nm of any point of Southern Cross aerodrome's runways</li> <li>Aircraft are restricted to a minimum height of 500 ft (152.4 m) AGL above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas. The proposed WTGs will be a maximum of 240 m (787.4 ft) at the top of the blade tip. The rotor blade at its maximum height will be approximately 87.6 m (287.4 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft).</li> <li>Aircraft approaching Southern Cross aerodrome from the southeast would likely approach over the Project Area currently, prior to joining a circuit to land in the selected direction. Development of the WTGs may require aircraft to track around the WTGs while approaching from the southeast to land at the aerodrome, noting that aircraft could overfly the WTGs and join a circuit pattern for YSCR</li> <li>In the event that descending cloud forces an aircraft lower than 500 ft (152.4 m) AGL, the minimum visibility of 5,000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.</li> <li>The WTGs are typically coloured white so they should be visible to pilots during the day.</li> <li>The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of all WTGs can be noted on aeronautical maps and charts.</li> <li>Because the Project WTGs are proposed to be above 100 m AGL, there is a statutory requirement to report the WTGs to CASA and notified to Airservices Australia prior to construction. CASA will review the Project for potential hazards to aircraft operations and may recommend the use of obstacle lighting.</li> </ul>	
<p><b>Level of Risk</b></p> <p>The level of risk associated with a Possible likelihood of a Catastrophic consequence is 8 (Unacceptable).</p>	
<i>Current Level of Risk</i>	8 - Unacceptable
<p><b>Risk Decision</b></p> <p>A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.</p>	
<i>Risk Decision</i>	Unacceptable
<p><b>Recommended Treatments</b></p> <p>The following treatments which can be implemented which will provide an acceptable level of safety:</p>	

- Details of the Project should be communicated to local and regional aircraft operators (refer to **Section 5**) prior to construction to heighten their awareness of its location and so that they can plan their operations accordingly (regional aircraft operators will be consulted with during this aviation impact assessment).
- WTGs will be published by Airservices Australia in applicable aeronautical publications.

## **Residual Risk**

With the implementation of the Recommended Treatments listed above, the likelihood of an aircraft collision with a WTG resulting in multiple fatalities and damage beyond repair will be **Unlikely**, and the consequence remains **Catastrophic**, resulting in an overall risk level of **7 - Tolerable**.

The level of risk with the implementation of the Recommended Treatments is considered **As Low As Reasonably Practicable (ALARP)**.

It is our assessment that there will be an acceptable level of aviation safety risk associated with the potential for an aircraft collision with a Project WTG without obstacle lighting on the WTGs. The Shire of Yilgarn have requested that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.

**Residual Risk**      **7 - Tolerable**



Table 9 Harsh manoeuvring leading to controlled flight into terrain

<b>Risk ID:</b>	<b>2. Harsh manoeuvring leads to controlled flight into terrain (CFIT)</b>
<p><b>Discussion</b></p> <p>An aircraft colliding with terrain as a result of manoeuvring to avoid colliding with a WTG would result in harm to people and damage to property.</p> <p>There are a few ground collision accidents resulting from manoeuvring to avoid wind farms, but none in Australia, and all were during the day.</p> <p>The Project is clear of the OLS of any aerodrome.</p> <p>Aircraft are restricted to a minimum height of 152.4 m (500 ft) above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built up areas. The proposed WTGs will be a maximum of 240 m (787.4 ft) at the top of the blade tip. The rotor blade at its maximum height will be approximately 87.6 m (287.4 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft).</p> <p>Nevertheless, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.</p> <p>Aircraft are restricted to a minimum height of 304.8 m (1000 ft) above obstacles within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night).</p> <p>Aircraft authorised to intentionally fly below 152.4 m (500 ft) AGL (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities.</p> <p><b>Assumed risk treatments</b></p> <ul style="list-style-type: none"> <li>• The WTGs are typically coloured white so they should be visible during the day.</li> <li>• The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of WTGs can be noted on aeronautical maps and charts.</li> <li>• Since the WTGs will be higher than 100 m AGL, there is a statutory requirement to report the WTG to CASA.</li> </ul>	
<p><b>Consequence</b></p> <p>If an aircraft collided with terrain, the worst credible effect would be multiple fatalities and damage beyond repair. This would be a Catastrophic consequence.</p>	
	<p><b>Consequence</b> Catastrophic</p>
<p><b>Untreated Likelihood</b></p> <p>There are a few ground collision accidents resulting from manoeuvring to avoid WTGs, but none in Australia, and all were during the day (see Section 8). It is assessed that a ground collision accident following manoeuvring to avoid a WTG is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.</p>	
	<p><b>Untreated Likelihood</b> Possible</p>
<p><b>Current Treatments (without lighting)</b></p>	

- The Project site is clear of the obstacle limitation surfaces (OLS) of any aerodrome.
- Aircraft operations are likely to occur in the vicinity of the Project Area including RFDS aircraft arriving and departing at night.
- Aircraft are restricted to a minimum height of 152.4 m (500 ft) above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas.
- Aircraft flying at night are required to maintain at least the established LSALT with at least 1000 ft clearance over the highest obstacle except within 3 nm of the aerodrome during landing and take-off operations
- The proposed WTGs will be a maximum of 240 m (787.4 ft) at the top of the blade tip. The rotor blade at its maximum height will be approximately 87.6 m (287.4 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft).
- Nevertheless, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.
- Aircraft authorised to intentionally fly below 152.4 m AGL (500 ft) (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities.
- The WTGs are typically coloured white, typical of most WTGs operational in Australia, so they should be visible during the day.
- The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of wind farms can be noted on aeronautical maps and charts.
- Since the WTGs will be higher than 100 m AGL, there is a statutory requirement to report the WTGs to CASA.

## Level of Risk

The level of risk associated with a Possible likelihood of a Catastrophic consequence is 8.

<b>Current Level of Risk</b>	8 – Unacceptable
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## Risk Decision

A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.

<b>Risk Decision</b>	Unacceptable
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## Recommended Treatments

The following treatments which can be implemented which will provide an acceptable level of safety:

- Details of the Project should be communicated to local and regional aircraft operators (refer to **Section 5**) prior to construction to heighten their awareness of its location and so that they can plan their

<p>operations accordingly (regional aircraft operators will be consulted with during this aviation impact assessment).</p> <ul style="list-style-type: none"> <li>• Ensure details of the Project WTGs have been communicated to Airservices Australia, and local and regional aerodrome and aircraft operators prior to construction.</li> </ul>	
<p><b>Residual Risk</b></p> <p>With the implementation of the Recommended Treatments listed above, the likelihood of an aircraft collision with a WTG resulting in multiple fatalities and damage beyond repair will be <b>Unlikely</b>, and the consequence remains <b>Catastrophic</b>, resulting in an overall risk level of <b>7 - Tolerable</b>.</p> <p>The level of risk with the implementation of the Recommended Treatments is considered <b>As Low As Reasonably Practicable (ALARP)</b>.</p> <p>It is our assessment that there will be an acceptable level of aviation safety risk associated with the potential for an aircraft collision with a Project WTG without obstacle lighting on the WTGs. The Shire of Yilgarn have requested that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.</p>	
	<p><b>Residual Risk</b>    <b>7 - Tolerable</b></p>



Table 10 Effect of the Project on operating crew

<b>Risk ID:</b>	<b>3. Effect of the Project on operating crew</b>	
<b>Discussion</b>		
<p>Introduction or imposition of additional operating procedures or limitations can affect an aircraft’s operating crew.</p> <p>There are no known aerial application operations conducted at night in the vicinity of the Project site.</p> <p>Some aircraft operations in the vicinity of the Project Area are possible at night, primarily associated with RFDS aircraft operating to and from Southern Cross aerodrome at night.</p> <p>Day VFR operations in the vicinity of the Project may occur.</p>		
<b>Consequence</b>		
<p>The worst credible effect a wind farm could have on flight crew would be the imposition of operational limitations, and in some cases, the potential for use of emergency procedures. This would be a Minor consequence.</p>		
<b>Consequence</b>		Minor
<b>Untreated Likelihood</b>		
<p>The imposition of operational limitations is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.</p>		
<b>Untreated Likelihood</b>		Possible
<b>Current Treatments (without lighting)</b>		
<ul style="list-style-type: none"><li>• The Project site is clear of the obstacle limitation surfaces (OLS) of any certified aerodrome.</li><li>• There are no WTGs proposed to be located within 3 nm of the Southern Cross aerodrome.</li><li>• Aircraft flying at night are required to maintain at least the established LSALT with at least 1000 ft clearance over the highest obstacle except within 3 nm of the aerodrome during landing and take-off operations</li><li>• Aircraft are restricted to a minimum height of 500 ft (152.4 m) AGL above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas. The proposed WTGs will be a maximum of 240 m (787.4 ft) at the top of the blade tip. The rotor blade at its maximum height will be approximately 87.6 m (287.4 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft).</li><li>• Aircraft approaching Southern Cross aerodrome from the southeast would likely approach over the Project Area currently, prior to joining a circuit to land in the selected direction. Development of the WTGs would likely require aircraft to track around the WTGs while approaching from the southeast to land at the aerodrome, noting that aircraft could overfly the WTGs and join a circuit pattern for YSCR</li><li>• In the event that descending cloud forces an aircraft lower than 500 ft (152.4 m) AGL, the minimum visibility of 5,000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.</li></ul>		

<ul style="list-style-type: none"> <li>The WTGs are typically coloured white so they should be visible to pilots during the day.</li> <li>The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of all WTGs can be noted on aeronautical maps and charts.</li> <li>Because the Project WTGs are proposed to be above 100 m AGL, there is a statutory requirement to report the WTGs to CASA and notified to Airservices Australia prior to construction. CASA will review the Project for potential hazards to aircraft operations and may recommend the use of obstacle lighting.</li> </ul>	
<p><b>Level of Risk</b></p> <p>The level of risk associated with a Possible likelihood of a Minor consequence is 5.</p>	
<b>Current Level of Risk</b>	5 - Tolerable
<p><b>Risk Decision</b></p> <p>A risk level of 5 is classified as Tolerable: Treatment action possibly required to achieve ALARP - conduct cost/benefit analysis. Relevant manager to consider for appropriate action.</p>	
<b>Risk Decision</b>	Accept, conduct cost benefit analysis
<p><b>Recommended Treatments</b></p> <p>The following treatment, which can be implemented at little cost, will provide an additional margin of safety:</p> <ul style="list-style-type: none"> <li>Ensure details of the Project WTGs have been communicated to Airservices Australia, and local and regional aerodrome and aircraft operators prior to construction.</li> </ul>	
<p><b>Residual Risk</b></p> <p>Notwithstanding the current level of risk is considered <b>Tolerable</b>, the additional Recommended Treatments listed above will enhance aviation safety. The likelihood remains <b>Possible</b>, and consequence remains <b>Minor</b>. In the circumstances, the risk level of 5 is considered <b>ALARP</b>.</p> <p><b>It is our assessment that there is an acceptable level of aviation safety risk associated with the potential for operational limitations to affect aircraft operating crew, without obstacle lighting on the Project WTGs. However, the use of obstacle lighting may be considered as an additional safety measure. The Shire of Yilgarn have requested that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.</b></p>	
<b>Residual Risk</b>	5 – Tolerable

Table 11 Effect of obstacle lighting on neighbours

<b>Risk ID:</b>	<b>4. Effect of obstacle lighting on neighbours</b>	
<b>Discussion</b>		
<p>This scenario discusses the consequential impact of a decision to install obstacle lighting on the wind farm.</p> <p>Installation and operation of obstacle lighting on WTGs can have an effect on neighbours' visual amenity and enjoyment, specifically at night and in good visibility conditions.</p> <p>If a proposed object or structure will be 100 m AGL or more, details of the relevant proposal must be referred to CASA for CASA to determine, in writing:</p> <ul style="list-style-type: none"><li>(a) whether the object or structure will be a hazard to aircraft operations</li><li>(b) whether it requires an obstacle light that is essential for the safety of aircraft operations.</li></ul> <p>In general, objects outside an OLS and above 100 m would require obstacle lighting unless CASA, in an aeronautical study, assesses it is shielded by another lit object or it is of no operational significance.</p>		
<b>Consequence</b>		
<p>The worst credible effect of obstacle lighting specifically at night in good visibility conditions would be:</p> <ul style="list-style-type: none"><li>Moderate site impact, minimal local impact, important consideration at local or regional level, possible long-term cumulative effect. Not likely to be decision making issues. Design and mitigation measures may ameliorate some consequences.</li></ul> <p>This would be a Moderate consequence.</p>		
<b>Consequence</b>		Moderate
<b>Untreated Likelihood</b>		
<p>The likelihood of moderate site impact, minimal local impact is Almost certain - the event is likely to occur many times (has occurred frequently).</p>		
<b>Untreated Likelihood</b>		Almost certain
<b>Current Treatments</b>		
<p>If the WTGs will be higher than 150 m (492 ft) AGL, they must be regarded as obstacles unless CASA assess otherwise. In general, objects outside an OLS and above 100 m would require obstacle lighting unless CASA, in an aeronautical study, assesses it is shielded by another lit object or it is of no operational significance.</p>		
<b>Level of Risk</b>		
<p>The level of risk associated with an Almost certain likelihood of a Moderate consequence is 8.</p>		
<b>Current Level of Risk</b>		8 - Unacceptable
<b>Risk Decision</b>		
<p>A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.</p>		
<b>Risk Decision</b>		Unacceptable



## Recommended Treatments

Not installing obstacle lighting would completely remove the source of the impact.

As per the above safety risk assessment, the provision of lighting for the WTGs is not considered necessary to provide an acceptable level of safety.

If CASA or a planning authority decide that obstacle lighting is required there are impact reduction measures that can be implemented to reduce the impact of lighting on surrounding neighbours, including:

- reducing the number of WTGs with obstacle lights
- specifying an obstacle light that minimises light intensity at ground level
- specifying an obstacle light that matches light intensity to meteorological visibility
- mitigating light glare from obstacle lighting through measures such as baffling.

These measures are designed to optimise the benefit of the obstacle lights to pilots while minimising the visual impact to residents within and around the Project site.

Consideration may be given to activating the obstacle lighting via a pilot activated lighting system.

An option is to consider using Aircraft Detection Lighting Systems (referred in the United States Federal Aviation Administration Advisory Circular AC70/7460-1L CHG1 – *Obstruction Marking and Lighting*). Such a system would only activate the lights when an aircraft is detected in the near vicinity and deactivate the lighting once the aircraft has passed. This technology reduces the impact of night lighting on nearby communities and migratory birds and extends the life expectancy of obstruction lights.

## Residual Risk

Not installing obstacle lights would clearly be an acceptable outcome to those potentially affected by visual impact.

If lighting is required, consideration of visual impact in the lighting design should enable installation of lighting that reduces the impact to neighbours.

The likelihood of a **Moderate** consequence remains **Likely**, with a resulting risk level of **7 – Tolerable**.

**It is our assessment that visual impact from obstacle lights can be negated if they are not installed.** If obstacle lights are to be installed, they can be designed so that there is an acceptable risk of visual impact to neighbours.

<b>Residual Risk</b>	<b>7 - Tolerable</b>
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## 10. CONCLUSIONS

The key conclusions of this AIA are summarised as follows:

### 10.1. Project description

The Project will comprise the following:

- up to a maximum of 10 WTGs with a maximum overall height (tip height) of up to 240 m AGL
- the highest WGT has a ground elevation of 438 m AHD and an overall height of 678 m AHD (2224.41 ft AMSL)
- Associated high voltage equipment and transmission infrastructure including connection to the existing overhead transmission line located within the Project Area

The Project is located within the Shire of Yilgarn LGA.

### 10.2. Aviation Impact Statement

Based on the Project WTG layout and maximum blade tip height of up to 240 m AGL, the blade tip elevation of the highest WTG associated with both proposed WTG configurations, will not exceed 678 m AHD (2224.41 ft AMSL) and:

- will not infringe Southern Cross aerodrome's obstacle limitation surfaces (for the current and potential future upgrade of runway 09/27)
- infringes the PANS-OPS surfaces of Southern Cross aerodrome associated with procedures aligned with runway 14/32 and will require amendments to both instrument approach procedures
- the infringements to the YSCR PANS-OPS surfaces will not create an impact to the existing flight paths and minimum descent altitude
- does not constrain the future implementation of instrument flight procedures to runway 09/27 at YSCR
- will require an increase to the LSALT for air route V242
- will require an increase to the Grid LSALT
- will not have an impact on operational airspace
- is wholly contained within Class G airspace
- is outside the clearance zones associated with civil aviation navigation aids and communication facilities.

### 10.3. ALA analysis summary

There are no uncertified aerodromes (ALA) within 3 nm of the Project WTGs.

#### **10.4. Aircraft operator characteristics**

Aircraft operators flying in vicinity of the Project will be mostly those aircraft operating to and from Southern Cross aerodrome. Aerial firefighting and aerial application operations may be possible in the vicinity of the Project Area.

Aircraft operating to YSCR will be mostly day-time operations, and those aircraft operating at night are anticipated to be operating under the IFR.

There are air transport operations that would be conducted in the vicinity of the Project Area. The Project is not anticipated to affect the normal operation of air transport aircraft.

#### **10.5. Hazard marking and lighting**

The following conclusions apply to hazard marking and lighting:

- With respect to CASR Part 139 Division 139.E.1 Notifying potential hazards 139.165, the proposed WTGs must be reported to CASA.
- CASA will review the proposed WTG development and make a recommendation for obstacle lighting if required.
- The Shire of Yilgarn have requested that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.
- With respect to marking of WTGs, a white colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents. WTGs must be marked in accordance with Part 139 MOS 2019 Chapter 8 Division 10 section 8.110



## 10.6. Summary of risks

A summary of the level of residual risk associated with the Project with the Recommended Treatments implemented, is provided in Table 12.

Table 12 Summary of Residual Risks

<i>Identified Risk</i>	<i>Consequence</i>	<i>Likelihood</i>	<i>Risk</i>	<i>Actions Required</i>
<b>Aircraft collision with wind turbine generator (WTG)</b>	Catastrophic	Unlikely	7	<b>Acceptable without obstacle lighting (ALARP).</b> Consider installing obstacle lights as additional safety measure, primarily associated with night operations at Southern Cross aerodrome. Communicate details of the Project WTGs to local and regional operators. The Shire of Yilgarn have requested that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.
<b>Avoidance manoeuvring leads to ground collision</b>	Catastrophic	Unlikely	7	<b>Acceptable without obstacle lighting (ALARP).</b> Consider installing obstacle lights as additional safety measure, primarily associated with night operations at Southern Cross aerodrome. Communicate details of the Project WTGs to local and regional operators. The Shire of Yilgarn have requested that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.
<b>Effect on crew</b>	Minor	Possible	5	<b>Acceptable without obstacle lighting (ALARP)</b> Consider installing obstacle lights as additional safety measure, primarily associated with night operations at Southern Cross aerodrome. Communicate details of the Project WTGs to local and regional operators. The Shire of Yilgarn have requested that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.
<b>Visual impact from obstacle lights</b>	Moderate	Likely	7	Acceptable without obstacle lighting (zero risk of visual impact from obstacle lighting). If lights are installed, design to minimise impact.

## 11. RECOMMENDATIONS

Recommended actions resulting from the conduct of this assessment are provided below.

### Notification and reporting

1. Details of WTGs exceeding 100 m AGL must be reported to CASA as soon as practicable after forming the intention to construct or erect the proposed object or structure, in accordance with CASR Part 139.165(1)(2).
2. 'As constructed' details of WTG coordinates and elevation should be provided to Airservices Australia, by submitting the form at this webpage: [https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085\\_Vertical\\_Obstruction\\_Data\\_Form.pdf](https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf) to the following email address: [vod@airservicesaustralia.com](mailto:vod@airservicesaustralia.com)
3. Any obstacles above 100 m AGL (including temporary construction equipment) should be reported to Airservices Australia NOTAM office until they are incorporated in published operational documents. With respect to crane operations during the construction of the Project, a notification to the NOTAM office may include, for example, the following details:
  - a. The planned operational timeframe and maximum height of the crane; and
  - b. Either the general area within which the crane will operate and/or the planned route with timelines that crane operations will follow.
4. Details of the wind farm should be provided to local and regional aircraft operators prior to construction in order for them to consider the potential impact of the wind farm on their operations. This should include The Royal Flying Doctor Service, the RAAF, Maroomba airlines and any other known IFR air transport operators.
5. To facilitate the flight planning of aerial application operators, details of the Project, including the 'as constructed' location and height information of WTGs, WMTs and overhead transmission lines should be provided to landowners so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.
6. The proponent should liaise with the Shire of Yilgarn and plan for the implementation of terminal instrument flight procedures at Southern Cross aerodrome that are aligned with runway 09/27.

### Marking of WTGs

7. The rotor blades, nacelle and the supporting mast of the WTGs should be painted white, typical of most WTGs operational in Australia. No additional marking measures are required for WTGs.

### Lighting of WTGs

8. CASA will determine whether obstacle lighting is recommended for the WTGs. It is not a formal requirement to light the WTGs. The Shire of Yilgarn have requested that WTGs T1, T6 and T7 are equipped with 2000cd aviation hazard lighting that meets international standards.

### Micrositing

9. The potential micrositing of the WTGs has been considered in the assessment. Siting of the WTGs within a 500 m radius of the proposed locations referenced in the assessment won't affect the results of the analysis.

### Overhead transmission line

10. Details of overhead transmission lines has not been specified for this assessment. An existing transmission line runs through the Project Area already.

#### Triggers for review

11. Triggers for review of this risk assessment are provided for consideration:
  - a. prior to construction to ensure the regulatory framework has not changed
  - b. following any significant changes to the context in which the assessment was prepared, including the regulatory framework
  - c. following any near miss, incident or accident associated with operations considered in this risk assessment.



## ANNEXURES

1. References
2. Definitions
3. CASA regulatory requirements – Lighting and Marking
4. Risk Framework

## ANNEXURE 1 – REFERENCES

References used or consulted in the preparation of this report include:

- Airservices Australia, Aeronautical Information Package; including AIP Book, Departure and Approach Procedures and En Route Supplement Australia dated 30 November 2023
- Airservices Australia, Designated Airspace Handbook, effective 30 November 2023
- Western Australia Government, Department of Planning, Lands and Heritage, Position Statement: Renewable energy facilities, March 2020
- Civil Aviation Safety Authority, Civil Aviation Safety Regulations 1998 (CASR)
  - Advisory Circular (AC) 91-10 v1.1: *Operations in the vicinity of non-controlled aerodromes*, dated November 2021
  - Advisory Circular 139.E-01 v1.0—*Reporting of Tall Structures*, dated December 2021
  - Advisory Circular (AC) 139.E-05 v1.1 *Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome*, October 2022
  - CASR Part 139 Manual of Standards (Aerodromes) 2019, dated 13 August 2020
  - CASR Part 173 Manual of Standards – *Standards Applicable to Instrument Flight Procedure Design*, version 1.5, dated March 2016
- Department of Infrastructure and Regional Development, Australian Government, National Airport Safeguarding Framework, Guideline D *Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* dated July 2012
- International Civil Aviation Organization (ICAO) Doc 8168 Procedures for Air Navigation Services—Aircraft Operations (PANS-OPS)
- ICAO Standards and Recommended Practices, Annex 14—Aerodromes
- OzRunways, aeronautical navigation charts extracts, dated 30 November 2023
- Standards Australia, ISO 31000:2018 *Risk management – Guidelines*

## ANNEXURE 2 – DEFINITIONS

<i>Term</i>	<i>Definition</i>
<b>Aerial Agricultural Operator</b>	Specialist pilot and/or company who are required to have a commercial pilot's licence, an agricultural rating and a chemical distributor's licence
<b>Aerodrome</b>	A defined area on land or water (including any buildings, installations, and equipment) intended to be used either wholly or in part for the arrival, departure, and surface movement of aircraft.
<b>Aerodrome facilities</b>	Physical things at an aerodrome which could include: <ul style="list-style-type: none"> <li>a. the physical characteristics of any movement area including runways, taxiways, taxilanes, shoulders, aprons, primary and secondary parking positions, runway strips and taxiway strips;</li> <li>b. infrastructure, structures, equipment, earthing points, cables, lighting, signage, markings, visual approach slope indicators.</li> </ul>
<b>Aerodrome reference point (ARP)</b>	The designated geographical location of an aerodrome.
<b>Aeronautical Information Publication (AIP)</b>	Details of regulations, procedures, and other information pertinent to the operation of aircraft
<b>Aeronautical Information Publication En-route Supplement Australia (AIP ERSa)</b>	Contains information vital for planning a flight and for the pilot in flight as well as pictorial presentations of all licensed aerodromes
<b>Civil Aviation Safety Regulations 1998 (CASR)</b>	Contain the mandatory requirements in relation to airworthiness, operational, licensing, enforcement.
<b>Instrument meteorological conditions (IMC)</b>	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minimum specified for visual meteorological conditions.
<b>Manual of Standards (MOS)</b>	The means CASA uses in meeting its responsibilities under the Act for promulgating aviation safety standards
<b>National Airports Safeguarding Framework (NASF)</b>	The Framework has the objective of developing a consistent and effective national framework to safeguard both airports and communities from inappropriate on and off airport developments.
<b>Obstacles</b>	All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.



<i>Term</i>	<i>Definition</i>
<b>Runway</b>	A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
<b>Runway strip</b>	A defined area including the runway and stopway, if provided, intended: <ul style="list-style-type: none"><li>a. to reduce the risk of damage to aircraft running off a runway; and</li><li>b. to protect aircraft flying over it during take-off or landing operations.</li></ul>
<b>Safety Management System</b>	A systematic approach to managing safety, including organisational structures, accountabilities, policies and procedures.

## ANNEXURE 3 – CASA REGULATORY REQUIREMENTS – LIGHTING AND MARKING

In considering the need for aviation hazard lighting and marking, the applicable regulatory context was determined.

The Civil Aviation Safety Authority (CASA) regulates aviation activities in Australia. Applicable requirements include the Civil Aviation Regulations 1988 (CAR), Civil Aviation Safety Regulations 1998 (CASR) and associated Manual of Standards (MOS) and other guidance material. Relevant provisions are outlined in further detail in the following section.

### **Civil Aviation Safety Regulations 1998, Part 139—Aerodromes**

CASR 139.165 requires the owner of a structure (or proponents of a structure) that will be 100 m or more above ground level to inform CASA. This must be given in written notice and contain information on the proposal, the height and location(s) of the object(s) and the proposed timeframe for construction. This is to allow CASA to assess the effect of the structure on aircraft operations and determine whether the structure will be hazardous to aircraft operations.

### **Manual of Standards Part 139—Aerodromes**

Chapter 9 sets out the standards applicable to Visual Aids Provided by Aerodrome Lighting.

Section 9.30 provides guidance on Types of Obstacle Lighting and Their Use:

1. *The following types of obstacle lights must be used, in accordance with this MOS, to light hazardous obstacles:*
  - a. *low-intensity;*
  - b. *medium-intensity;*
  - c. *high-intensity;*
  - d. *a combination of low, medium or high-intensity.*
2. *Low-intensity obstacle lights:*
  - a. *are steady red lights; and*
  - b. *must be used on non-extensive objects or structures whose height above the surrounding ground is less than 45 m.*
3. *Medium-intensity obstacle lights must be:*
  - a. *flashing white lights; or*
  - b. *flashing red lights; or*
  - c. *steady red lights.*

*Note CASA recommends the use of flashing red medium-intensity obstacle lights.*

4. *Medium-intensity obstacle lights must be used if:*
  - a. *the object or structure is an extensive one; or*

- b. the top of the object or structure is at least 45 m but not more than 150 m above the surrounding ground; or
- c. CASA determines in writing that early warning to pilots of the presence of the object or structure is desirable in the interests of aviation safety.

*Note* For example, a group of trees or buildings is regarded as an extensive object.

- 5. For subsection (4), low-intensity and medium-intensity obstacle lights may be used in combination.
- 6. High-intensity obstacle lights:
  - a. must be used on objects or structures whose height exceeds 150 m; and
  - b. must be flashing white lights.
- 7. Despite paragraph (6) (b), a medium-intensity flashing red light may be used if necessary, to avoid an adverse environmental impact on the local community.

Sections 9.31 (8) and (9) provide guidance on obstacle lighting specific to wind farms:

- 8. Subject to subsection (9), for wind turbines in a wind farm, medium-intensity obstacle lights must:
  - a. mark the highest point reached by the rotating blades; and
  - b. be provided on a sufficient number of individual wind turbines to indicate the general definition and extent of the wind farm, but such that intervals between lit turbines do not exceed 900 m; and
  - c. all be synchronised to flash simultaneously; and
  - d. be seen from every angle in azimuth.

*Note:* This is to prevent obstacle light shielding by the rotating blades of a wind turbine and may require more than 1 obstacle light to be fitted.

- 9. If it is physically impossible to light the rotating blades of a wind turbine:
  - a. the obstacle lights must be placed on top of the generator housing; and
  - b. a note must be published in the AIP-ERSA indicating that the obstacle lights are not at the highest position on the wind turbines.
- 10. If the top of an object or structure is more than 45 m above:
  - a. the surrounding ground (ground level); or
  - b. the top of the tallest nearby building (building level); then the top lights must be medium-intensity lights, and additional low-intensity lights must be:
    - c. provided at lower levels to indicate the full height of the structure; and
    - d. spaced as equally as possible between the top lights and the ground level or building level, but not so as to exceed 45 m between lights.

#### **Advisory Circular 139.E-01 v1.0—Reporting of Tall Structures**

In Advisory Circular (AC) 139.E-01 v1.0—Reporting of Tall Structures, CASA provides guidance to those



authorities and persons involved in the planning, approval, erection, extension or dismantling of tall structures so that they may understand the vital nature of the information they provide.

Airservices Australia has been assigned the task of maintaining a database of tall structures. RAAF and Airservices Australia require information on structures which are:

- a) 30 metres or more above ground level—within 30 kilometres of an aerodrome; or
- b) 45 metres or more above ground level elsewhere for the RAAF, or
- c) 30 m or more above ground level elsewhere for Airservices Australia.

The purpose of notifying Airservices Australia of these structures is to enable their details to be provided in aeronautical information databases and maps/charts etc used by pilots, so that the obstacles can be avoided.

The proposed WTGs must be reported to Airservices Australia. This action should occur once the final layout after micro-siting is confirmed and prior to construction.

### **International Civil Aviation Organisation**

Australia, as a contracting State to the International Civil Aviation Organisation (ICAO) and signatory to the Chicago Convention on International Civil Aviation (the Convention), has an obligation to implement ICAO's standards and recommended practices (SARPs) as published in the various annexes to the Convention.

Annex 14 to the Convention — *Aerodromes, Volume 1*, Section 6.2.4 provides SARPs for the obstacle lighting and marking of WTGs, which is copied below:

#### **6.2.4 Wind turbines**

**6.2.4.1** *A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.*

*Note 1. — Additional lighting or markings may be provided where in the opinion of the State such lighting or markings are deemed necessary.*

*Note 2. — See 4.3.1 and 4.3.2*

#### **Markings**

**6.2.4.2 Recommendation.** — *The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines should be painted white, unless otherwise indicated by an aeronautical study.*

#### **Lighting**

**6.2.4.3 Recommendation.** — *When lighting is deemed necessary, in the case of a wind farm, i.e. a group of two or more wind turbines, the wind farm should be regarded as an extensive object and the lights should be installed:*

- a) to identify the perimeter of the wind farm;*
- b) respecting the maximum spacing, in accordance with 6.2.3.15, between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used;*
- c) so that, where flashing lights are used, they flash simultaneously throughout the wind farm;*
- d) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located; and*
- e) at locations prescribed in a), b) and d), respecting the following criteria:*

i) for wind turbines of less than 150 m in overall height (hub height plus vertical blade height), medium-intensity lighting on the nacelle should be provided;

ii) for wind turbines from 150 m to 315 m in overall height, in addition to the medium-intensity light installed on the nacelle, a second light serving as an alternate should be provided in case of failure of the operating light. The lights should be installed to assure that the output of either light is not blocked by the other; and

iii) in addition, for wind turbines from 150 m to 315 m in overall height, an intermediate level at half the nacelle height of at least three low-intensity Type E lights, as specified in 6.2.1.3, should be provided. If an aeronautical study shows that low-intensity Type E lights are not suitable, low-intensity Type A or B lights may be used.

*Note.* — The above 6.2.4.3 e) does not address wind turbines of more than 315 m of overall height. For such wind turbines, additional marking and lighting may be required as determined by an aeronautical study.

6.2.4.4 Recommendation. — The obstacle lights should be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.

6.2.4.5 Recommendation. — Where lighting is deemed necessary for a single wind turbine or short line of wind turbines, the installation should be in accordance with 6.2.4.3 e) or as determined by an aeronautical study.

As referenced in Section 6.2.4.3(e)(iii), Section 6.2.1.3 is copied below:

6.2.1.3 The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked shall be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object, or by an adjacent object, additional lights shall be provided on that adjacent object or the part of the object that is shielding the light, in such a way as to retain the general definition of the object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

As referenced in Section 6.2.4.3(b), Section 6.2.3.15 is copied below:

6.2.3.15 Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and

a) low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45 m; and

b) medium-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900 m.

Section 4.3 Objects outside the OLS states the following:

4.3.1 Recommendation.— Arrangements should be made to enable the appropriate authority to be consulted concerning proposed construction beyond the limits of the obstacle limitation surfaces that extend above a height established by that authority, in order to permit an aeronautical study of the effect of such construction on the operation of aeroplanes.

4.3.2 Recommendation. — In areas beyond the limits of the obstacle limitation surfaces, at least those objects which extend to a height of 150 m or more above ground elevation should be regarded

*as obstacles, unless a special aeronautical study indicates that they do not constitute a hazard to aeroplanes.*

*Note. — This study may have regard to the nature of operations concerned and may distinguish between day and night operations.*

ICAO Doc 9774 Manual on Certification of Airports defines an aeronautical study as:

*An aeronautical study is a study of an aeronautical problem to identify potential solutions and select a solution that is acceptable without degrading safety.*

### **Light characteristics**

If obstacle lighting is required, installed lights should be designed according to the criteria set out in the applicable regulatory material and taking CASA's recommendations into consideration in the case that CASA has reviewed this risk assessment and provided recommendations.

The characteristics of the obstacle lights should be in accordance with the applicable standards in Part 139 MOS 2019.

The characteristics of low and medium intensity obstacle lights specified in Part 139 MOS 2019, Chapter 9, are provided below.

Part 139 MOS 2019 Chapter 9 Division 4 – Obstacle Lighting section 9.32 outlines Characteristics of Low Intensity Obstacle Lights.

1. *Low-intensity obstacle lights must have the following:*
  - a. *fixed lights showing red;*
  - b. *a horizontal beam spread that results in 360-degree coverage around the obstacle;*
  - c. *a minimum intensity of 100 candela (cd);*
  - d. *a vertical beam spread (to 50% of peak intensity) of 10 degrees;*
  - e. *a vertical distribution with 50 cd minimum at +6 degrees and +10 degrees above the horizontal;*
  - f. *not less than 10 cd at all elevation angles between –3 degrees and +90 degrees above the horizontal.*

*Note: The intensity requirement in paragraph (c) may be met using a double-bodied light fitting. CASA recommends that double-bodied light fittings, if used, should be orientated so that they show the maximum illuminated surface towards the predominant, or more critical, direction of aircraft approach.*

2. *To indicate the following:*
  - a. *taxiway obstacles;*
  - b. *unserviceable areas of the movement area; low-intensity obstacle lights must have a peak intensity of at least 10 cd.*

Part 139 MOS 2019 Chapter 9 Division 4 – Obstacle Lighting section 9.33 outlines Characteristics of Medium Intensity Obstacle Lights.

1. *Medium-intensity obstacle lights must:*



- a. be visible in all directions in azimuth; and
  - b. if flashing — have a flash frequency of between 20 and 60 flashes per minute.
2. The peak effective intensity of medium-intensity obstacle lights must be  $2\,000 \pm 25\%$  cd with a vertical distribution as follows:
  - a. for vertical beam spread — a minimum of 3 degrees;
  - b. at -1-degree elevation — a minimum of 50% of the lower tolerance value of the peak intensity;
  - c. at 0 degrees elevation — a minimum of 100% of the lower tolerance value of the peak intensity.
3. For subsection (2), vertical beam spread means the angle between 2 directions in a plane for which the intensity is equal to 50% of the lower tolerance value of the peak intensity.
4. If, instead of obstacle marking, a flashing white light is used during the day to indicate temporary obstacles in the vicinity of an aerodrome, the peak effective intensity of the light must be increased to  $20\,000 \pm 25\%$  cd when the background luminance is  $50\text{ cd/m}^2$  or greater.

#### Visual impact of night lighting

Annex 14 Section 6.2.4 and Part 139 MOS 2019 Chapter 9.31 (8)(9) are specifically intended for WTGs and recommends that medium intensity lighting is installed.

Generally accepted considerations regarding minimisation of visual impact are provided below for consideration in this aeronautical study:

- To minimise the visual impact on the environment, some shielding of the obstacle lights is permitted, provided it does not compromise their operational effectiveness;
- Shielding may be provided to restrict the downward component of light to either, or both, of the following:
  - such that no more than 5% of the nominal intensity is emitted at or below 5 degrees below horizontal; and
  - such that no light is emitted at or below 10 degrees below horizontal;
- If a light would be shielded in any direction by an adjacent object or structure, the light so shielded may be omitted, provided that such additional lights are used as are necessary to retain the general definition of the object or structure.
- If flashing obstacle lighting is required, all obstacle lights on a wind farm should be synchronised so that they flash simultaneously; and
- A relatively small area on the back of each blade near the rotor hub may be treated with a different colour or surface treatment, to reduce reflection from the rotor blades of light from the obstacle lights, without compromising the daytime visibility of the overall WTG.

#### Marking of WTGs

ICAO Annex 14 Vol 1 Section 6.2.4.2 recommends that the rotor blades, nacelle and upper 2/3 of the supporting mast of the WTGs should be painted a shade of white, unless otherwise indicated by an aeronautical study.

It is generally accepted that a shade of white colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents.

#### **Overhead transmission lines**

Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be identified in consultation with local aerial application operators and marked in accordance with Part 139 MOS 2019.

The Project will utilise the existing distribution network comprising of overhead power lines and poles approximately 15 m AGL. The marking specifications referenced are not considered applicable.

## ANNEXURE 4 – RISK FRAMEWORK

A risk management framework is comprised of likelihood and consequence descriptors, a matrix used to derive a level of risk, and actions required of management according to the level of risk.

The risk assessment framework used by Aviation Projects has been developed in consideration of ISO 31000:2018 *Risk management—Guidelines* and the guidance provided by CASA in its Safety Management System (SMS) for Aviation guidance material, which is aligned with the guidance provided by the International Civil Aviation Organization (ICAO) in Doc 9589 *Safety Management Manual*, Third Edition, 2013. Doc 9589 is intended to provide States (including Australia) with guidance on the development and implementation of a State Safety Programme (SSP), in accordance with the International SARPs, and is therefore adopted as the primary reference for aviation safety risk management in the context of the subject assessment.

Section 2.1 of the ICAO Doc 9589 *The concept of safety* defines safety as follows [author's underlining]:

*2.1.1 Within the context of aviation, safety is “the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management.”*

### Likelihood

Likelihood is defined in ISO 31000:2018 as the chance of something happening. Likelihood descriptors used in this report are as indicated in Table 1.

Table 1 Likelihood Descriptors

No	Descriptor	Description
1	Rare	It is almost inconceivable that this event will occur
2	Unlikely	The event is very unlikely to occur (not known to have occurred)
3	Possible	The event is unlikely to occur, but possible (has occurred rarely)
4	Likely	The event is likely to occur sometimes (has occurred infrequently)
5	Almost certain	The event is likely to occur many times (has occurred frequently)

### Consequence

Consequence is defined as the outcome of an event affecting objectives, which in this case is the safe and efficient operation of aircraft, and the visual amenity and enjoyment of local residents.

Consequence descriptors used in this report are as indicated in Table 2.



Table 2 Consequence Descriptors

No	Descriptor	People Safety	Property/Equipment	Effect on Crew	Environment
1	Insignificant	Minor injury – first aid treatment	Superficial damage	Nuisance	No effects or effects below level of perception
2	Minor	Significant injury – outpatient treatment	Moderate repairable damage – property still performs intended functions	Operations limitation imposed. Emergency procedures used.	Minimal site impact – easily controlled. Effects raised as local issues, unlikely to influence decision making. May enhance design and mitigation measures.
3	Moderate	Serious injury - hospitalisation	Major repairable damage – property performs intended functions with some short-term rectifications	Significant reduction in safety margins. Reduced capability of aircraft/crew to cope with conditions. High workload/stress on crew. Critical incident stress on crew.	Moderate site impact, minimal local impact, and important consideration at local or regional level, possible long-term cumulative effect. Not likely to be decision making issues. Design and mitigation measures may ameliorate some consequences.
4	Major	Permanent injury	Major damage rendering property ineffective in achieving design functions without major repairs	Large reduction in safety margins. Crew workload increased to point of performance decrement. Serious injury to small number of occupants. Intense critical incident stress.	High site impact, moderate local impact, important consideration at state level. Minor long-term cumulative effect. Design and mitigation measures unlikely to remove all effects.
5	Catastrophic	Multiple Fatalities	Damaged beyond repair	Conditions preventing continued safe flight and landing. Multiple deaths with loss of aircraft	Catastrophic site impact, high local impact, national importance. Serious long-term cumulative effect. Mitigation measures unlikely to remove effects.

### Risk matrix

The risk matrix, which correlates likelihood and consequence to determine a level of risk, used in this report is shown in Table 3.

Table 3 Risk Matrix

		CONSEQUENCE				
		INSIGNIFICANT 1	MINOR 2	MODERATE 3	MAJOR 4	CATASTROPHIC
LIKELIHOOD	ALMOST CERTAIN 5	6	7	8	9	10
	LIKELY 4	5	6	7	8	9
	POSSIBLE 3	4	5	6	7	8
	UNLIKELY 2	3	4	5	6	7
	RARE 1	2	3	4	5	6

### Actions required

Actions required according to the derived level of risk are shown in Table 4.

Table 4 Actions Required

8-10	<b>Unacceptable Risk</b>	Immediate action required by either treating or avoiding risk. Refer to executive management.
5-7	<b>Tolerable Risk</b>	Treatment action possibly required to achieve As Low As Reasonably Practicable (ALARP) - conduct cost/benefit analysis. Relevant manager to consider for appropriate action.
0-4/5	<b>Broadly Acceptable Risk</b>	Managed by routine procedures, and can be accepted with no action.



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# **Annexure 10:**

## **Feasibility Study Instrument Procedure Assessment Report**



## **Instrument Procedure Assessment Report**

# **FEASIBILITY STUDY RNP APCH RWY 09/27 SOUTHERN CROSS AERODROME, WA**

## **SOUTHERN CROSS WIND FARM**

Project no	GLOBAL-24/185
Version	1.0
Date of issue	31 January 2024
Status	Releasable
Author/company	Bas Smeulders / Global Airspace Solutions Pty Ltd
Owner/company	Mr. David Beardsmore / Yilgarn Holdings Pty Ltd
File	 GLOBAL-24-185 - Feasibility Study Southern Cross Aerodrome RNP APCH RWY 09-27 v1.0.docx
Pages	31
Classification	Commercial-in-Confidence – Global Airspace Solutions Pty Ltd
Distribution	To: Mr. David Beardsmore (Yilgarn Holdings Pty Ltd) Cc: Mr. Stirling Preston (Global Airspace Solutions Pty Ltd)
Appendices	01. Draft Publications for DAP Australia 02. - 03. -

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## **EXECUTIVE SUMMARY**

Global Airspace Solutions Pty Ltd (GAS) has been commissioned by Yilgarn Holdings Pty Ltd to investigate the feasibility of developing and publishing RNP Approaches for runways 09 and 27 at Southern Cross Aerodrome, WA.

Yilgarn Holdings Pty Ltd is planning to build a wind farm near Southern Cross, which would impact the published Minimum Sector Altitude (MSA) and Lower Safe Altitudes (LSALT) and therefore impact the operations of certain aircraft operators landing in accordance with the Visual Flight Rules (VFR) at Southern Cross Aerodrome.

The proposed wind farm is located approximately 12 km southeast of the outskirts of Southern Cross township and approximately 10 km southeast of Southern Cross Aerodrome, in Western Australia Wheatbelt region.

## *ASSESSMENT OF INSTRUMENT FLIGHT PROCEDURES*

The aerodrome has no ground nav aids, therefore the only possible instrument flight procedures are based on satellite navigation with PBN specification RNP APCH. The proposed wind farm does not impact the assessed instrument flight procedures, except for the starting altitude, which is based on the MSA.

## *CONCLUSIONS*

The Southern Cross Wind Farm impacts the Minimum Sector Altitude and Lowest Safe Altitude, i.e. altitudes must be increased. An aircraft is not allowed to fly lower than the published LSALT under the Instrument Flight Rules (IFR) unless taking off or landing using instrument flight procedures.

If there are no instrument flight procedures available for landing, then an aircraft can only descent below the LSALT when able to continue under the Visual Flight Rules (VFR), which means the aircraft has to fly in Visual Meteorological Conditions (VMC).

When increasing the altitude of the LSALT and/or MSA the probability that an aircraft can continue under the VFR in VMC decreases and therefore the need for instrument flight procedures becomes more important.

The mitigation to maintain Southern Cross Aerodrome runway 09/27 accessible during construction and operational lifetime of the Southern Cross Wind Farm is to develop and publish RNP Approaches for these runways. This study shows it is feasible and that the proposed wind farm does not impact the approaches, except for the starting altitude, which is driven by the MSA.

The approaches are straight-in approaches down to circling minima, because the strip width is not in accordance with Part 139 MOS for a Code 2 Non-Precision runway and therefore the runway is classified as a Non-Instrument runway.

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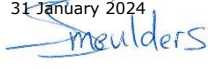
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## STATUS PAGE

DOCUMENT DATA	
<b>Title</b>	Feasibility Study RNP APCH RWY 09/27 Southern Cross Aerodrome, WA
<b>Subtitle</b>	Southern Cross Wind Farm
<b>Type</b>	Instrument Procedure Assessment Report
<b>Version</b>	1.0
<b>Date of issue</b>	31 January 2024
<b>Status</b>	Releasable

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HISTORY OF DOCUMENT			
Version	Status Document	Date of issue	Remarks
0.1	Draft	29 January 2024	New version
1.0	Releasable	31 January 2024	



## ABBREVIATIONS

½AW	Semi-Area Width
AGL	Above Ground Level
AIA	Aviation Impact Assessment
AIP	Aeronautical Information Package
AHD	Australian Height Datum
Alt	Altitude
AMSL	Above Mean Sea Level
APCH	Approach
ARP	Aerodrome Reference Point
ATT	Along-Track Tolerance
AWIS	Aerodrome Weather Information Service
BoM	Bureau of Meteorology
CASA	Civil Aviation Safety Authority
CAT	Category
CEO	Chief Executive Officer
CTAF	Common Traffic Advisory Frequency
DAH	Designated Airspace Handbook
DAP	Departure and Approach Procedures
DOC	Document
Elev	Elevation
ERSA	En-Route Supplement Australia
FAC	Facilities
FAF	Final Approach Fix
ft	Feet
GAS	Global Airspace Solutions Pty Ltd
GNSS	Global Navigation Satellite System
IAF	Initial Approach Fix
IAS	Indicated Airspeed
ICAO	International Civil Aviation Organization
IF	Intermediate approach Fix
IFP	Instrument Flight Procedure
ISA	International Standard Atmosphere
km	Kilometres

Kts	Knots
Lat	Latitude
LNAV	Lateral Navigation
Long	Longitude
LSALT	Lowest Safe Altitude
m	metres
MAPt	Missed Approach Point
Max	Maximum
MDA/H	Minimum Descent Altitude/Height
MOC	Minimum Obstacle Clearance
MOCA	Minimum Obstacle Clearance Altitude
MOS	Manual of Standards
MS	Microsoft
MSA	Minimum Sector Altitude
NM	Nautical Mile
OCA/H	Obstacle Clearance Altitude/Height
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations
PBN	Performance Based Navigation
Pty Ltd	Proprietary Limited
RNAV	Area Navigation
RNP	Required Navigation Performance
RWY	Runway
SOC	Start of Climb
TAS	True Airspeed
TCH	Threshold Crossing Height
THR	Threshold
Tol	Tolerance
VODB	Vertical Obstacle Database
Vol	Volume
WA	Western Australia
WTG	Wind Turbine Generator
XTT	Cross-Track Tolerance
YSCR	Southern Cross Aerodrome, WA

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## 1 INTRODUCTION

### 1.1 MOTIVATION

Global Airspace Solutions Pty Ltd (GAS) has been commissioned by Yilgarn Holdings Pty Ltd to investigate the feasibility of developing and publishing RNP Approaches for runways 09 and 27 at Southern Cross Aerodrome, WA.

Yilgarn Holdings Pty Ltd is planning to build a wind farm near Southern Cross, which would impact the published Minimum Sector Altitude (MSA) and Lower Safe Altitudes (LSALT) and therefore impact the operations of certain aircraft operators landing in accordance with the Visual Flight Rules (VFR) at Southern Cross Aerodrome.

Southern Cross Aerodrome has already 2 published RNP Approaches for Runways 14 and 32 (RNP N and RNP S). The width of runway 14/32 is 18 metres and therefore not suitable for these aircraft operators and circling is not an option either.

The width of runway 09/27 is 30 metres and therefore publishing instrument flight procedures for this runway would assure that the aircraft operators are able to descent below the MSA and LSALT in marginal weather and still able to land.

This assessment uses the ICAO PANS-OPS and CASA MOS Part 173 design criteria.

### 1.2 PURPOSE, TARGET AUDIENCE, STATUS

The purpose of this document is to determine the feasibility of instrument flight procedures for runway 09 and 27 at Southern Cross Aerodrome, WA and to inform appropriate stakeholders.

The appropriate stakeholders are as follows and in no particular order:

- Yilgarn Holdings Pty Ltd;
- Southern Cross Aerodrome, WA (YSCR);
- Aircraft operators operating to/from Southern Cross Aerodrome;
- Western Australia Government Department of Planning, Lands and Heritage;
- Civil Aviation Safety Authority (CASA);
- Airservices Australia.

### 1.3 CRITERIA

- ICAO Doc 8168 PANS OPS "Aircraft Operations", Vol II, "Construction of Visual and Instrument Flight Procedures", Seventh edition – 2020;
- ICAO Doc 9137, Part 6 "Control of Obstacles", Second Edition – 1983;
- ICAO Doc 9613, "Performance-based Navigation (PBN) Manual", Fourth Edition – 2013;
- CASA Manual of Standards Part 173, Version 1.8, 11 August 2022.
- GAS Instrument Flight Procedure Design Operations Manual, Version 1.5, May 2023.

### 1.4 REFERENCE DATA

- Aeronautical Information Package (AIP) Australia, including, En route Supplement Australia (ERSA);
- Data provided by Yilgarn Holding Pty Ltd, including the proposed wind turbine coordinates and heights;
- Data derived from Geoscience Australia;
- Data derived from Google Earth;
- Vertical Obstacle Database (VODB).

### 1.5 SOFTWARE TOOLS

- PDToolkit, Version 2021.10.22.15733, Windows 10, 64-bit;
- Autodesk AutoCAD Map 3D 2021.0.1, Version 24.0.30.14;
- MS Office Excel 365;
- Blue Marble Global Mapper, Version 21.1.0 (b021820) (59) (64-bit)
- Google Earth Pro, Version 7.3.6.9345 (64-bit) – 29 December 2022.



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## 2 GENERAL INFORMATION

This chapter provides the general information of the proposed Southern Cross wind farm and Southern Cross Aerodrome (See Figure 2-1 and Figure 2-2).

### 2.1 PROPOSED WIND FARM, VICINITY OF SOUTHERN CROSS, WA

The closest part of the proposed Southern Cross Wind Farm area is located approximately 12 km southeast of the outskirts of Southern Cross township and approximately 10 km southeast of Southern Cross Aerodrome, in Western Australia Wheatbelt region.

The elevation of the terrain at the proposed wind farm location varies between 379 m AHD and 438 m AHD.

The feasibility study used the following values for the proposed wind farm<sup>1</sup>:

- Wind turbine height including blades: 240 m AGL
- Assessed wind turbine locations (named as WTG\_001, WTG\_002, etc.), using a radius of 500 m around the specified location: See Table 2-1

WTG NAME	Location		Ground Elevation (m AHD)	WTG Elevation (m AHD)
	Easting	Northing		
WTG_001	733567.00	6536327.00	438	678
WTG_002	733483.00	6535674.00	424	664
WTG_003	733468.00	6534828.00	422	662
WTG_004	732349.00	6534880.00	408	648
WTG_005	732019.00	6534307.00	400	640
WTG_006	733357.00	6533235.00	398	638
WTG_007	733367.00	6532536.00	393	633
WTG_008	733351.00	6531837.00	387	627
WTG_009	732184.00	6531641.00	379	619
WTG_010	732142.00	6530471.00	381	621

Table 2-1 Windfarm obstacle data as of September 2023, AIA Southern Cross Wind Farm, Aviation Projects

### 2.2 AERODROME

Southern Cross Aerodrome, WA is a certified regional civil aerodrome, suitable mainly for CAT A, B and C aircraft.

The Aerodrome has two runways which are designated RWY 09/27 and RWY 14/32.

Instrument flight procedures are available for runway 14 and 32.

<sup>1</sup> Source Data: Aviation Projects: Aviation Impact Assessment, Southern Cross Wind Farm, September 2023



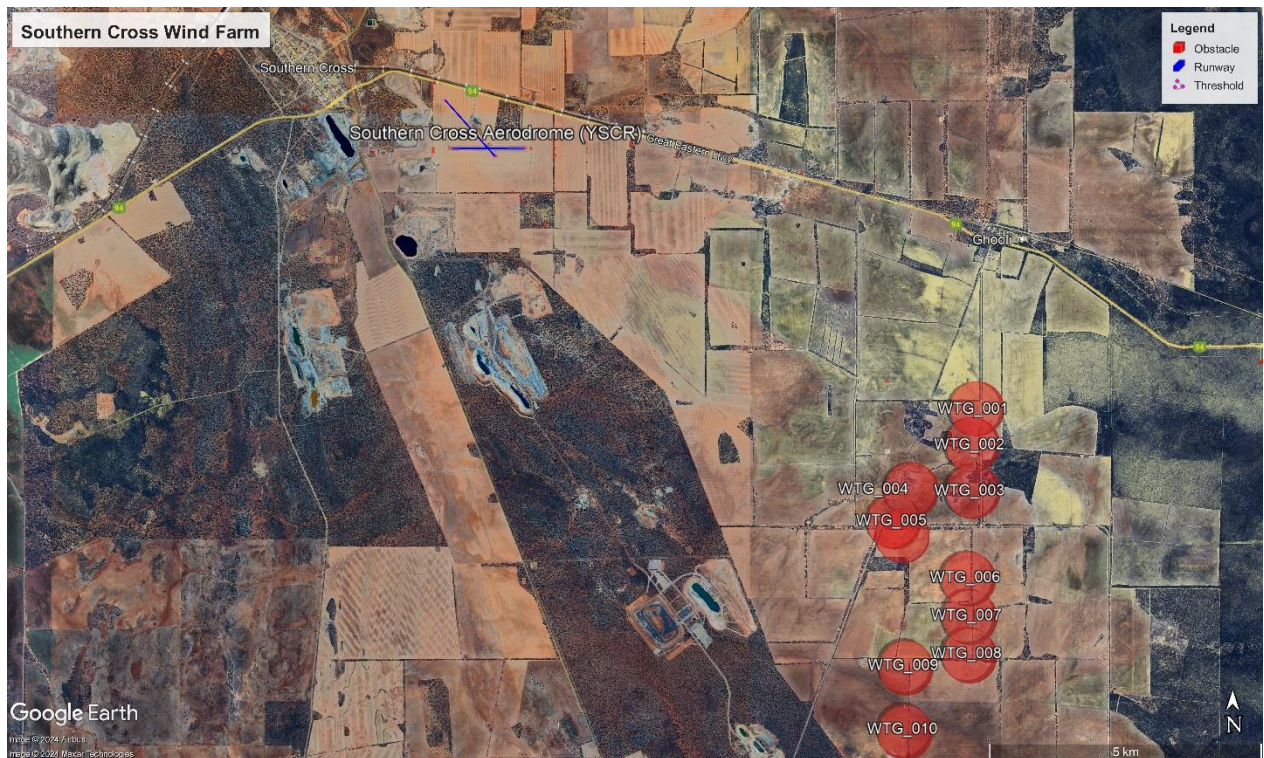


Figure 2-1 Proposed wind farm Location, Southern Cross, WA. Diagrammatic view, not reflecting wind turbine specifications.



Figure 2-2 Overview Southern Cross Aerodrome and most northern WTG of the Project Area

### 2.2.1 AIRSPACE

Southern Cross aerodrome is located within uncontrolled airspace and is serviced by the Flight Information Area of Melbourne Centre (See Figure 2-3). Southern Cross Aerodrome has its own Common Traffic Advisory Frequency (CTAF) as well.



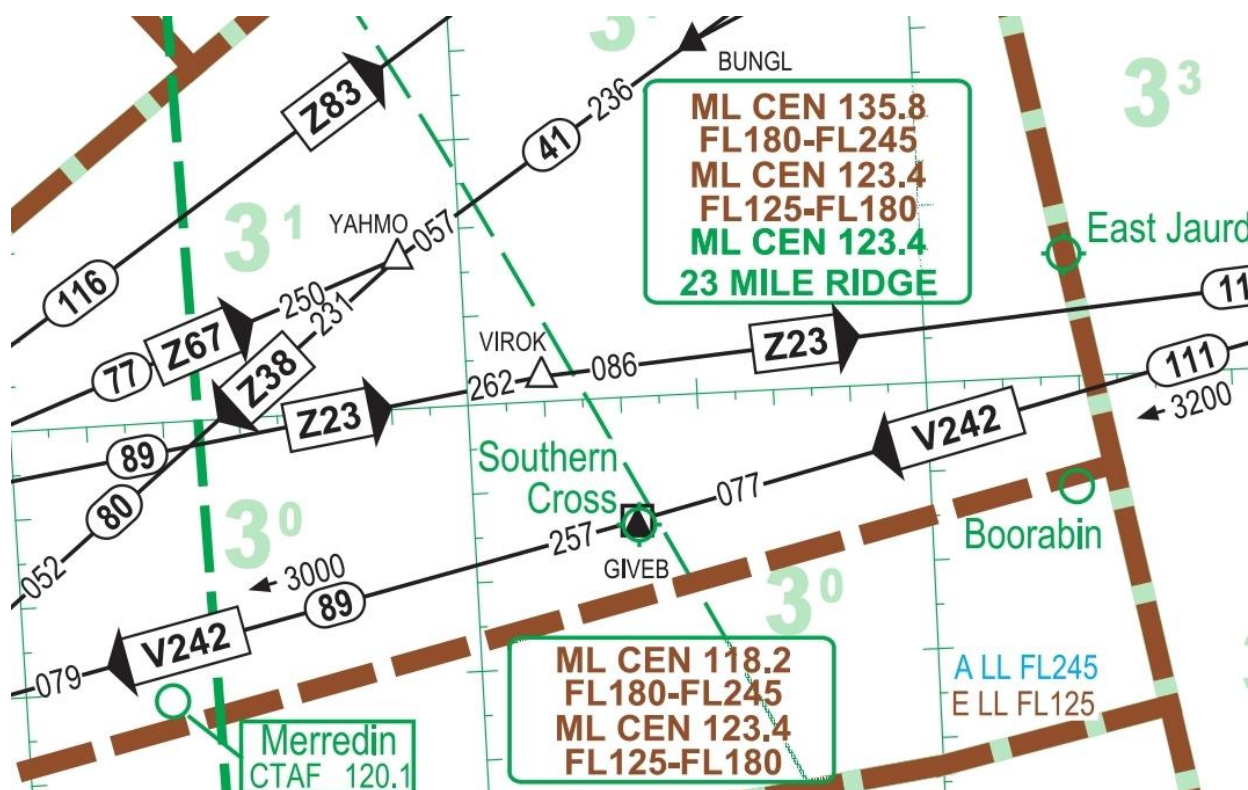


Figure 2-3 Overview of Airspace above Southern Cross Aerodrome

## 2.2.2 AERODROME REFERENCE POINT AND ELEVATION

The Aerodrome Reference Point (ARP) is published in the DAH:

- ARP coordinates: **31°14'25" S 119°21'35" E** and (Source: DAH, Section 17, 30 NOV 2023)
- Aerodrome elevation: **354.4824 m (1163 ft)** (Source: ERSA, FAC YNRG – 1, 30 NOV 2023)

## 2.2.3 MAGNETIC VARIATION

Magnetic variation has been derived using the Geoscience Australia tool.

- Magnetic Variation: **0.031°W**

## 2.2.4 ISA TEMPERATURE

The reference temperature mentioned in the monthly climate statistics provided by the Bureau of Meteorology<sup>2</sup> is 34.8°C. Therefore, for aircraft speed calculations ISA +20°C has been used, i.e. the maximum average temperature at the aerodrome can be higher than 30°C.

## 2.2.5 LIGHTING SYSTEMS AND MARKINGS

For an overview of the different lighting systems see ERSA FAC YSCR – 1.

## 2.2.6 METEOROLOGICAL INFORMATION

For an overview of the meteorological information see ERSA FAC YSCR – 1.

<sup>2</sup> Source: BoM Australia, Site number 012320 (Southern Cross Airfield), 04 Jan 2024

## 2.2.7 NAVIGATION AIDS

Southern Cross Aerodrome does not have any ground-based navigation aids, only GNSS could be used for possible future instrument flight procedure development.

Navaid	Ident	Coordinates	Function
GNSS	N/A	N/A	Could be used for: • RNP approaches for RWY 09/27

Table 2-2 Navaid information

### 2.2.7.1 XTT, ATT and ½AW

XTT, ATT and Area Semi-Width for RNP APCH in NM Aeroplane											
IF/IAF/missed approach (<30 NM ARP)			FAF			MAPt			Missed approach (<15 NM ARP)		
XTT	ATT	½AW	XTT	ATT	½AW	XTT	ATT	½AW	XTT	ATT	½AW
1.00	0.80	2.50	0.30	0.24	1.45	0.30	0.24	0.95	1.00	0.80	2.00

Table 2-3 XTT, ATT and ½AW information RNP APCH

## 2.2.8 RUNWAY INFORMATION

Runway	THR Elev* (ft)	Threshold Coordinates**	Runway-end Coordinates**	RWY End Elev* (ft)	Direction (°T)	Direction (°M)
09	1140 ft	31°14'26.83" S 119°21'09.50" E	31°14'26.83" S 119°21'59.34" E	1162 ft	090.00°T	090.03°M
27	1162 ft	31°14'26.83" S 119°21'59.34" E	31°14'26.83" S 119°21'09.50" E	1140 ft	270.00°T	270.03°M
14	1137 ft	31°13'57.74" S 119°21'04.25" E	31°14'31.79" S 119°21'39.55" E	1153 ft	138.31°T	138.34°M
32	1153 ft	31°14'31.79" S 119°21'39.55" E	31°13'57.74" S 119°21'04.25" E	1137 ft	318.30°T	318.33°M

Table 2-4 Runway information

\* Source: DAP Aerodrome Chart YSCR, 08 SEP 2022

\*\* Source: DAH, 30 NOV 2023

## 2.3 OBSTACLE TOLERANCE

Vertical tolerances used are dependent on the type of obstacles (e.g. 6 m for trees, 1 metre for surveyed antennas, etc.) or as provided for in the Vertical Obstacle Database (VODB) Australia.

The horizontal tolerance for the proposed wind turbine locations is set at a radius of 500 metres to account for the rotor radius, the accuracy of the installation site and possible changes after further detailed geotechnical surveys of each turbine location.

## 2.4 FLIGHT PROCEDURES

### 2.4.1 PUBLISHED INSTRUMENT FLIGHT PROCEDURES

Southern Cross Aerodrome has two published instrument flight procedures. RNP N for RWY 14 and RNP S for RWY 32. These procedures have been developed by Airservices Australia.

Certain aircraft operators cannot use runway 14/32 due to the width of 18 metres and therefore have to use runway 09/27, which has a width of 30 metres. The aircraft operators do

not use the published instrument flight procedures, because their operations do not allow for circling approaches.

## 2.4.2 FUTURE INSTRUMENT FLIGHT PROCEDURES

The aviation impact assessment provided by Aviation Projects describes that the Southern Cross Wind Farm will have an impact on the published MSA and LSALT. This means that the MSA and LSALT have to be raised from 2900 ft to 3300 ft AMSL.

Due to this increase, it could become more of a challenge to use runway 09/27 when approaching in accordance with the Visual Flight Rules due to weather circumstances (e.g. cloud base, visibility, etc.).

A mitigation could be to develop instrument flight procedures for runway 09 and 27. This study looks at the development of RNP APCH procedures for RWY 09 and RWY 27 down to circling minima only. The runway infrastructure does not allow for the publication of straight-in minima, due to:

- Runway Strip width of 90 metres not in accordance with the criteria provided in Part 139 MOS for a Non-Precision Code 2 runway, i.e. 140 metres;
- The runway does not have secondary wind direction indicators near the landing thresholds;
- The aerodrome does not have a broadcasting AWIS.

The approaches can be flown as straight-in approaches, but when approaching the circling MDA, the pilot has to take over visually and land the plane.

### 2.4.2.1 Waypoints

The waypoint naming convention is as follows:

- The first two letters are assigned for a given location and will be used for waypoints used in RNAV Instrument Approach procedures. These first two letters would remain static for a given location. These two letters could be taken from the aerodrome location code, NAVAID or another combination. These characters aren't used in normal pilot communications;
- The third letter is replaced by a digit starting from 2, excluding 0 and 1. When the instrument approach procedure is revised and deemed necessary to change waypoint names, the number can be changed from 2 to 3, 3 to 4 etc;
- The fourth and fifth letter still follow the current convention of indicating the true direction from which the procedure approaches and the fix type respectively. This is to ensure that they correlate with current pilot operational procedures for radio telephony, direction and waypoint sequence;

The first two letters for waypoints used for Southern Cross Aerodrome are "SQ". This has been allocated by Airservices.

Waypoint Name	Lat	Long	Description	Fly by / Fly over	Used by which RWY
SQ2WO	S31° 19' 08.56"	E119° 07' 29.39"	Right IAF	Fly By	RWY 09
SQ2WP	S31° 14' 25.58"	E119° 03' 39.85"	Straight IAF	Fly By	RWY 09
SQ2WR	S31° 09' 43.55"	E119° 07' 30.78"	Left IAF	Fly By	RWY 09
SQ2WI	S31° 14' 26.26"	E119° 09' 29.75"	IF	Fly By	RWY 09
SQ2WF	S31° 14' 26.68"	E119° 15' 19.63"	FAF	Fly By	RWY 09
RW09	S31° 14' 26.83"	E119° 21' 09.50"	MAPt	Fly Over	RWY 09

Waypoint Name	Lat	Long	Description	Fly by / Fly over	Used by which RWY
SQ2EK	S31° 09' 43.62"	E119° 35' 37.97"	Right IAF	Fly By	RWY 27
SQ2EL	S31° 14' 25.58"	E119° 39' 28.82"	Straight IAF	Fly By	RWY 27
SQ2EN	S31° 19' 08.49"	E119° 35' 39.36"	Left IAF	Fly By	RWY 27
SQ2EI	S31° 14' 26.26"	E119° 33' 39.01"	IF	Fly By	RWY 27
SQ2EF	S31° 14' 26.68"	E119° 27' 49.19"	FAF	Fly By	RWY 27
RW27	S31° 14' 26.83"	E119° 21' 59.34"	MAPt	Fly Over	RWY 27



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### 3 DEVELOPMENT OF INSTRUMENT FLIGHT PROCEDURES RWY 09/27

The following paragraphs describe the development of the RNP APCH procedures for runway 09 and runway 27, including the MSA and the Circling minima.

#### 3.1 MINIMUM SECTOR ALTITUDE (MSA)

The MSA is divided in 2 sectors, i.e. 25 NM MSA sector and 10 NM MSA sector. The published MSA has no subsectors and with the construction of the wind turbines, this will not change. The wind turbines impact the MSA. The minima for the MSA sectors are:

- **25 NM MSA:**  $678 + 300 = 978 \text{ m}$  (rounded up: **3300 ft**)
- **10 NM MSA:**  $678 + 300 = 978 \text{ m}$  (rounded up: **3300 ft**)

Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA (m/ft)	Remarks
WTG_001	S31°17'02.34"	E119°27'12.78"	678	0	25 NM MSA 10 NM MSA	300	<b>978 m</b> <b>3209 ft</b>	Critical

Table 3-1 Obstacle information MSA

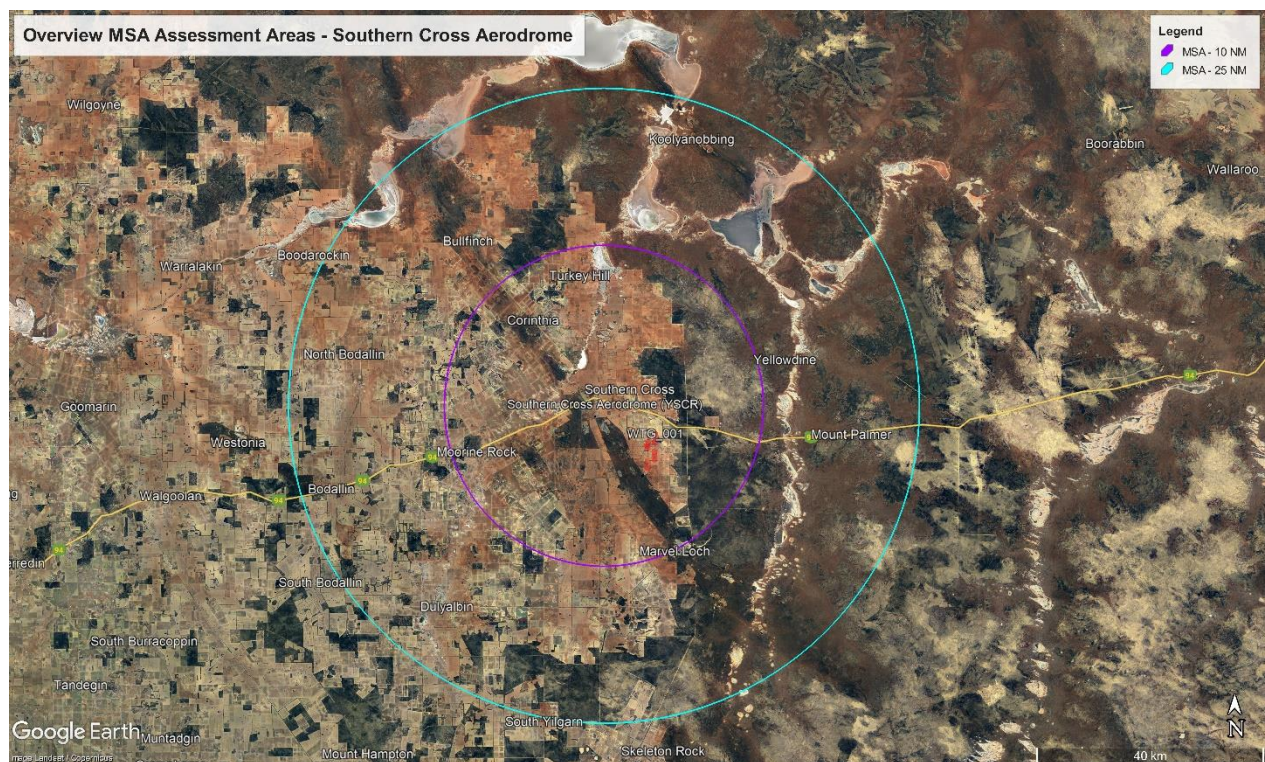


Figure 3-1 Overview of MSA Areas, Southern Cross Aerodrome

#### 3.2 VISUAL MANOEUVRING (CIRCLING)

The instrument part of the approaches for RWY 09/27 are down to circling minima only and therefore circling areas have to be assessed to calculate the MDA for CAT A&B and CAT C aircraft.

The Southern Cross Wind Farm is not impacting the circling minima, because the wind turbines are located outside the Circling assessment areas (See Figure 3-2).

The minima for the circling areas are:



- **Circling CAT A/B**:  $456 + 90 = 546 \text{ m}$  (rounded up: **1800 ft**)
- **Circling CAT C**:  $470 + 120 = 590 \text{ m}$  (rounded up: **1940ft**)

An allowance of 100 ft must be added to the lowest OCA [CASA MOS Part 173, Chapter 8, Paragraph 8.1.5(b)] and the published Circling MDA box will be shaded.

Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA/OCA (m/ft)	Remarks
SCR_020	S31°14'58.95"	E119°25'01.47"	415.52	40.48	CAT A/B circling area	90	<b>546 m / 1792 ft</b>	Critical
SCR_021	S31°16'46.37"	E119°26'12.75"	429.52	40.48	CAT C circling area	120	<b>590 m / 1936 ft</b>	Critical

Table 3-2 Obstacle information circling

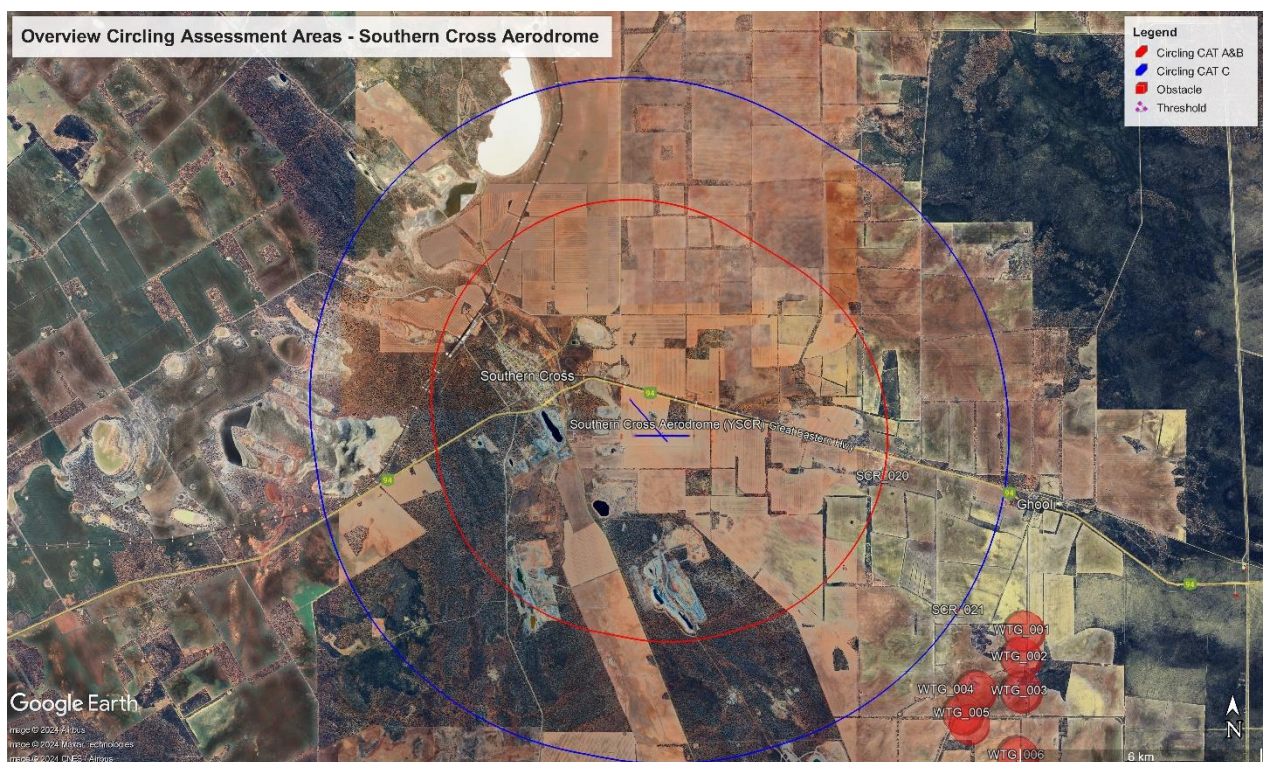


Figure 3-2 Overview of CAT A&B and CAT C Circling approach areas, Southern Cross Aerodrome

### 3.3 RNP W (RWY 09) APPROACH

The following paragraphs describe the RNP approach for RWY 09, including the holding, initial segment, intermediate segment, final segment and missed approach segment. The PBN specification for this approach is RNP APCH. If nothing is mentioned regarding criteria, then the standard PANS-OPS criteria has been used. See Figure 3-3 for an overview of the assessment areas.

#### 3.3.1 HOLDING RNP W (RWY 09) APPROACH

The holding is positioned at Straight IAF SQ2WP.

The **minimum holding altitude** is:  $520 \text{ m} + 300 \text{ m} = 820 \text{ m}$  (rounded up: **2700 ft**). The published holding altitude will be 3300 ft, same as the MSA 25 NM.



Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA (m/ft)	Remarks
SCR_027	S31°12'13.45"	E119°02'36.49"	479.52	40.48	Basic holding	300	<b>820 m 2691 ft</b>	Critical

Table 3-3 Obstacle information Holding RNP W

### 3.3.2 INITIAL SEGMENTS RNP W (RWY 09) APPROACH

The initial segment of the approach is constructed according the Y-bar criteria. There are 3 initial fixes, i.e. SQ2WO (Right IAF), SQ2WP (Straight IAF) and SQ2WR (Left IAF). The maximum IAS is set to 210 kts, which is standard for a 5 NM segment length. The initial segments end at SQ2WI.

The **MOCA** is:  $504\text{ m} + 300\text{ m} = 804\text{ m}$  (rounded up: **2700 ft**).

Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA (m/ft)	Remarks
SCR_022	S31°09'31.25"	E119°07'03.45"	463.52	40.48	Primary	300	<b>804 m 2638 ft</b>	Critical

Table 3-4 Obstacle information Initial Segment RNP W

### 3.3.3 INTERMEDIATE SEGMENT RNP W (RWY 09) APPROACH

The intermediate segment starts at the intermediate approach fix SQ2WI and ends at the final approach fix SQ2WF. The segment length is 5 NM.

The **MOCA** is:  $458\text{ m} + 150\text{ m} = 608\text{ m}$  (rounded up: **2000 ft**).

Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA (m/ft)	Remarks
SCR_023	S31°12'34.07"	E119°09'12.66"	417.52	40.48	Primary	150	<b>608 m 1995 ft</b>	Critical

Table 3-5 Obstacle information Intermediate Segment RNP W

### 3.3.4 FINAL APPROACH SEGMENT RNP W (RWY 09) APPROACH

The final approach segment starts at the final approach fix SQ2WF and ends at the MAPt RW09. The segment length is 5 NM.

The final approach is designed as a straight-in approach, but the minima box will only publish circling minima, due to the strip width of the runway not in accordance with the criteria of Part 139 MOS for a Non-Precision Approach Code 2 runway and there is no secondary wind direction indicator available near Threshold RWY 09.

This means that the published minima will be higher than the calculated minima.

The final approach segment **OCA/H** could be:  $438\text{ m} + 75\text{ m} = 513\text{ m}$  (rounded up: **1690 ft**).

Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA (m/ft)	Remarks
SCR_019	S31°14'02.62"	E119°19'27.07"	428	10	Primary	75	<b>513 m 1684 ft</b>	Critical

Table 3-6 Obstacle information Final Segment RNP W

The straight-in approach minima are 110 ft lower than the circling minima for CAT A&B and 250 ft lower than the circling minima for CAT C.

### 3.3.5 MISSED APPROACH SEGMENT RNP W (RWY 09) APPROACH

The straight missed approach starts at the MAPt RW09 and is described as:

“TRACK 090°, CLIMB TO 3300FT”

There is no turn specified in the missed approach. The MOC for the part of the missed approach before the Start of Climb (SOC) is 75 metres and at 1800 metres before the SOC reduces linearly from 75 metres to 30 metres to be reached at the SOC location.

There are no critical obstacles identified in the missed approach segment. The wind turbines located in the proposed Southern Cross Wind Farm are outside the obstacle assessment area for the missed approach and therefore have no impact on the approach (See Figure 3-4).

### 3.3.6 VSS RNP W (RWY 09) APPROACH

The Visual Segment Surface (VSS) is not applicable for approaches with only circling minima.

Assessing the VSS in case straight-in minima can be published, then it shows that the VSS is not penetrated.

### 3.3.7 MINIMA BOX RNP W (RWY 09) APPROACH

The minima are derived by adding the applicable MOC to the critical obstacle in the specific obstacle evaluation areas and then add the allowance of 100 ft to the lowest OCA (CASA MOS Part 173, Chapter 8, Paragraph 8.1.5.1(b) for the occasion that a local QNH is not available. The published MDA box will be shaded.

The minima box for the RNP W approach plate is:

CATEGORY	A	B	C	D
				NOT APPLICABLE
CIRCLING	1900 (737 – 2.4)		2040 (877 – 4.0)	
ALTERNATE	(1237 – 4.4)		(1377 – 6.0)	

Table 3-7 - Table MDA/H RNP W approach

## 3.4 RNP E (RWY 27) APPROACH

The following paragraphs describe the RNP approach for RWY 27, including the holding, initial segment, intermediate segment, final segment and missed approach segment. The PBN specification for this approach is RNP APCH. If nothing is mentioned regarding criteria, then the standard PANS-OPS criteria has been used. See Figure 3-5 for an overview of the assessment areas.

### 3.4.1 HOLDING RNP E (RWY 27) APPROACH

The holding is positioned at Straight IAF SQ2EL.

The **minimum holding altitude** is: 500 m + 300 m = 800 m (rounded up: **2700 ft**). The published holding altitude will be 3300 ft, same as the MSA 25 NM.

Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA (m/ft)	Remarks
SCR_028	S31°13'11.99"	E119°35'27.45"	459.52	40.48	Basic holding	300	800 m 2625 ft	Critical

Table 3-8 Obstacle information Holding RNP E



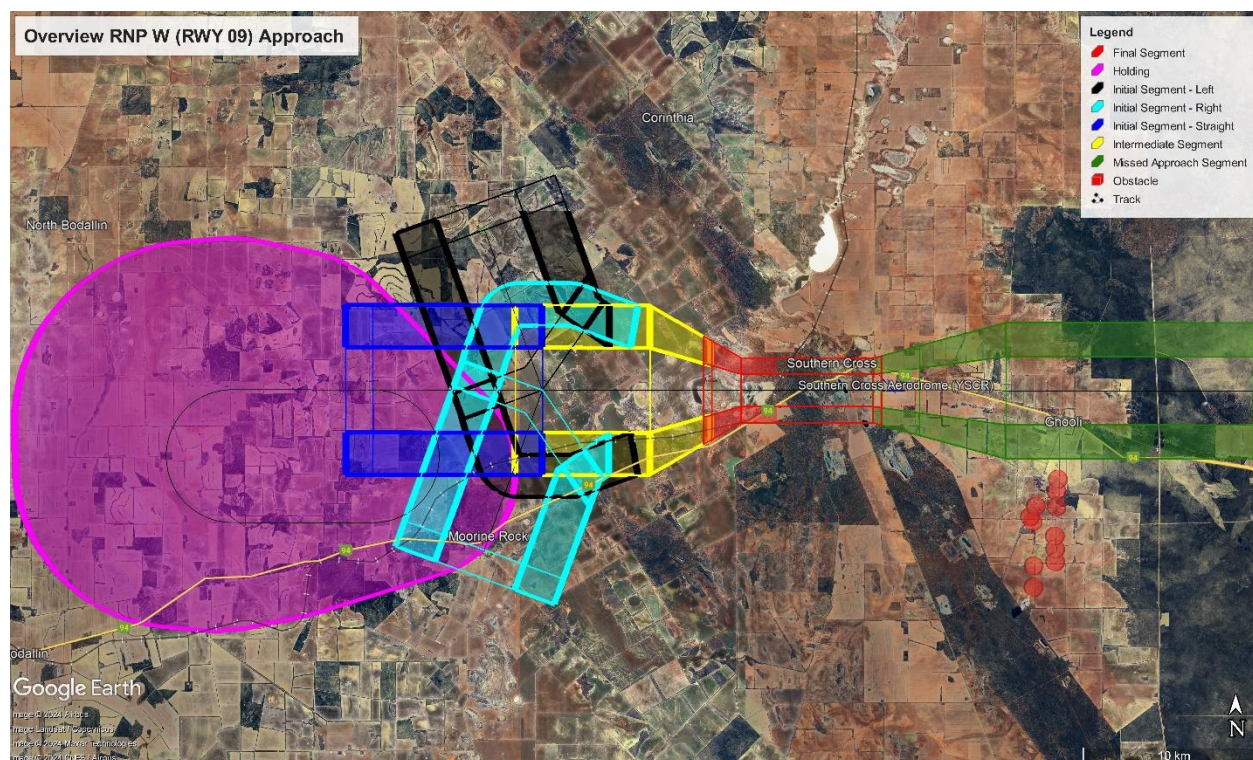


Figure 3-3 Overview RNP W (RWY 09) Approach

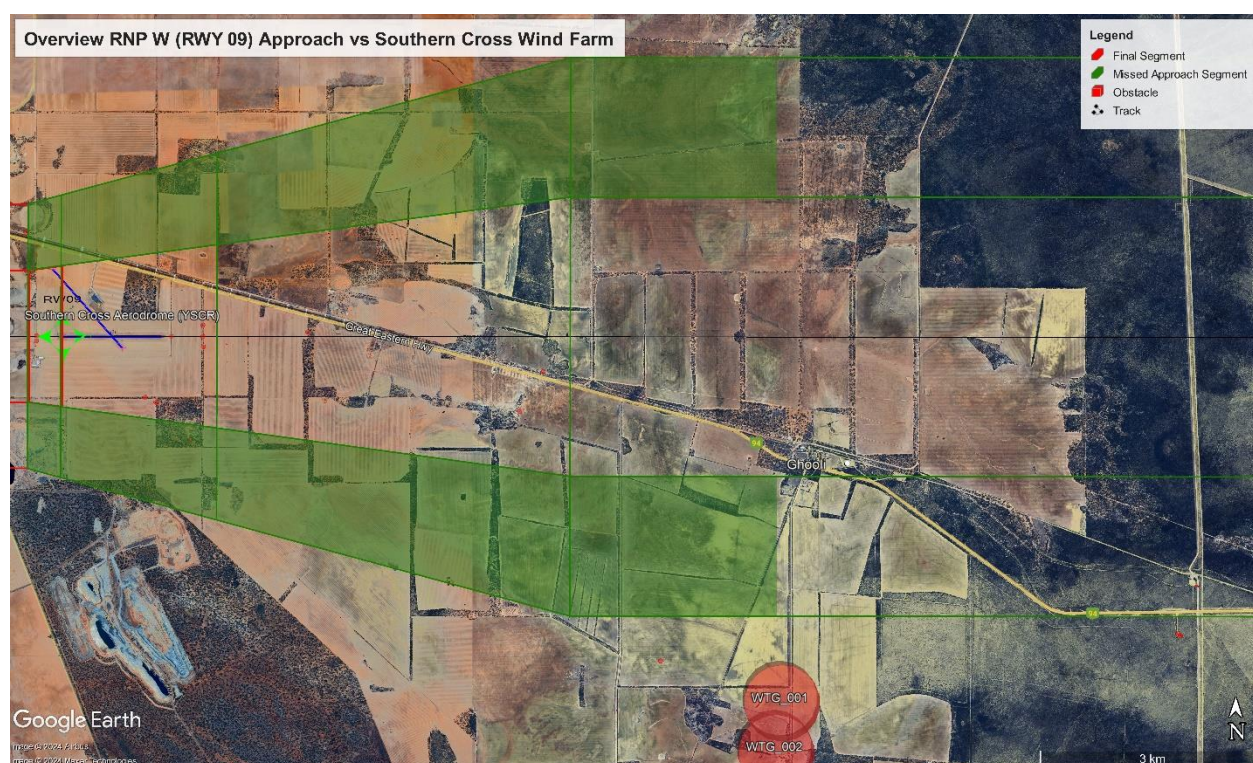


Figure 3-4 Overview RNP W (RWY 09) Missed Approach vs Southern Cross Wind Farm

### 3.4.2 INITIAL SEGMENTS RNP E (RWY 27) APPROACH

The initial segment of the approach is constructed according to the Y-bar criteria. There are 3 initial fixes, i.e. SQ2EK (Right IAF), SQ2EL (Straight IAF) and SQ2EN (Left IAF). The maximum IAS is set to 210 kts, which is standard for a 5 NM segment length. The initial segments end at SQ2EI.



The **MOCA** is: 502 m + 300 m = 802 m (rounded up: **2700 ft**).

Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA (m/ft)	Remarks
SCR_024	S31°13'39.56"	E119°34'58.93"	461.52	40.48	Primary	300	<b>802 m 2632 ft</b>	Critical

Table 3-9 Obstacle information Initial Segment RNP E

### 3.4.3 INTERMEDIATE SEGMENT RNP E (RWY 27) APPROACH

The intermediate segment starts at the intermediate approach fix SQ2EI and ends at the final approach fix SQ2EF. The segment length is 5 NM.

The **MOCA** is: 504 m + 150 m = 654 m (rounded up: **2200 ft**).

Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA (m/ft)	Remarks
SCR_025	S31°13'21.96"	E119°32'08.44"	463.52	40.48	Primary	150	<b>654 m 2146 ft</b>	Critical

Table 3-10 Obstacle information Intermediate Segment RNP E

### 3.4.4 FINAL APPROACH SEGMENT RNP E (RWY 27) APPROACH

The final approach segment starts at the final approach fix SQ2EF and ends at the MAPt RW27. The segment length is 5 NM.

The final approach is designed as a straight-in approach, but the minima box will only publish circling minima, due to the strip width of the runway not in accordance with the criteria of Part 139 MOS for a Non-Precision Approach Code 2 runway and there is no secondary wind direction indicator available near Threshold RWY 27.

This means that the published minima will be higher than the calculated minima.

The final approach segment **OCA/H** could be: 458 m + 75 m = 533 m (rounded up: **1750 ft**).

Obst Name	Lat	Long	Elev (m)	Tol (m)	Position	MOC (m)	MOCA (m/ft)	Remarks
SCR_026	S31°14'41.94"	E119°25'13.32"	417.52	40.48	Primary	75	<b>533 m 1749 ft</b>	Critical

Table 3-11 Obstacle information Final Segment RNP E

The straight-in approach minima are 50 ft lower than the circling minima for CAT A&B and 190 ft lower than the circling minima for CAT C.

The wind turbines located in the proposed Southern Cross Wind Farm are outside the obstacle assessment area for the final approach and therefore have no impact on the approach (See Figure 3-6).

### 3.4.5 MISSED APPROACH SEGMENT RNP E (RWY 27) APPROACH

The straight missed approach starts the MAPt RW27 and is described as:

"TRACK 270°, CLIMB TO 3300FT"

There is no turn specified in the missed approach. The MOC for the part of the missed approach before the Start of Climb (SOC) is 75 metres and at 1800 metres before the SOC reduces linearly from 75 metres to 30 metres to be reached at the SOC location.

There are no critical obstacles identified in the missed approach segment.

### 3.4.6 VSS RNP E (RWY 27) APPROACH

The Visual Segment Surface (VSS) is not applicable for approaches with only circling minima.

Assessing the VSS in case straight-in minima can be published, then it shows that the VSS is penetrated by obstacles (trees) higher than 15 metres above threshold elevation. If Southern Cross aerodrome is keen to publish straight-in minima and deal with the appropriate runway infrastructure as per Part 139 MOS, then also these obstacles have to be removed or a higher descent gradient could possibly be applied.

### 3.4.7 MINIMA BOX RNP E (RWY 27) APPROACH

The minima are derived by adding the applicable MOC to the critical obstacle in the specific obstacle evaluation areas and then add the allowance of 100 ft to the lowest OCA (CASA MOS Part 173, Chapter 8, Paragraph 8.1.5.1(b) for the occasion that a local QNH is not available. The published MDA box will be shaded.

The minima box for the RNP E approach plate is:

CATEGORY	A	B	C	D
				NOT APPLICABLE
CIRCLING	1900 (737 – 2.4)		2040 (877 – 4.0)	
ALTERNATE	(1237 – 4.4)		(1377 – 6.0)	

Table 3-12 - Table MDA/H RNP E approach

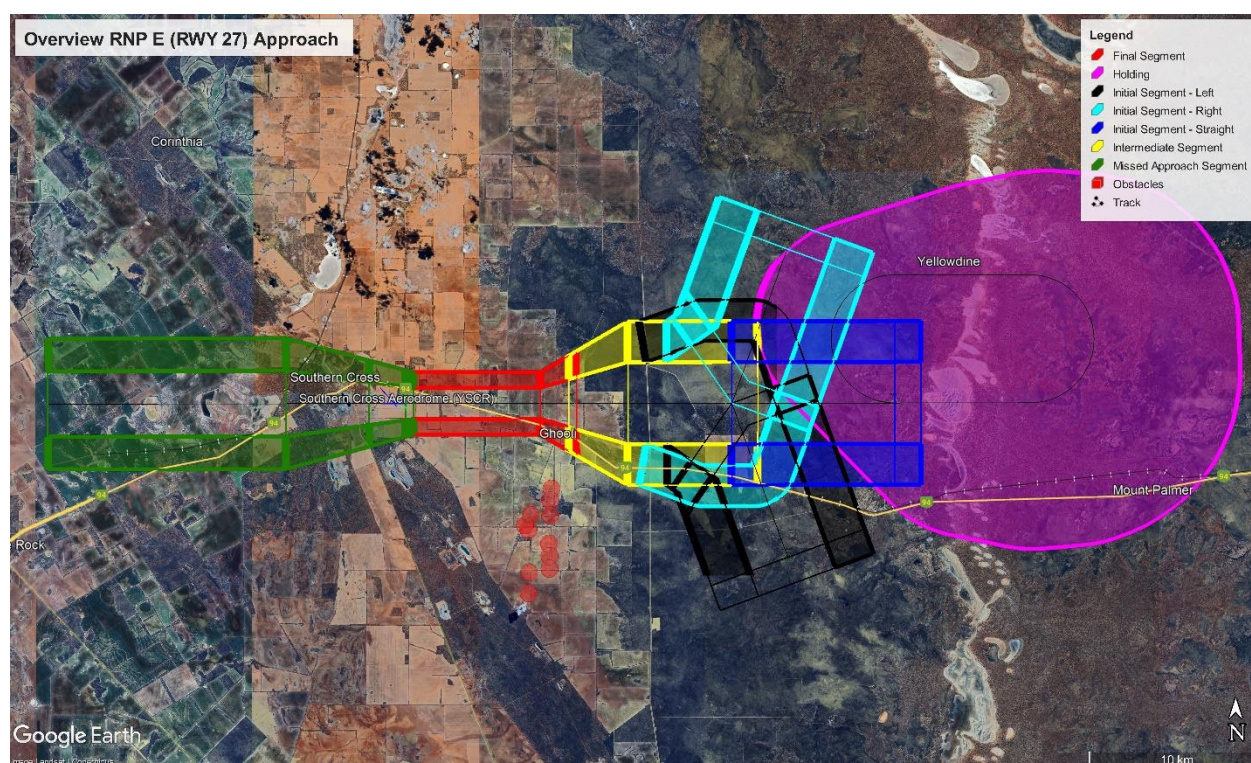


Figure 3-5 Overview RNP E (RWY 27) Approach



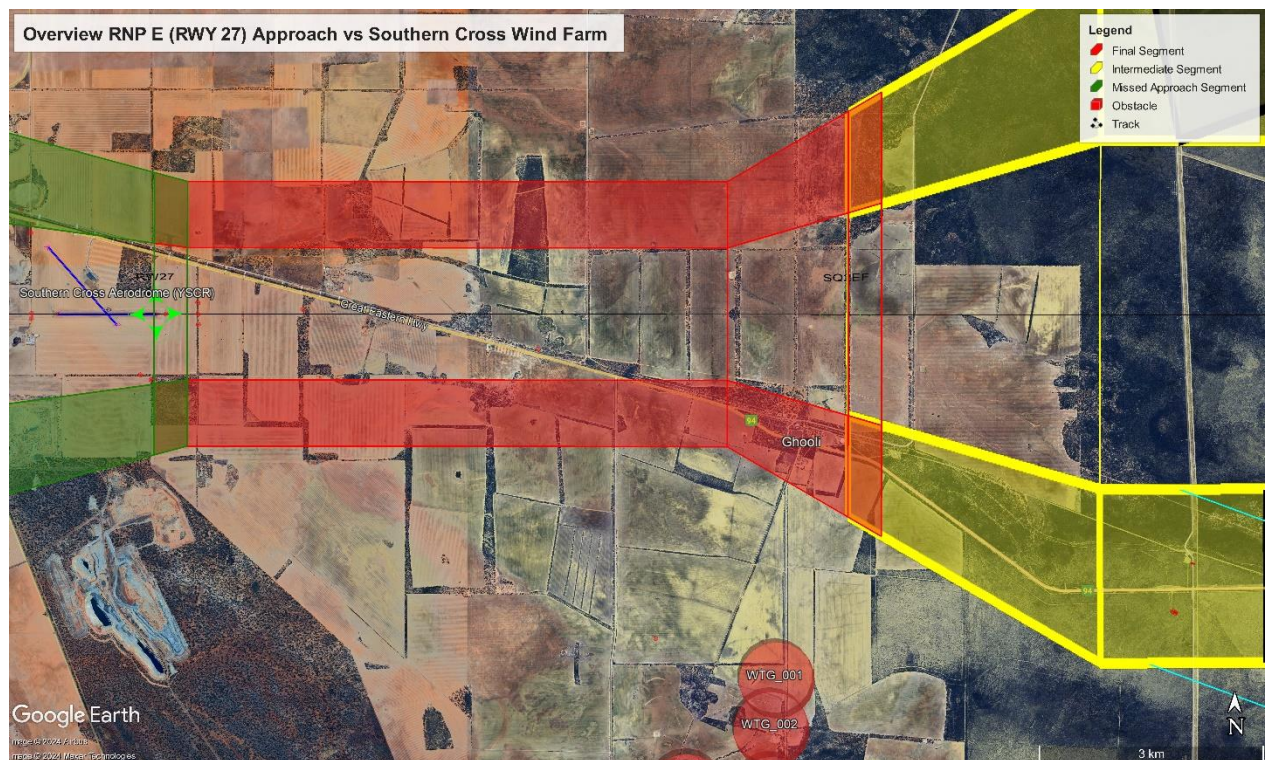


Figure 3-6 Overview RNP E (RWY 27) Final Approach vs Southern Cross Wind Farm



## **4 CONCLUSION**

The Southern Cross Wind Farm impacts the Minimum Sector Altitude and Lowest Safe Altitude, i.e. altitudes must be increased. An aircraft is not allowed to fly lower than the published LSALT under the Instrument Flight Rules (IFR) unless taking off or landing using instrument flight procedures.

If there are no instrument flight procedures available for landing, then an aircraft can only descent below the LSALT when able to continue under the Visual Flight Rules (VFR), which means the aircraft has to fly in Visual Meteorological Conditions (VMC).

When increasing the altitude of the LSALT and/or MSA the probability that an aircraft can continue under the VFR in VMC decreases and therefore the need for instrument flight procedures becomes more important.

Runway 09/27 at Southern Cross Aerodrome is being used by certain aircraft operators, due to the width of the runway. The aircraft operators are landing on the runway under the VFR in VMC, because there are no instrument flight procedures available for runway 09/27.

The mitigation to maintain Southern Cross Aerodrome runway 09/27 accessible during construction and operational lifetime of the Southern Cross Wind Farm is to develop and publish RNP Approaches for these runways. This study shows it is feasible and that the proposed wind farm does not impact the approaches, except for the starting altitude, which is driven by the MSA.

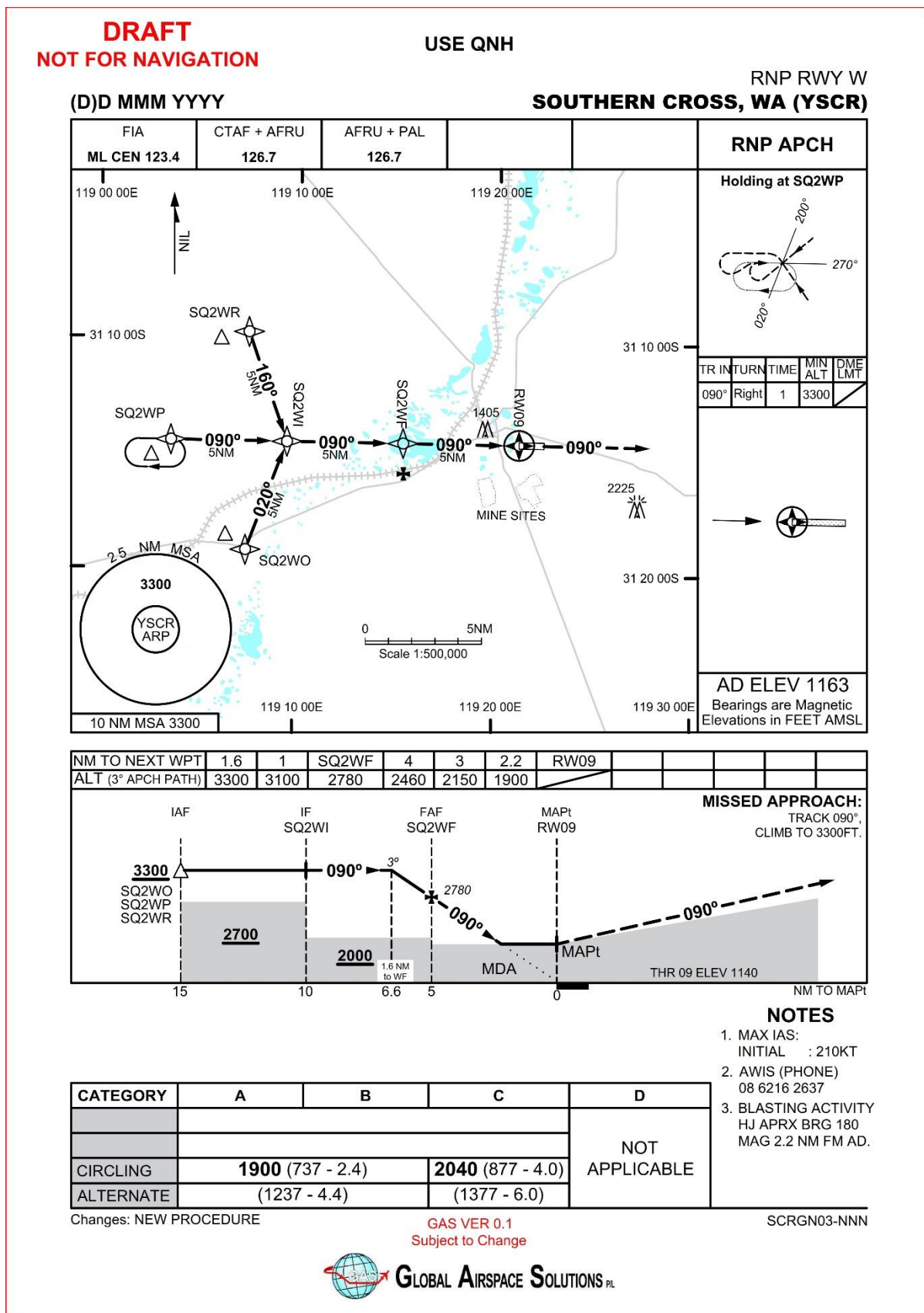
The approaches are straight-in approaches down to circling minima, because the strip width is not in accordance with Part 139 MOS for a Code 2 Non-Precision runway and therefore the runway is classified as a Non-Instrument runway.

Draft publications are available in Appendix 1 to this report.

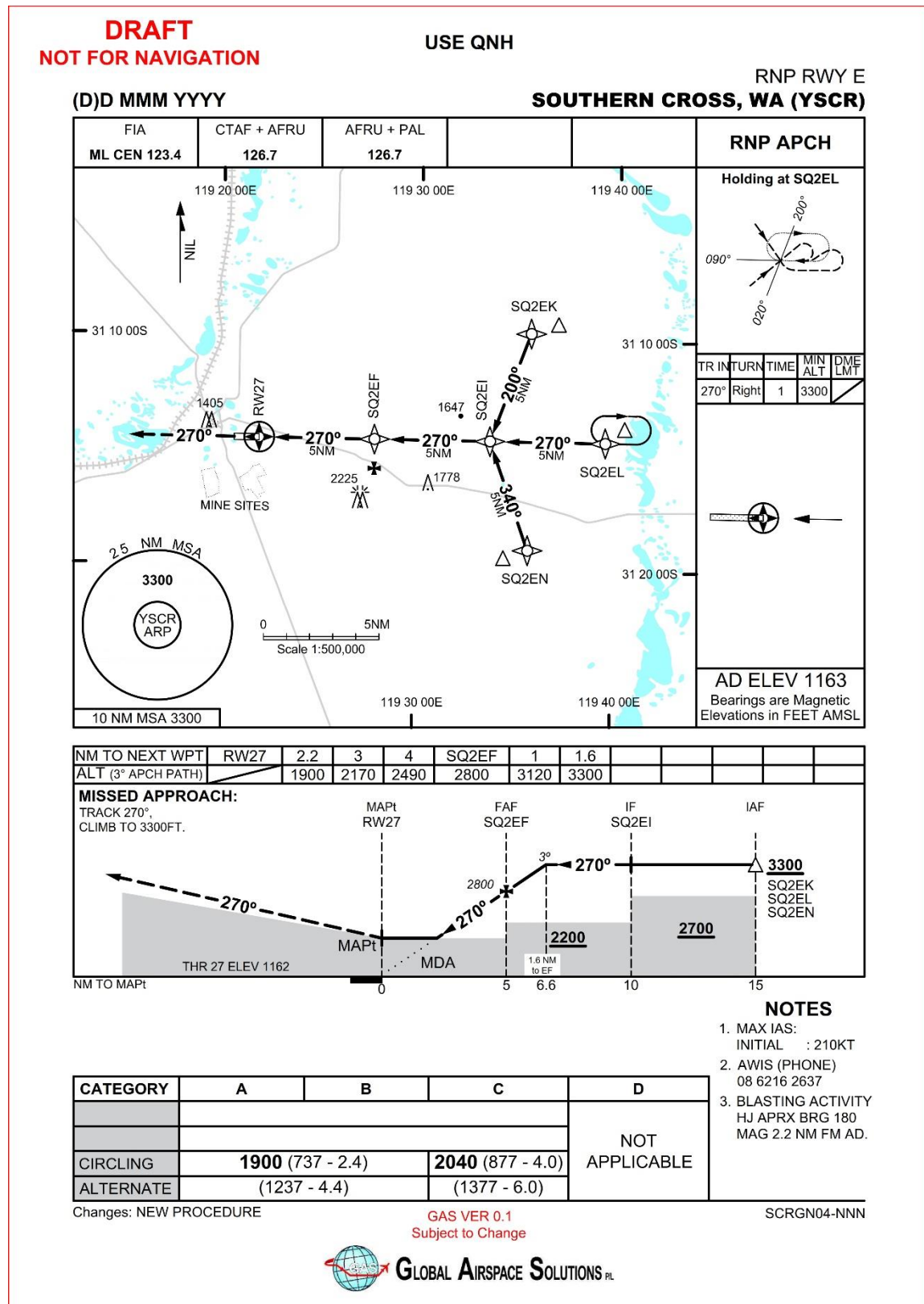
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## APPENDIX 01: DRAFT PUBLICATIONS FOR DAP AUSTRALIA

### DAP Australia – SOUTHERN CROSS, WA (SCR) - RNP W





**DAP Australia – SOUTHERN CROSS, WA (SCR) - RNP W**

-----END OF DOCUMENT-----

# **Annexure 11:**

## **Stakeholder Engagement Diary**





# YILGARN HOLDINGS PTY LTD

POWERING THE  
RENEWABLES REVOLUTION

## Stakeholder Consultation Diary



# Project Details

<b>Project name</b>	Southern Cross Wind Farm
<b>Proponent</b>	Yilgarn Holdings Pty Ltd
<b>Prepared by</b>	Yilgarn Holdings Pty Ltd

## Document Control

Revision	Revision Date	Comments	Name/Role	Approval Status
0.1	15/04/2023	First draft review	D Beardsmore	Draft
0.2	8/06/2023	Updates and amendments	R Trainer	Draft
A	13/06/2023	Final updates and review	D Beardsmore	Approved For Use

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# 1 STAKEHOLDER ENGAGEMENT

Table 1 contains a summary of stakeholder engagement for the project

1.1 TABLE 1

Stakeholder	Engagement Description	Subjects Covered	Timing
Landowners	<p>Landowners initially engaged in 2022 and regularly through 2022 and 2023.</p> <p>Face to face and telephone discussions focussed on an introduction to the project.</p> <p>Initial concept plans discussed and shared to promote an understanding and prompt questions.</p> <p>Regular follow up engagements with landowners as the project matures.</p>	<p>Wind monitoring</p> <p>Wind farm proposal</p> <p>Wind farm Concept</p> <p>Project phases and execution timing</p> <p>Wind farm layout and impact to land</p> <p>Wind turbine location</p> <p>Development approval process and supporting studies</p> <p>Option to Lease and Lease provisions</p> <p>Project progress/update</p>	From 2021 to date
Neighbours	<p>Face to face and telephone discussions focussed on an introduction to the project.</p> <p>Project concept discussed and shared to help improve understanding prompt questions.</p> <p>Introductory meeting</p>	<p>Wind farm proposal</p> <p>Wind farm location and concept</p> <p>Project phases and execution timing</p> <p>Project progress update</p>	From 02/03/2023 to date
Shire of Yilgarn	<p>Face to face and telephone discussions focussed on an introduction to the project.</p> <p>Introductory presentation with Shire Executive Team, provided project concept overview and summary of preliminary completed.</p>	<p>Wind farm proposal presentation</p> <p>Wind farm location and concept</p> <p>Project phases and execution timing</p> <p>Project progress update and forward plan ahead of submitting formal Planning Application</p>	From May 2022 to date

	Regular follow up engagements to discuss project execution, accommodation, and local content		
Western Power Networks	<p>Face to face and telephone discussions focussed on an introduction to the project.</p> <p>Meeting to discuss Southern Cross project, WPN Network Planning Strategy and key assumptions for project Network Access Enquiry.</p> <p>Decarbonisation Workshop</p>	<p>Wind farm proposal</p> <p>Wind farm location and concept</p> <p>Project phases and execution timing</p> <p>Network Access Enquiry</p>	From September 2022 to date
Resource Companies/Explorers	<p>Telephone discussions focussed on an introduction to the project.</p> <p>Project concept discussed and shared to help identify potential areas of conflict</p>	<p>Wind farm proposal</p> <p>Wind farm location and concept</p> <p>Project phases and execution timing</p> <p>Project progress update</p>	From December 2023 to date
DPIRD	Email introduction and project overview	<p>Wind farm proposal</p> <p>Wind farm location and concept</p>	From March to date
WA Air Services	Email introduction and request for a WA focal point		From April to date
Water Corporation	Formal request for a WA focal point through online media		From April to date
Department of Fire and Emergency Services	Formal request for a WA focal point through online media		From April to date
St John Ambulance	Email introduction and request for a WA focal point		From April to date

## **Annexure 12:**

# **Community Engagement Philosophy**





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## Appendix 7

# Southern Cross Wind Farm Community Engagement Philosophy



## Project Details

<b>Project name:</b>	Southern Cross Wind Farm
<b>Proponent</b>	Yilgarn Holdings Pty Ltd
<b>Prepared by</b>	Yilgarn Holdings Pty Ltd

## Document Control

Revision	Revision Date	Comments	Name/Role	Approval Status
0.1	30/01/2023	First draft review	D. Beardsmore	Draft
0.2	28/02/2023	Draft for review	D. Beardsmore	Draft
0.3	14/03/2023	Final draft for review	D. Beardsmore	Final Draft
A	20/03/2023	Approved For Use	D. Beardsmore	AFU

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# 1 INTRODUCTION

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Yilgarn Holdings Pty Ltd (Proponent) proposes to construct a wind farm located approximately 13 km southeast of Southern Cross townsite. Southern Cross Wind Farm is proposed to comprise of up to 10 wind turbines, up to 15MWac of solar and up to 10MW/10MWh of battery storage. The wind farm is proposed to be constructed on an area of freehold rural land cleared and historically used for cropping and grazing.

The purpose of this Community Engagement Philosophy is to provide a clear set of requirements that will be used during the development of the Southern Cross Community Engagement Plan for the Execute Phase of the Project.

The philosophy sets out requirements to be included within the plan with the primary object to:

- deliver a robust and consistent approach to community engagement
- ensure community stakeholders are fully notified and engaged before starting any activity that may impact them
- provide clear and transparent information to allow communities to engage and respond appropriately through a robust consultation process to build trust and constructive relations with local communities and stakeholders
- build confidence in community in relation to the wind farm
- develop effective engagement supporting processes and tools
- be regarded as a business of integrity that is respectful of the communities within which it operates, while being fully engaged and accountable for its activity

This philosophy sets out the approach, depth, and breadth of engagements to be applied and has been written in accordance with the Clean Energy Council Community Engagement Guidelines for the Australian Wind Industry. The guidelines provide a comprehensive best practice approach to community engagement addressing key stages of a wind farm lifecycle.

Tools within the guidelines have been adopted into this philosophy and will be used during development of the Community Engagement Plan to ensure throughout the Execute Phase of the Project, the community are appropriately consulted and engaged, and appropriate tools are in place to support this.

The Community Engagement Plan will be produced 6 months prior to wind farm construction, thus allowing sufficient time to implement the plan, and engage the community ahead of on-site civil works.

## 2 ENGAGEMENT THROUGHOUT THE WIND FARM LIFECYCLE

Community engagement is essential throughout all phases of a wind farm, typically multi decade. The proactive approach to community engagement by the Proponent to date will increase upon submission of the Project Development Application. Upon successful Development Approval community engagement will follow the Execute Phase Community Engagement Plan.

The four key stages in a wind farm project lifecycle still to be completed include:

1. project planning and approval (in progress)
2. construction (planned for 2024)
3. commissioning and operations (planned for 2025)
4. decommissioning

Community engagement activities have taken place during site selection and feasibility stages and will continue to be carried out throughout each of the remaining 4 stages of the wind farm.

Given each project development stage has unique implications and priorities for community engagement, the Community Engagement Plan will tailor communications based on each specific stage (*Refer to Table 1: Project stages, implications and priorities for community engagement*).

Construction	Commissioning and Operations	De-commission or Re-power	Stage
Building the wind farm.	Commercial operations of the wind farm, routine maintenance and monitoring.	Closure and dismantling of operations.	Description
Temporary disruptions to the community may be caused and will need to be minimised and communicated.	As an operational wind farm and part of the community, ongoing relations include participation in the life of the community befitting the nature of the project.	Dependant upon the decision to de-commission or repower there may be some disruption to the community and as such, should be kept informed in advance of any decision.	Impact
Maintain a positive environment around the project by ensuring awareness of the benefits of the project for the community and addressing potential negative impacts, demonstrating commitment to remedy when needed via formal meetings, reference groups, complaints management.	Ensure that wind farms become part of the community's life, benefiting their economic and social development, including activities for collaborations with local partners, continuing regular communication channels, open meetings, updates, etc.	Demonstrate proactivity to identify and address any questions raised by communities supported by development of a clear process .	Priority

Table 1: Project Stages, Implications and Priorities for Community Engagement

### 3 COMMUNITY ENGAGEMENT GUIDING PRINCIPLES

---

We are committed to meeting all applicable regulatory and legislative requirements and working with regional government groups to fully communicate our approach and principles.

We value and respect our relationships with communities in which we operate. We are focused on ensuring that we remain engaged with stakeholders to inform and consult them in meaningful ways about our activities.

We recognise that every community has insights, knowledge and experiences that can add value to, or improve the outcomes of our Project or its supporting activities. By tapping into these we can improve our decision-making processes and develop better and more sustainable solutions with the help of the community.

This Community Engagement Philosophy adopts 6 Guiding Principles which underpin development of each project-specific Community Engagement Plan.

#### Principle 1:

Meaningful – engagements are genuine and inform the final decision.

- the purpose and objectives are clear and shared with the community
- the public has adequate time, resources, and opportunities to provide feedback before decision-making.
- the public can take part in decisions that affect their lives
- decision-makers consider the views of the community

#### Principle 2:

Inclusive – engagements are respectful, inclusive, and accessible.

- the engagement design is human-centred and enables full participation
- asking individuals or groups how they would like to participate and designing the process accordingly
- offering several ways to engage
- the community has opportunities to influence the problem definition

#### Principle 3:

Transparent – engagements are clear and open about what the community can and cannot influence.

- sharing background information about the project and the engagement process
- explaining why some decisions can be influenced by the engagement, while others cannot
- communicating the level of influence the community has in the decision-making process
- seeking diverse opinions to build a greater understanding of the broad range of community views and values



#### Principle 4:

Informed - engagements provide relevant and timely information to the community.

- promoting the opportunity to take part in the engagement
- communicating accessible, relevant, tailored, and timely information
- giving the Community the knowledge and time to provide informed contributions
- providing clarity about the role of the engagement in the broader project - this includes how contributions will be considered and relevant legislation and standards

#### Principle 5:

Accountable - engagements are of high quality, and responsive to the community.

- planning must ensure that the purpose, scope, and objectives are clear
- engagement risks must be understood and mitigated
- communications provide pathways for questions and feedback
- demonstrate the proponents' values underpin the actions and behaviours of community engagement staff
- address concerns or requests from the community
- participants are advised how their input affected/or did not affect, the decision at the end of an engagement
- Community engagement is measured and reported to support continuous improvement

#### Principle 6:

Valuable - engagements create social, economic, and environmental value for the community.

- drawing on local knowledge and experience creating improved outcomes for community and the Proponent
- valuing participants and their time. In some instances, community members may be reimbursed for their time or supported to enable full participation. This may include transport, accommodation, and/or catering
- supporting the Proponent to understand and represent their community and inform decision-making
- building value for participants in the process through the social impact of informing, empowering, and enabling people to be part of changes that benefit their community

### 3.1 COMMUNITY ENGAGEMENT

The Community Engagement Plan shall ensure all stakeholders and community groups are recognised and listened to in relation to the Project or specific activities. Stakeholders and community groups may be connected by geographic location, special interest, affiliation, or identity. The approach within the Community Engagement Plan shall therefore be guided by the following objectives:

- **no surprises:** inform and engage community members and key stakeholders early in the process, and ensure they remain fully informed
- **be inclusive:** ensure the community has easy access to clear and concise information, ensuring all communications use non-technical language appropriate for each audience

- **be honest and act with integrity:** always use facts and speak the truth. If the answer is not known then the question will be taken on notice, the appropriate parties spoken with, and a response provided promptly.
- **be responsive:** respond to all stakeholders in a timely manner and make every effort to resolve issues to the satisfaction of all involved
- **be a part of the community:** use the Project to contribute to stronger local communities and provide economic and social benefit

### 3.2 CONSULTATION TIMING

Consultation was undertaken by the Proponent during the Site Selection and Feasibility Phase of the Project. Engagements and consultation will increase as the Project moves through from Feasibility through the Planning and Approvals Phase and into executing the Project.

Community engagements and consultation will be timed within the plan to identify, and or highlight, any specific concerns regarding Project activity during the Execute Phase, or in response to expressions of interest by the community.

Engagement and consultation will also occur as required to by law or in agreement with a government or statutory body.

## 4 ENGAGEMENT STYLES

Development of Community Engagement Plan will consider the most appropriate engagement styles suitable for specific engagements. Four engagement styles shall be considered including Inform, Consult, Involve and Collaborate.

Other engagement styles may be considered when developing the plan to address a specific need or concern. The use of co-creation for example may be used to seek input from a specific stakeholder with them playing a central role in resolving an issue.

The style of engagement necessary should be selected to ensure it is proportional to the impact. For example, where impacts are less significant, an approach such as Inform and Consult may be considered. Greater impacts on communities may require 'Involve' and 'Collaborate' styles of engagement to be considered.

Each engagement style, its goals, core outcomes and tools developed and deployed, are presented in Table 2 below.

Inform	Consult	Involve	Collaborate	
To provide balanced and objective information to assist their understanding of the development, alternatives and opportunities.	To obtain feedback which can form an input to decision making.	To work directly with individuals to ensure their feedback is understood and considered.	To work directly with individuals in all aspects of the development, including the alternatives and the identification of the preferred solution.	Objective
The community are well informed.	The community are well informed, listened to, and concerns acknowledge and feedback provide on how this input will influence a decision.	The community are well informed and engaged to ensure concerns and aspirations are directly reflected in the alternatives developed. Feedback provided on how input influenced a decision.	The community are well informed and looked to, for direct advice and innovation in formulating solutions and recommendations into the decisions to the maximum extent possible.	Stakeholder Outcome
Fact sheets Web materials Open houses Email Phone	Public comment Focus groups Public meetings	Workshops Feedback fact Sheets	Committees Consensus building Participatory decision-making	Tools To Deploy

Table 2: Community Engagement Styles



When undertaking any engagement, the Community Engagement Plan will ensure the Principles of CARE are embodied in any engagement undertaken.

### Comprehensive

Engagement will be thorough and cover all aspects of the project including social, environmental, and economic issues. It will give equal time to discussing the potential benefits and potential issues to ensure a well-rounded understanding by stakeholders and community members, as well as a balanced approach to information sharing.

### All-inclusive

Engagement will recognise the diversity of backgrounds and interests within the region, such as Indigenous and non-Indigenous residents and businesses, local and non-local, and a range of organisations with an influence and interest in the future growth and protection of the region. It will also ensure two-way communication is encouraged with all members of the community.

### Robust

Engagement will be conducted using a disciplined approach ensuring all feedback and consultation outcomes are accurately captured and reported.

### Equitable

Engagement will make use of a range of communication techniques and tools to promote equitable access for all members of the community. Everyone will have an opportunity to have their say, ask questions and receive answers.

## 5 ENGAGEMENT PLAN DEVELOPMENT

### 5.1 ENGAGEMENT PLAN CYCLE

The community engagement plan should comprise a cycle of constant learning to ensure continuous improvement occurs throughout the entire engagement process. Five key steps will therefore be considered during development of the plan to support continual learning (*Refer to Figure 1: Community Engagement Cycle*).



Figure 1. Community Engagement Cycle

### 5.2 STEP 1 - DISCOVER

Stakeholder identification and mapping has previously been undertaken and key groups and individuals identified. This analysis provided an overview of the relevant stakeholders in the community who were engaged throughout the Concept Phase and up to lodgement of the Develop Approval Application. This process will be repeated to ensure that all stakeholders identified are still current and appropriate.

Stakeholder analysis shall consider individuals from the community, civil society and community groups, government, or members of the community including:

- traditional owners, landowners, and neighbours
- community groups
- local businesses
- tourist organisations
- electricity network service providers
- local, regional, state, or national social and environmental interest groups
- local media
- municipal, state, and federal government departments, authorities, agencies, and regulators

It is essential to understand the community and all stakeholders and hence, a period of 'discovery' is necessary to assess the social context in the community and in particular the following aspects:

- political, economic, social, technological, legal, and environmental context
- type of groups that make up the community
- community's awareness of and interest in the issues associated with the project
- existing relationships with the community
- existing relationships among different groups in the community
- potential alignment of their interests
- willingness to participate in the Project (local content)
- community values

### 5.3 STEP 2 - ANALYSE

When all preliminary information about the community has been compiled it will be analysed to define the boundary and engagement style to be implemented. The boundary refers to defining the relevant stakeholders and any concerns they have that may need to be addressed in the engagement process. The style also refers to the level of engagement and tools that will be used to build trust and constructive relations with the community.

Defining Boundaries and Engagement Styles are outlined in Table 3 below including key questions to be used to define the boundary and style of their Community Engagement Plan.

Question	Implication
What are the key organisations and groups in the community?	Based on the information gathered, identify the groups most affected by or likely to affect the project and/or other community organisations or groups.
What are the most material issues for the community?	With key groups identified, identify community attitudes, risks and opportunities.
What level of engagement is best suited to address these issues with the community?	Determine the level of engagement to meet the needs of the community in relation to the project. Noting that the levels of engagement may vary with each group within the community along the project lifecycle.

Table 3: Defining Boundaries and Engagement Styles



## 5.4 STEP 3 - DEVELOP

Once all relevant information about the community has been collected, analysed, and boundary and engagement styles defined, the community engagement plan will be written.

The plan shall include:

- clear goals
- description of the community and the relevant issues for the Project
- choice of suitable tools for communicating, and interacting with the community
- clearly defined roles and responsibilities for company personnel
- timetable of proposed actions and events
- identification of the resources that will be needed to implement the plan

Ultimately, the success of the community engagement plan will not depend upon the plan in isolation, rather on those who deliver through the plan. Therefore, it is essential that those individuals are made familiar with the plan, are aware of the social context of the community, are pro- active in building relationships, consistent apply the plan, and understand the part they play as an individual in its success.

The elements of a successful community engagement plan are summarised in Table 4 below.

Item	Definition Required
Goals of the Engagement	Identification and explicit commitment to building trust and constructive relations with the community through the execution phase and through commercial operations.
Results from Step 1 – Discover	Explain the key findings from the community baseline study, profiling and mapping of stakeholders, and their concerns.
Boundary of the Engagement	Prioritise concerns and potential risks for community engagement.
Styles of to Engagement and Corresponding Tools	Select the most suitable level of engagement style and the tools to articulate them.
Roles and Responsibilities	Distribute and define tasks for individuals within the organisation.
Timelines	Define the community engagement timeline to reflect the remaining Project stages. Include milestones for engagement at each stage of the Project lifecycle including if the Project does not go ahead. project does not go ahead.
Resources Needed	Define of the financial, technical, technological and human requirements to deliver the plan.

Table 4: Elements of The Community Engagement Plan

## 5.5 STEP 4 - IMPLEMENT

The implementation of the plan will provide sufficient time in advance of 'go live' to ensure stakeholders are aware of the process and have opportunities to participate. To this end and upon implementation of the plan, the community will be invited to participate in the process and provide information on:

- the goals of the community engagement process
- the key issues that the process will address and why
- the approach of the company to address these issues
- opportunities to participate (including practical information about how and when)
- possible outcomes of the engagement process
- timelines and advising whether the project will progress

A common understanding of the basic rules of the engagement process shall be communicated such that communities understand the principles of openness, inclusivity, responsiveness, and accountability that will guide the process.

Within the plan a process will exist for engagement to be documented including participants, tools used, timeframe and a summary of outcomes. Depending upon the engagement this information may be shared with the attendees.

The plan will ensure that every enquiry or request made by the community is acknowledged and promptly responded to. Whilst it may not be possible to accommodate all issues raised, a response to each enquiry with accompanying explanation behind the subsequent decisions and actions must take place.

## 5.6 STEP 5 - MONITOR AND REVIEW

As part of the Plan a process will be developed to Monitor and Review the engagement process. Key Performance Indicators and documentation shall be established to ensure there is a continuous improvement mindset in relation to the end-to end engagement process.

## 5.7 PERFORMANCE REPORTING

Key Performance Indicators and community engagement shall form part of the corporate Reporting Process. This will ensure sufficient visibility is shared with senior managers.

## 6 ENGAGEMENT TYPES

---

The following engagement types shall be included whilst developing the plan.

### 6.1 ONE- TO-ONE BRIEFINGS

One-to-One Briefings will be used for personal meetings between the Project and individuals or groups from the community. While these briefings will be informal, pre-prepared materials will be developed and shared.

During these engagements the team shall be well equipped to respond to questions, concerns, or any aspect of the Project when questions arise.

It is anticipated that Individuals or groups who participate in a One-to-One Briefing, will seek a better understanding of the Project including how it may affect them as individuals. One-to-One briefings will include such information as:

- location size and number of wind turbines
- project timeframes
- lifecycle of a wind turbine
- perceived and potential Project risks
- impact on the local environment and wildlife
- noise from turbines
- electricity generation capacity
- local economic benefits and impacts
- other opportunities to engage

To support One-on-One briefings a briefing pack shall be developed and available to stakeholders after a briefing.

### 6.2 OPEN HOUSES

Open house events will be organized to provide a better understanding of the project and wind farms in general. These 'open space' format events will be undertaken at a prominent local location with desk, poster and displays providing opportunity to explore the project with our team.

### 6.3 PROJECT WEBSITE

A dedicated Southern Cross Wind Farm website will be an online resource for communities to access information about the Project. As is the case of the One-on-One briefings, the Website will be developed with the aim of providing accessible, readable, and factual content and will include:

- location
- history
- owners and approach
- information about wind energy
- frequently Asked Questions (FAQs)
- news and project progress
- contact details and opportunities to engage with the team



The use of social media platforms such as Twitter, Facebook and Instagram will also be considered to assist dispersing Project information in a timelier manner and to engage a broader community demographic.

#### 6.4 SITE VISIT

Site visits will be limited given the risk associated with Bio Security for landowners. However, it is intended to facilitate an opportunity for the broader community to attend the opening of the Wind Farm. Additional visits may be undertaken in certain specific circumstances with the agreement of Landowners.

#### 6.5 PROJECT ADVERTISEMENT

Project Advertising will be via local media services such as Crosswords, in addition to public notices or displays to inform the community and encourage community participation in planned engagements.

#### 6.6 COMMUNITY PARTNERSHIP

The Project will explore opportunities to collaborate with local government, civil society groups and local businesses in partnerships. These partnerships may include involvement in wildlife monitoring programs, support local tourism or other economic, social, or environmental projects.

#### 6.7 COMMUNITY FEEDBACK

A formal framework will be developed to channel feedback from the community that arise in relation to the Wind Farm. The framework will provide a structured process to resolve feedback and foster community ownership of solutions. It will contain sound definitions and criteria in relation to the type and degree of complaint or feedback to be addressed. This may include such things as community concerns or grievances about the performance or behaviour of Wind Farm Representatives or its contractors.

## 7 COMPLAINTS MANAGEMENT

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### 7.1 COMPLAINTS FROM THE COMMUNITY

As part of the Community Engagement Plan a complaints and dispute resolution procedure will be developed. This procedure will enable stakeholders to raise grievances or disputes and will provide a framework for addressing and resolving these in an appropriate and timely manner.