

Lincoln Gap Windfarm Pty Ltd

Construction of a forty-two (42) turbine windfarm and ancillary infrastructure

Eyre Highway, Lincoln Gap

010/V070/19

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Constructed Turbines – Stage 1: Lincoln Gap Windfarm

OVERVIEW

Application No	010/V070/19
Unique ID/KNET ID	2019/17031/01
Applicant	Lincoln Gap Windfarm Pty Ltd c/- Nexif Energy Australia Pty Ltd
Proposal	Lincoln Gap Windfarm - Stage 3 - Construction of a forty-two (42) turbine windfarm and ancillary infrastructure. Key features: maximum WTG tip height of up to 206m (and up to 6MW capacity), overhead and underground connection and/or transmission lines (33kV-275kV) substation, switch room, operations and maintenance buildings, security fencing, temporary construction facilities, battery energy storage system and/or synchronous condenser units with various internal tracks, and site and civil works. Stage 3 maximum generating capacity is 252MW.
Subject Land	Eyre Highway, Lincoln Gap
Zone/Policy Area	Remote Areas Zone
Relevant Authority	Minister for Planning and Local Government
Lodgement Date	26 November 2019
Council	Out of Councils
Planning & Design Code	1 July 2019
Type of Development	s131 - Crown Development
Public Notification	YES - Development over \$10m
Representations	NIL
Referral Agencies	EPA, ARTC, Defence, Transport, CASA, ASA, DEW
Report Author	Simon Neldner

EXECUTIVE SUMMARY

The development of a further stage of the Lincoln Gap windfarm builds upon an approved development and land use to the south-west of Port Augusta. Stage 1 of the development has been completed and is operational. Stage 2 has full development approval to commence construction.

The new stage utilises land to north and south of the Eyre Highway to accommodate an additional 42 turbines up to a height of 206m and turbine capacity of up to 6MW. The development will utilise (where practicable) existing infrastructure, such as internal roadways, access points, storage areas, site services, and a (temporary) concrete batching plant on the land.

The application was considered against the new Planning and Design Code (Phase 1) being land not within a council area. The Remote Areas Zone anticipates the development of renewable energy facilities and will continue to be used for low intensity (sheep) grazing by the landowner. No sites, or objects of cultural significance should be impacted. No endangered or threatened flora or fauna species should be unduly affected, but there will be native vegetation clearance and habitat loss.

The development application was referred to relevant stage agencies, including the EPA and Commissioner of Highways, and subject to appropriate conditions, no objection was raised. A four-week public notification period resulted in no submissions being received. The adjoining Council (Port Augusta) was also consulted, such that the development should not result in undue impacts to local services or infrastructure. No significant air safety or communications issues were identified.

There are no residences or sensitive land uses that should be impacted by the development, such as the separation distances, highway setbacks and relative remoteness of the development site from Port Augusta and the Eyre Highway (respectively). Temporary traffic controls may be required – particularly for the southern site entrance – given the 100km/h speed zone and vehicle passing lane during construction.

Subject to appropriate conditions of approval, the proposal is an appropriate land use to be further developed and operated on the subject land, and provides a source of additional (local) employment and assist in the further diversification of the electricity network through sustainable energy production.

ASSESSMENT REPORT

1. BACKGROUND

1.1 Strategic Context

New [State Planning Policies](#) (SPPs) are the highest order policy document in South Australia's planning system. They outline matters of importance to the state in land use planning and development and provide a policy environment aimed at enhancing our liveability, sustainability and prosperity. The SPPs are given effect through the creation of planning instruments, including Regional Plans and the Planning and Design Code.

There are sixteen SPPs relating to: integrated planning, design quality, adaptive reuse, biodiversity, climate change, housing supply and diversity, cultural heritage, primary industry, employment lands, key resources, strategic transport infrastructure, energy, coastal environment, water security and quality, natural hazards and emissions and hazardous activities.

State Planning Policy 12: Energy states that: *Planning has a key role to play in enabling all forms of energy infrastructure. This includes maintaining and expanding the existing energy network as well as enabling the development of renewable energy and alternative energy options. As new technologies such as battery storage, evolve there is a need to provide policies that are sufficiently flexible to allow for creative and innovative responses to energy demand and supply.*

Renewable energy infrastructure – due to the potential for external impacts (from noise, public safety and visual amenity etc) – needs to be carefully located and designed. The proposed development does not conflict with these broad principles (Policies 12.1, 12.2), whilst at the same time allows for the continuation of primary production activities (Policies 8.1, 8.4), does not unduly impact on more sensitive land uses or areas of cultural and environmental value (Policies 4.1, 4.2, 4.5, 7.1, 7.2) and helps reduce greenhouse gas emissions (Policies 5.6,5.9).

1.2 Regional Plans

Each region in South Australia has a plan to guide development and reflect the vision of the State Planning Policies. Regional plans set the direction for future planning and development of South Australia, however revised plans are still to be developed and adopted for the state's Far North region. The current (operative) plan being the [Far North Regional Plan](#) (being a volume of the South Australian Planning Strategy) from July 2010.

The regional volumes have three interlocking objectives: maintain and improve liveability; increase competitiveness; and drive sustainability and resilience to climate change. In respect to renewable energy facilities, the Far North volume of the SA Planning Strategy seeks to:

- Support renewable and clean energy technologies.
- Development that reduces greenhouse gas emissions.
- Provision of local employment opportunities to retain and attract people to the region.

The proposed windfarm development is broadly consistent with these policies. It is also noted that the development should not compromise existing environmental values or threatened species, increase hazard risk to life or property, or impact sites of cultural or heritage significance. The existing pastoral use of the land can also be maintained with minimal interruption or loss of productivity (and can support further investment in primary production and loss of valuing adding).

1.3 State Government Policy

[Climate Smart South Australia](#) sets the policy directions and desired outcomes to guide the work and decision making of all state Government agencies. A number of programs and practical actions have been introduced to support the state's climate change response based on new economic opportunities, reducing greenhouse gas emissions and measures to adapt and build resilience to manage climate risk. Such policies seek to attract new investment, drive innovation, create jobs and further enhance the liveability of local communities.

Renewable energy and storage projects that help meet the state's energy needs and Australia's Paris climate emission agreements are supported. Key focus areas are:

- large-scale renewable energy generation and storage, such as wind, solar thermal, solar PV, bioenergy, battery, pumped hydro and thermal storage
- demand-side energy such as rooftop solar, bioenergy, distributed storage, energy efficiency and demand management
- hydrogen production, use and export
- uptake of zero emission vehicles and investment in charging and refuelling infrastructure
- supply-chain development of low carbon technologies
- research and industry partnerships in low carbon technologies.

1.4 Office of the Technical Regulator

A Certificate (for lodgement purposes) was granted by the Office of the Technical Regulator on 26 June 2019. Any shortfall in inertia from the installed turbines will need to be compensated by a Fast Frequency Response (FFR) solution. This service is generally met through the provision of a Battery Energy Storage Facility (BESS), which supports the reliability and stability of the electricity network during the transition to a lower emission, more distributed, generation mix.

1.5 Crown Sponsorship & Pre-lodgement Process

No specific prelodgement process was undertaken, although the crown sponsorship request from NEXIF to the Department for Energy and Mining was circulated to state agencies for comment before being considered. No objection was raised from DPTI (now DIT). The crown sponsorship was granted by the Chief Executive of DEM on 11 July 2019.

1.6 Previous Development Applications

On 6 March 2006, a Development Application was lodged over the subject land (to the west of the current site and formed Stages 1-2) by Wind Energy Solutions Pty Ltd with the former Development Assessment Commission to construct a wind farm comprising 59 wind turbine generators and associated infrastructure.

This application identified turbines to be situated in the vicinity of Corraberra Hill, Old Man Hill, View Point and Goat Hill, arranged in a linear pattern on the western side of the plateau, north of the Eyre Highway at Lincoln Gap, approximately 15 kms west of Port Augusta.

The application was assessed 'on merit' and underwent Category 3 notification. A total two (2) representations were received. On 22 June 2006, the Development Assessment Commission resolved to grant Development Plan consent to the proposal, subject to eleven (11) conditions. A number of extensions of time to this consent were subsequently granted over the next 10 years.

On 17 July 2014, a variation was approved increasing the turbine height from 124m to 150m, in the power generation of each turbine from 2.0MW up to 3.3MW, alterations to the approved turbine locations (including an allowance to enable a micro-siting of up to 100m) with no more than 59 turbines to be constructed; and the installation of two (2) additional 80m high meteorological and wind monitoring masts on the site.

On 26 April 2016, a related application was approved, which amended the location of the on-site 33kV/275kV substation and established an overhead 275kV transmission line to an off-site switchyard (separately approved under DA 010/U032/15). This transmission line had previously been approved as an underground cable to the Eyre Highway as part of 010/0011/06.

On 2 November 2017, a further variation to increase turbine heights by 30m (from 150m to 180m) was approved. The increase was primarily due to a change in hub height, from 80m to 110m. Blade length was unchanged from the 2014 variation application.

A number of minor variations and related amendments have been approved since 2017, including minor changes to turbine heights (as a result of detailed design +/- 2m) and turbine model (from Servion>Vestas turbines), site access, concrete batching plant, and both temporary and permanent meteorological masts.

Stage 1 has been completed. Stage 2 has full Development approval.

2. DESCRIPTION OF PROPOSAL

Application details are contained in the ATTACHMENTS.

Lincoln Gap Windfarm Stage 3: construction of a forty-two (42) turbine windfarm and ancillary infrastructure in association with the previously approved Stages 1-2. The key features are:

- 42 wind turbines with a maximum tip height of up to 206m (Refer Figures 1-2).
- Each wind turbine to have a maximum capacity of up to 6MW.
- Three potential windfarm models are being considered:
 - GE 5.3 MW model; with a rated capacity of 5.3 MW, hub height of 121 m, rotor diameter of 158 m, and maximum tip height of 200 m
 - Vestas 5.6 MW model; with a rated capacity of 5.6 MW, hub height of 125 m, rotor diameter of 162 m, and a maximum tip height of 206 m
 - Siemens Gamesa, SG 6.0-155 model; with a rated capacity of 6.0 MW, hub height of 107.5 m, rotor diameter of 155 m, and maximum tip height of 185 m
- Maximum generating capacity is 252MW.
- Overhead and underground connection and/or transmission lines (33kV-275kV) up to 30m in height, the later to be established within an approved infrastructure corridor.
- Substation, switch room, operations and maintenance buildings, security fencing (3m).
- Temporary construction facilities.
- Battery energy storage system and/or synchronous condenser units.
- Internal tracks, and site and civil works.

The development represents a further stage to the Lincoln Gap Wind Farm. Stages 1-2 comprise 59 wind turbines (with Stage 1 turbines now installed). It is anticipated that the Project would generate approximately 960 GWh of clean energy per year (based in the largest turbine model under consideration). 12 permanent employees would be employed during the operational phases.

3. SITE AND LOCALITY

3.1 Site Description

The proposed development is located 15 km south-west of Port Augusta. The project area (see Figure 3) comprises three allotments and are described as follows:

Identifier	Plan	Street	Suburb	Hundred	Title Reference
S4	HP540400	Eyre Highway	Lincoln Gap	Handyside	CT 6138/344
S2	HP540400	Eyre Highway	Lincoln Gap	Handyside	CT 6138/388
Q1	DP37168	Eyre Highway	Lincoln Gap	Handyside	CT 6138/331

Figure 1: Typical Turbine Elevation (Source: NEXIF)

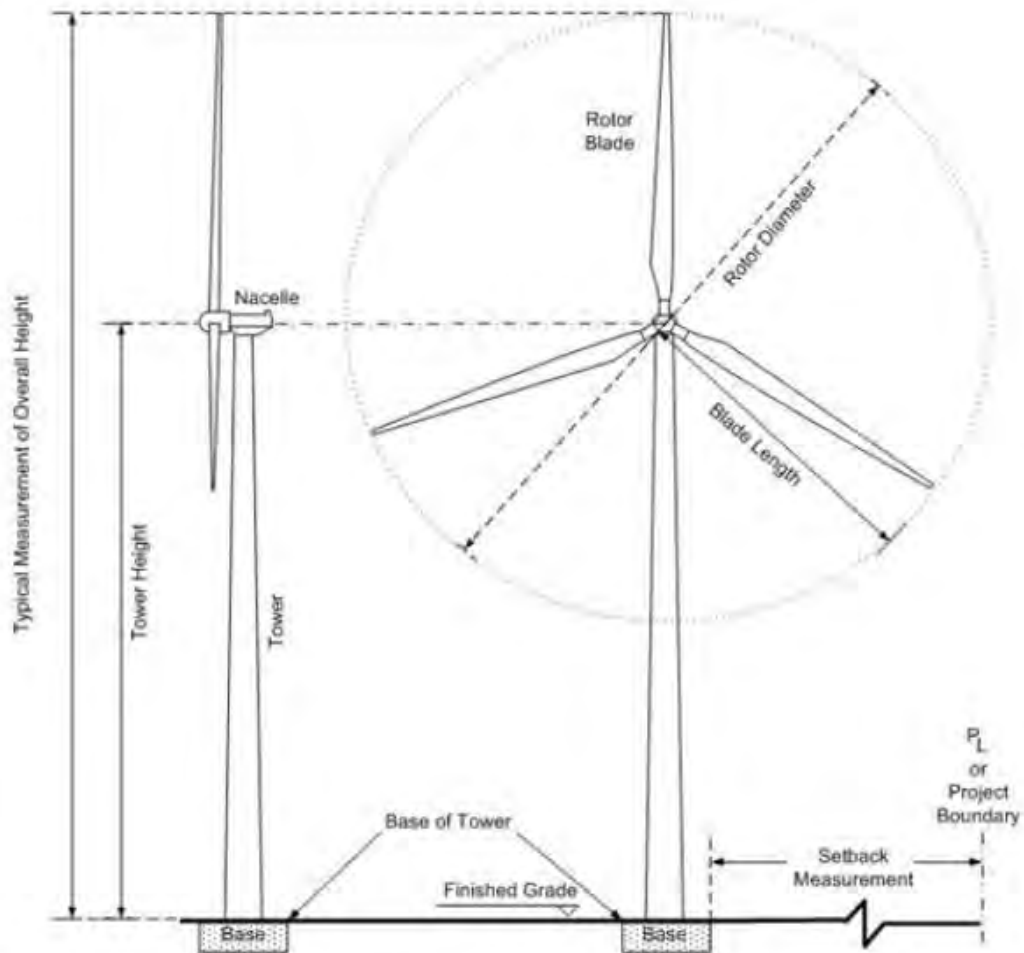


Figure 4.1 Generic wind turbine generator

Figure 2: Proposed Turbine specifications (Source: NEXIF)

MODEL	MW	BLADE LENGTH (m)	HUB HEIGHT (m)	DIAMETER (m)	TOTAL HEIGHT (m)
GE 5.3 MW	5.3	79	121	158	200
Vestas 5.6 MW	5.6	81	125	162	206
Siemens Gamesa SG 6.0-155	6.0	78	107.5	155	185

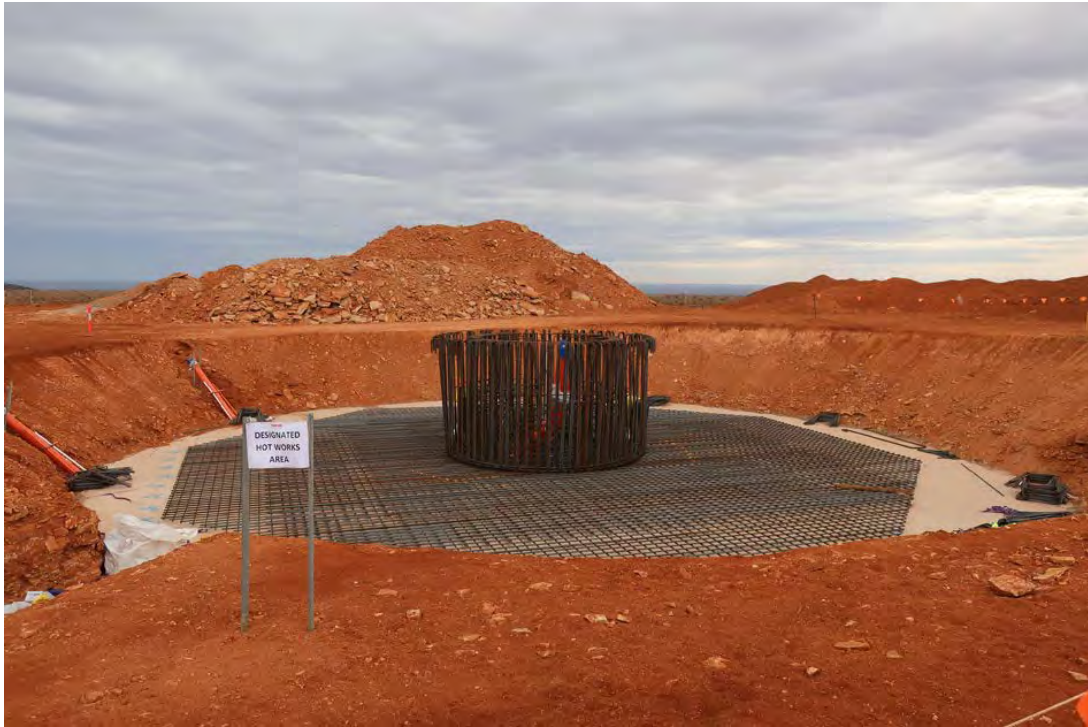
Figure 3: Locality Plan





Above: View from the main site entrance (Eyre Highway) to the north.
Below: On-site substation and transformer – Stage 1.





Above: Turbine base construction – Stage 1
Below: Turbine base – Stage 1





Above & Below: Turbine installation and completion – Stage 1





Above: View from Stage 3 (approx. WP24) to Stage 1 (on top of the plateau)
Below: View from Stage 3 looking south towards Eyre Highway and Cultana.





Above: View from WP33 to Stage 1 to the north (note – closest turbines are 4.5km distant)
Below: View from WP33 to the east.



The expanded windfarm site comprises elevated landforms (tablelands or mesas) that dominate the immediate locality and surrounding plains. The site is characterised by a number of steep strike ranges that rise from the plain and comprise plateaus edged by steep escarpments (with deep gullies) and long footslopes. The plateaus support sparse Chenopod shrubland (mainly Saltbush and Bluebush), whilst the slopes support Mallee and Sheoak woodlands. Red Gum woodland occurs along the gullies and creeklines.

The project area has been grazed, which has impacted the natural vegetation cover, with the area is largely devoid of larger trees or permanent water (natural) sources.

The northern site has an existing homestead (occupied by the landowner), various farm buildings, internal access tracks and the first (developed) stage of the Lincoln Gap Windfarm; the southern site is relatively undeveloped, with the main windfarm substation (connecting to the adjacent high voltage transmission lines), abandoned buildings and rudimentary tracks to an elevated ridgeline.

The project area is accessible from the Eyre Highway and established entry points – although the southern entry may need to be modified and upgraded. A railway line runs parallel to the highway through Lincoln Gap, with high voltage power lines (managed by ElectraNet) to the south.

One communications tower is located on the land (ARTC/Telstra/Vodafone) adjacent the Stage 1 development (south-western corner). A truck stop is located to the east of the southern entrance, along with a number of disused concrete water tanks (filled with tyres).

No existing easements are directly affected by the proposal – however the Moomba-Port Bonython Gas Pipeline (managed by Epic Energy SA Pty Ltd) traverses the northern side of the Eyre Highway, and then crosses this highway just to the west of the southern site entrance. Other easements are in favour of ElectraNet and the Australian Rail Track Corporation.

The project area is owned by a single landowner – Nutt Bros Nominees Pty Ltd.

3.2 Locality

The expanded windfarm is located within a sparsely populated and developed area to the west of Port Augusta. The project area is bisected by the Eyre Highway. The tablelands or mesas are the most visually dominant landforms and clearly visible from all directions, framing the western skyline from Port Augusta which lies at the head of Spencer Gulf, 15kms to the north-east of the site. The tablelands are approximately 300m AHD and the low-lying plains are at 20m AHD.

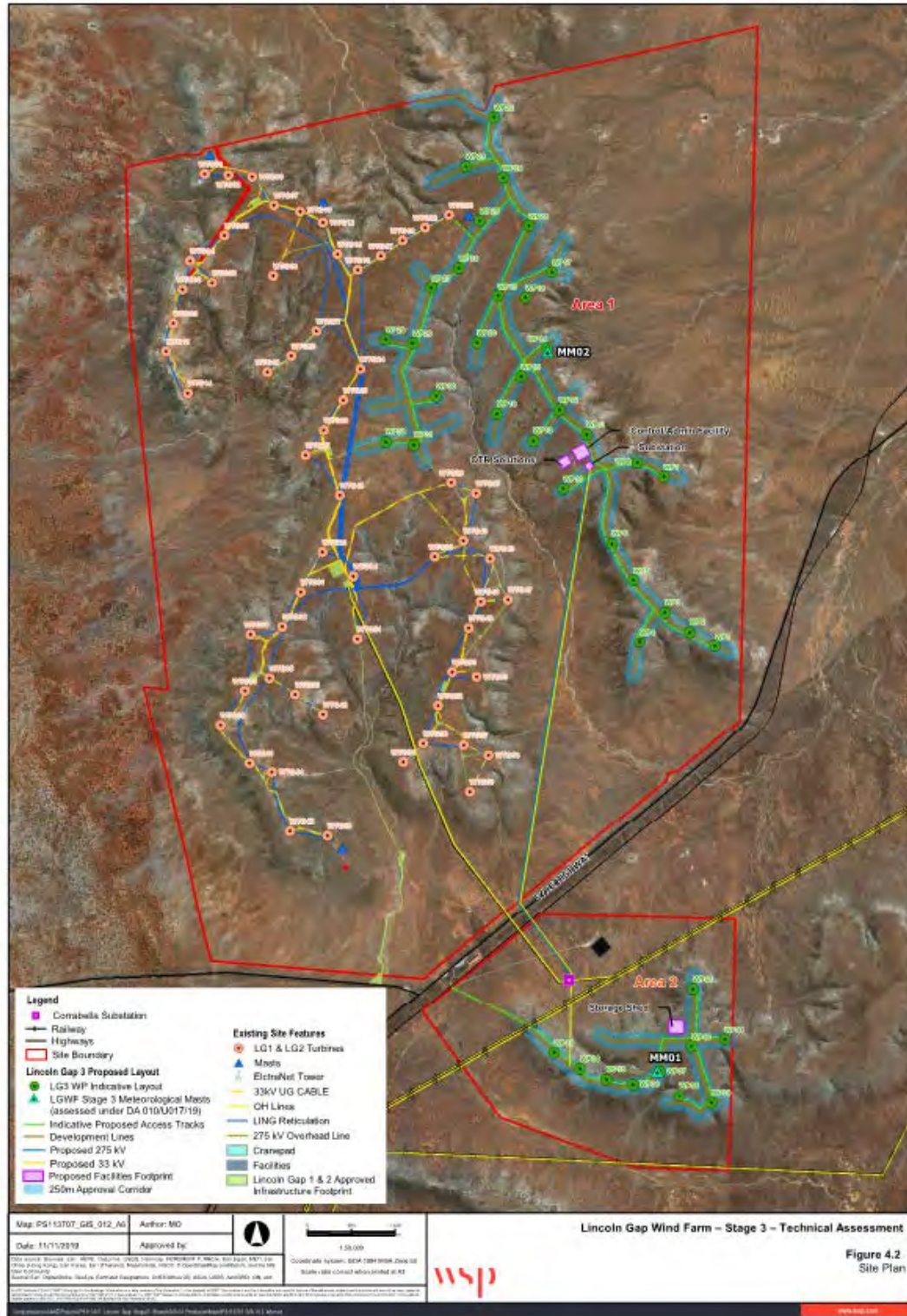
The population of the regional city of Port Augusta is around 13,000 persons (2016 Census).

The Cultana Training area is located to the south, south-west and south-east of the windfarm site, comprising a 2100km² area for Defence Force training and combined arms exercises, including live firing of field and medium artillery weapons and air-delivered munitions. Electronic warfare systems and unmanned aerial vehicles are also used with additional base and support facilities.

The El Alamein Army Reserve Base and Airfield base is located to the east of the windfarm site (Caroona Road), a component of which formed the Baxter Detention Centre from 2002-2007.

Port Augusta Airport is located to the immediate west of Port Augusta and serviced by Regional Express (REX) Airlines, providing regular passenger transport to Adelaide and Coober Pedy. A Royal Flying Doctor Communications Centre is also located at the airport, providing comprehensive health services to people in the far west and northern regions of South Australia.

Figure 4: Proposed Stage 3 Layout with Stages 1-2 (NEXIF, 2019)



To the west and north of the windfarm site, open rangelands are used for low-intensity (sheep) grazing on large pastoral (station) properties, with associated homesteads and farm buildings (shearing sheds, workers accommodation and support infrastructure).

4. COUNCIL COMMENTS or TECHNICAL ADVICE

4.1 Port Augusta Council

No objection. The Council considered the potential for any impacts to its existing infrastructure (in terms of roads, stormwater etc) from the construction of the Stage 3 development. It was noted that all access is via the Eyre or Lincoln Highway so does not affect Council's road assets. Onsite stormwater and any potential runoff from the developed sites will have no impact on Councils stormwater systems or management.

5. STATUTORY REFERRAL BODY COMMENTS

Referral responses are contained in the ATTACHMENTS.

Referral Body	Type	Recommendation	Hyperlink
Part 3 - Overlay - Commissioner of Highways - Regard	Key Outback and Rural Roads Overlay – Development that alters an existing access or changes the nature of vehicle movements.	No objection – subject to recommended conditions.	Pg 568-570
Part 8 – Referrals - Environment Protection Authority - Regard	Energy generation and storage facilities - Windfarms and Energy Generation and Storage	No objection – subject to recommended conditions.	561-567
Advice Only	Reason	Recommendation	Hyperlink
Australian Rail Track Corporation	Crossing of ARTC rail corridor required for southern cluster	No objection – subject to consideration of level crossing upgrade / requirements.	609-612
Department of Defence	Proximity of windfarm to Cultana Training area and defence communications	No objection – subject to consideration of radio frequency interference in the form of High Frequency (HF) noise impacts on communications.	579-582
Department for Environment and Water	General advice on potential impact on habitat & environment	No comment	
Civil Aviation Safety* Authority	Proximity of windfarm to airport	No objection – subject to consideration of obstacle lighting and navigational markers.	571-572
Airservices Australia**	Proximity of windfarm to airport	Awaiting response	
SA Country Fire Service	Bushfire safety	No response	
Department for Energy and Mining	Interaction with mining activities and infrastructure	No objection – subject to early engagement & communication with stakeholders	573-578

* Civil Aviation Safety Authority regulates Australian aviation safety, including the licensing of pilots, aircraft registration and oversee and promote safety.

**Airservices Australia provides air navigation services, ensuring safe, secure, efficient, and environmentally-responsible air navigation and aviation rescue firefighting services.

6. PUBLIC NOTIFICATION

The application was publicly notified in the Adelaide Advertiser, the Transcontinental Newspaper and made available on the SA Planning Portal for a period of 4 weeks. No representations were received.

7. POLICY OVERVIEW

The subject site is within the Remote Areas Zone of the Planning and Design Code (1 July 2019) under the *Planning, Development and Infrastructure Act 2016*.

7.1 Remote Areas Zone

The zone seeks a diverse range of activities from pastoral, grazing and farming activities, agricultural processing and transportation, mining and petroleum (and associated settlement activities), the generation and storage of energy, pipelines or infrastructure, aerospace and defence related facilities (and associated settlement activities), tourism, remote settlements, Aboriginal lands and related rural land activities (DO1).

For a windfarm (under performance assessed criteria), all policies apply to an assessment within the Remote Areas Zone, with specific reference to those general development policies that relate to Clearance from Overhead Powerlines, Design and Siting, Interface between Land Uses, Transport Access and Carparking, Infrastructure and Renewable Energy Facilities,

7.2 General Development Provisions

Infrastructure and Renewable Energy Facilities

Desired Outcome: The efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and that suitably manages adverse visual impacts on natural and rural landscapes and residential amenity.

General Development Provisions that are held **not** to apply to this assessment:

- Advertisements
- Animal and Horse Keeping
- Aquaculture
- Bulk Handling and Storage Facilities
- Forestry
- Intensive Animal Husbandry and Dairies
- Land Division
- Marina and On-Water Structures
- Mineral Extraction
- Open Space and Recreation
- Residential Liveability
- Tourism Development
- Workers Accommodation and Settlements

7.3 Overlays

A total of 21 Overlays formed part of the Phase 1 Code.

Four Overlays identify the subject land:

- Hazards (Bushfire – Outback)
- Key Outback and Rural Routes
- Sloping Land
- Water Resources

The complete Phase 1 Code is available here:

https://plan.sa.gov.au/_data/assets/pdf_file/0006/564450/Planning_and_Design_Code_as_applyi ng_to_land_not_within_a_council_area.pdf

8. PLANNING ASSESSMENT

The application has been considered against the relevant provisions of the Planning and Design Code – Phase 1. An edited copy of relevant code policies taken into account for this assessment is contained in the ATTACHMENTS.

General Rules of Interpretation

- Zone, Subzone, Overlay and General Development policies are comprised of desired outcomes and performance outcomes.
- Desired outcomes (DO) are policies designed to aid the interpretation of performance outcomes by setting a general policy agenda for a Zone, Subzone, Overlay or General Development module. Where a relevant authority is uncertain as to whether or how a performance outcome applies to a development, the desired outcome(s) may inform its consideration of the relevance and application of a performance outcome, or in assessing the merits of the development against the applicable performance outcomes collectively.
- Performance outcomes (PO) are policies designed to facilitate assessment according to specified factors, including land use, site dimensions and land division, built form and character and hazard risk minimisation.
- Designated performance features (DPF) provide a guide to what is generally considered to satisfy the corresponding performance outcome but does not derogate from the discretion to determine that the outcome is met in another way.
- Where there is an inconsistency between provisions in the library of policies, the following rules apply to the extent of any inconsistency between policies:
 - the provisions of an Overlay will prevail over all other policies applying in the particular case;
 - a Subzone policy will prevail over a Zone policy or a General Development policy; and
 - a Zone policy will prevail over a General Development policy.

Land Use

Remote Areas Zone	DO 1
Infrastructure and Renewable Energy Facilities	DO 1

The Remote Areas Zone anticipates the installation of renewable energy facilities, along with the continuation (or where such activities do not affect) existing primary production activities. It is noted that the majority of the expanded project area is already situated on land that has either been constructed as a windfarm or has Development approval to do so, with only the southern site (10 turbines) being on land not previously used or approved for this purpose. Low intensity grazing activities can continue on the land (and are being used for this purpose by the current landowner). The extension of the windfarm should not impact upon neighbouring land uses – subject to appropriate design and operational controls in respect to the Cultana Training area.

The Department for Energy and Mining provided advice on Mining and petroleum and tenement information within the Lincoln Gap Windfarm Project Area. The project area is located within the Olympic Copper-Gold Province, a region of South Australia considered prospective for iron oxide-copper-gold (10CG) mineralisation and containing the Olympic Dam, Prominent Hill and Carrapateena deposits. This Department recommends early engagement with Extractive Lease or Extractive Mining

rights holders to ensure any potential impacts are appropriately managed. In addition, the long-term maintenance and safety of high-pressure gas pipelines also requires compliance with AS2885. No objection was raised by this agency, noting that the crown sponsorship was granted by DEM in 2019, nor were any submissions received from existing mineral exploration and production rights holders.

No operating mines are affected by the proposal.

The development accords with the Desired Outcome for new renewable energy developments in the Remote Areas Zone and does not compromise the continued use of the land for primary production. No existing mining operation or extractive industry is affected by the development.

Interface

Infrastructure and Renewable Energy Facilities	DTS/DPF 8.1 PO 1.1, PO 7.1, PO 8.1
Interface between Land Uses	DO 1, PO 1, PO 2, PO 3

Renewable energy facilities – particularly windfarms – due to their scale and operation have the potential to create external impacts, such as noise, shadow flicker and visual intrusion. The extent of these potential impacts is influenced by their location, context and settlement patterns, such that relatively remote or isolated land parcels tend to have fewer issues, especially where more generous setbacks from non-host residences and more sensitive land uses can be achieved.

(a) Noise

An acoustic assessment was undertaken by WSP for the applicant. This assessment considered the potential impacts of the proposed Stage 3 windfarm, the cumulative effects of the approved Stages 1-2 and the overall impact of all three stages at completion. Whilst a number of turbine models have been proposed, the acoustic modelling was undertaken on the Vesta V162 5.6MW turbine (which has the highest maximum sound power level).

There are only two sensitive noise receiver locations identified within the project area – both are located on the existing pastoral property and either occupied or controlled by the host landowner, being their homestead (H1) and shearer quarters (S1). The SA Environmental Protection Authority *Wind Farms Environmental Noise Guidelines (2009)* were used to assess the development. A 45dBA LAeq, 10min noise criterion was adopted for these locations (endorsed by the EPA).

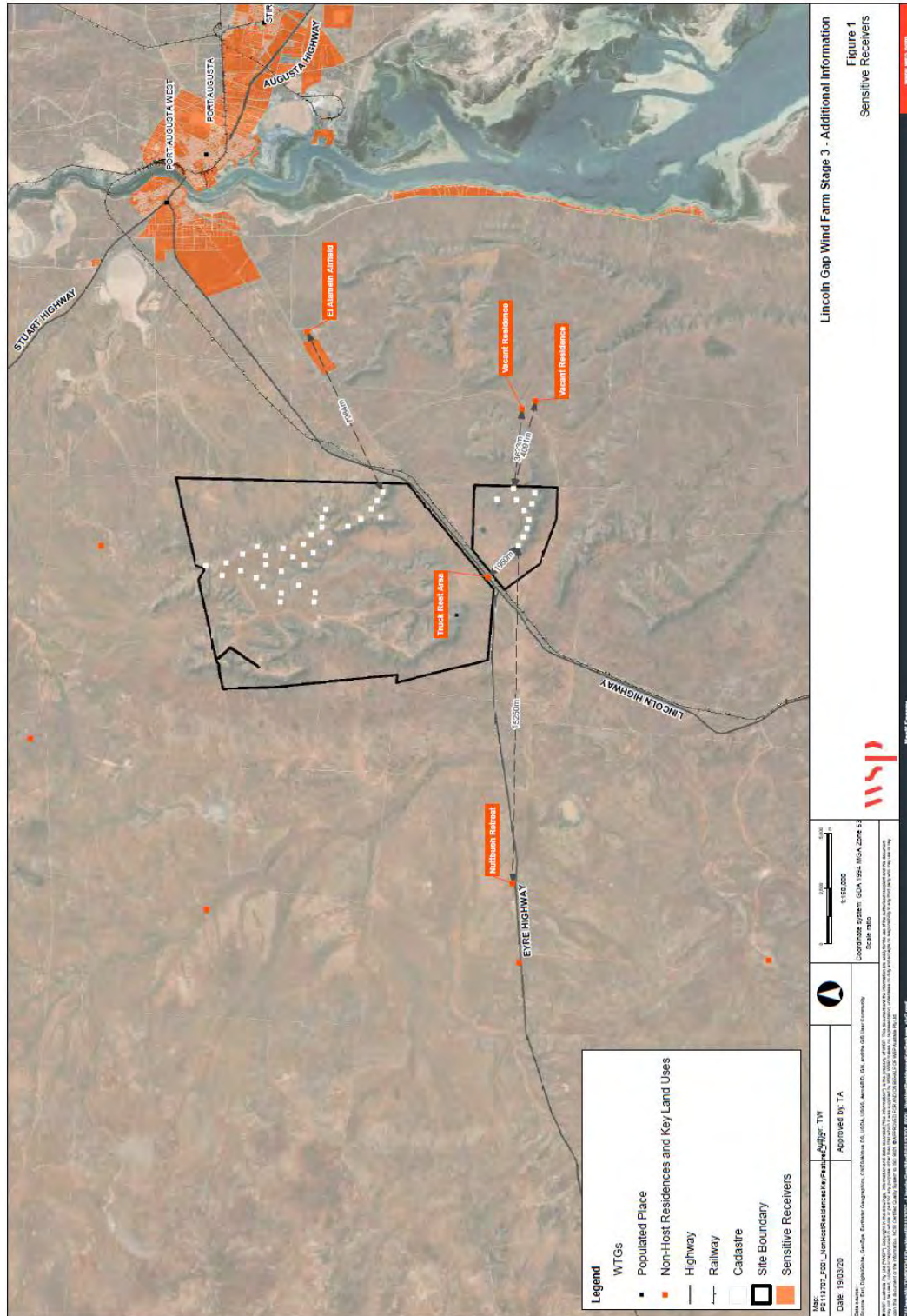
Additional information was requested by the EPA (along with the reporting officer), which resulted in additional noise contours being provided for both assessment and public notification purposes. This demonstrated that noise impacts were fully contained to the development site, with no impacts to any other (non-host) sensitive receiver or land uses within the wider locality.

Modelling undertaken for these locations by the applicant indicated that the EPA Noise can be met outdoors, based on a consideration of both Stage 3 and all other stages completed and operating. As Stage 3 is further away than the other approved stages from both H1 and S1, it's contribution to the cumulative result was negligible, noting that the acoustic assessment also took into account a 125m micro-siting allowance (which would only increase noise levels at these receivers by less than 1dBA). All locations met the 45dBA LAeq criterion.

The EPA considered issues of noise impacts for the development overall, beneficiary landowners and noise sensitive receivers without a commercial interest in the development. Of the five potential additional noise-sensitive locations, four are located further than 3,500m from the nearest Lincoln Gap Stage 3 Windfarm turbine, and include:

- Vacant residence 1 (3,500m from nearest Stage 3 turbine)
- Vacant residence 2 (4,000m from nearest Stage 3 turbine)

Figure 5: Location of Adjacent (non-host) Sensitive Receivers



- El Alamein Airfield (7,500m from nearest Stage 3 turbine)
- Nuttbush retreat (15,000m from nearest Stage 3 turbine)

Wind turbine noise levels at these four locations is predicted to be significantly less than 30 dB(A), for all of the evaluated turbine configurations. No objection was raised by the EPA in records the methodology adopted or findings reported, noting that post-operational verification will be required.

A truck stop located at the “The Tanks’ site on the Eyre Highway, just to the east of the southern entrance road, was also considered (for temporary stays), but again, wind turbine noise levels were found to be less than 40dB(A) and compliant with the guideline. Five conditions have been recommended by the EPA and three advisory notes in relation to mandated noise levels, pre-construction noise assessment, tonal levels, independent monitoring (post construction) and non-compliance mitigation measures.

(b) Shadow Flicker

A shadow flicker effect is caused when light ‘escapes’ through a rotating turbine when the sun is behind and casts an intermittent shadow, but only when turbines are in operation.

The level of incidence is variable, as is dependent on weather conditions, time of day, season, sun angle, turbine operation, blade dimension, line of sight and distance to a sensitive receiver (which needs to be in a fixed location). If any one of these factors creates less than optimal conditions for the effect to occur, then shadow flicker will either not occur at all, or be greatly diminished as a result, and only then is generally experienced to the east or west of a rotating turbine.

A shadow flicker assessment is based on the maximum (modelled) incidence of hours per day at a sensitive receiver location, based on national windfarm guidelines developed in July 2010. A sufficient setback to sensitive receivers or public road can mitigate or nullify any effect.

Based on the turbine specifications for the Stage 3 development, the effective assessment distance of any shadow flicker effect was determined to be 1.140km, noting that the turbine setbacks to H1 and S1 were already 3.3km and 2.4km (respectively). Road safety and/or driver distraction impacts would also appear to be negligible, given the setbacks provided.

Notwithstanding the desktop assessment, a model was constructed to measure the worst-case scenario by simulating real-world effects to the nearest sensitive receivers, which concluded that at no time or circumstance would the effect be observed at these locations (and therefore under the 30 hours of exposure per year allowed under the national guidelines without mitigation).

The proponent has committed to observational studies during operations (and if a problem were to be identified, implement a mitigation strategy), but given the circumstances outlined above, no condition or requirement is recommended.

Design and Siting

Design and Siting	DO 1, PO 1.1, PO 2.4, PO 2.5
Infrastructure and Renewable Energy Facilities	DTS/DPF 8.1
Interface between land uses	PO 7.1

The siting and location of the proposed turbines for Stage 3 of the Lincoln Gap Windfarm satisfies the ‘Deemed to Satisfy’ criteria 8.1 (Infrastructure and Renewable Energy Facilities) as each turbine will be setback at least 1000m from any non-associated dwelling or tourist accommodation facility; and at least 2000m from any sensitive zone (i.e. settlement, township etc).

Above ground elements of the project have been arranged in a logical and consistent layout, following the topography and contours of the flatter portions of the elevated landform, with transmission lines

connecting into existing and/or proposed substations along a defined infrastructure corridor (whilst connections between turbines are to be undergrounded). Ancillary elements, such as the control facility, BESS/SC and maintenance sheds have situated to minimise direct views.

These matters will be further considered in the landscape and visual assessment below, except that by their very nature, wind turbines, substations and transmission lines are large structural elements within an open, natural landscape, and will remain highly visible.

Visual Amenity and Landscape Character

Infrastructure and Renewable Energy Facilities	PO 2.1, PO 2.2, PO 5.1, PO 5.3
Remote Areas Zone	PO 1.1, PO 1.2

One the most contentious aspects of windfarm developments is the erosion of natural landscape character from the construction (and then operation) of larger turbines in previously vacant or undeveloped natural environments. Planning policies (at the time of the Windfarm DPA in 2012) provided greater clarity that turbines – where a renewable energy land use was envisaged – could be located in prominent and highly visible locations, such that more general policies in relation to siting and visibility were less relevant in a ‘merits’ assessment.

The applicant provided a Landscape and Visual Character assessment for the Stage 3 development by a Registered Landscape Architect. This took into account previous assessments, the construction of Stage 1 (turbines to 180m) and the approval – but not yet constructed – Stage 2 (to a similar height). A number of key viewpoints were identified, along with the most directly affected sensitive receptor, being the host landowners dwelling at the southern end of the original project area. From this information, a ‘zone of visual influence’ was identified, and the likely impact of the overall project (with the addition of Stage 3) considered under best practice guidelines for visual assessment.

From Port Augusta, the open (semi-arid) pastoral landscape is framed by the mesas either side of Lincoln Gap, and the troughs and peaks of these tableland features situated in a north to south direction, with the Eyre Highway traversing the ‘gap’. Within this viewshed, the turbines of Stage 1 are visible (heading west), along with various transmission lines and telecommunications facilities much closer to the project area. It is a ‘big’ landscape, such that *“the scale of the erected WTGs are proportional to and appropriate within the expansive contextual landscape”* of its surrounds.

The photomontages initially presented with the application (Refer Figure 6) – when viewed in detail – would have benefited from a clearer resolution, whereupon a video 3D model was developed by the proponent allowing a comparison with the prepared 2D montages, and included both the constructed and approved stages (refer to the attachments for this video).

The windfarm benefits from its relatively remote and sparsely populated location and the generous setback distance of turbines from the Eyre Highway, whilst much of the supporting infrastructure, with the exception of the main substation and transmission line(s), are located on the plateau above, and not directly visible. Whilst the Stage 3 proposal represents a significant intensification of the existing land use, the absence of any nearby non-host residences, with one host landowner, decreases the direct visual impact from directly adjoining land (which is not the case for most windfarms).

The visual analysis largely confirmed these observations, based on a number of site visits to and from Whyalla and Iron Knob, and should not result in a significant or adverse visual impact, but the turbines will be noticeable from the plains beyond, given the openness of the landscape and lack of trees.

One point of departure from the applicant's visual assessment, is the closer proximity of the southern cluster to the Eyre Highway, than the northern (Stage 1-2) development, which extends the project further southwards, with turbines to be located on both sides of the highway. In addition, two new overhead transmission lines are required to service Stage 3, in addition to the single transmission line from the northern site to the southern substation (which has already been established).

Figure 6: Photomontages (Source NEXIF)



Photo 5.1 View from SR 01



Photo 5.3 Photomontage of proposed Project, from SR 01 (view north-west – south-west)



Photo 5.4 View from Eyre Highway VP 1 (north-west – south-west)



Photo 5.5 View from Eyre Highway VP 2 (north-east – south-east)

The applicant proposes to connect a 33kV line with the southern-most turbines (WP33-WP42) to the on-site substation that forms part of the northern string (WP1-WP32), then a 275kV line back to the main station (which avoids having to build a second substation on the southern side).. The maximum height of this infrastructure is 30m. A new access track will also be required from the ARTC Level Crossing (LX) to the first southern cluster turbine at WP33. This will be visible from the Highway, but once on the plateau will be largely hidden from direct view.

The Stage 3 development is largely consistent with the provisions of the Planning and Design Code, being sited and designed to minimise impacts to areas of high conservation value, whilst the largest buildings have been situated on the northern plateau (and not directly visible from the Eyre Highway) or surrounding land (located on the reverse slopes of plateau and to the south-west of WP11).

Figure 7: Site of Northern Operations, Maintenance, Substation and BESS facilities



The WTGs will have a uniform appearance in colour, size and shape, and mounted on tubular towers. These towers are usually finished in an off-white or light grey colour, whilst the blades are pre-treated with anti-reflective coatings to ensure glare issues are minimised.

The main transmission line and companion 33kV internal connection, whilst co-located, will add to the visual clutter within the landscape, but will tend to be obscured by the topography from longer views, and only noticeable whilst travelling through the ‘gap’ from east to west. The use of more slender, galvanised poles, will help minimise the extent of visual intrusion.

A small storage shed (for maintenance purposes) will also be established on the southern site (pending detailed design). This is located 2km from the highway and will have a 290m² (est) floorplate. The use of galvanised steel poles and headframes for the transmission infrastructure (due to their neutral colour and minimal reflectivity) will also assist in minimising the overall visual impact. As these elements will be the subject of detailed design considerations, final specifications should be reserved for further assessment prior to their construction.

No vegetated buffers are proposed, mainly due to the location of the on-site substation, the setback distances provided, and the difficulty of establishing screen plantings in semi-arid environments. The majority of the service and maintenance infrastructure has been co-located to minimise visual impacts.

European and Cultural Heritage

Design and Siting	PO 1.1
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The project area is not subject to any State Heritage Area or State Heritage Place overlay. Planning and Design Code policies seek development that is integrated with the natural and cultural landscape through preservation of environmental and cultural features and values of the site and locality. The closest State heritage place is situated 16km to the north-east of the project site, being the Port Augusta West Water Tower. However, a more detailed inspection of the site – including a search of the Central Register (DPC-AAR) - was undertaken to identify any archaeological sites present for site avoidance purposes and to assist with refining the final project development footprint.

DPC-AAR in their response to the search request, advised that two entries for Aboriginal sites are within the project area: Archaeological Site 6432-4849; and Cultural Site 6432-5087. DPC-AAR also

advised that the Aboriginal group/organisations with an interest in the area includes the Barngarla Determination Aboriginal Corporation. Both sites are located at the south-eastern end of the northern Stage 3 development footprint. All 42 turbine locations were inspected, with a further 200m around each WTG site and 10m wide area for access tracks. Two new archaeological sites were identified during the archaeological inspection. One Aboriginal and one European.

The report noted that during the inspection a section of proposed infrastructure crossed a significant creek/gorge. Although not defined as a site under the Aboriginal Heritage Act (AHA), creek lines along with mature native vegetation, stone outcrops and clay pans were identified as environmental features to be avoided, if possible, by the Barngarla Determination Aboriginal Corporation (BDAC) during previous discussions.

None of the proposed works were found to impact on the existing Archaeological site 6432-4849, whilst the Cultural site 6432-5087 was located within an area that – due to the terrain – was difficult to access (but its approximate location and significance should be confirmed). The newly identified sites can be protected to meet the necessary requirements of current legislation.

The proposed layout is unlikely to disturb any unidentified ethnographic sites, definable under the AHA. It is noted that the Barngarla Aboriginal Corporation (BDAC) carried out an ethnographic survey for the Lincoln Gap Wind Farm (Stage 1 and 2) on the same landform and did not identify any ethnographic sites definable under the AHA. Subject to appropriate training and construction protocols (including mandatory reporting requirements), whilst also implementing an appropriate site discovery procedure (overseen by a qualified professional) and be compliant with current legislation.

Environmental

Water Resources Overlay	DO 1, PO 1.1, PO 1.10
Infrastructure and Renewable Energy Facilities	PO 8.3, PO 13.2
Design and Siting	PO 13.1
Interface between land Uses	DTS/DBF 4.1 PO 4.1, PO 5.1

The development of renewable energy facilities has the potential to degrade and impact upon the natural environment, particularly vulnerable and threatened flora and fauna species, due to additional clearance, site disturbance and for windfarms, bird/bat strike due to turbine operation.

The Planning and Design Code seeks the protection of sensitive ecosystems, the maintenance of biodiversity and the protection of key habitats, water catchments and native vegetation. The applicant undertook detailed analysis of the Lincoln Gap project area (including an EPBC Act risk assessment) in the preparation of their development application.

The analysis provides a baseline of information in relation to vegetation associations and biological status, visual assessment of habitat value for native fauna and a desktop assessment of threatened flora, fauna and ecological communities which may be present within the area. Additional avifauna and vegetation surveys were also undertaken as part of a more targeted assessment.

Flora Species

The project area is within the Gawler bioregion, characterised by “rocky hills, rounded landscapes, plains and salt encrusted lake beds ... dominant vegetation cover includes spinifex grasslands, open woodland and chenopod shrubs”. The development site has a cover of low chenopod shrub land, bardi bush (*Acacia victoriae*) with fringing Western Myall (*Acacia papyrocarpa*) woodland.

A desktop search identified 12 nationally threatened flora species within 50km of the project area, though none of these species was thought to be present within the project area. A total of 68 state threatened flora species were within the same 50km buffer area, with 11 likely within the project area. Seven vegetation associations were identified within the 250m corridor area of the WTG layout, but no threatened regional, state, or national level associations were observed.

The preliminary work undertaken will be used in the further assessment of native vegetation impacts in respect to future clearance requirements (and offsets required under the Native Vegetation Act) subject to detailed design and micro-siting considerations. Whilst no threatened flora species (at time of survey) were observed, steeper slopes and the edges of escarpments (which are less prone to stock grazing and human interaction), may contain these species. In addition, the EBS report noted that the land had not been over-grazed, but still returned a low vegetation score (due to sheep grazing, and the presence of goats and kangaroos in moderate numbers).

The loss of any vegetation cover would be via direct loss, from the establishment of site clearance and access tracks, laydown areas, turbine placement and infrastructure installation.

Fauna Species

Similar search parameters identified 35 nationally threatened and 45 state threatened fauna species within the 50km buffer area, with one and eight species (respectively) likely to be found within the windfarm project area. A total of 148 individual from 20 bird species were identified over the field assessment period – but only one species with a conservation status (being the Western Slender-Billed Thornbill (107ha of 753ha being potential habitat) was identified. Whilst clearance is required, stable population numbers and the availability of other habitat, should not result in undue impacts.

The EBS report noted that no wedge tail eagle nests were identified during the fauna survey, however nesting may occur within the project area, if new nests are established or previously inactive areas are re-occupied. Wind turbines are known risk factors (and contribute to the death) of avifauna, particularly wedge tail eagles (which is not improved with additional turbine height and lower ground clearance that assists other species), whose population dynamics can be affected.

For example, Wedge-tailed eagles (*Aquila audax*) take four to six years to reach breeding maturity and form breeding pairs, and then only produce one live chick a year. Whilst relatively widespread on mainland Australia, the elevated risk factors involved from larger turbines required further investigation – noting the presence of existing breeding pairs from earlier stages.

It was also noted that when the EBS survey for this application was conducted, the raptor breeding season had concluded. A supplemental report was prepared by EBS dated 19 June 2020 – although only a spring 2020 survey would provide more up-to-date information on species numbers.

Previous raptor surveys conducted on the Lincoln Gap windfarm site in 2015 and 2016, identified a total of three nests (all within 1.1km of each other, located at the southern end of the operational Stage 1 windfarm in scattered woodland). At the time, a 500m exclusion buffer was applied. One nest was determined to have been “highly likely” to have been used by a breeding pair, with one of the nests still active in 2019. Brown Falcons and Kestrels have also been recorded in the project area.

None of these species have protected status, but all have elevated risk factors in terms of minimum flight height, utilizing thermals and high winds to hunt across the project area. As noted in the EBS addendum report: “*raptors were considered one of the most at-risk groups of birds with regards to windfarm construction, due to their prevalence of flight within rotor swept areas, matched with their low fecundity and long lifespans*”. The increase in hub height lowers the risk profile for some raptors and increases it for others (as they would fly through the at-risk zone more often).

EBS re-evaluated the previous risk matrix used in 2005 (for the original application), and concluded that 9/14 raptor species would have a low risk, 5/14 would have a medium risk (including the Kestrel, Falcon and Wedge-Tailed Eagle) of collision. A high-risk rating would be unacceptable. For those species at a medium risk rating, any impact event would “likely” cause mortality, and that whilst individual birds may be affected, the viability of the local population should not be impacted (although as existing numbers are low, the immediate impact may be greater).

The report by EBS concluded that the overall impact on fauna species should be negligible, due to the nationally and state listed species uncommon to rare occurrence, widespread distribution and the availability of alternative habitat, including on the remainder of the windfarm site.

Mitigation Measures

The applicant has committed to avoiding areas of higher ecological value (where possible), the implementation of an Environmental Management Plan (in conjunction with any clearance and offset requirements required by the Native Vegetation Council), appropriate weed management strategies, training and site induction protocols for workers, and an on-going fauna monitoring program with a focus on migratory and at risk bird species, bats and threatened flora species (as outlined in the EBS assessment reports that were submitted with the development application).

Hazards

Hazards (Bushfire – Outback) Overlay	DO1, PO 2.1-2.2
Infrastructure and Renewable Energy Facilities	PO 4.1, PO 4.2, PO 4.3

The windfarm site is within the Hazards (Bushfire – Outback) Overlay where development should be located to minimise the threat and impact of bushfires on life and property. No response was received from the SACFS, however the previous approval for Stage 1-2 required the adoption of a number of specific requirements in respect to clearance, equipment and training incorporated as conditions.

As these requirements can and will change from time to time, it is instead recommended that a Fire and Emergency Services Plan be developed in consultation with local emergency service providers, whilst also outlining the training and services that would be provided on-site during construction and operation. It is noted that fuel loads are generally low, given the nature of the terrain and grazing practices, and no workers accommodation forms part of the development (but the facility is permanently manned, and operates 24/7, such that on-site safety of staff needs to be considered).

All weather access roads, with the main entry road allowing two-way traffic, provides direct access to all parts of the site for emergency service vehicles. The internal road networks, laydown areas and clearances around turbines and critical equipment, also act as firebreaks. First aid equipment and evacuation points for staff and visitors are already in place for Stage 1.

For aerial firefighting operations, the SA CFS has previously advised that aircraft alone cannot put out bushfires. SA CFS crews and appliances remain the primary method of controlling the fire ground.

Prior to any aerial firefighting aircraft being deployed, a dynamic risk assessment will always be undertaken, based on a consideration of weather conditions, fire behaviour, obstructions, visibility, assets at risk and an aircraft's performance parameters.

Following the Waterloo Windfarm Fire in 2017, the SA CFS conducted a review into the application of aerial firefighting resources. Their recommendations included a comprehensive response plan (from the proponent), requiring the pausing or braking of turbines, the better marking of meteorological masts, and the adoption of preventative strategies and predetermined notification procedures to dispatchers. It is noted that no meteorological masts are proposed as part of this application.

Additional requirements can be incorporated into a Fire and Emergency Services Plan.

No flood risk has been identified to project components, although natural drainage lines and ephemeral water courses can cause waterborne erosion from sudden rain events and storms (which may be further exacerbated by site works and ground disturbance). Recent rainfall within the region required the regrading and resurfacing of access roads within the project area.

The area is geotechnically 'stable', with only four low-level earthquakes recorded since 1979 within a 20km radius of the site, the most recent in 2012. Earthquakes generally range in magnitude from 1.1 to 1.9. The tablelands comprise a combination of quartzite and sandstone, generally encountered at shallow soil depths, which may pose construction challenges, although no blasting is anticipated (and even if did occur, could be conducted safely).

Transportation

Key Outback and Rural Routes Overlay	DO1-2, PO 1.1-1.3
Infrastructure and Renewable Energy Facilities	PO 4.1, PO 8.4, PO 8.5
Transport, Access and Parking	DTS/DBF 1.4-1.5, DTS/DBF 3.1 DO1, PO 1.1-1.5, PO 2.1, PO 3.1-3.4, PO 3.7-3.8, PO 5.1, PO 6.1, PO 6.6

The Eyre and Lincoln Highways provide the main arterial road access to the development sites – either north or south of the highway. Internal roads provide access to the windfarm, including for larger trucks and delivery vehicles to the main operational compound and laydown areas (for turbine components).

There are a number of transport related policies – access, safety, loading, parking etc – that are in the Planning and Design Code, and seek to ensure the safety of aircraft operations with respect to windfarm developments due to their large structures (e.g. WTGs, meteorological masts) – Refer PO 8.4 & 8.5 under the Infrastructure and Renewable Energy Facility provisions.

(a) Traffic Access, Parking and Road Safety

The applicant undertook a separate traffic and access assessment for the Stage 3 project, which considered the baseline conditions, construction and staging impacts, access requirements, volume/type/frequency and patterns of traffic movements, associated impacts and mitigation actions. This report was reviewed by the Department of Infrastructure and Transport.

The main access point from the Eyre Highway to the Stage 1-2 windfarm project area has already been authorised and developed to Commissioner of Highways standards) and does not need to be reconsidered. However, access to Area 2 (southern cluster of Stage 3 – Figure 8) does require consideration, due to the nature of the access, the speed of the road (110km/h), the presence of a passing lane directly opposite the entrance, and the ARTC single-track rail corridor and level crossing 200m in-board of the entrance (and the volume, type and frequency of vehicles during construction).

Figure 8: Southern site entrance and truck parking area (passing land in foreground).



Both the Eyre and Lincoln Highways are rated for heavy vehicles – the former up to 42m (double road train) and the latter 30m (B-Double). The highways account for 2200-2700 vehicles per day, 1/5 being heavy vehicles and road trains. The Lincoln / Eyre Highway intersection is a T-Junction with good sightlines in both directions. The ARTC level crossing (LX) is only passively controlled (with no lights or boom gates only warning signage). The road currently provides access to the main Lincoln Gap

substation, ElectraNet crews, SA Water facilities workers and private landowner. The construction of the windfarm to the south of the Highway will require daily movement of vehicles and/or equipment.

Crash statistics over the last 5yr time period available reveal no trends or issues, with 2 accidents recorded being hitting a fixed object at night, resulting in property damage and no casualties.

The project (construction) timeframe will be 24 months. A total of up to 92 workers are expected on-site (at any given time). The applicant's traffic report has estimated the number of trips, volumes and loads for each main component and daily worker movements – which will vary between construction phases. Larger components will require longer (permitted) vehicles. The Eyre and Lincoln Highway's have the capacity to carry any additional traffic over this time period.

The southern entry point and roadway is an unsealed, compacted rubble surface, with the expected traffic volumes likely to degrade its form and surface (even with maintenance). It is likely that road treatments will be required in order to accommodate the additional traffic. The ARTC was consulted on the proposed development and noted the use of the LX to deliver construction materials (including heavy and over-dimensional loads) and during operations. The LX may require upgrading.

Figure 9: ARTC Crossing (Source: NEXIF)



The applicant has responded that any physical upgrades and operational safety improvements will be part of the next phase of design development of the wind farm. It was noted that the LX is a “private” level crossing; the unsealed road is a private road and the single-line rail corridor is managed by ARTC. There are less than 10 scheduled and ad-hoc train movements over the crossing per week and only on specific days. The current volume of road traffic is not known but based on observations of the surrounding land uses, would be very low. Trains are restricted to 80km/h over the crossing.

The road and rail line cross at right angles, the land is quite flat and there is very good sight distances from both a road and rail perspective (Refer to Figure 9).

The crossing is passively controlled with a regulatory stop sign on each road approach. A number of mitigation measures have been considered, including the widening and sealing of the approach and crossing, improving clearances, maintaining a good quality road surface, restricting movements to daylight hours, coordinating deliveries with the ARTC, educating drivers, and possibly the employment of a railway protection officer when trains are scheduled. It was noted by the proponent that similar actions were undertaken during the construction of the main electricity substation in 2018. A condition of approval is recommended.

Sufficient areas exist on site for the manoeuvring, loading/unloading and parking of vehicles (DTS/DPF 6.7).

Overall, no objection was raised by the Department of Transport and Infrastructure, subject to the preparation of a Traffic Management Plan, overhead line clearance and stormwater management.

(b) Aviation Safety

An aviation impact assessment was prepared by the applicant to consider both civilian and military aircraft operations from the construction and operation of the Stage 3 development. It is noted that similar reports were prepared for Stages 1-2 and no significant issues were raised (and Stage 1 of the development is currently operational).

Civil Aviation Safety regulations define the marking or removal of hazardous objects within the Obstacle Limitation Surface of any aerodrome (usually 10km).

Any person who proposes to construct any structure above 110m above ground level must inform CASA. This agency will determine whether a proposed structure will be a hazardous object because of its location, height or requirement for navigational lighting. The regulations also define the minimum Lowest Safe Altitude (LSALT) for aircraft.

The assessment undertaken by the applicant considered existing navigational charts, maps and airspace restrictions, the locations of any airfields, mandatory notifications, national regulatory requirements, the need for obstacle lighting and an assessment of those known risks associated with aircraft operations in relation to Stage 3.

The closest aerodrome is located approximately 10km north-east of the Stage 3 site. Whyalla Airport is located 55km away, with other facilities or unlicensed aerodromes located in the order of 10-30km from the project area. No impacts to the operations of the Port Augusta, Whyalla or Tregalana aerodromes were found, nor to any other unlicensed or less used airstrips, given their distances and approach patterns to the Stage 3 project area. No hang gliding, paragliding or ultralight operations were identified (noting the land is privately held).

Current Visual Flight rules indicate that aircraft operations should occur above the intended WTG heights proposed and that the turbines themselves will be clearly visible. The project area is not within an airspace control zone, nor should the development affect air traffic control, instrument approach or navigational aids. The development may require a change to Lowest Safe Altitude (LSALT) thresholds for one existing air route which passes within 10km of the windfarm (but this an administrative change). No aerial agricultural operations are known to occur within the locality, but in any event, should not be an issue (noting the current use of the land is for low intensity grazing, not cropping).

The SA Country Fire Service has previously raised issues with the visibility of meteorological masts, due to their lattice structures and grey colour, and limited visibility of their external guidewires. Previous applications for this development have imposed conditions of approval for the marking and identification of meteorological masts (and in accordance with CASA's Manual of Standards Part 139 Section 8.10: Obstacle Markings.). No new meteorological masts are proposed.

The Department of Defence, CASA and Air Services Australia (ASA) were contacted about the development. No objection was raised by Defence in respect to flight operations, although standard Notifications and potential WTG lighting measures were recommended (if advised by CASA). A final ASA response has not been received, but based on previous advice for Stages 1-2 and the applicant's aviation assessment, no substantive issues are anticipated (outside of any statutory requirements to update navigational charts and aeronautical information for pilots along existing air routes).

CASA has recommended that for any WTG over 200m AGL – notwithstanding the low volume of aircraft movements within the vicinity of the windfarm – there remains a potential risk to aircraft operations due the penetration of navigable airspace as turbines are exceed the 500ft threshold). Low intensity red aviation hazard lighting (not less than 200 candela) is recommended to be installed.

The applicant does not support the installation of obstacle lighting – noting the very low risk factors and operational requirements for aircraft under VFR. Whilst the maximum height proposed exceeds this guidance by 6m, the recommendation of the regulator cannot be readily discounted. It is recommended that this requirement be conditioned, subject to the completion of a further independent assessment (noting that all other turbines approved and/or installed do not have lighting).

Other recommendations include the submission of final coordinates and heights and to allow a Notice to Airmen to be published prior to construction.

Based on a consideration of the applicant's documentation, agency advice and the requirements of the Planning & Design Code, the application can be undertaken in accordance with planning policies.

Infrastructure

Clearance from Overhead Powerlines	DO1, PO 1.1, DTS/DPF 1.1
Interface between land uses	PO 8.1

New development should avoid or mitigate impacts to existing critical infrastructure, such as overhead electricity lines, water and sewer pipes, gas infrastructure, and telecommunications services. The development requires two new electricity lines to cross the Eyre Highway and will be situated in close proximity to existing overhead transmission infrastructure. Notwithstanding the provision of a declaration by the proponent that that the proposal would not be contrary to the provisions of the *Electricity Act 1996* to existing infrastructure, the Commissioner of Highways will require that minimum clearance distances be maintained across the highway. A condition of approval is recommended.

Electronic Magnetic Interference (EMI) also has the capacity to disrupt or degrade existing telecommunications services. The applicant undertook an EMI assessment of existing services – including radar operations, television and radio broadcasting, mobile phone and internet, emergency services and fixed point to point communications links and multipoint licences. The largest (and widest) turbine model was considered, including the likely cumulative impact from all three stages. A total of 249 communications towers are within 75km of the project site. The applicant's report provides a comprehensive listing and analysis of any service that may be potentially affected.

The first mitigation measure adopted for all windfarms relates to the siting and location of WTGs – particularly in respect to limiting near field impacts or direct line of site intrusion for point to point services (and ensuring the WTGs are outside the 2nd Fresnel zone). The Fresnel Zone is the area around the visual line-of-sight that radio waves spread out into after they leave the antenna. Clear lines of sight are required to maintain signal strength. Mobile and digital services are less likely to be affected by windfarm operations, although where marginal signal strength is already an issue, small

changes can result in a loss of service. The applicant consulted Telstra, who advised that the potential for interference from the Stage 3 development was considered to be low.

Whilst a range of mitigation measures are available, including the relocation of WTGs or upgrade or relocation of other services, the extent of any impact may not be known until construction and/or operations commence on the site. Conditions of approval are therefore recommended in respect to both pre-construction and operational use, requiring ground surveys and signal testing at each stage to ascertain the requirement for any mitigation measures (at the cost of the proponent).

This requirement has been adopted for other windfarms, mostly notably for Crystal Brook and Twin Creek (which were located in better serviced and more settled locations). It is noted that the micro-siting allowance sought for each turbine, would also allow any identified turbine to be moved outside any exclusion zone for point to point services.

The Department of Defence raised a potential concern about wind turbine technologies that produce high frequency noise impacting on more sensitive communication equipment (as low power short range HF communication equipment is used within the Cultana Training area). Defence has requested an assurance from the operator that the turbines will not generate excessive levels of HF noise, and that HF noise mitigation measures will be employed on the turbines to reduce noise output.

This would appear to be a low risk (as the southern cluster of turbines will be approximately 1.8km from the northern boundary of the Cultana Training area), whilst it is noted that for aircraft operations generally, the development should not affect any Precision/Non- Precision Navigational Aids, HF/VHF Communications, Advanced Surface Movement Guidance and Control Systems, Radar or Satellite/Links that are used for existing, non-military services.

Landform and Excavation

Sloping Land Overlay	DO 1, PO 1.1-1.3, PO2.1, PO 3.1
Infrastructure and Renewable Energy Facilities	PO 2.3
Transport, Access and Parking	PO 12.1

Windfarms require significant earthworks for WTG foundations and laydown areas, access roads, substations, operational compounds, temporary concrete batching plants and storage areas for windfarm components. Such facilities are generally established on elevated land or ridgelines to capture the wind resource (where disturbance and erosion impacts can be greater). Stage 3 works (for the northern site) will be able to utilise the existing site entrance and temporary areas previously established (and can be readily remobilised).

Both a Soil Erosion and Drainage Management Plan (SEDMP) and Construction Environmental Management Plan (CEMP) are recommended as a condition of approval to manage and mitigate temporary impacts – including the post-development rehabilitation of disturbed areas. The initial earthworks to establish Stages 1-2 have been undertaken without undue impacts, with no complaints received by the planning authority. The majority of the on-site access tracks are hidden from view, with the main access from the Eyre Highway and traversing through the site to the upper plateau.

On the basis all internal roadways are appropriately designed, engineered and constructed, no adverse environmental impacts are anticipated.

Rehabilitation and Decommissioning

Design and Siting	PO 9.1
Infrastructure and Renewable Energy Facilities	PO 3.1
Sloping Land Overlay	DO 1, PO 4.3

The applicant has advised that the windfarm will be decommissioned and dismantled at the end of its 30-year operational life. All above-ground components will be removed, and the land rehabilitated to allow for a primary production use to resumed on previously utilised land. Consideration will also be

given to those project components that could be repurposed (often through separate landowner agreements), such as the operations building or internal tracks.

Due to the size, reinforcement, and depth of the WTG foundations, it may be impracticable for them to be completely removed, but sufficient soil depth must be provided to enable natural regrowth (with up to 500mm removed and top soil reinstated).

A separate remediation strategy will also be required to stabilise, rehabilitate, and restore the site (and sloped) areas temporarily disturbed during construction, so to prevent erosion from water and airborne processes in the short term. This can be developed as part of both the CEMP and OEMP (Operational Environmental Management Plan), which the applicant has indicated will be implemented, but which should also be conditions of approval.

A draft and then final Decommissioning Plan are recommended as conditions of approval.

Waste Management

Design and Siting	PO 10.1
Infrastructure and Renewable Energy Facilities	PO 13.1
Waste Treatment and Management Facilities	DO 1, PO 1.1.

Renewable energy projects have the potential to generate significant waste volumes from the packaging used in the supply and delivery of equipment and components, such as cable spools, crates, cradles, containers etc. A strategy or protocol is required to assemble, store, recycle and/or dispose of these materials, so they do not find their way into the environment or as landfill.

A Waste Management Plan is recommended as a condition of approval.

Site Contamination

Site Contamination	DO 1, PO 1
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Planning policy seeks the protection of human health and the environment wherever site contamination has been identified or is suspected to have occurred (DO 1). Whilst no sensitive land use has been proposed, the applicant did undertake a preliminary site investigation of the development site (Refer *Lincoln Gap Windfarm – Preliminary Site Investigation (PSI)* dated November 2019 prepared by WSP). It was noted that the land has primarily been used for low intensity grazing purposes, with the land largely undeveloped up until the mid-1950s, with the nearby water reservoir (managed by SA Water) built in 1965. No notifications of site contamination or environmental authorisations are recorded for the subject land, although some sources of contamination related to the use of weedicides/herbicides (along the adjacent rail corridor) and pesticides (sheep yards) are likely (at small levels) and the overall risk to human health or environmental impact is considered low. No residential or tourist accommodation is proposed as part of the development.

Social and Economic Impacts

The development is likely to have a net-positive social and economic impact, through a demand for local workers, contractors and services. The size of the construction workforce should not unduly compromise existing accommodation options within Port Augusta, whilst the permanent (operational) workforce will provide an on-going source of support to the local economy, public and recreational facilities and social services. The applicant has indicated that a Community and Stakeholder Engagement Plan will be developed, to facilitate on-going communication with the Port Augusta Council and Outback Communities Authority, and to develop procedures for the management of complaints or concerns raised by the community. The wider economic benefit is to provide further competition within the National Electricity market and assist in meeting State and Commonwealth emission reduction targets through the provision of emission free sources of energy.

9. CONCLUSION

The proposal to develop a further stage of the Lincoln Gap Windfarm is both a logical extension and complementary development within a zone that seeks renewable energy facilities. The project area has already been developed for a windfarm use (excepting the southern site), and is situated within a locality where impacts of noise, traffic, visual intrusion can be more easily accommodated and managed (or are not as significant due to its relative isolation and sparsely settled land holdings).

No objection or serious concern was raised in respect to the development, and the applicant has responded to matters raised by state and Commonwealth agencies in a separate response document. A number of conditions should be imposed in relation to the project, from final design details, to various management plans, and agency requirements. These will ensure that any impacts can be appropriately managed, and that key infrastructure is decommissioned at the project's end.

If no further information is required, and all relevant assessment matters have been considered, this planning report can be endorsed by the State Commission Assessment Panel pursuant to Section 131 of the *Planning, Development and Infrastructure Act 2016*, and a formal recommendation provided to the Minister for Planning and Local Government for further review and a decision.



SIMON NELDNER
TEAM LEADER – CROWN AND MAJOR DEVELOPMENT
PLANNING AND LAND USE SERVICES
ATTORNEY-GENERAL'S DEPARTMENT



Legend	
	Highways
	Railway
	Site Boundary

Map: PS113707_GIS_008_A1	Author: MO
Date: 18/06/2019	Approved by:

1:300,000

Data source - Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), Magyris, NCCO, © OpenStreetMap contributors, and the GIS User Community

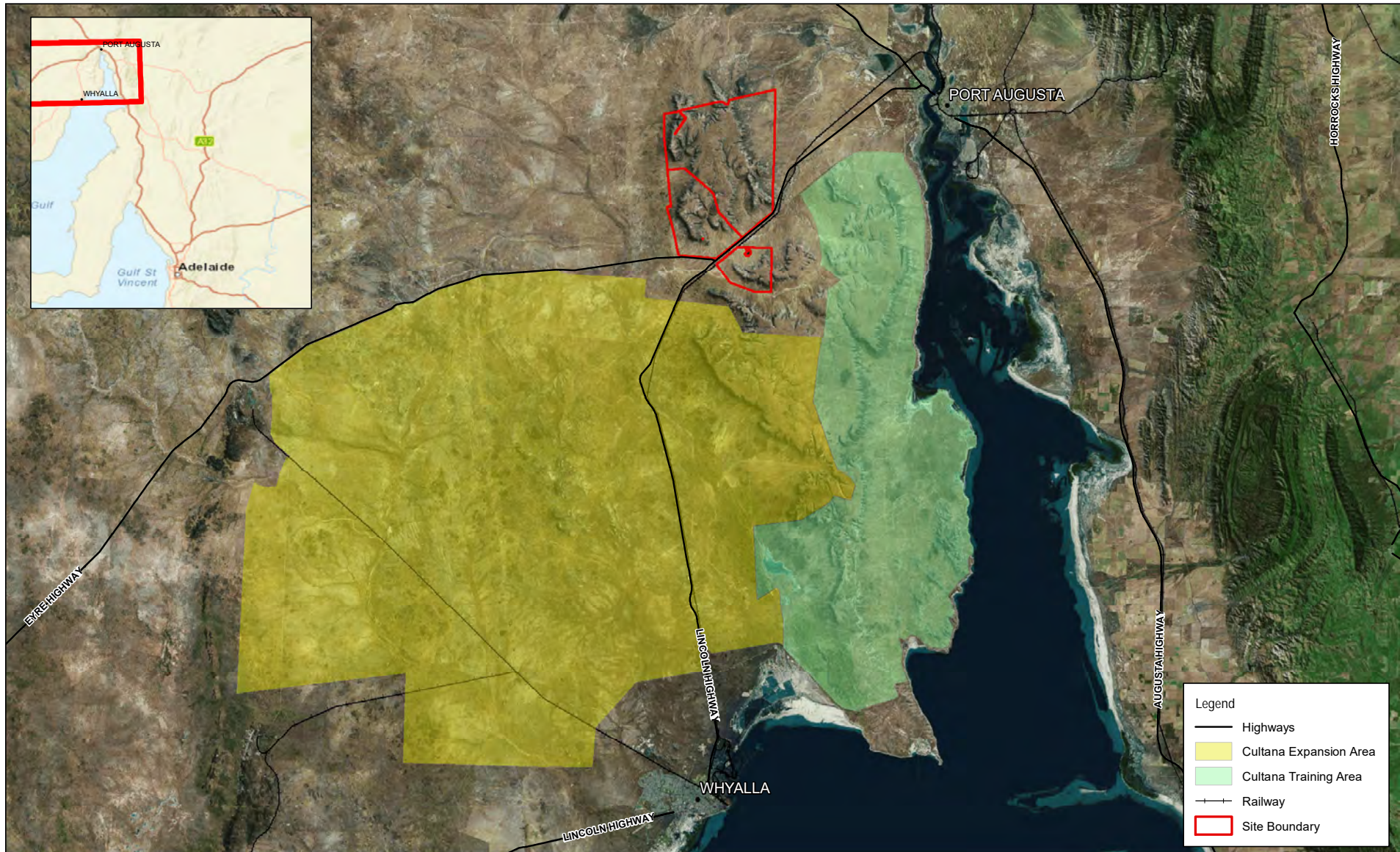
Coordinate system: GDA 1994 MGA Zone 53
Scale ratio correct when printed at A3



Lincoln Gap Wind Farm Stage 3

Figure 1.1
Site Location Plan

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Legend

- Highways
- Cultana Expansion Area
- Cultana Training Area
- Railway
- Site Boundary

Map: PS113707_GIS_002_A2	Author: MO
Date: 27/05/2019	Approved by:




1:300,000

Data source - Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), Magyrisia, NCSO, © OpenStreetMap contributors, and the GIS User Community

Coordinate system: GDA 1994 MGA Zone 53
Scale ratio correct when printed at A

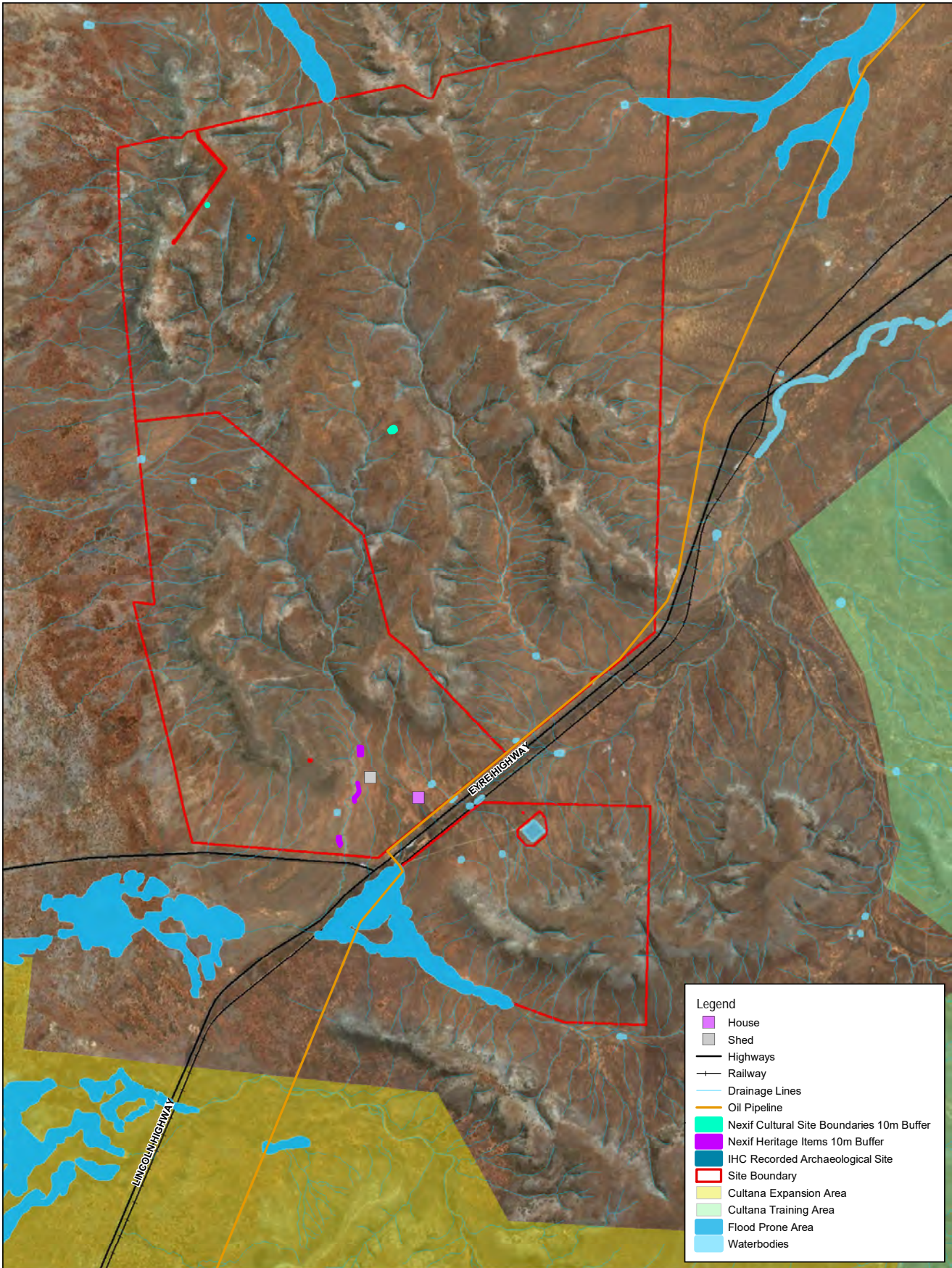


Lincoln Gap Wind Farm Stage 3

Figure 3.4
Site Location

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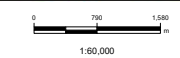


Legend

- House
- Shed
- Highways
- + Railway
- Drainage Lines
- Oil Pipeline
- Nexif Cultural Site Boundaries 10m Buffer
- Nexif Heritage Items 10m Buffer
- IHC Recorded Archaeological Site
- Site Boundary
- Cultana Expansion Area
- Cultana Training Area
- Flood Prone Area
- Waterbodies

Map: PS113707_GIS_003_A1

Author: MO



Date: 27/05/2019
 Approved by:

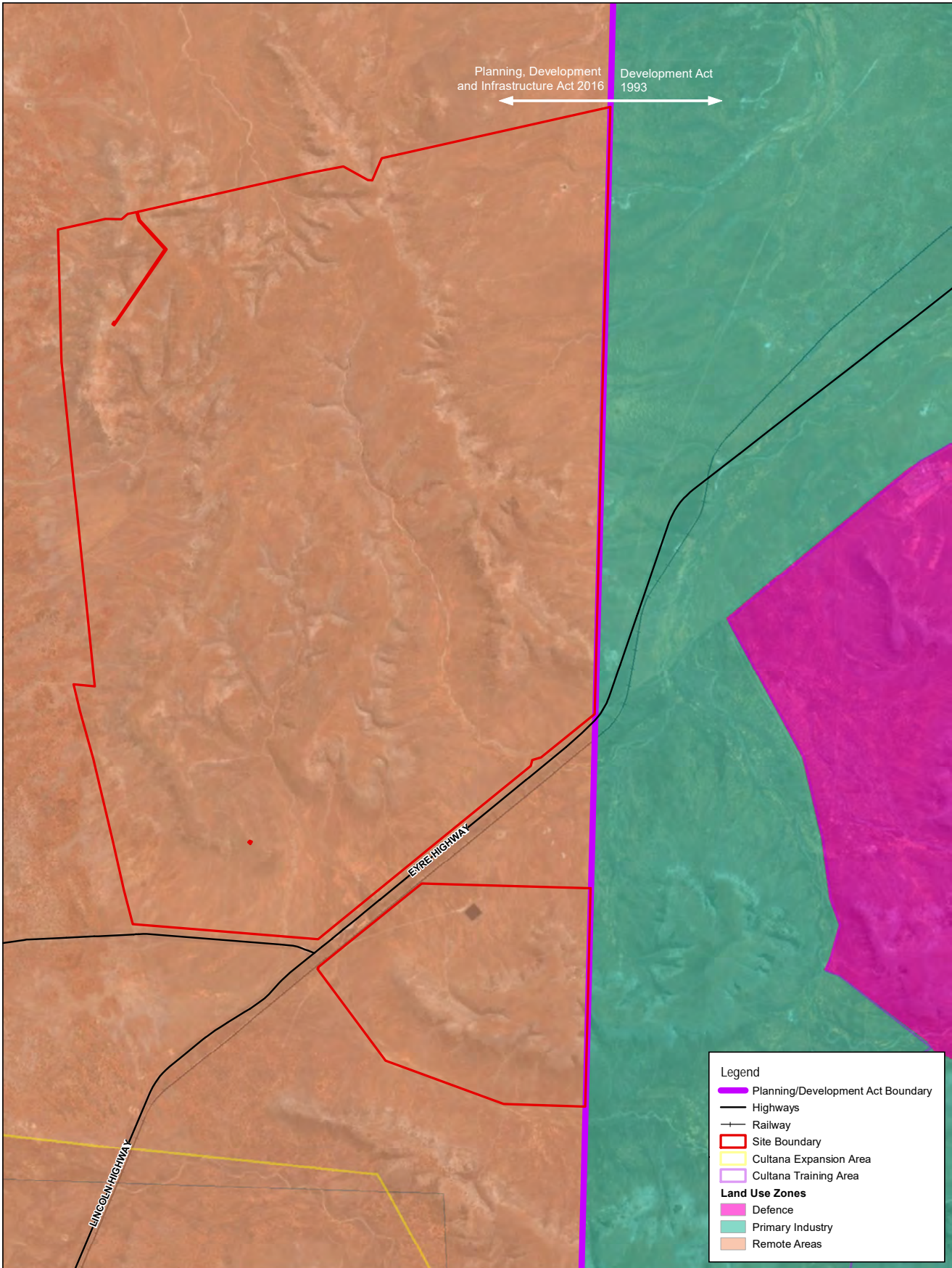
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Data sources: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
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Lincoln Gap Wind Farm Stage 3

Figure 3.1
 Key Physical Features



Planning, Development and Infrastructure Act 2016 ← → Development Act 1993

Legend

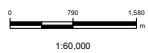
- Planning/Development Act Boundary
- Highways
- + Railway
- Site Boundary
- Cultana Expansion Area
- Cultana Training Area

Land Use Zones

- Defence
- Primary Industry
- Remote Areas

Map: PS113707_GIS_015_A1

Author: MO



Lincoln Gap Wind Farm Stage 3

Date: 6/08/2019

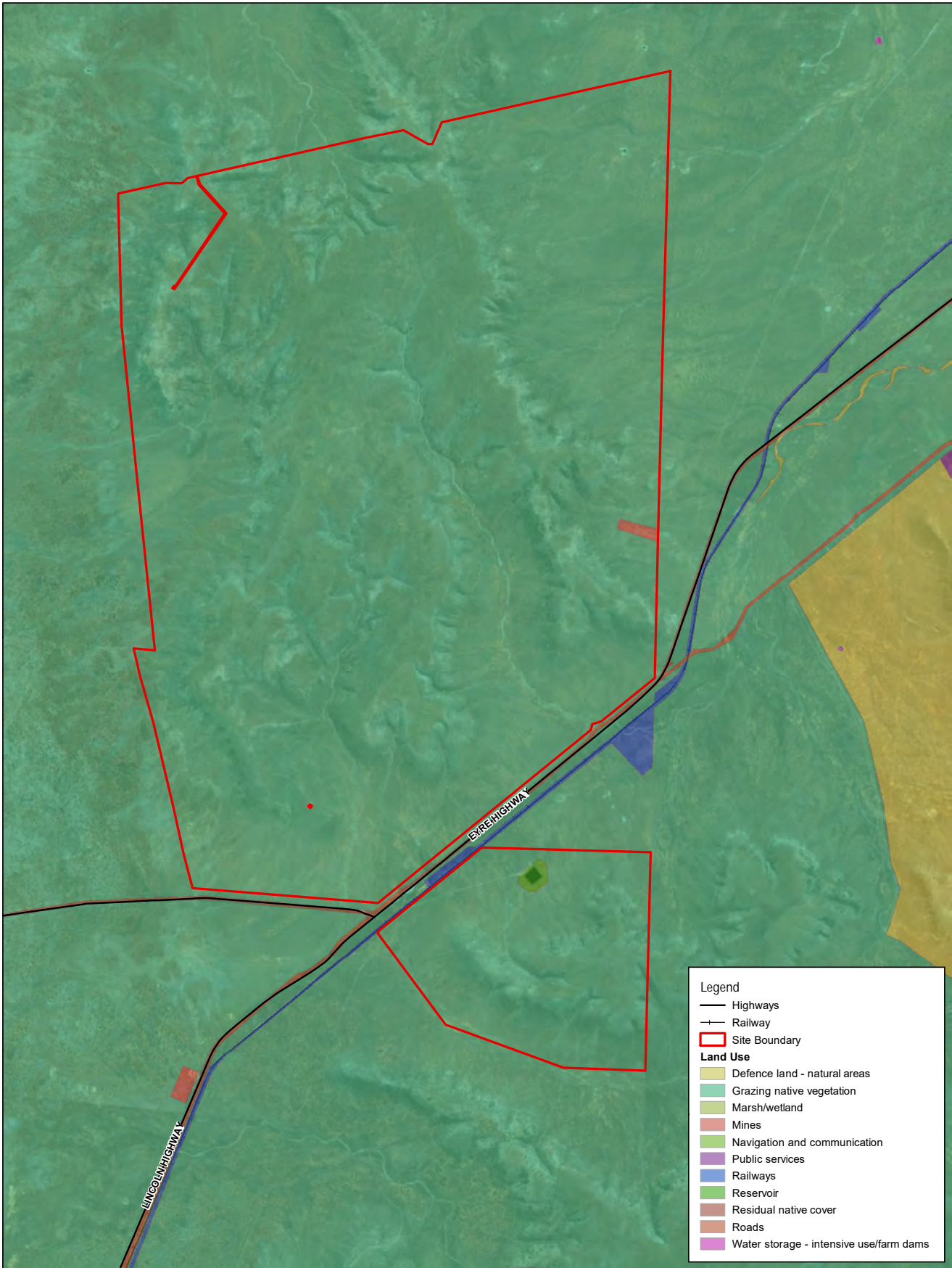
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Coordinate system: GDA 1994 MGA Zone 53
Scale ratio correct when printed at A3



Figure 3.2
Land Use Zoning



Legend

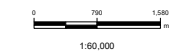
- Highways
- +— Railway
- Site Boundary

Land Use

- Defence land - natural areas
- Grazing native vegetation
- Marsh/wetland
- Mines
- Navigation and communication
- Public services
- Railways
- Reservoir
- Residual native cover
- Roads
- Water storage - intensive use/farm dams

Map: PS113707_GIS_010_A1

Author: MO



Coordinate system: GDA 1994 MGA Zone 53
Scale ratio correct when printed at A3

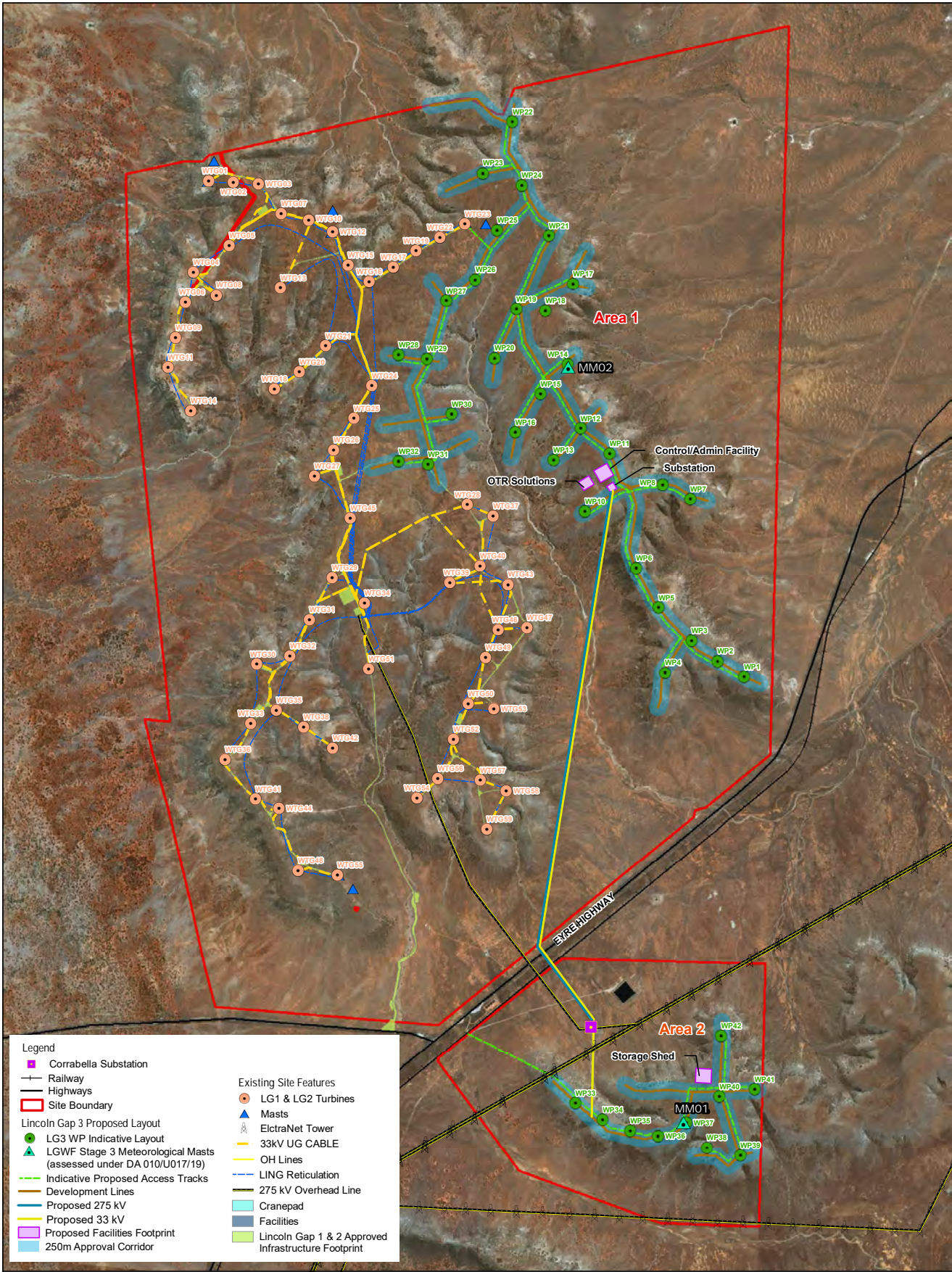
Date: 18/06/2019
Approved by:

Data source: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Lincoln Gap Wind Farm Stage 3

Figure 3.3
Land use within the project area



Legend

- Corrabella Substation
- Railway
- Highways
- ▭ Site Boundary

Lincoln Gap 3 Proposed Layout

- LG3 WP Indicative Layout
- ▲ LGWF Stage 3 Meteorological Masts (assessed under DA 010/U017/19)
- Indicative Proposed Access Tracks
- Development Lines
- Proposed 275 kV
- Proposed 33 kV
- ▭ Proposed Facilities Footprint
- ▭ 250m Approval Corridor

Existing Site Features

- LG1 & LG2 Turbines
- ▲ Masts
- ▲ ElectraNet Tower
- 33kV UG CABLE
- OH Lines
- LING Reticulation
- 275 kV Overhead Line
- ▭ Cranepad
- ▭ Facilities
- ▭ Lincoln Gap 1 & 2 Approved Infrastructure Footprint

Map: PS113707_GIS_012_A6	Author: MO		
Date: 11/11/2019	Approved by:		

Data sources: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
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Coordinate system: GDA 1994 MGA Zone 53
 Scale ratio correct when printed at A3

Lincoln Gap Wind Farm – Stage 3 – Technical Assessment

Figure 4.2
Site Plan

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Typical Turbine Elevation (Source: NEXIF)

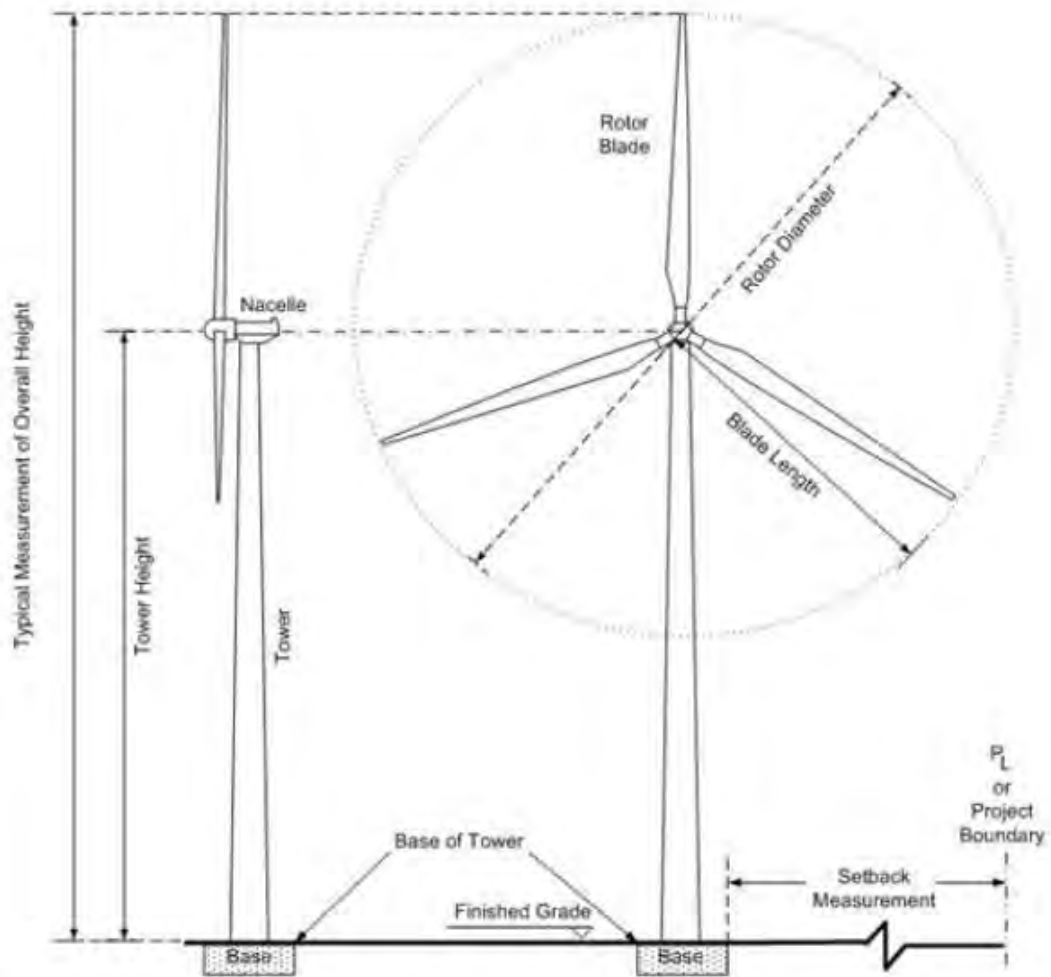


Figure 4.1 Generic wind turbine generator

Proposed Turbine specifications (Source: NEXIF)

MODEL	MW	BLADE LENGTH (m)	HUB HEIGHT (m)	DIAMETER (m)	TOTAL HEIGHT (m)
GE 5.3 MW	5.3	79	121	158	200
Vestas 5.6 MW	5.6	81	125	162	206
Siemens Gamesa SG 6.0-155	6.0	78	107.5	155	185

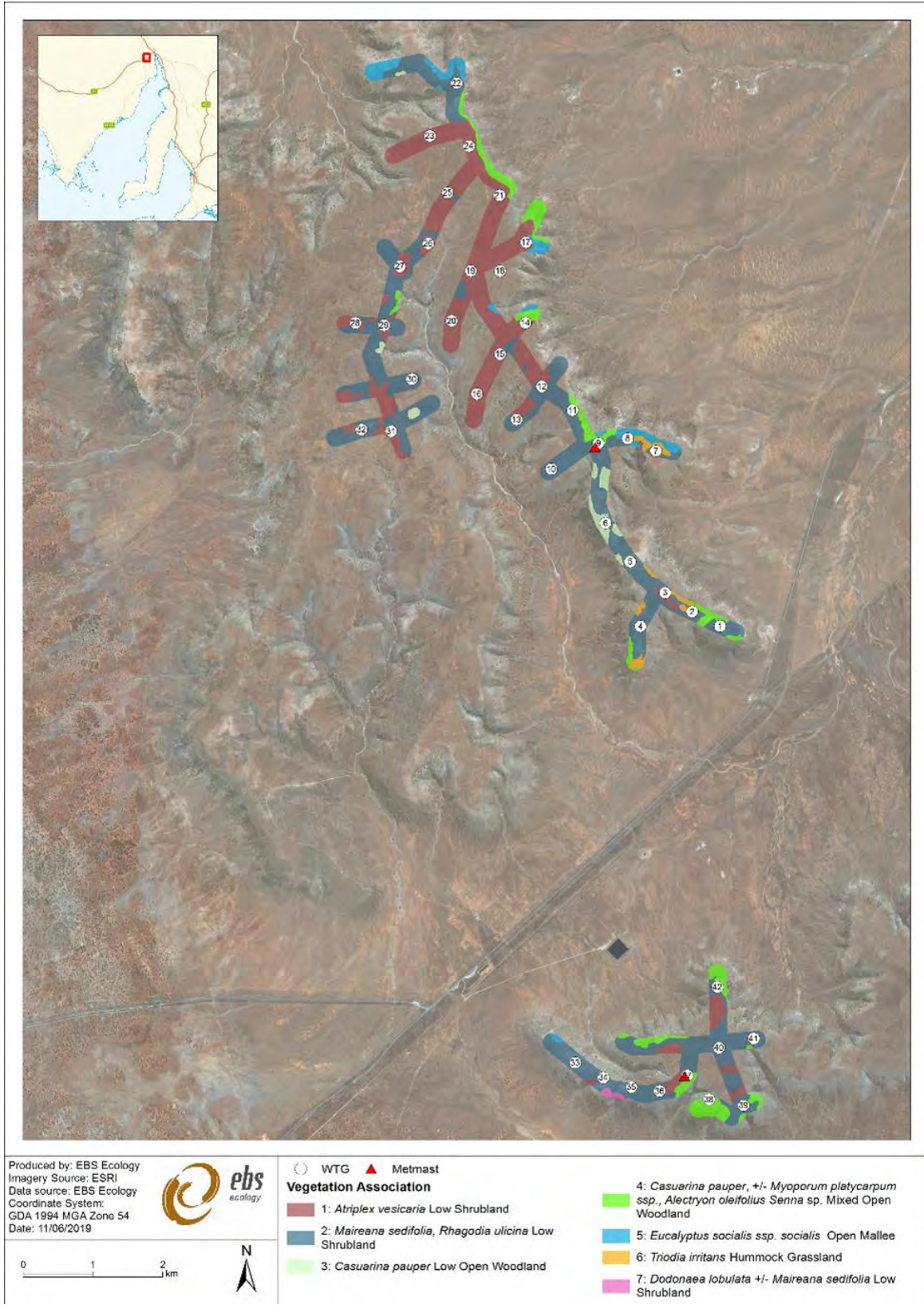
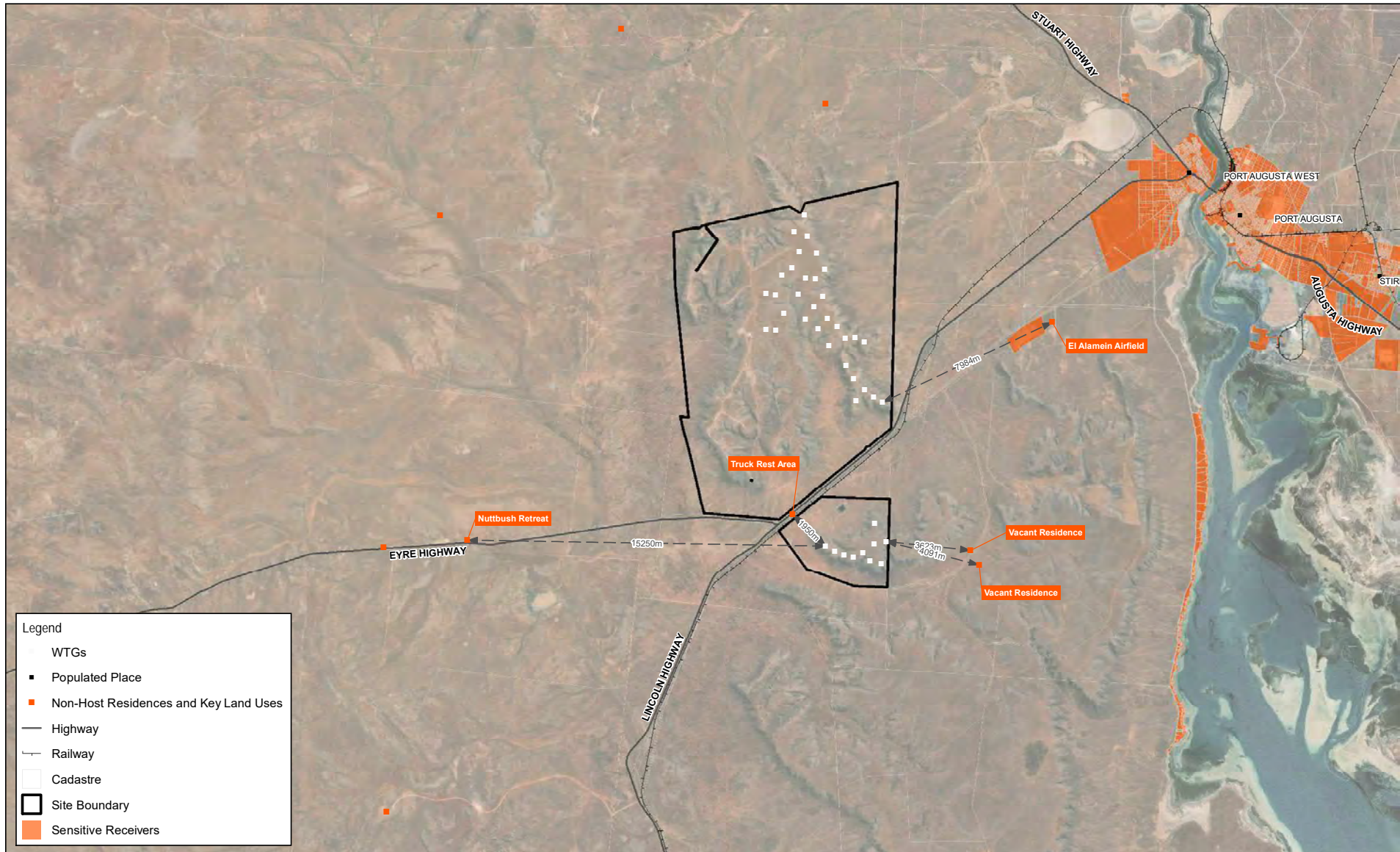


Figure 5.2 Vegetation Association identified within the 250 m 'Approval Corridor'

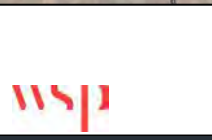


Legend

- WTGs
- Populated Place
- Non-Host Residences and Key Land Uses
- Highway
- Railway
- Cadastre
- Site Boundary
- Sensitive Receivers

Map: PS113707_F001_NonHostResidencesKeyFeatures
 Date: 19/03/20
 Author: TW
 Approved by: TA

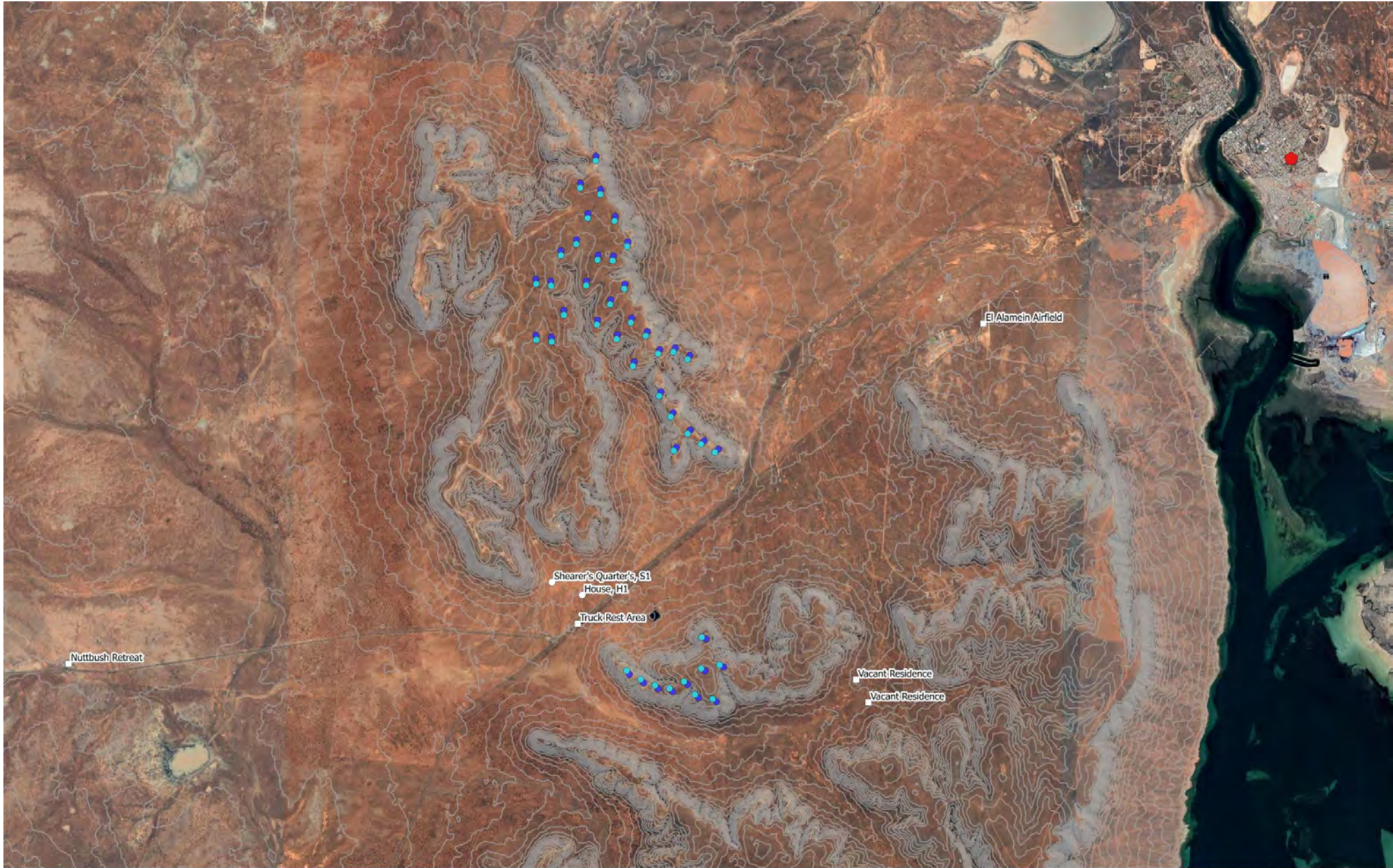
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Lincoln Gap Wind Farm Stage 3 - Additional Information

Figure 1
Sensitive Receivers

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Map: PS113707 Map 1	Author: LF
Date: 26/03/2020	Approved by: AC

Map Source: Google Satellite

To be read in conjunction with WSP document: PS113707-ACO-MEM-0001 Rev0

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1:90,000 at A3

Legend

- Host Receivers
- Non-host Receivers
- Stage 3 with micro-siting
- Stage 3 without micro-siting
- Port Augusta
- Elevation Contours

Lincoln Gap Stage 3 Noise Assessment
 Wind Turbine Stage 3 Locations With and Without 125m Micro-siting



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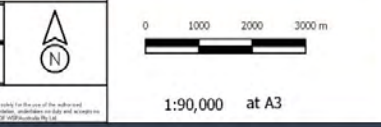


Map: PS113707 Map 2	Author: LF
Date: 26/03/2020	Approved by: AC

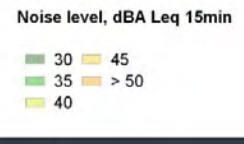
Web Source: Google Satellite

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- Legend**
- Host Receivers
 - Non-host Receivers
 - Stage 3 without micro-siting
 - Port Augusta
 - Elevation Contours
 - Host Receiver Noise Criteria, 45 dBA



Lincoln Gap Stage 3 Noise Assessment
 Wind Turbine Stage 3 (without micro-siting)



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Map: PS113707 Map 3	Author: LF
Date: 26/03/2020	Approved by: AC

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1:90,000 at A3

Legend

- Host Receivers
- Non-host Receivers
- ▲ Stage 1
- ▲ Stage 2
- Stage 3 without micro-siting
- ◆ Port Augusta
- Elevation Contours
- - - Host Receiver Noise Criteria, 45 dBA

Noise level, dBA Leq 15min



Lincoln Gap Stage 3 Noise Assessment
 Wind Turbine Stages 1, 2, and 3 (Stage 3 without micro-siting)



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Map: PS113707 Map 4	Author: LF
Date: 26/03/2020	Approved by: AC

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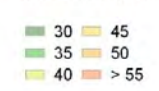


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Legend

- Host Receivers
- Non-host Receivers
- ▲ Stage 1
- △ Stage 2
- Stage 3 with Micro-siting
- ◆ Port Augusta
- Elevation Contours
- - - Host Receiver Noise Criteria, 45 dBA

Noise level, dBA Leq 15min



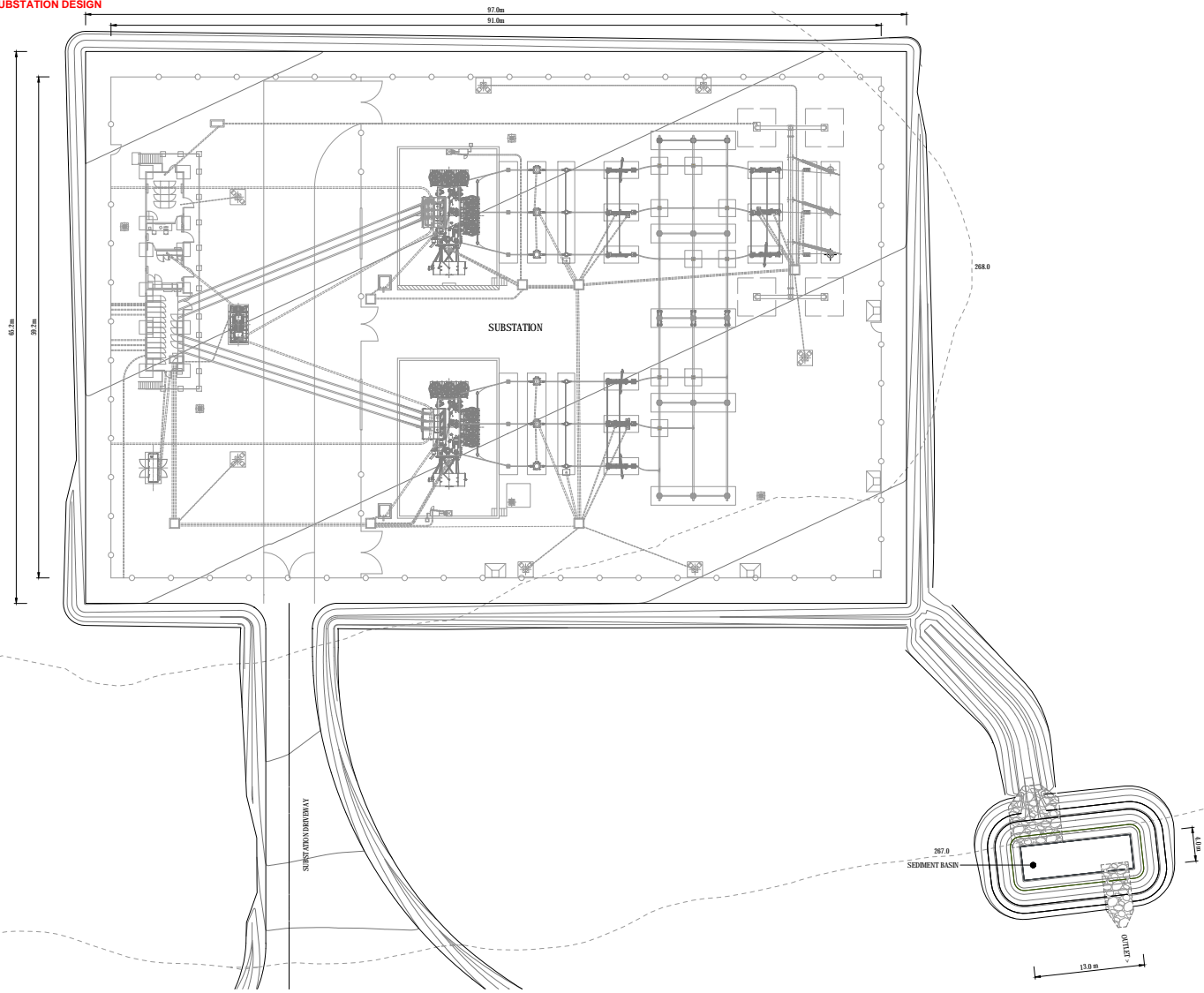
Lincoln Gap Stage 3 Noise Assessment
 Wind Turbine Stages 1, 2, and 3 (Stage 3 with 125m micro-siting)



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APPENDIX C: EXAMPLE SUBSTATION DESIGN



LEGEND

	EXISTING CONTOURS - 5.0m INTERVAL
	DESIGN CONTOURS - 0.25m INTERVAL
	PAD R.L.
	ROCK PROTECTION

SUBSTATION - LAYOUT PLAN

SCALE 1:250

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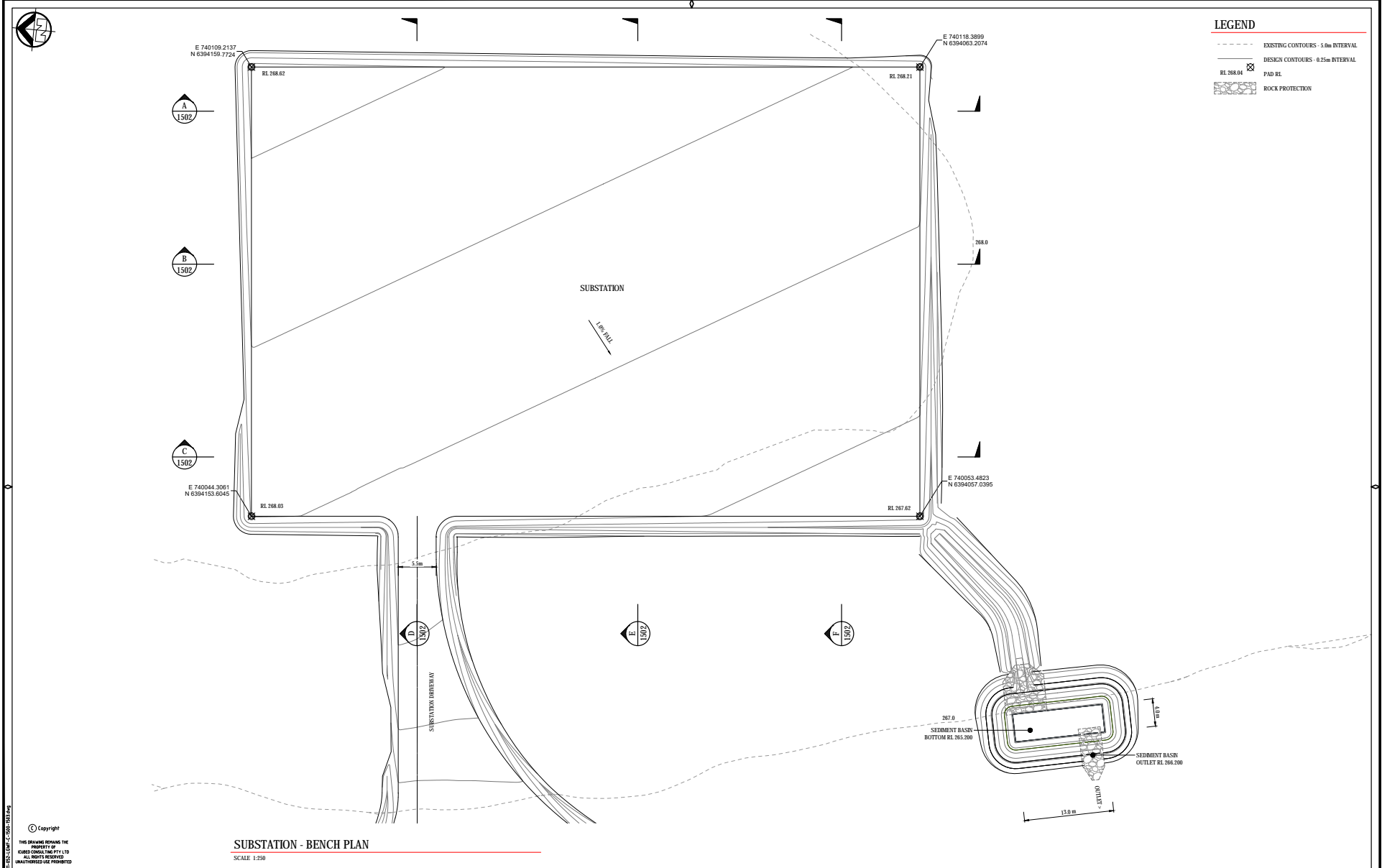
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C	FOR APPROVAL	J.C.	N.C.	B.P.	17.04.18
B	SUBSTATION LOCATION CHANGED	J.C.	N.C.	B.P.	28.03.18
A	FOR APPROVAL	J.C.	N.C.	B.P.	20.03.18



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CAD FILE No:	APPROVED:	DATE:	SCALE: AS SHOWN	JOB CODE: 11-052			
11-052-LGW-C-1500-1503.dwg	N.C.	20.03.18					



LEGEND

- - - - - EXISTING CONTOURS - 5.0m INTERVAL
- DESIGN CONTOURS - 0.25m INTERVAL
- RL 268.04 □ PAD RL
- ▨ ROCK PROTECTION

SUBSTATION - BENCH PLAN
SCALE 1:250

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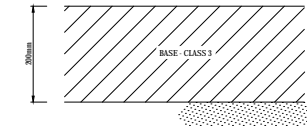
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B	SUBSTATION LOCATION CHANGED	J.C.	N.C.	B.P.	28.03.18
A	FOR APPROVAL	J.C.	N.C.	B.P.	20.03.18



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PAVEMENT NOTES

ALL PAVEMENTS ARE BASED ON A SOUND AND TRAFFICABLE SUBGRADE. WET AND/OR SOFT AREAS FAILING THE SUBGRADE PROOF ROLL TEST MAY REQUIRE SOME FORM OF SUBGRADE IMPROVEMENT. THE DESIGN ENGINEER SHALL BE CONSULTED TO ASSESS OPTIONS SUCH AS:
 - LIME STABILISATION
 - GEOTEXTILE STRENGTHENING
 - COARSE ROCK FILL STRENGTHENING
 - SUBGRADE REINFORCEMENT
 OR A COMBINATION OF ALL THESE OPTIONS.
 SUBGRADE UNDRAINED SHEAR STRENGTH TO BE 120kPa OR BETTER.



SUBSTATION PAVEMENT DETAILS

SUBJECT TO FINAL DESIGN BASED ON INSITU STRENGTH TESTING



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SCALE 1:250



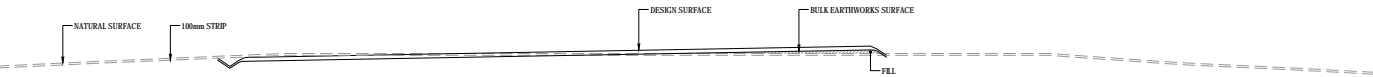
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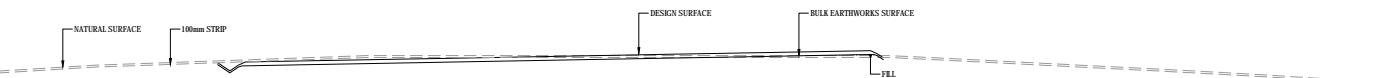
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D SUBSTATION - SECTION D
SCALE 1:250



E SUBSTATION - SECTION E
SCALE 1:250



F SUBSTATION - SECTION F
SCALE 1:250

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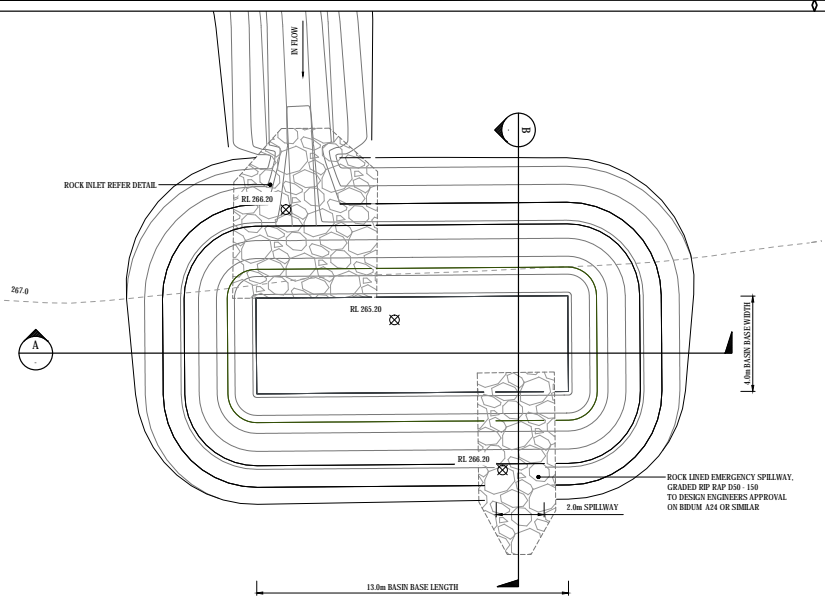
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B		NOTES CHANGED	J.C.	N.C.	B.P.	23.03.18
A		FOR APPROVAL	J.C.	N.C.	B.P.	20.03.18



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DRAWN BY:	DATE:	DESIGNED BY:	DATE:	TITLE: SUBSTATION SECTIONS AND DETAILS			
J.C.	20.03.18	J.C.	20.03.18	SHEET SIZE: A1			
DRG. CHECKED BY:	DATE:	DES. CHECKED BY:	DATE:	REVISION: 0			
B.P.	15.03.18	N.C.	20.03.18	SCALE: AS SHOWN	DRAWING No: LGWF-C-1502	SHEET No:	
CAD FILE No:	APPROVED:	DATE:					
11-052-LGWf-C-1500-1503.dwg	N.C.	20.03.18	JOB CODE: 11-052				



LEGEND

---	EXISTING CONTOURS - 5.0m INTERVAL
---	DESIGN CONTOURS - 0.25m INTERVAL
RL 268.04	PAD RL
[Rock symbol]	ROCK PROTECTION

SUBSTATION SEDIMENT BASIN DETAIL
SCALE 1:100

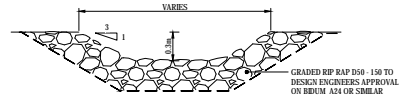
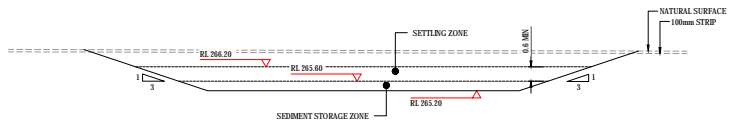
SEDIMENT BASIN SIZING - TYPE F

BASIN No.	CATCHMENT AREA	SETTLING ZONE VOLUME	SEDIMENT STORAGE VOLUME	SPLIWAY
SUB	0.99 ha	68 cu.m	25 cu.m	2 m

SEDIMENT BASIN CONSTRUCTION NOTES

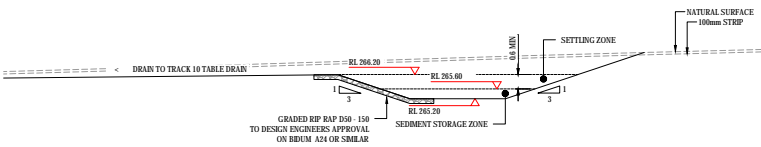
- REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE BASIN AND FROM WITHIN THE STORAGE AREA.
- SELECT FILL THAT IS FREE OF ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL.
- PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING TO AT LEAST 100mm TO HELP BOND COMPACTED FILL TO EXISTING SUBSTRATE.
- SPREAD THE FILL IN 200mm LOOSE LAYERS AND COMPACT IT AT OPTIMUM MOISTURE CONTENT.
- CONSTRUCT THE EMERGENCY SPILLWAY.
- REHABILITATE THE STRUCTURE FOLLOWING THE CMP.

SEDIMENT BASIN - SECTION A
SCALE 1:100



ROCK INLET DETAIL
NTS

SEDIMENT BASIN - SECTION B
SCALE 1:100



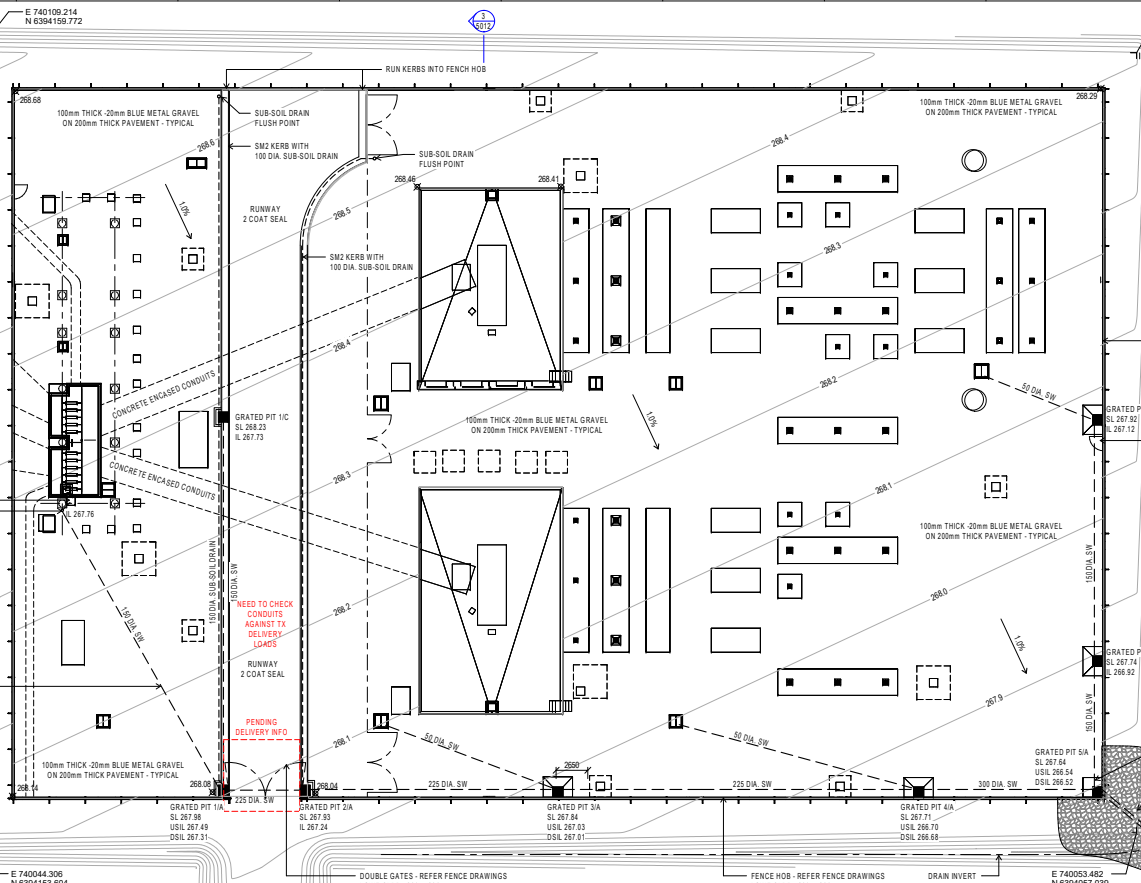
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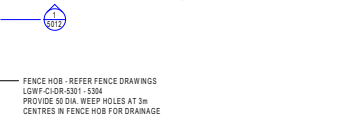
REV	NO	REVISION DESCRIPTION	DRAWN BY	APPROD BY	CHECKED BY	DATE
0		FOR CONSTRUCTION	J.C.	N.C.	B.P.	22.05.18
B		FOR APPROVAL	J.C.	N.C.	B.P.	17.04.18
A		PRELIMINARY	J.C.	N.C.	B.P.	20.03.18



CLIENT: SENVION				PROJECT: LINCOLN GAP WIND FARM			
DRAWN BY: J.C.	DATE: 20.03.18	DESIGNED BY: J.C.	DATE: 20.03.18	TITLE: SUBSTATION SEDIMENT AND EROSION CONTROL LAYOUT AND DETAILS		SHEET SIZE: A1	
DRG. CHECKED BY: B.P.	DATE: 15.03.18	DES. CHECKED BY: N.C.	DATE: 20.03.18	SCALE: AS SHOWN	DRAWING No: LGWF-C-1503	SHEET No: 0	REVISION: 0
CAD FILE No: 11-052-LGWF-C-1500-1503.dwg	APPROVED: N.C.	DATE: 20.03.18	JOB CODE: 11-052				



CONCRETE REINFORCEMENT BONDING DETAIL

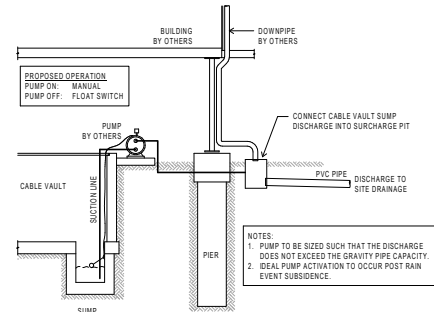


STORMWATER NOTES

1. ALL STORMWATER DRAINAGE TO BE IN ACCORDANCE WITH AS/NZS 3500.3
2. ALL NON-PRESSURE PIPE TO BE HD UPVC PIPE
3. LAYING OF PIPES TO BE IN ACCORDANCE WITH AS/NZS 3500.3
4. ALL LEVELS SHOWN ARE FINISHED SURFACE LEVELS TO TOP OF 100mm BLUE METAL GRAVEL
5. FOR CONDUIT AND CONDUIT TRENCH DETAILS REFER DRAWINGS LGWF-CI-DR-5103
6. FOR EARTH GRID REFER DRAWING LGWF-EL-GR-101
7. FOR FENCE AND GATE DETAILS REFER DRAWINGS LGWF-CI-DR-5301 - 5304
8. ALL STORMWATER PIPES AT MINIMUM 1.0% D/S TO D.
9. ALL STORMWATER PITS SHALL BE 600x600 GRATED INLETS U.O.D.

LEGEND

TAG	DESCRIPTION
100.00	FINISHED SURFACE LEVEL
SL	SURFACE LEVEL
IL	INVERT LEVEL
USL	UP STREAM INVERT LEVEL
DSL	DOWN STREAM INVERT LEVEL
DIA. SW	DIAMETER STORMWATER PIPE
- - -	STORMWATER PIPE
- - -	STORMWATER SUB-SOIL
□	FOOTING ABOVE GRAVEL
□	FOOTING BELOW GRAVEL

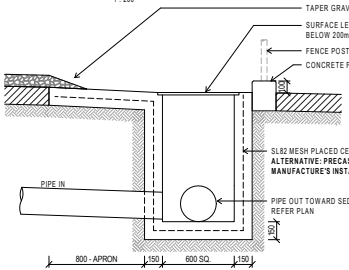


CABLE VAULT DISCHARGE

N.T.S. (SCHEMATIC PURPOSES ONLY)

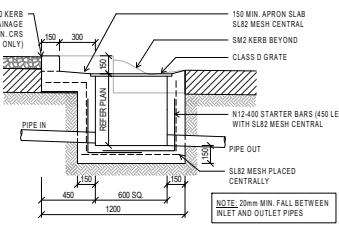
FINISHED SURFACE PLAN

1:200



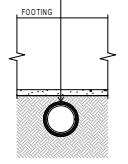
TYPICAL GRATED PIT DETAIL - FENCELINE

1:20



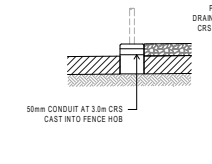
TYPICAL GRATED PIT DETAIL - RUNWAY

1:20



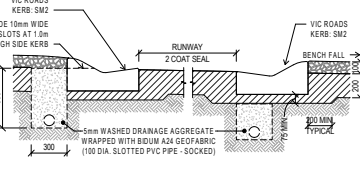
PIPE LAGGING DETAIL

1:20



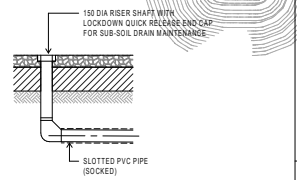
FENCE HOB WEEP HOLE DETAIL

1:20



TYPICAL RUNWAY DETAIL

1:20



SUB-SOIL DRAIN FLUSH POINT DETAIL

1:20

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No	REVISIONS	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE
1	ISSUES FOR CONSTRUCTION		B.M.	S.K.	R.L.	21.05.2018
2	ISSUES FOR CONSTRUCTION		B.M.	S.K.	R.L.	06.06.2018
3	ISSUES FOR CONSTRUCTION		B.M.	S.K.	R.L.	18.06.2018

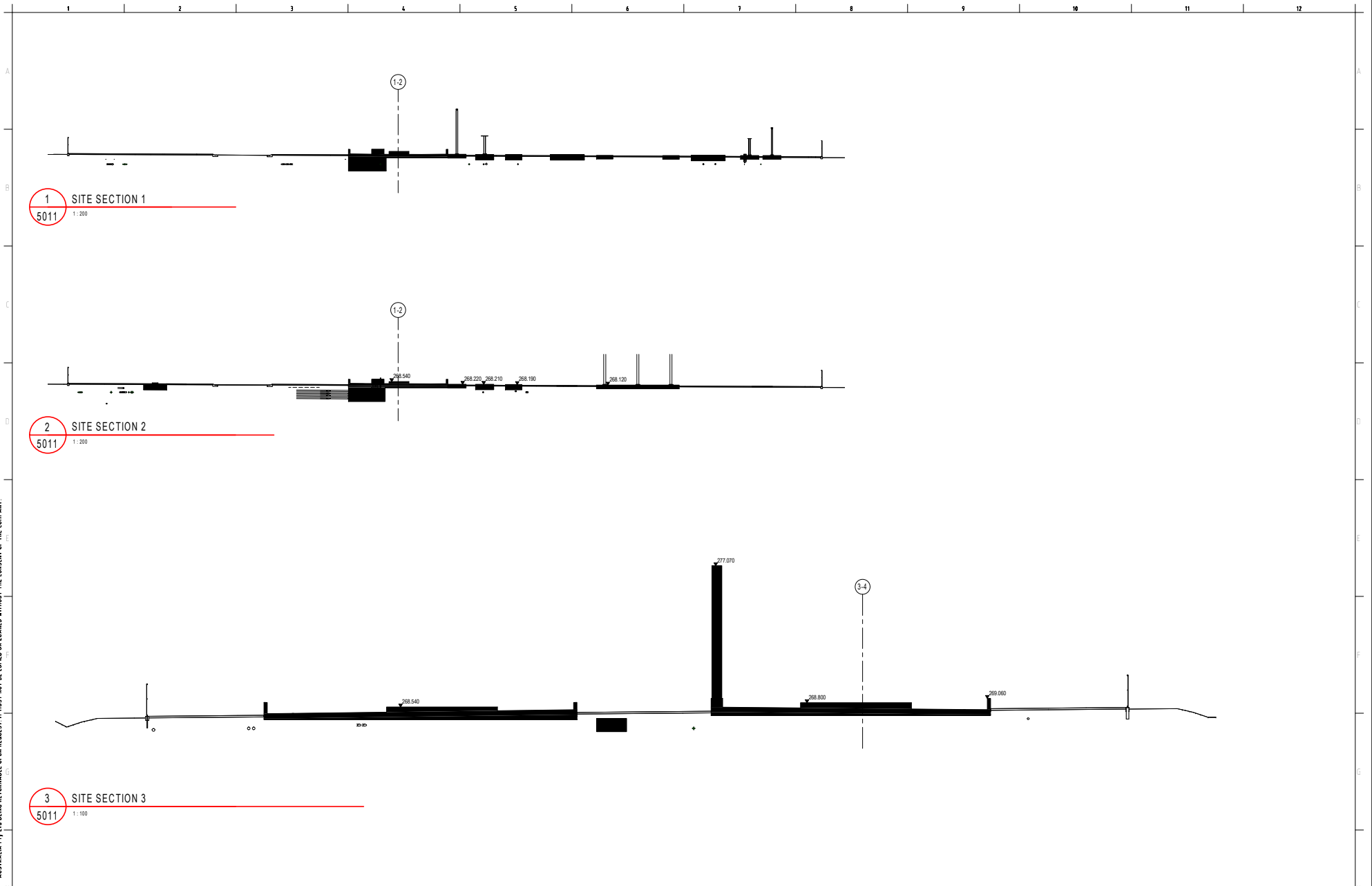
PROJECT
LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
LINCOLN GAP WIND FARM 275/33KV SUBSTATION
FINISHED SURFACE PLAN

DESIGN	APPROV	B.M.R.	M.B.	R.L.	DATE	A1 SCALE	DRAWING No	PROJECT No	SHEET No	REV
					16.02.2018	A1	LGWF-CI-DR-5011	10616		0
					12.02.2018					
					16.02.2018					

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1 SITE SECTION 1
5011 1:200

2 SITE SECTION 2
5011 1:200

3 SITE SECTION 3
5011 1:100

No.	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE
REVISIONS					



consulting pty ltd
 engineering consultants
 innovation. integrity. inspiration

SENVION
 wind energy solutions

NEXIF ENERGY
 LINCOLN GAP WIND FARM

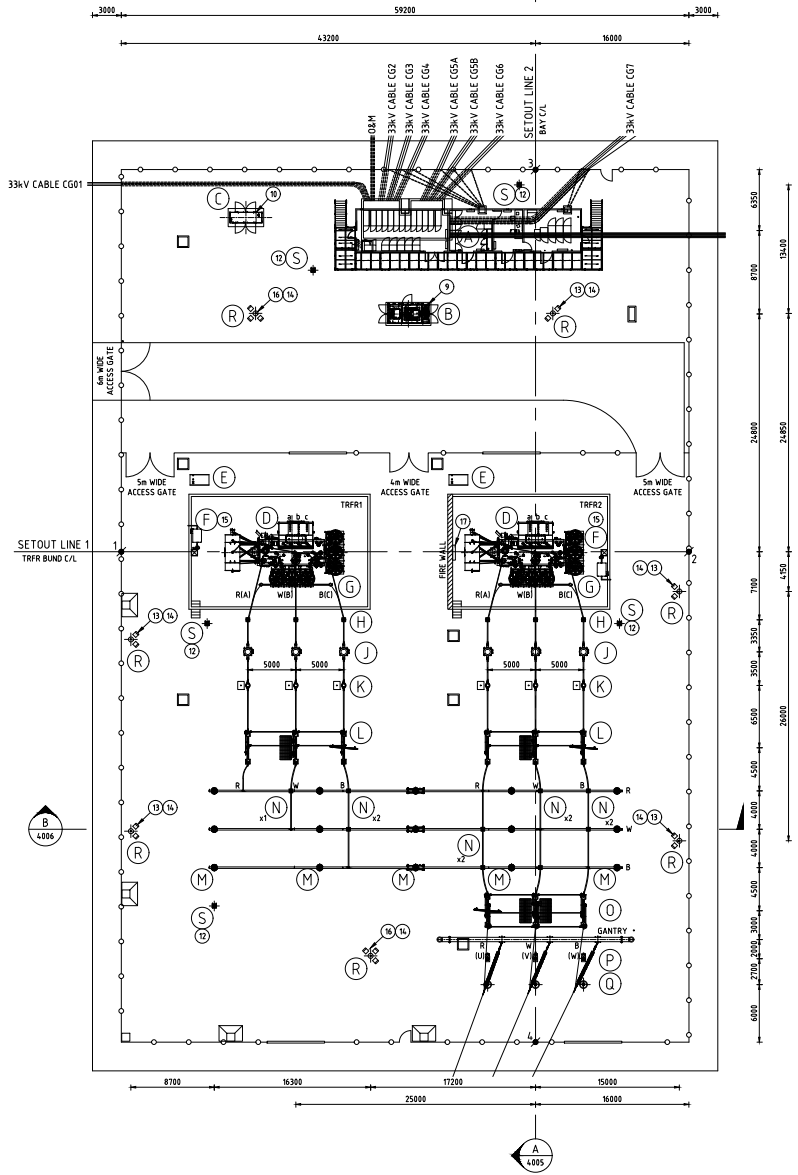
PROJECT
 LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
 LINCOLN GAP WIND FARM 275/33KV SUBSTATION SITE SECTIONS

DRAWN	S.H.R.	14.02.2018	A1 SCALE As indicated	PROJECT No. 10614
DESIGN	M.B.	12.02.2018	DRAWING No.	
APPVD	R.L.	16.02.2018	LGWF-CI-DR-5012	SHEET No.
			A1	REV 0

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SETOUT POINTS (MGA 53)		
POINT	EASTINGS	NORTHINGS
1	740051.346	6394111.230
2	740110.281	6394116.831
3	740090.583	6394154.988
4	740099.191	6394064.397

EQUIPMENT SCHEDULE			
MK No.	QTY	DESCRIPTION	WWF ID #
A	1	CONTROL & SWITCHGEAR BUILDING	
B	1	AUXILIARY TRANSFORMER	+TF3
C	1	DIESEL GENERATOR	+U10
D	2	275/33kV TRANSFORMER	+TF1, +TF2
E	2	NEUTRAL EARTH RESISTOR	+TF1-R1, +TF2-R1
F	2	OIL/WATER SEPARATOR	
G	6	275kV SURGE ARRESTOR	
H	6	275kV POST INSULATOR - HIGH LEVEL	
J	6	275kV CURRENT TRANSFORMER	+C02-T10, +C03-T10
K	2	275kV CIRCUIT BREAKER (3 x 1 PHASE)	+C02-Q10, +C03-Q10
L	2	275kV ISOLATOR WITH SINGLE E/W	+C02-Q11, +C02-Q10, +C03-Q11, +C03-Q10E
M	5	275kV HIGH LEVEL BUSBAR SUPPORT	
N	9	275kV LOW LEVEL POST INSULATOR SUPPORT	
O	1	275kV ISOLATOR WITH DOUBLE E/W	+C01-Q11, +C01-Q10E, +C01-Q12E
P	3	275kV CAPACITOR VOLTAGE TRANSFORMER	+C01-T11
Q	3	275kV SURGE ARRESTOR W/COUNTER	
R	7	10m SEE-SAW LIGHT POLE	
S	5	20m LIGHTNING MAST WITH 1m EARTH ROD	

REFERENCE DRAWINGS:

- LGWF-EL-DR-4001 PLANT DATA SHEET
- LGWF-EL-DR-4005 275KV LINE ENTRY AND TRANSFORMER BAY - ELEVATION
- LGWF-EL-DR-4006 275KV BUSBAR - ELEVATION
- LGWF-EL-DR-4007 SWITCHYARD - MATERIAL SCHEDULE
- LGWF-EL-DR-4008 SUBSTATION LANDING TERMINAL STRUCTURE - 275KV STRUCTURE ELECTRICAL CLEARANCE
- LGWF-EL-DR-4009 GANTRY LOAD TREE
- LGWF-EL-DR-4010 GANTRY OPGW TERMINATION ARRANGEMENT
- LGWF-EL-DR-4101 CONTROL AND SWITCHGEAR BUILDING - LAYOUT
- LGWF-EL-DR-4201 LIGHTNING COVERAGE PLAN
- LGWF-EL-DR-4202 EXTERIOR LIGHTING COVERAGE PLAN
- LGWF-EL-DR-4301 LABELS DETAILS
- LGWF-EL-DR-4302 LABELS DETAILS
- LGWF-EL-DR-4701 SUBSTATION BASIC EARTHING PLAN
- LGWF-CI-DR-5001 SUBSTATION GENERAL CONSTRUCTION NOTES
- LGWF-CI-DR-5010 SUBSTATION FOOTING PLAN
- LGWF-CI-DR-5103 275/33KV SWITCHYARD CONDUIT LAYOUT
- LGWF-CI-DR-5301 FENCING LAYOUT
- LGWF-CI-DR-5401 CABLE TRENCH SECTION - SUBSTATION AREA - TYPICAL

NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE.
2. MINIMUM ELECTRICAL CLEARANCES ARE IN ACCORDANCE WITH AS 2067 (TABLE 3.2):
 - a. PHASE TO PHASE 2600mm
 - b. PHASE TO EARTH 1900mm
 - c. SECTIONAL CLEARANCE 4455mm
 - d. GROUND CLEARANCE 2440mm
 - e. NON-FLASHOVER DISTANCE 2015mm
3. EQUIPMENT INTERCONNECTION 275kV:
 - a. MAIN BUSBAR $\phi 160 \times 8 \text{ AL} - 4000\text{mm}$ PHASE SPACING
 - b. DROPPER SINGLE AAC 1120 SULPHUR (BY OTHERS)
 - c. INTERPLANT DOUBLE AAC VENUS
4. POLLUTION LEVEL III (HEAVY), 25mm/kV
5. FAULT LEVEL STRUCTURAL DESIGN 15kA/0.5sec

No.	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE
1	ISSUED FOR CONSTRUCTION	NEB	PM	LDP	18/05/18
2	ISSUED FOR REVIEW	NEB	PM	LDP	16/02/18
3	ISSUED FOR REVIEW	NEB	PM	LDP	22/01/17



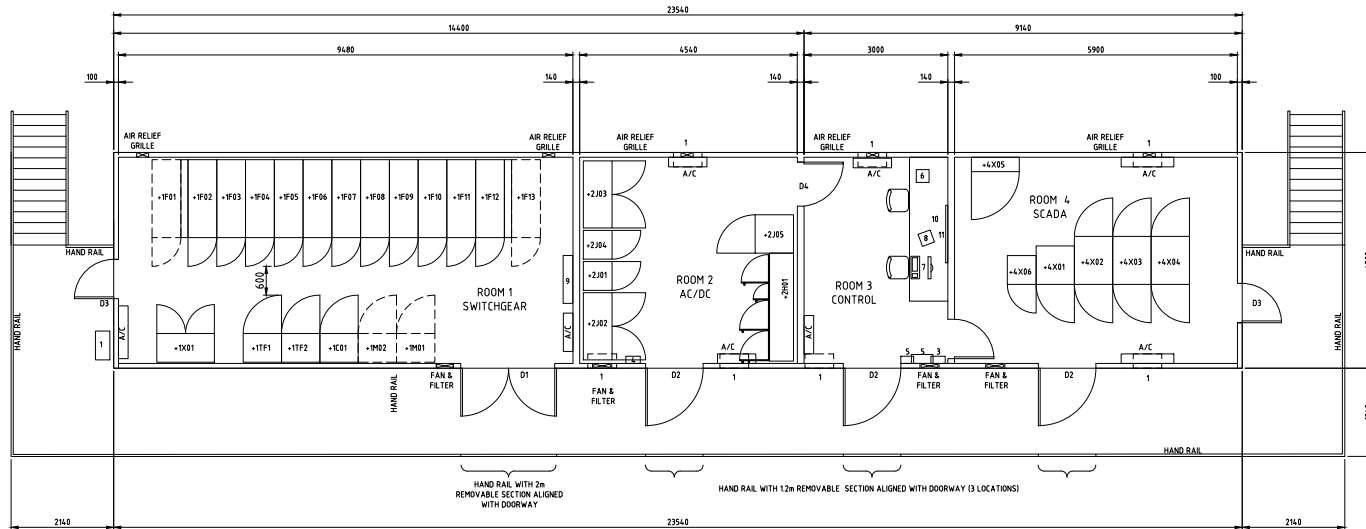
LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
 LINCOLN GAP WIND FARM 275/33KV SUBSTATION
 SUBSTATION
 GENERAL ARRANGEMENT

DRAWN	NEB	27/10/2017	AT SCALE	PROJECT No.
DESIGN	PM	27/10/2017	1:51500	10614
APPRVD	LDP	27/10/2017	DRAWING No.	LGWFF-EL-DR-4004
			SHEET No.	1 OF 1
			REV	0

DIMENSIONS IN MILLIMETRES DO NOT SCALE

APPENDIX D: EXAMPLE SWITCHROOM DESIGN



CONTROL CUBICLES AND EQUIPMENT (WxDxH)				WEIGHT	
ROOM 1 - SWITCHGEAR ROOM					
+X01	275kV LINE 1 CUBICLE (800Wx600Dx2200H)	500kg	-4X01	SCADA SUBSTATION I/O RACK (SSU) (800Wx800Dx2000H) - RTU PANEL	+1000kg
+F01	FUTURE (800Wx1625Dx2570H)	900kg	-4X02	SCADA SERVER & COMPS RACK (SSC) (800Wx1000Dx2000H)	+1000kg
+F02	WTG COLLECTOR GROUP 1 (600Wx1625Dx2570H)	900kg	-4X03	SENVION SCADA CABINET (SSC) (800Wx1000Dx1600H)	+1000kg
+F03	WTG COLLECTOR GROUP 2 (600Wx1625Dx2570H)	900kg	-4X04	FIBER OPTIC TERMINATION CABINET (FOTC) (800Wx1000Dx2000H)	+1000kg
+F04	WTG COLLECTOR GROUP 3 (600Wx1625Dx2570H)	900kg	+4X05	SENVION POWER MANAGEMENT UNIT (PMU) (1000Wx3000Dx1000H)	10kg
+F05	WTG COLLECTOR GROUP 4 (600Wx1625Dx2570H)	900kg	+4X06	ELECTRANET TELECOMMUNICATIONS PANEL (600Wx600Dx2100H)	+1000kg
+F06	33kV INCOMER 'A' (600Wx1625Dx2570H)	900kg			
+F07	33kV BUS COUPLER (600Wx1625Dx2570H)	900kg			
+F08	33kV BUS RISER (600Wx1625Dx2570H)	900kg			
+F09	33kV INCOMER 'B' (600Wx1625Dx2570H)	900kg			
+F10	WTG COLLECTOR GROUP 5 (600Wx1625Dx2570H)	900kg	1	AIR CONDITIONER CONDENSER UNIT	
+F11	WTG COLLECTOR GROUP 6 (600Wx1625Dx2570H)	900kg			
+F12	WTG COLLECTOR GROUP 7 (600Wx1625Dx2570H)	900kg	3	FIRE SYSTEM	
+F13	FUTURE (600Wx1625Dx2570H)	900kg	4	EYE WASH STATION	
+M01	FUTURE (800Wx600Dx2200H)	500kg	5	SECURITY SYSTEM	
+M02	FUTURE (800Wx600Dx2200H)	500kg	6	FAX MACHINE/PRINTER	
+TF1	275kV TRANSFORMER 1 CUBICLE (800Wx600Dx2200H)	500kg	7	SUBSTATION PC/HM	
+TF2	275kV TRANSFORMER 2 CUBICLE (800Wx600Dx2200H)	500kg	8	TELEPHONE	
+IX01	MARSHALLING KIOSK (1200Wx600Dx2200H)	500kg	9	SWITCHGEAR TOOL CABINET (1000x200x1800)	
ROOM 2 - AC/DC ROOM					
+2J01	BATTERY CHARGER 'X' DC DIST. BOARD (600Wx600Dx2200H)	500kg	11	SAFETY BOARD	
+2J02	BATTERY 'X' (1600Wx600Dx2000)	225kg			
+2J03	BATTERY 'Y' (1600Wx600Dx2000)	225kg			
+2J04	BATTERY CHARGER 'Y' DC DIST. BOARD (600Wx600Dx2200H)	500kg			
+2J05	LPS CUBICLE (800Wx800Dx2200H)	500kg			
+2H01	AC DISTRIBUTION BOARD (2250Wx500Dx2100H)	TBA			
ROOM 3 - CONTROL ROOM					

NOTES

- FIBRE OPTIC DUCTING TO BE RUN INSIDE CONTROL ROOM.
- CABLE TRAYS TO RUN INTERNALLY AND EXTERNALLY.
- DOORS TO SWITCH ROOMS TO BE FITTED WITH PANIC BAR.
- FLOOR LOADING OF SWITCHBOARD: 30kPa.
- FLOOR LOADING OF AREAS SUPPORT BATTERY RACK: 35kPa.
- REFER TO TRANSPORTABLE BUILDING DESIGN SPECIFICATION FOR DOOR SIZES.
- FOR EARTHING REQUIREMENTS REFER TO EARTHING DRAWINGS.
- FINAL DIMENSIONS OF EQUIPMENT TO BE CONFIRMED.

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No.	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE
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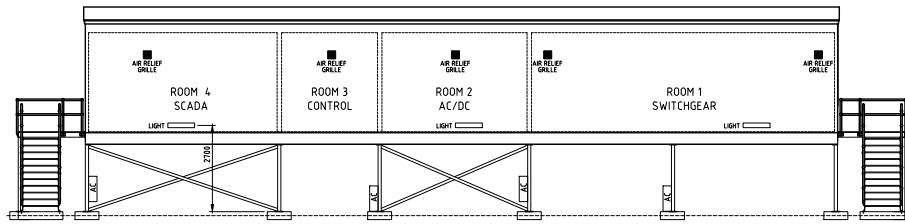


PROJECT
LINCOLN GAP WIND FARM PROJECT

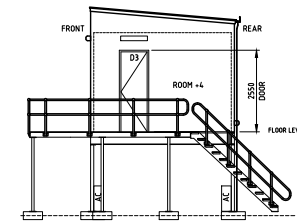
DRAWING TITLE
LINCOLN GAP WIND FARM 275/33kV SUBSTATION CONTROL AND SWITCHROOM BUILDING LAYOUT

DESIGN	DATE	AT SCALE	PROJECT No.
DESIGN	27/10/2017	1:50	10614
APPVD	27/10/2017		

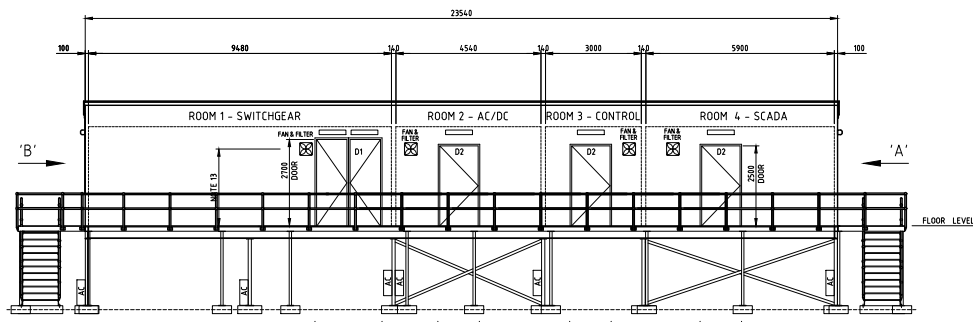
DIMENSIONS IN MILLIMETRES DO NOT SCALE



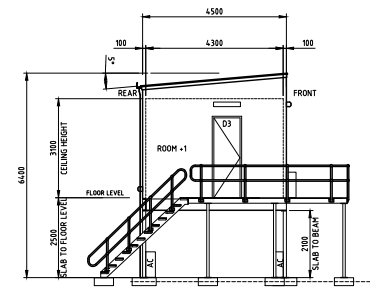
REAR VIEW



END VIEW 'A'



FRONT VIEW



END VIEW 'B'

- NOTES:
- THESE NOTES TO BE READ IN CONJUNCTION WITH CONTROL BUILDING DESIGN SPECIFICATION.
1. ALL DIMENSIONS, LAYOUTS AND SPECIFICATIONS INDICATED ARE NOMINAL.
 2. INTERNAL WALLS SHALL BE ACOUSTICALLY INSULATED, FIRE RATED IN ACCORDANCE WITH THE BUILDING SPECIFICATION.
 3. BUILDING SHALL BE DESIGNED FOR A 25 YEAR DESIGN LIFE.
 4. BUILDING INTRUSION DETECTION SYSTEM SHALL BE PROVIDED. THE SYSTEM SHALL MONITOR THE WHOLE BUILDING INCLUDING DOORS.
 5. AUXILIARY SUPPLIES, COOLING AND HEATING, INTERNAL AND EXTERNAL LIGHTING, POWER, DATA AND TELEPHONE CONNECTIONS SHALL BE PROVIDED.
 6. A KEY SAFE SHALL BE PROVIDED.
 7. THE BUILDING SHALL BE MOUNTED ON A STEEL BASE FRAME AND ELEVATED ABOVE GROUND LEVEL AS SHOWN TO ENABLE CONNECTION OF FIELD CABLES AND SERVICES.
 8. IN ACCORDANCE WITH THE TRANSPORTABLE BUILDING DESIGN SPECIFICATION, THE BUILDING SHALL BE PROVIDED WITH AN APPROVED FIRE ALARM SYSTEM.
 9. ALL DOORS TO BE KEYS ALIKE.
 10. ALL ROOMS TO BE POSITIVELY PRESSURISED AS STATED IN THE TRANSPORTABLE CONTROL BUILDING DESIGN SPECIFICATION.
 11. CEILING HEIGHT TO BE A MINIMUM 3000mm.
 12. ALL FOOTINGS SHALL BE CAST IN MATERIAL WITH A MINIMUM ALLOWABLE BEARING CAPACITY OF 100kPa.
 13. OUTLET VENTS TO BE AS CLOSE TO THE ROOF AS PRACTICABLE.
 14. BUILDING SUPPORT AND LANDING SUPPORT LEG LOCATIONS ARE SUBJECT TO CHANGE BASED ON FINAL MANUFACTURER'S DRAWINGS.
 15. FOOTING LOCATIONS AND TYPES ARE PRELIMINARY ONLY AND SUBJECT TO CHANGE.

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No.	DESCRIPTION	DRAWN	CHECK	APPROVED	DATE
1	ISSUED FOR CONSTRUCTION	NEB	PM	LDP	27/10/2017
2	ISSUED FOR REVIEW	NEB	PM	LDP	27/10/2017
3	ISSUED FOR REVIEW	NEB	PM	LDP	27/10/2017
4	ISSUED FOR REVIEW	NEB	PM	LDP	27/10/2017



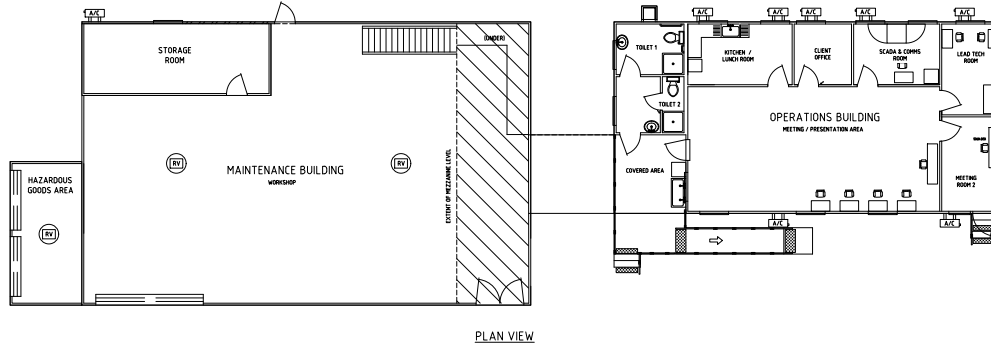
PROJECT
LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
LINCOLN GAP WIND FARM 275/33kV SUBSTATION CONTROL AND SWITCHROOM BUILDING ELEVATIONS

DRAWN	NEB	27/10/2017	AT SCALE	PROJECT No.
DESIGN	PM	27/10/2017	1:75	10614
APPVD	LDP	27/10/2017	DWG No.	LGWF-EL-DR-4102
			SHEET No.	1 OF 1
			REV	0

DIMENSIONS IN MILLIMETRES DO NOT SCALE

APPENDIX E: EXAMPLE OPERATIONS AND MAINTENANCE BUILDING DESIGN



GENERAL

- ALL MATERIALS AND WORKMANSHIP TO COMPLY WITH THE RELEVANT SAA CODES AND APPLICABLE BUILDING REGULATIONS.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER CLIENT'S DRAWINGS AND CONSULTANT'S DRAWINGS & SPECIFICATIONS. ALL DIMENSIONS ARE IN MILLIMETRES. DO NOT SCALE THESE DRAWINGS. DIMENSIONS MAY VARY FROM THIS DRAWING. IT IS THE BUILDERS RESPONSIBILITY TO VERIFY ALL DIMENSIONS SETTING OUT DIMENSIONS SHALL BE TAKEN FROM THE SUPPLIER'S DRAWINGS.
- EXIT DOORS ARE TO BE PROVIDED WITH SINGLE DOWNWARD ACTION 'D' TYPE LEVERS ON A SINGLE DEVICE MOUNTED BETWEEN 900-1000mm ABOVE F.F.L., OPERABLE FROM FROM INSIDE WITHOUT THE USE OF A KEY.
- THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION DURING ERECTION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY ROOF AND/OR WALL BRACING MAY BE REQUIRED DURING CONSTRUCTION.
- ALL WINDOWS TO BE DOUBLE GLAZED.
- POWER SUPPLY TO WORKSHOP SHALL BE RUN IN A DESIGNATED CONDUIT AND SHALL NOT BE SHARED WITH ANY OTHER SERVICES.

STRUCTURAL STEEL

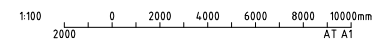
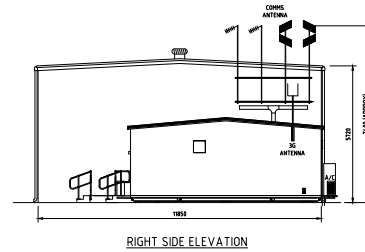
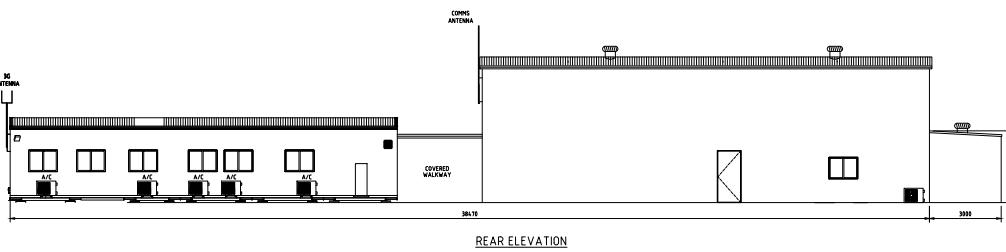
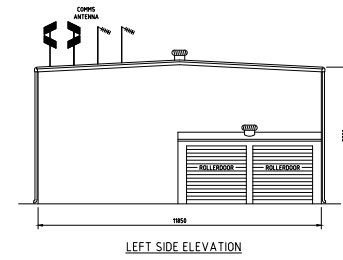
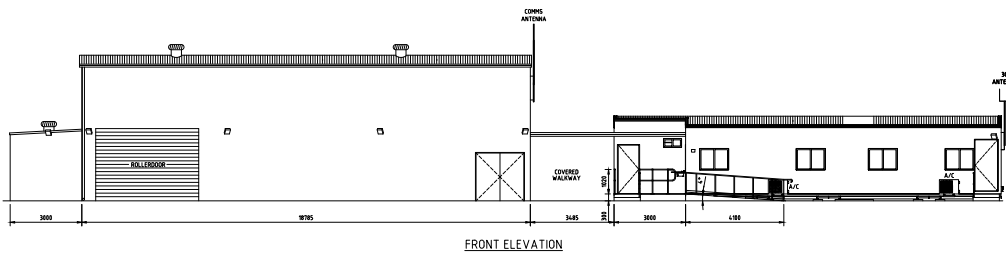
- ALL STEELWORK TO COMPLY WITH AS 4100 STEEL STRUCTURES CODE AND AS/NZS 4680 COLD-FORMED STEEL STRUCTURES CODE
- ALL STEEL FRAMING SHALL BE MANUFACTURED FROM HI-TENSILE HOT DIP-ZINC COATED STEEL (G450 - G550) CONFORMING TO AS 1097 UNO. AND INSTALLED TO MANUFACTURER'S INSTRUCTIONS.
- ALL BOLTS SHALL BE M12 8.8/5 UNO.
- ALL TEK SCREWS SHALL BE No 12 - 14x20 UNO.
- MEZZANINE LEVEL TO BE A MINIMUM OF 3m ABOVE F.F.L.

CLADDING

- ALL ROOF AND WALL CLADDING TO BE INSTALLED IN ACCORDANCE WITH AS 1562 AND THE MANUFACTURER'S INSTRUCTIONS.
- COLOUR OF ROOF AND WALLS TO BE ADVISED.

LEGEND

- ⊙ ROTARY VENT IN ROOF
- ☐ 150w HPS FLOOD LIGHT, MOUNTED AT 2.8m FROM FFL.



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No.	ISSUED FOR REVIEW	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE
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2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						



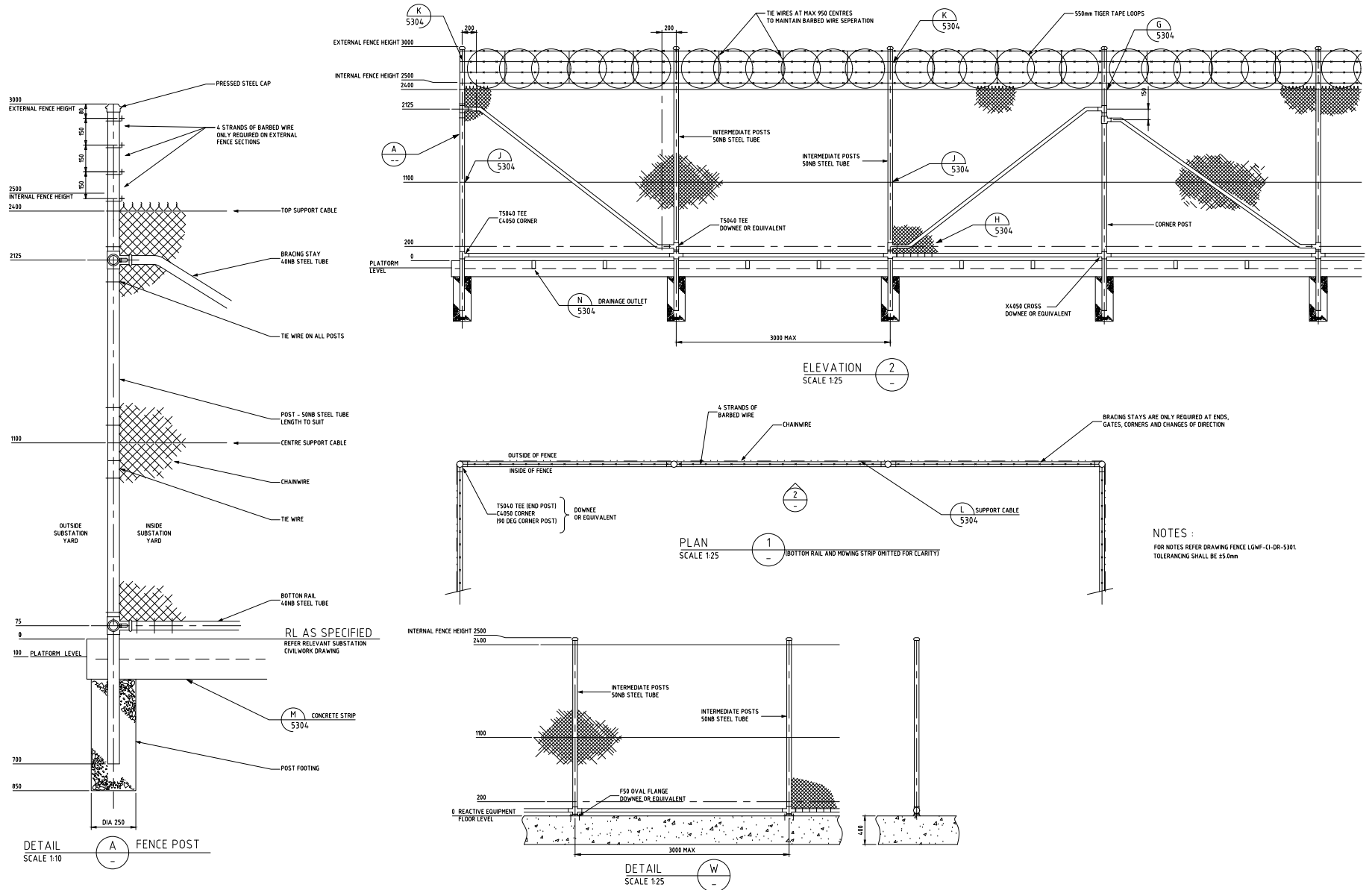
LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
LINCOLN GAP WIND FARM 275/33kV SUBSTATION
O & M BUILDING ELEVATIONS

DRAWN	DESIGN	APPRVD	DATE	AT SCALE	PROJECT No.	DRAWING No.	SHEET No.	REV
N.BUDNIKOVA	N.BUDNIKOVA	D.BELEGRIS	14/03/2018	1:100	16614	LGWF-ST-DR-6204	A1	B-01
					1 OF 1			

DIMENSIONS IN MILLIMETRES DO NOT SCALE

APPENDIX F: FENCE DETAILS



NOTES:
FOR NOTES REFER DRAWING FENCE LGWF-CI-DR-5301
TOLERANCING SHALL BE ±5.0mm

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REVISIONS					
No	DESCRIPTION	DRAWN	CHKD	APPROVD	DATE
1	ISSUED FOR CONSTRUCTION	NEB	PH	LDP	16/01/18
2	ISSUED FOR REVIEW	NEB	PH	LDP	16/02/18



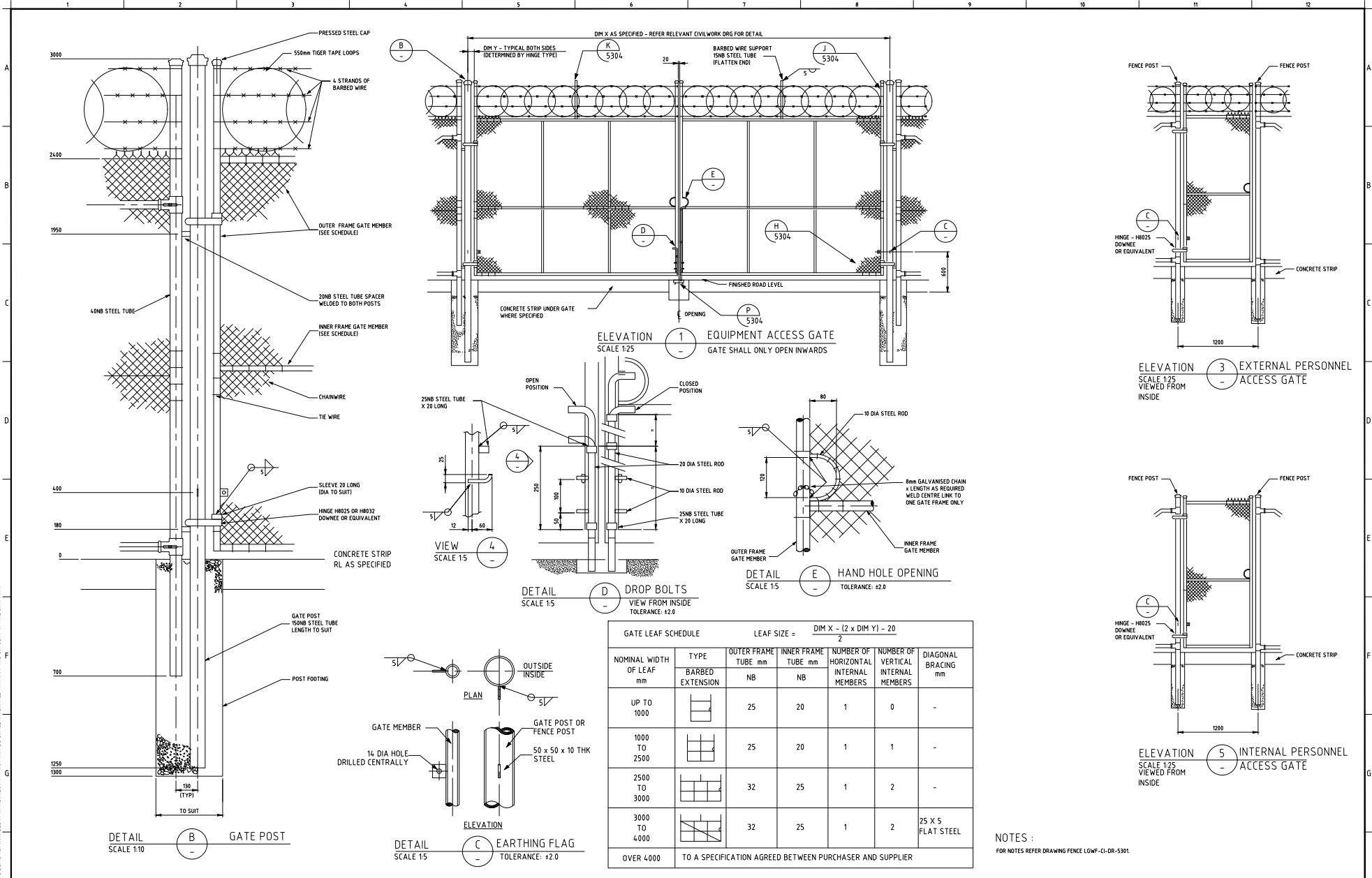
PROJECT
LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
LINCOLN GAP WIND FARM 275/33kV SUBSTATION FENCING DETAILS

DRAWN	NEB	07/02/2018	AS SCALE AS SHOWN	PROJECT No. 10014
DESIGN	PM	14/02/2018	DRAWING No. LGWF-CI-DR-5302	
APPVD	LDP	16/02/2018		
			A1	SHEET No. 1 OF 1
				REV 0

DIMENSIONS IN MILLIMETRES DO NOT SCALE

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NOTES:
FOR NOTES REFER DRAWING FENCE LGWF-CI-DR-5301.

No	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE
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2	ISSUED FOR REVIEW	NEB	PH	LDP	16/02/18

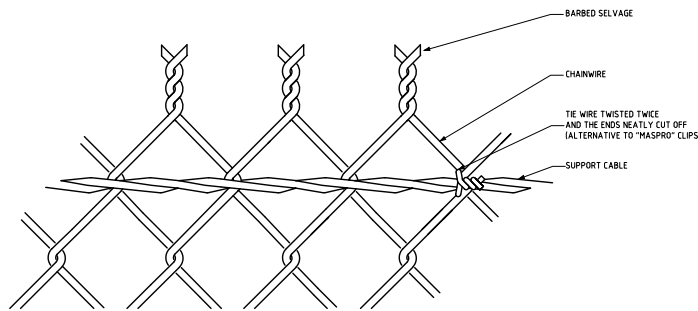


LINCOLN GAP WIND FARM PROJECT

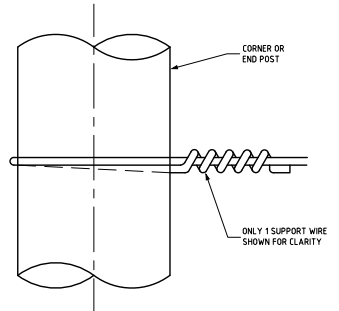
DRAWING TITLE: LINCOLN GAP WIND FARM 275/33kV SUBSTATION FENCING DETAILS

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DRAWING No: LGWF-CI-DR-5303					SHEET No: 1 OF 1

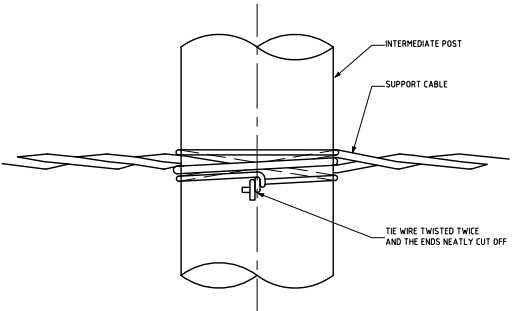
DIMENSIONS IN MILLIMETRES DO NOT SCALE



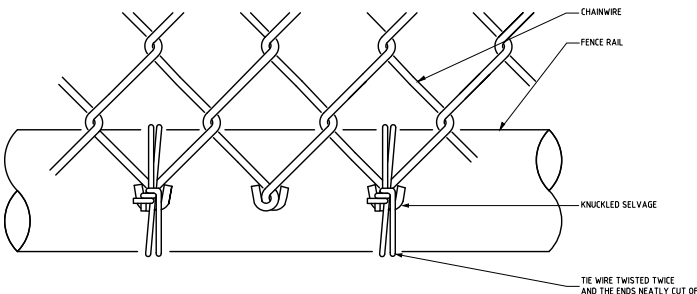
DETAIL SCALE 1:1
G 5302
VIEWED FROM INSIDE



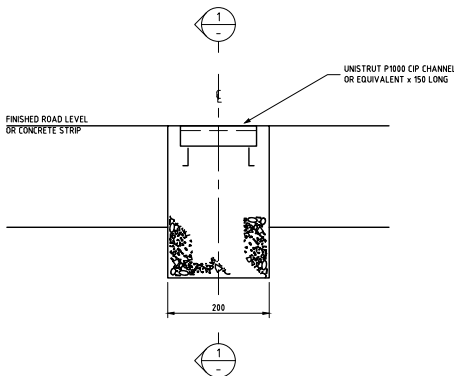
DETAIL SCALE 1:1
J SUPPORT WIRE END
5302,5303 (ALSO TYPICAL FOR BARBED WIRE)



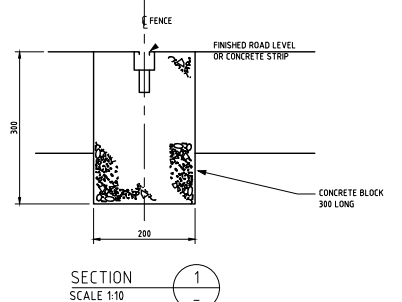
DETAIL SCALE 1:1
K SUPPORT CABLE RUN
5302,5303 (TYPICALLY FOR BARBED WIRE)



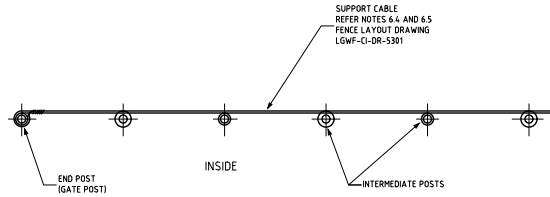
DETAIL SCALE 1:1
H BOTTOM SELVAGE
5302,5303
VIEWED FROM INSIDE



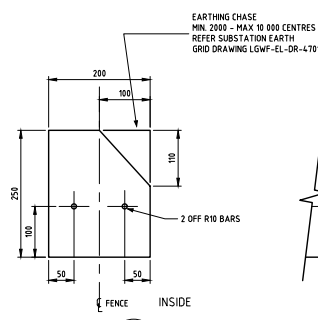
DETAIL SCALE 1:5
P DROP BOLT KEEPER
5303



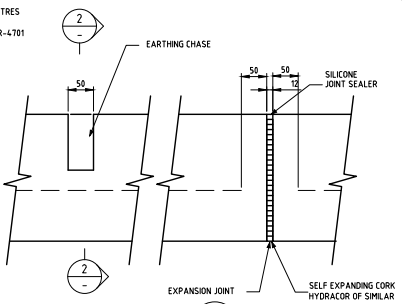
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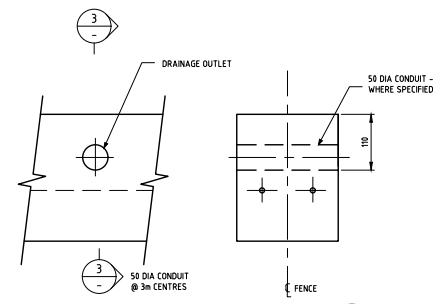
DETAIL SCALE 1:25
L SUPPORT CABLE INSTALLATION
5302



SECTION SCALE 1:5
2



ELEVATION SCALE 1:5
1



SECTION SCALE 1:5
3

DETAIL SCALE 1:5
M CONCRETE STRIP
5302

NOTES:
FOR NOTES REFER DRAWING FENCE LGWF-CI-DR-5301

DETAIL SCALE 1:5
N DRAINAGE OUTLET
5302

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2	ISSUED FOR REVIEW	NEB	PH	LDP	16/02/18



LINCOLN GAP WIND FARM PROJECT

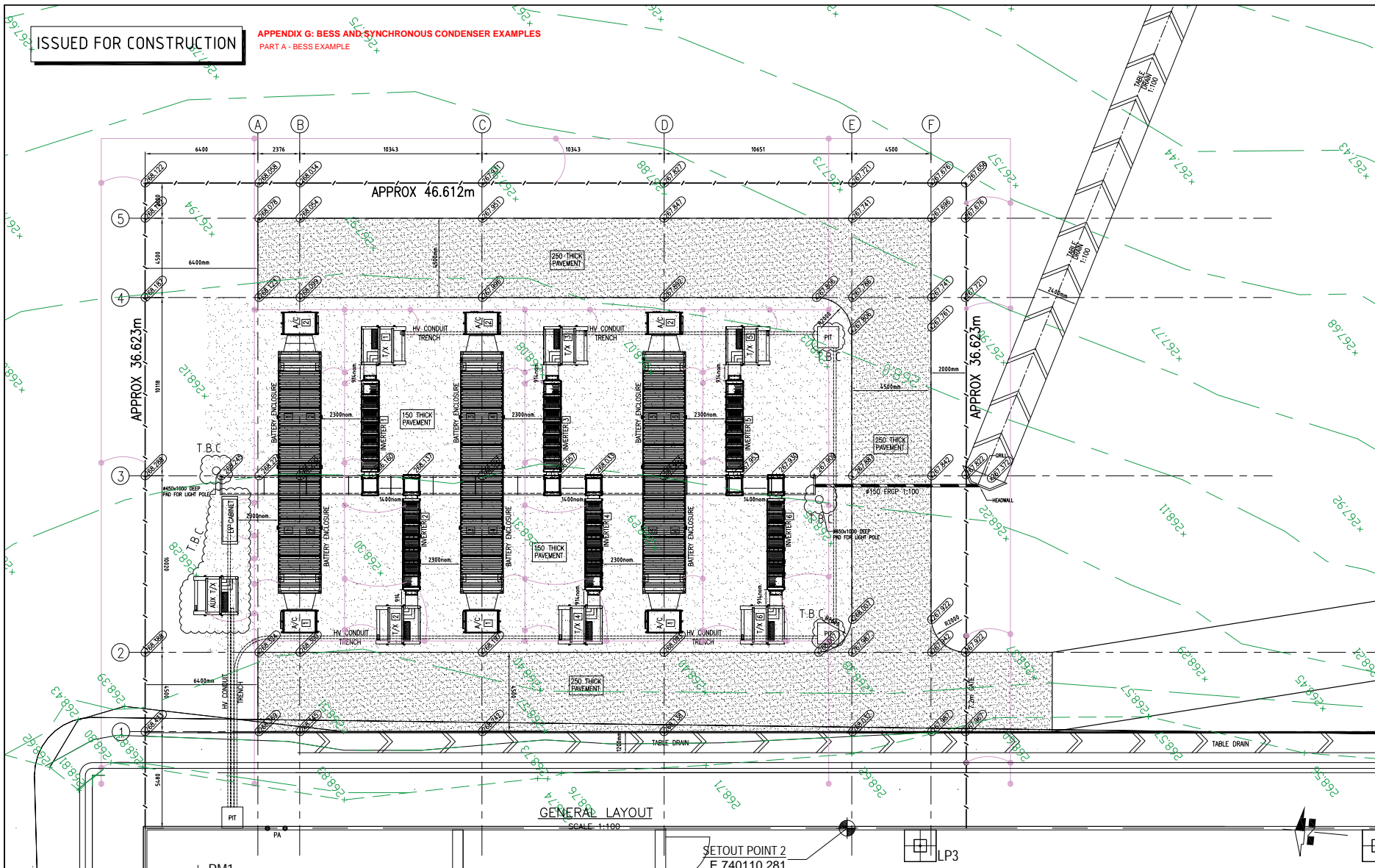
DRAWING TITLE
LINCOLN GAP WIND FARM 275/33KV SUBSTATION
FENCING
DETAILS

DRAWN	NEB	07/02/2018	AT SCALE	PROJECT No.	18014
DESIGN	PM	14/02/2018	AS SHOWN	DRAWING No.	LGWF-CI-DR-5304
APPROV	LDP	16/02/2018	AS SHOWN	SHEET No.	1 OF 1
				REV	0

DIMENSIONS IN MILLIMETRES DO NOT SCALE

ISSUED FOR CONSTRUCTION

APPENDIX G: BESS AND SYNCHRONOUS CONDENSER EXAMPLES
PART A - BESS EXAMPLE



GENERAL LAYOUT
SCALE: 1:100

SETOUT POINT 2
E 740110.281

PROJECT:
BATTERY ENERGY STORAGE SYSTEM
LINCOLN GAP WIND FARM
SOUTH AUSTRALIA

TITLE:
GENERAL LAYOUT

CLIENT:
FLUENCE ENERGY PTY LTD

REV.	DATE	AMENDMENT	REV.	DATE	AMENDMENT
D	17/10/18	FIRST ISSUE			
A	24/10/18	REVISIONS			
B	30/10/18	REVISIONS			
C	23/11/18	REVISIONS			
D	04/12/18	ISSUED FOR CONSTRUCTION			

DATE:	04/12/18
DRAWN:	JT
DESIGNED:	RN
CHECKED:	RN
SCALE: @ A1	1:100



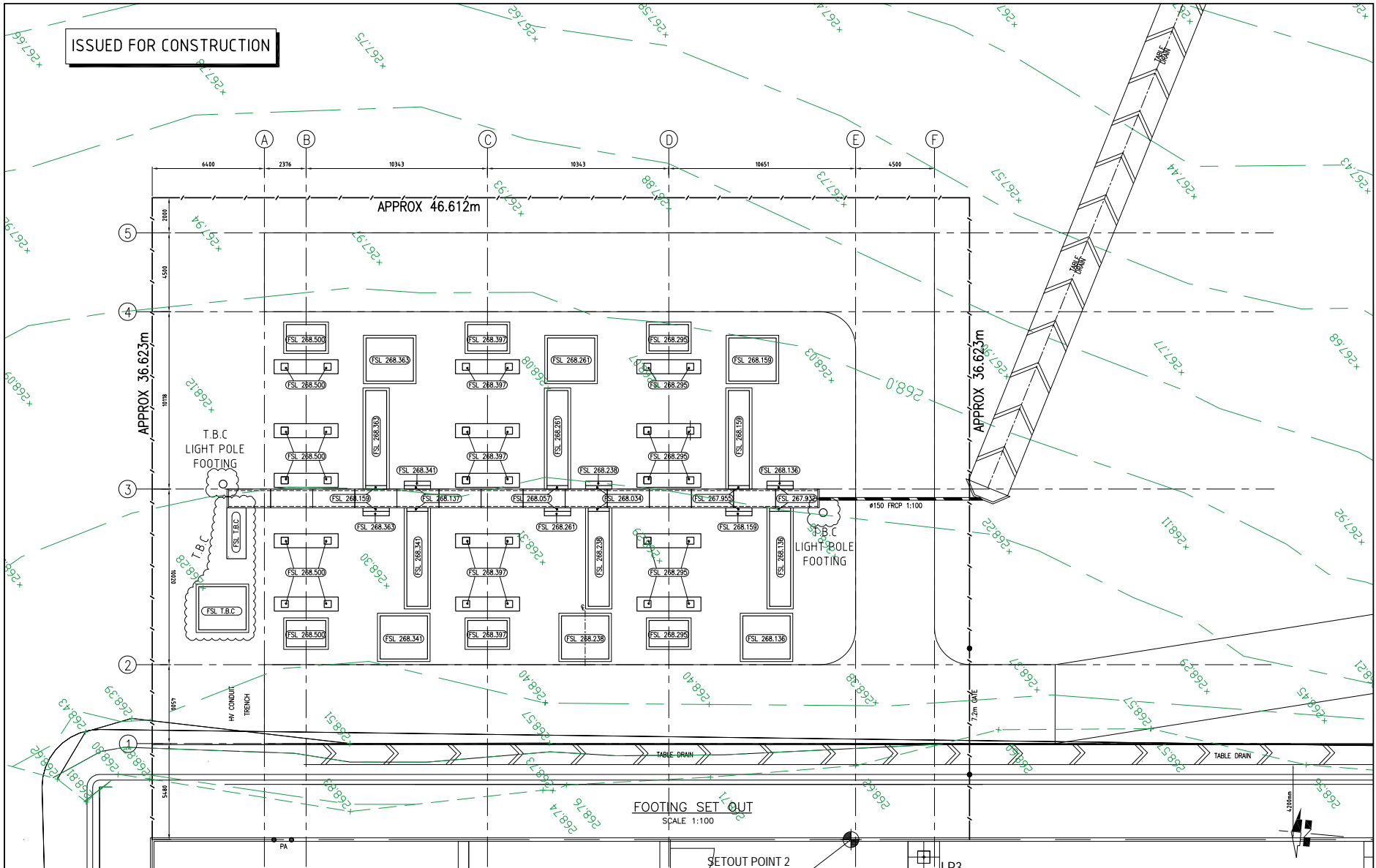
 Consulting Structural & Geotechnical Engineers
 20 Sydney Road
 Bayswater, Vic. 3153
 P.O. Box 301
 Box Hill, Vic. 3128
 ph. 9780 4566
 fax. 9780 4867
 email.office@tgaengineers.com

JOB No. 18200

DRAWING No. S2

REVISION: D

ISSUED FOR CONSTRUCTION



FOOTING SET OUT
SCALE 1:100

SETOUT POINT 2

LP3

PROJECT:
BATTERY ENERGY STORAGE SYSTEM
LINCOLN GAP WIND FARM
SOUTH AUSTRALIA

TITLE:
FOOTING SET OUT

CLIENT:
FLUENCE ENERGY PTY LTD

REV.	DATE	AMENDMENT	REV.	DATE	AMENDMENT
D	17/10/18	FIRST ISSUE			
A	24/10/18	REVISIONS			
B	30/10/18	REVISIONS			
C	23/11/18	REVISIONS			
D	04/12/18	ISSUED FOR CONSTRUCTION			

DATE: 04/12/18

DRAWN: JT

DESIGNED: RN

CHECKED: RN

SCALE: @ A1 1:100

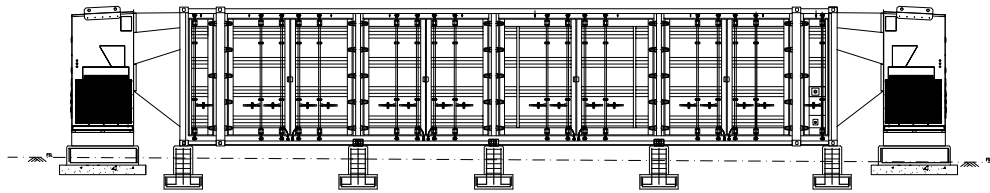
Consulting Structural & Geotechnical Engineers

20 Sydney Road
Bayswater, Vic. 3153
P.O. Box 301
Box Hill, Vic. 3128
ph. 9780 4566
fax. 9780 4867
email.office@tgaengineers.com

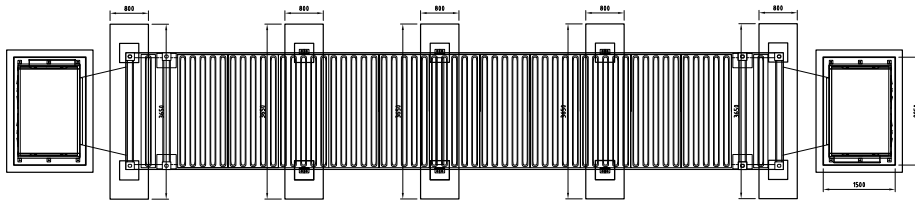
JOB No. 18200

DRAWING No. S3

REVISION: D

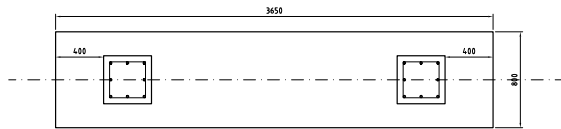


BATTERY/AC FOOTING DETAILS
SCALE 1:50

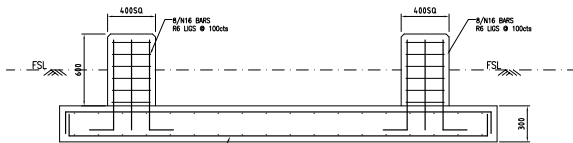


BATTERY/AC FOOTING PLAN
SCALE 1:50

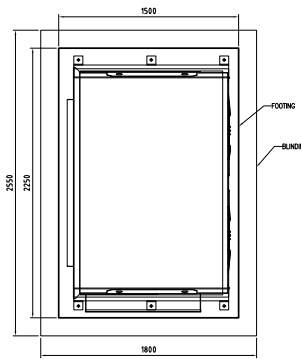
ISSUED FOR CONSTRUCTION



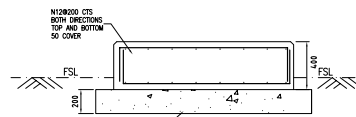
BATTERY FOOTING PLAN
SCALE 1:20



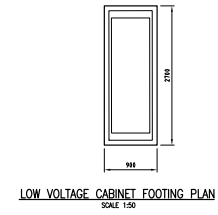
BATTERY FOOTING DETAILS
SCALE 1:20



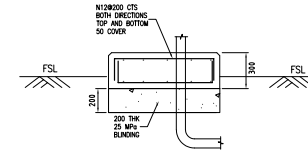
A/C FOOTING PLAN
SCALE 1:20



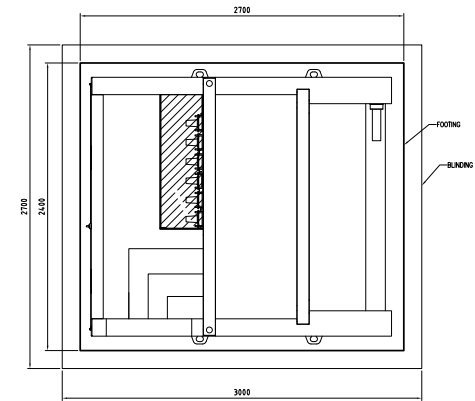
A/C FOOTING DETAILS
SCALE 1:20



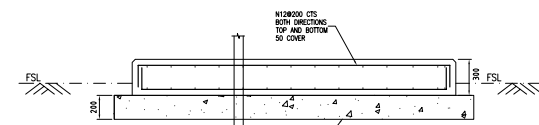
LOW VOLTAGE CABINET FOOTING PLAN
SCALE 1:50



LOW VOLTAGE CABINET FOOTING DETAILS
SCALE 1:20



TRANSFORMER FOOTING PLAN
SCALE 1:50



TRANSFORMER FOOTING DETAILS
SCALE 1:20

PROJECT.
BATTERY ENERGY STORAGE SYSTEM
LINCOLN GAP WIND FARM
SOUTH AUSTRALIA

TITLE.
FOOTING DETAILS
CLIENT
FLUENCE ENERGY PTY LTD

REV.	DATE	AMENDMENT	REV.	DATE	AMENDMENT
D	17/10/18	FIRST ISSUE			
A	24/10/18	REVISIONS			
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D	04/12/18	ISSUED FOR CONSTRUCTION			

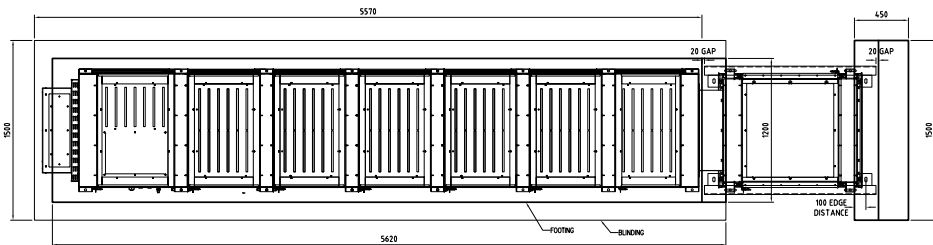
DATE.	04/12/18
DRAWN.	JT
DESIGNED.	RN
CHECKED.	RN
SCALE. @ A1	1:100



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Geotechnical Engineers
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DRAWING No. S5
REVISION. D

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INVERTER FOOTING PLAN
SCALE 1:20

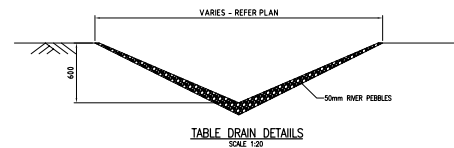
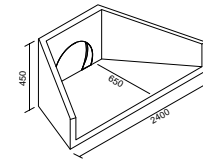
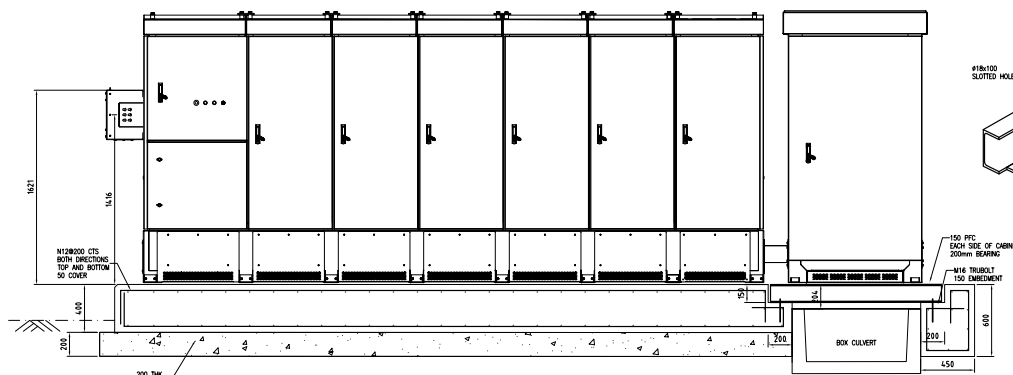


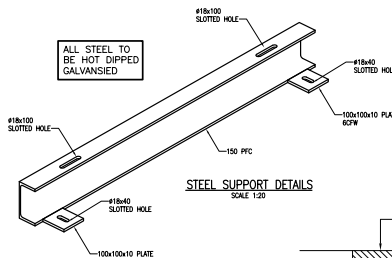
TABLE DRAIN DETAILS
SCALE 1:20



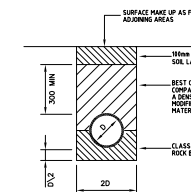
HEADWALL DETAIL



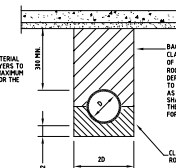
INVERTER FOOTING DETAILS
SCALE 1:20



STEEL SUPPORT DETAILS
SCALE 1:20



UNDER LANDSCAPED AREAS

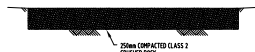


UNDER FLEXIBLE PAVEMENT

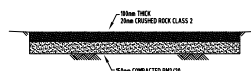
PIPE LAYING DETAILS



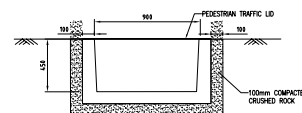
150THICK LIGHT TRAFFIC ROADWAY



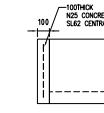
250THICK HEAVY VEHICLE ROADWAY



ACCESS ROADWAY DETAILS



TYPICAL INVERTED CULVERT DETAILS
SCALE 1:20



CULVERT END WALL DETAIL
SCALE 1:20

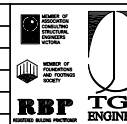
PROJECT:
BATTERY ENERGY STORAGE SYSTEM
LINCOLN GAP WIND FARM
SOUTH AUSTRALIA

TITLE:
FOOTING AND DRAINAGE DETAILS

CLIENT:
FLUENCE ENERGY PTY LTD

REV.	DATE	AMENDMENT	REV.	DATE	AMENDMENT
D	17/10/18	FIRST ISSUE			
A	24/10/18	REVISIONS			
B	30/10/18	REVISIONS			
C	23/11/18	REVISIONS			
D	04/12/18	ISSUED FOR CONSTRUCTION			

DATE: 04/12/18
DRAWN: JT
DESIGNED: RN
CHECKED: RN
SCALE: A1 1:100



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ph. 9780 4866
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JOB No. 18200
DRAWING No. S6
REVISION: D

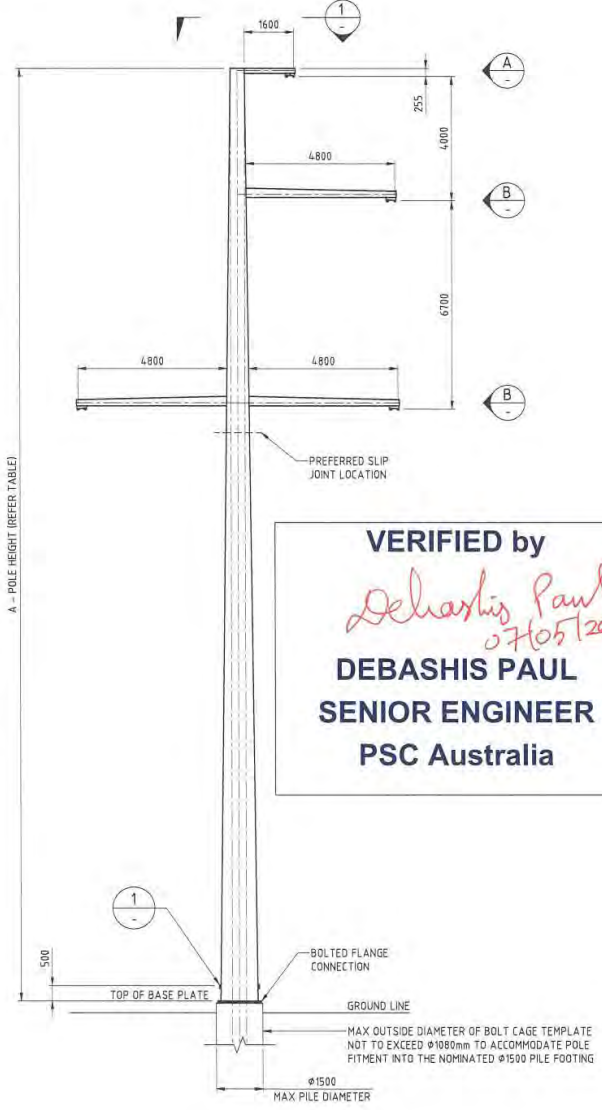


APPENDIX G: BESS AND SYNCHRONOUS CONDENSER EXAMPLES

PART B - SYNCHRONOUS CONDENSER EXAMPLE

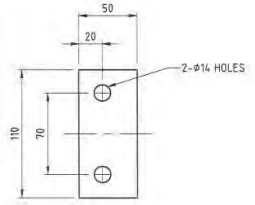
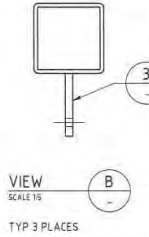
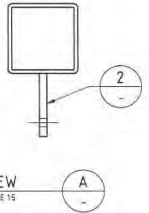
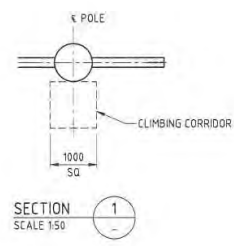


APPENDIX B: EXAMPLE TRANSMISSION LINE AND POLE DESIGN

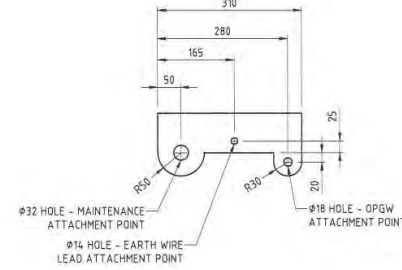


VERIFIED by
Debashis Paul
 07/05/2018
DEBASHIS PAUL
SENIOR ENGINEER
PSC Australia

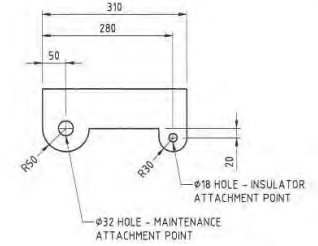
POLES T1 & T2 - SC SUSPENSION POLE - ELEVATION



DETAIL 1 EARTH PLATE
 MATL: 6 PL
 2 OFF REQD



DETAIL 2 OPGW ATTACHMENT PLATE
 MATL: 16 PL
 1 OFF REQD



DETAIL 3 INSULATOR ATTACHMENT PLATE
 MATL: 16 PL
 3 OFF REQD

- NOTES:
- ALL DIMENSIONS IN MILLIMETRES (mm) UNO
 - ALL DIMENSIONS ARE TO CONDUCTOR ATTACHMENT POINTS
 - PHASE CONDUCTOR LINE HARDWARE FITTINGS AND EARTHWIRE HARDWARE FITTINGS TO AS1154.1
 - POLE DIAMETER AT GROUND LEVEL AND TOP DIAMETER TO BE SUBMITTED BY POLE DESIGNER TO CPP FOR APPROVAL
 - POLE AND ALL COMPONENTS TO BE HOT DIP GALVANIZED ON INTERNAL AND EXTERNAL FACES TO AS/NZS 4680 AND AS/NZS 4792
 - THE ATTACHMENT DETAILS ARE FOR GUIDANCE TO THE POLE DESIGNER WHO MAY DECIDE FOR MANUFACTURING AND STRENGTH REASONS TO PROPOSE ALTERNATIVES.
 - ALL POLE SECTION CONNECTIONS TO BE SLIP JOINTS.
 - FOR POLES WHICH ARE SUPPLIED IN MULTIPLE SECTIONS AND UTILIZE SLIP JOINTS, JACKING FORCES AND MINIMUM/MAXIMUM OVERLAP SHALL BE SPECIFIED. JACKING CLEATS SHALL BE PROVIDED ON EACH SECTION.
 - POLE SLIP JOINTS BETWEEN THE TOP OF THE POLE AND BOTTOM CONDUCTOR ATTACHMENT LEVEL SHOULD BE AVOIDED IF POSSIBLE. IF UNAVOIDABLE, ADDITIONAL TOLERANCE IN THE SLIP JOINT MAY BE REQUIRED TO ENSURE THE PHASE SEPARATION IS NOT COMPROMISED.
 - STRUCTURE MATERIAL SHALL HAVE MINIMUM IMPACT PROPERTIES AS SPECIFIED IN AS/NZS 3679.1 OR AS3678, DEPENDING ON STEEL GRADE, FOR THE REQUIRED TESTING TEMPERATURE OF -20°C. TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS1544.2
 - FOR DESIGN AND MANUFACTURE OF STEEL POLES, CROSSARMS, FASTENERS AND HOLD DOWN BOLTS REFER TO CPP POLE DESIGN AND FABRICATION SPECIFICATION - LGWF-EL-PP-9023
 - ALL SUSPENSION INSULATOR ATTACHMENT POINTS AND CORRESPONDING MAINTENANCE POINTS TO BE RATED TO BREAKING STRENGTH OF INSULATOR ASSEMBLY (70kN).
 - ALL OPGW ATTACHMENT POINTS AND CORRESPONDING MAINTENANCE POINTS TO BE RATED TO BREAKING STRENGTH OF OPGW ASSEMBLY (70kN).
 - PERSONNEL ACCESS ON THE STEEL POLE SHALL BE PROVIDED USING STEP BOLTS STARTING AT 5m ABOVE GROUND LEVEL. FALL ARREST LOOP SHALL BE DESIGNED IN ACCORDANCE WITH AS7000.2010 AND SHALL BE PROVIDED STARTING AT 5m ABOVE THE GROUND AND BE POSITIONED TO ENABLE PERSONNEL TO ATTACH TO THOSE POINTS AT ALL TIMES WHILST ON THE STRUCTURE.
 - NO ACCESS ALLOWED ON THE CROSS ARMS.
 - POLE TO BE FITTED WITH BIRD ANTI-NESTING PROTECTION - PARTICULARLY AT CROSS ARM OPENINGS

REFERENCE DRAWINGS			
POLE TYPE	A - POLE HEIGHT	DESCRIPTION	DRAWING No
T1	27m	STRUCTURE LOAD TREE - POLE T1 - SC SUSPENSION POLE	LGWF-OH-DR-7400
T2	30m	STRUCTURE LOAD TREE - POLE T2 - SC SUSPENSION POLE	LGWF-OH-DR-7401

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No	DESCRIPTION	DRAWN	CHECK	APPROVED	DATE
1	ISSUED FOR CONSTRUCTION	VL	NR	DR	26/03/2018
2	ISSUED FOR REVIEW	VL	NR	FS	20/02/2018
3	ISSUED FOR REVIEW	VL	NR	FS	09/01/2018



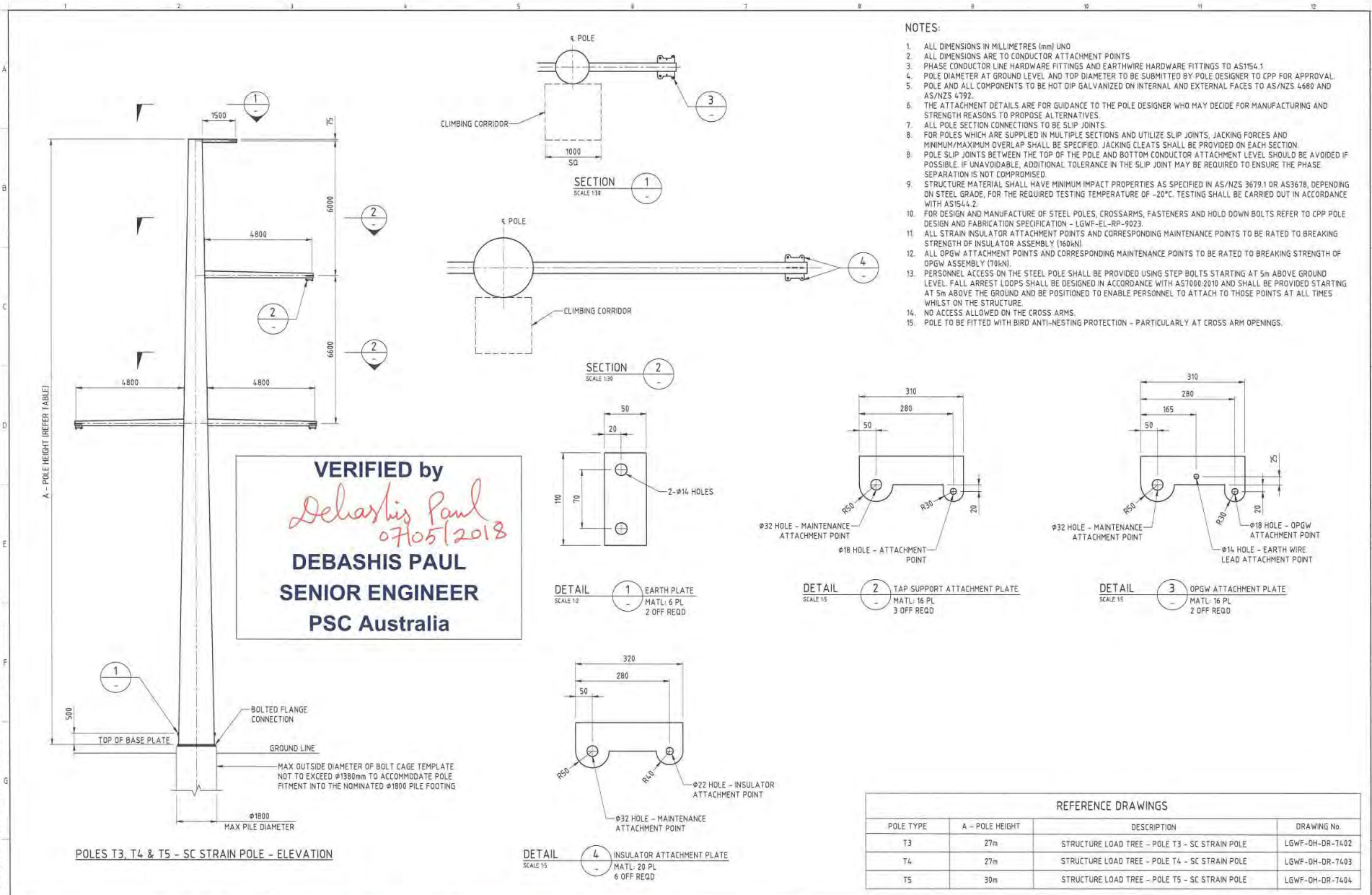
LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
 275KV OVERHEAD LINE DESIGN SET OUT
 POLES T1 & T2 - SC SUSPENSION POLE

DRAWN	V.DE.LEO	08/01/2018	AT SCALE	PROJECT No
DESIGN	N.BRYKSN	08/01/2018	1:75 UNO	10614
APPVD	F.SALANDRA	08/01/2018	DRAWING No	LGWF-OH-DR-7300
			SHEET No	A1
			REV	0

DIMENSIONS IN MILLIMETRES DO NOT SCALE

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- NOTES:**
1. ALL DIMENSIONS IN MILLIMETRES (mm) UNO
 2. ALL DIMENSIONS ARE TO CONDUCTOR ATTACHMENT POINTS
 3. PHASE CONDUCTOR LINE HARDWARE FITTINGS AND EARTHWIRE HARDWARE FITTINGS TO AS156.1
 4. POLE DIAMETER AT GROUND LEVEL AND TOP DIAMETER TO BE SUBMITTED BY POLE DESIGNER TO CPP FOR APPROVAL
 5. POLE AND ALL COMPONENTS TO BE HOT DIP GALVANIZED ON INTERNAL AND EXTERNAL FACES TO AS/NZS 4680 AND AS/NZS 4792.
 6. THE ATTACHMENT DETAILS ARE FOR GUIDANCE TO THE POLE DESIGNER WHO MAY DECIDE FOR MANUFACTURING AND STRENGTH REASONS TO PROPOSE ALTERNATIVES
 7. ALL POLE SECTION CONNECTIONS TO BE SLIP JOINTS.
 8. FOR POLES WHICH ARE SUPPLIED IN MULTIPLE SECTIONS AND UTILIZE SLIP JOINTS, JACKING FORCES AND MINIMUM/MAXIMUM OVERLAP SHALL BE SPECIFIED. JACKING CLEATS SHALL BE PROVIDED ON EACH SECTION.
 8. POLE SLIP JOINTS BETWEEN THE TOP OF THE POLE AND BOTTOM CONDUCTOR ATTACHMENT LEVEL SHOULD BE AVOIDED IF POSSIBLE. IF UNAVOIDABLE, ADDITIONAL TOLERANCE IN THE SLIP JOINT MAY BE REQUIRED TO ENSURE THE PHASE SEPARATION IS NOT COMPROMISED.
 9. STRUCTURE MATERIAL SHALL HAVE MINIMUM IMPACT PROPERTIES AS SPECIFIED IN AS/NZS 3679.1 OR AS3678, DEPENDING ON STEEL GRADE, FOR THE REQUIRED TESTING TEMPERATURE OF -20°C. TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS1544.2.
 10. FOR DESIGN AND MANUFACTURE OF STEEL POLES, CROSSARMS, FASTENERS AND HOLD DOWN BOLTS REFER TO CPP POLE DESIGN AND FABRICATION SPECIFICATION - LGWF-EL-RP-9023.
 11. ALL STRAIN INSULATOR ATTACHMENT POINTS AND CORRESPONDING MAINTENANCE POINTS TO BE RATED TO BREAKING STRENGTH OF INSULATOR ASSEMBLY (160kN)
 12. ALL OPGW ATTACHMENT POINTS AND CORRESPONDING MAINTENANCE POINTS TO BE RATED TO BREAKING STRENGTH OF OPGW ASSEMBLY (70kN).
 13. PERSONNEL ACCESS ON THE STEEL POLE SHALL BE PROVIDED USING STEP BOLTS STARTING AT 5m ABOVE GROUND LEVEL. FALL ARREST LOOPS SHALL BE DESIGNED IN ACCORDANCE WITH AS7000.2010 AND SHALL BE PROVIDED STARTING AT 5m ABOVE THE GROUND AND BE POSITIONED TO ENABLE PERSONNEL TO ATTACH TO THOSE POINTS AT ALL TIMES WHILE ON THE STRUCTURE.
 14. NO ACCESS ALLOWED ON THE CROSS ARMS.
 15. POLE TO BE FITTED WITH BIRD ANTI-NESTING PROTECTION - PARTICULARLY AT CROSS ARM OPENINGS.

REFERENCE DRAWINGS			
POLE TYPE	A - POLE HEIGHT	DESCRIPTION	DRAWING No.
T3	27m	STRUCTURE LOAD TREE - POLE T3 - SC STRAIN POLE	LGWF-OH-DR-7402
T4	27m	STRUCTURE LOAD TREE - POLE T4 - SC STRAIN POLE	LGWF-OH-DR-7403
T5	30m	STRUCTURE LOAD TREE - POLE T5 - SC STRAIN POLE	LGWF-OH-DR-7404

No.	DESCRIPTION	DRAWN	CHKD	APPROVD	DATE
1	ISSUE FOR CONSTRUCTION	YSL	NB	DD	24/03/2014
2	ISSUE FOR REVIEW	YSL	NB	FS	28/01/2018
3	ISSUE FOR REVIEW	YSL	NB	FS	08/02/2018



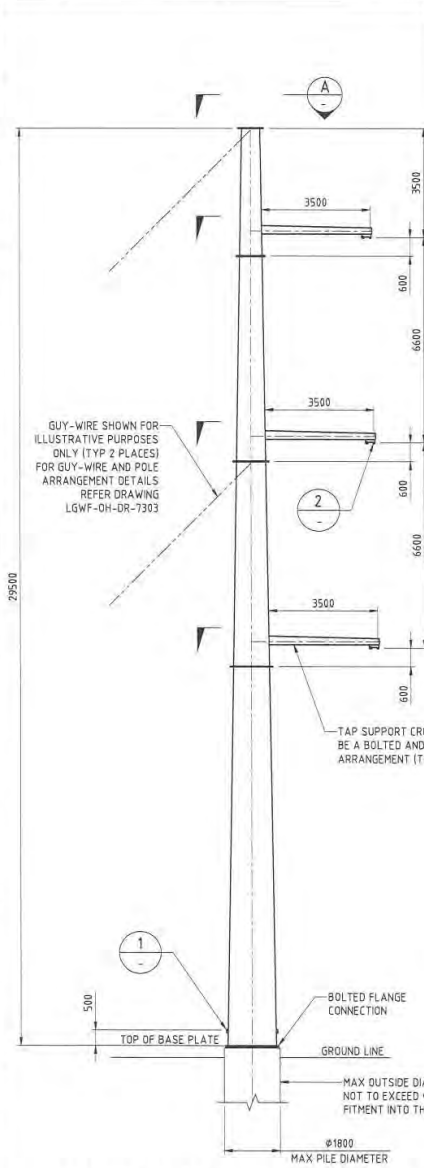
PROJECT
 LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
 275KV OVERHEAD LINE DESIGN SET OUT
 POLES T3, T4 & T5 - SC STRAIN POLE

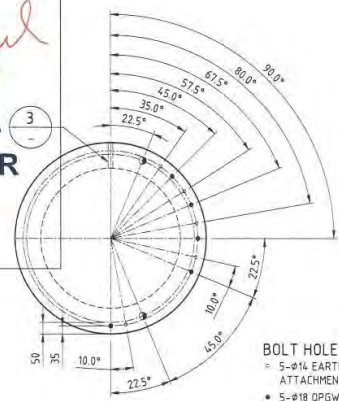
DRAWN	V DE LEO	08/01/2018	A1 SCALE 1:75 UNO	PROJECT No. 10614
DESIGN	N BRYKSN	08/01/2018	DRAWING No. LGWF-OH-DR-7301	
APPROV	F SALANDRA	08/01/2018	SHEET No. A1	REV 0

DIMENSIONS IN MILLIMETRES DO NOT SCALE

VERIFIED by
Debashis Paul
 07/05/2018
DEBASHIS PAUL
SENIOR ENGINEER
PSC Australia

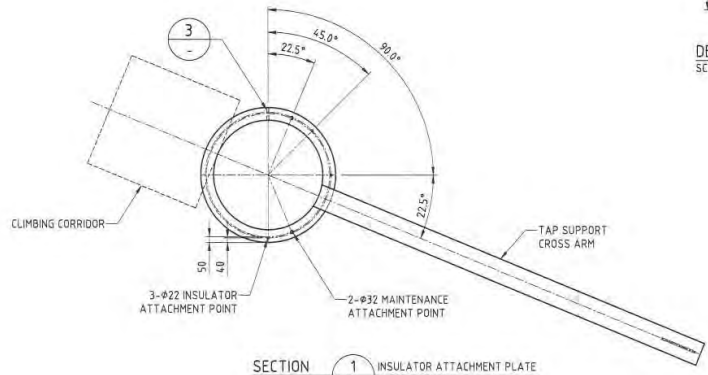


POLES T6 - SC VERTICAL TERMINAL POLE - ELEVATION
 ARRANGEMENT FOR 45° LINE DEVIATION SHOWN



BOLT HOLE LEGEND
 ○ 5-φ14 EARTH LEAD ATTACHMENT POINT
 ● 5-φ18 OPGW ATTACHMENT POINT
 ⊙ 2-φ32 MAINTENANCE ATTACHMENT POINT

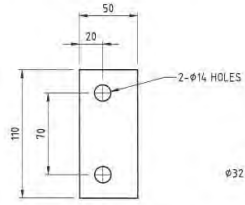
VIEW A
 OPGW ATTACHMENT PLATE
 SCALE 1/10
 MATL: 16 PL
 1 OFF REQD



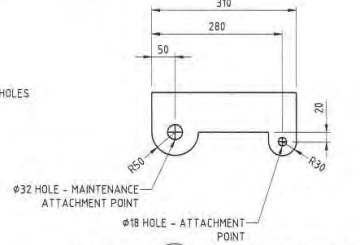
SECTION 1
 INSULATOR ATTACHMENT PLATE
 SCALE 1/10
 MATL: 20 PL
 3 OFF REQD

NOTES:

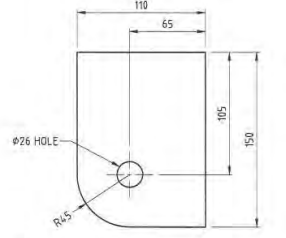
1. ALL DIMENSIONS IN MILLIMETRES (mm) UNL
2. ALL DIMENSIONS ARE TO CONDUCTOR ATTACHMENT POINTS
3. PHASE CONDUCTOR LINE HARDWARE FITTINGS AND EARTHWIRE HARDWARE FITTINGS TO AS154.1
4. POLE DIAMETER AT GROUND LEVEL AND TOP DIAMETER TO BE SUBMITTED BY POLE DESIGNER TO CPP FOR APPROVAL
5. POLE AND ALL COMPONENTS TO BE HOT DIP GALVANIZED ON INTERNAL AND EXTERNAL FACES TO AS/NZS 4680 AND AS/NZS 4792.
6. THE ATTACHMENT DETAILS ARE FOR GUIDANCE TO THE POLE DESIGNER WHO MAY DECIDE FOR MANUFACTURING AND STRENGTH REASONS TO PROPOSE ALTERNATIVES.
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10. STRUCTURE MATERIAL SHALL HAVE MINIMUM IMPACT PROPERTIES AS SPECIFIED IN AS/NZS 3679.1 OR AS3618, DEPENDING ON STEEL GRADE, FOR THE REQUIRED TESTING TEMPERATURE OF -20°C. TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS154.2.
11. FOR DESIGN AND MANUFACTURE OF STEEL POLES, CROSSARMS, FASTENERS AND HOLD DOWN BOLTS REFER TO CPP POLE DESIGN AND FABRICATION SPECIFICATION - LGWF-EL-RP-9023.
12. ALL STRAIN INSULATOR ATTACHMENT POINTS AND CORRESPONDING MAINTENANCE POINTS TO BE RATED TO BREAKING STRENGTH OF INSULATOR ASSEMBLY (160kN).
13. ALL OPGW ATTACHMENT POINTS AND CORRESPONDING MAINTENANCE POINTS TO BE RATED TO BREAKING STRENGTH OF OPGW ASSEMBLY (70kN).
14. PERSONNEL ACCESS ON THE STEEL POLE SHALL BE PROVIDED USING STEP BOLTS STARTING AT 9m ABOVE GROUND LEVEL. FALL ARREST LOOPS SHALL BE DESIGNED IN ACCORDANCE WITH AS7000.2010 AND SHALL BE PROVIDED STARTING AT 5m ABOVE THE GROUND AND BE POSITIONED TO ENABLE PERSONNEL TO ATTACH TO THOSE POINTS AT ALL TIMES WHILST ON THE STRUCTURE.
15. NO ACCESS ALLOWED ON THE CROSS ARMS.
16. POLE TO BE FITTED WITH BIRD ANTI-NESTING PROTECTION - PARTICULARLY AT CROSS ARM OPENINGS.



DETAIL 1
 EARTH PLATE
 SCALE 1/2
 MATL: 6 PL
 2 OFF REQD



DETAIL 2
 TAP SUPPORT ATTACHMENT PLATE
 SCALE 1/5
 MATL: 16 PL
 3 OFF REQD



DETAIL 3
 GUY WIRE ATTACHMENT CLEAT
 SCALE 1/2
 MATL: 20 PL
 2 OFF REQD

DETAIL 3
 LGWF-OH-DR-7303

REFERENCE DRAWINGS			
POLE TYPE	POLE HEIGHT	DESCRIPTION	DRAWING No.
T6	29.5m	GUY-WIRE DESIGN SET-OUT - POLE T6 - SC VERTICAL TERMINAL POLE	LGWF-OH-DR-7303
T6	29.5m	STRUCTURE LOAD TREE - POLE T6 - SC VERTICAL TERMINAL POLE	LGWF-OH-DR-7495

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No	DESCRIPTION	DRAWN	CHKD	APPROVD	DATE
1	ISSUED FOR CONSTRUCTION	VS	NB	PM	07/05/2018
2	ISSUED FOR DESIGN REVIEW	VS	NB	FS	06/01/2018
3	ISSUED FOR DESIGN REVIEW	VS	NB	FS	20/01/2018
4	ISSUED FOR REVIEW AND	VS	NB	FS	07/05/2018



PROJECT
 LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
 275KV OVERHEAD LINE DESIGN SET OUT
 POLES T6 - SC VERTICAL TERMINAL POLE

DRAWN	V DE LED	08/01/2018	AT SCALE	PROJECT No.
DESIGN	N.BRYKSN	08/01/2018	1/75 UNL	10514
APPVD	F.SALANDRA	08/01/2018	DRAWING No.	LGWF-OH-DR-7302
			SHEET No.	A1
			REV D	

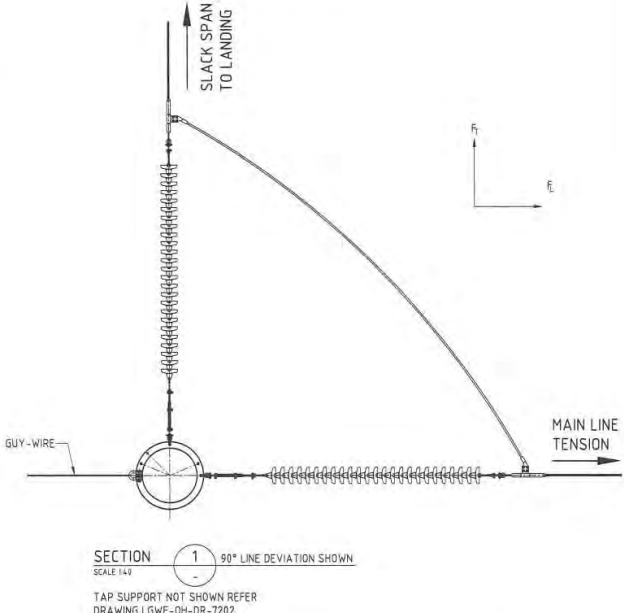
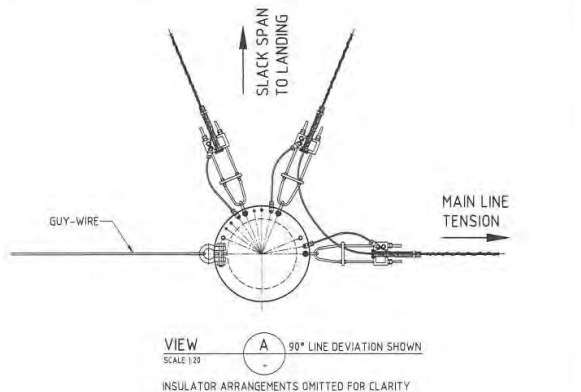
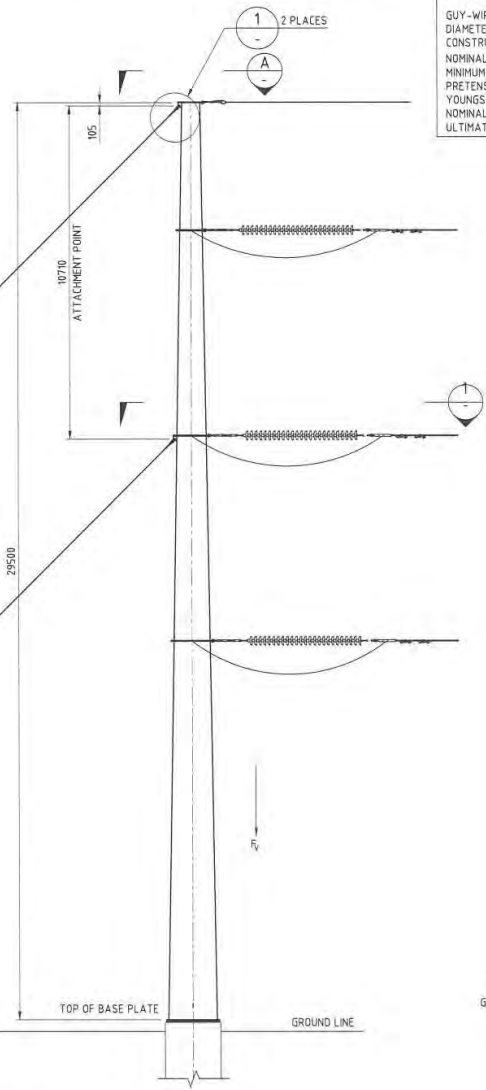
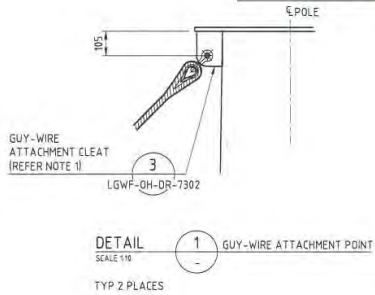
DIMENSIONS IN MILLIMETRES DO NOT SCALE

- NOTES:
- GUY-WIRE ATTACHMENT CLEAT TO BE SUITABLE FOR MINIMUM BREAK FORCE OF NOMINATED GUY-WIRE APPLIED AT 45° TO HORIZONTAL

VERIFIED by
Debashis Paul
 07/05/2018
DEBASHIS PAUL
SENIOR ENGINEER
PSC Australia

GUY-WIRE DETAILS	
GUY-WIRE STANDARD AS 2841	
DIAMETER:	φ18 mm
CONSTRUCTION:	1x19
NOMINAL AREA:	183 mm ²
MINIMUM BREAKING FORCE (kN):	265 kN
PRETENSION VALUE:	2.0% of CBL
YOUNG'S MODULUS:	166 GPa
NOMINAL MASS:	163kg/100m
ULTIMATE CAPACITY:	172kN (65% CBL)

REFERENCE DRAWINGS	
DESCRIPTION	DRAWING No.
GUY-WIRE ARRANGEMENT	LGWF-OH-DR-7705



POLES T6 - SC VERTICAL TERMINAL POLE - ELEVATION
 ARRANGEMENT FOR 90° LINE DEVIATION SHOWN

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No.	DESCRIPTION	REVISIONS	DRAWN	CHKD	APPROVD	DATE
1	ISSUED FOR CONSTRUCTION		VL	HE	SB	08/21/2018
2	ISSUED FOR REVIEW		VL	HE	PS	08/21/2018
3	ISSUED FOR REVIEW		VL	HE	PS	29/11/2018
4	ISSUED FOR REVIEW		VL	HE	PS	08/21/2018



PROJECT
LINCOLN GAP WIND FARM PROJECT

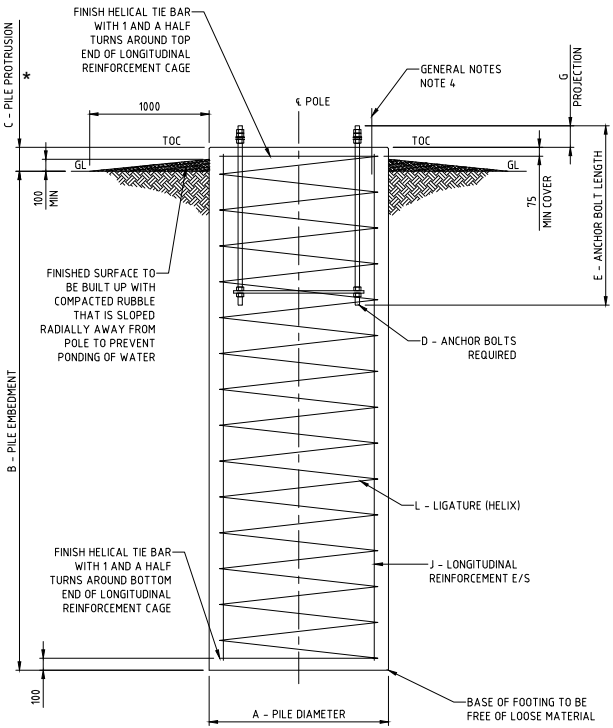
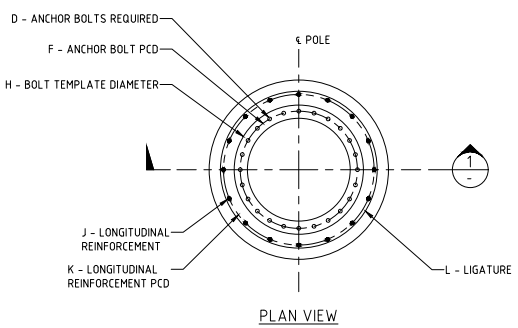
DRAWING TITLE
275KV OVERHEAD LINE GUY-WIRE DESIGN SET OUT POLES T6 - SC VERTICAL TERMINAL POLE

DRAWN	V DE LEO	08/21/2018	A1 SCALE	1:75 LIND	PROJECT No.	10616
DESIGN	N BRYKSN	08/21/2018	DRAWING No.	LGWF-OH-DR-7303		
APPVD	F SALANDRA	08/21/2018	SHEET No.	A1	SHEET No.	REV 0

DIMENSIONS IN MILLIMETRES DO NOT SCALE

POLE TYPE	A - DIAMETER (m)	B - PILE EMBEDMENT (m)	C - PILE PROTRUSION (mm)	D - ANCHOR BOLTS REQUIRED	E - ANCHOR BOLT LENGTH (mm)	F - ANCHOR BOLT PCD (mm)	G - PROJECTION	H - BOLT TEMPLATE DIAMETER (mm)	J - LONGITUDINAL REINFORCEMENT	K - LONGITUDINAL REINFORCEMENT PCD (mm)	L - LIGATURE (HELIX)	ANCHOR BOLT REFERENCE DRAWING
T1	1.5	5.0	150 min, 250 max	24 - M30	1500	980	180	1080	20-N28	1260	N12-250	LGWF-OH-DR-7601
T2	1.5	5.5 *	150 min, 250 max *	32 - M30	1500	980	180	1080	28-N28	1260	N16-250	LGWF-OH-DR-7603
T3	1.8	6.0	150 min, 250 max	28 - M36	2000	1270	220	1380	20-N32	1560	N16-250	LGWF-OH-DR-7605
T4	1.8	6.0	150 min, 250 max	36 - M36	2000	1270	220	1380	24-N32	1560	N16-130	LGWF-OH-DR-7607
T5	1.8	8.0	150 min, 250 max	36 - M36	2000	1270	220	1380	24-N32	1560	N16-150	LGWF-OH-DR-7609
T6	1.8	6.0	150 min, 250 max	28 - M36	2000	1270	220	1380	20-N32	1560	N16-200	LGWF-OH-DR-7611

* FOR STRUCTURE CN16:
 - PILE PROTRUSION = 750mm ±50
 - PILE EMBEDMENT = 6.0m
 FOR ALL OTHER T2 POLES PILE PROTRUSION AND EMBEDMENT AS ABOVE



SECTION 1
 TYPICAL PILE FOOTING DETAIL
 REFER TO TABLE FOR DIMENSIONS AND RELEVANT POLE TYPES

GENERAL NOTES

1. ALL DIMENSIONS IN MILLIMETRES (mm) UNO.
2. DIMENSIONS SHALL NOT BE OBTAINED BY SCALING FROM THE DRAWINGS.
3. ALL STANDARDS REFERRED TO SHALL BE THE LATEST EDITION UNO.
4. FOR POLE EARTHING DETAILS REFER DRAWING LGWF-OH-DR-7800.
5. FOR POLE GROUTING DETAILS REFER DRAWING LGWF-OH-DR-7801.
6. FOR STRUCTURE SCHEDULE AND CORRESPONDING POLE TYPES REFER LGWF-OH-DR-7080.

CONSTRUCTION

1. BAR CHAIRS/WHEELS ARE REQUIRED.
2. CONCRETE SHALL BE MECHANICALLY VIBRATED.
3. CONCRETE SHALL BE CURED FOR 7 DAYS AFTER PLACEMENT.
4. CONTRACTOR TO PROVIDE MIX DESIGN TO DESIGNER FOR APPROVAL.
5. CONTRACTOR TO TAKE ADEQUATE MEASURES TO ENSURE CRACKING DUE TO HEAT OF HYDRATION IS MITIGATED TO MINIMISE THE RISK OF THERMAL CRACKING. CONCRETE TEMPERATURE DIFFERENTIALS NEED TO BE CONTROLLED TO WITHIN 20°C.
6. CONSTRUCTION JOINTS ARE NOT PERMITTED UNLESS APPROVED BY THE DESIGNER.
7. DURING CONSTRUCTION THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE STRUCTURE AND EXCAVATION IN A STABLE CONDITION AND ENSURING NO PART IS OVERSTRESSED DURING CONSTRUCTION.

DESIGN LOADS

FOOTING DESIGN LOADS AT BASE OF POLES:

BORED PILE FOOTING NOTES

1. CONCRETE SHALL CONFORM TO AS3600.
2. BORED PILE CONSTRUCTION SHALL BE TO AS 2159-2009 "PILING - DESIGN AND INSTALLATION".
3. THE CONTRACTOR IS RESPONSIBLE FOR CORRECT SET-OUT OF THE PILES.
4. CONCRETE GRADE TO BE 32 MPA AT 28 DAYS.
5. CONCRETE SLUMP SHALL BE 100mm.
6. NOMINAL SIZE OF COARSE AGGREGATE SHALL NOT BE LARGER THAN 20mm.
7. THE DROP HEIGHT OF FRESH CONCRETE TO SHALL NOT EXCEED 1.5m (USE CHUTES AND/OR PUMP HOSES WHERE NECESSARY).
8. REINFORCEMENT GRADE TO BE 500 MPa AND SHALL CONFORM TO THE REQUIREMENTS OF AS/NZS 4671.
9. CLEAR CONCRETE COVER TO REINFORCEMENT TO BE 75 mm MINIMUM UNLESS NOTED OTHERWISE.
10. NO LAPS PERMITTED FOR LONGITUDINAL REINFORCEMENT.
11. TRANSVERSE REINFORCEMENT SHALL BE SPOT WELDED TO EACH BAR OF LONGITUDINAL REINFORCEMENT.
12. BORED EXCAVATION AND REINFORCEMENT CAGE ARE TO BE INSPECTED BY A GEOTECHNICAL ENGINEER, OR OTHER SUITABLY QUALIFIED AND EXPERIENCED PERSON, BEFORE PLACEMENT OF THE REINFORCEMENT CAGE IN THE BORED EXCAVATION.
13. PRIOR TO PLACEMENT OF THE REINFORCEMENT CAGE, ALL LOOSE, DISTURBED AND FALL-IN MATERIAL SHALL BE REMOVED FROM THE SHAFT AND BASE OF THE BORED EXCAVATION.
14. ALL SURFACE WATER INFLOW AND PERCHED GROUNDWATER INFLOW INTO THE BORED EXCAVATION SHALL BE PROMPTLY REMOVED BY PUMPING OUT. IN THE UNLIKELY EVENT OF ANY CONTINUAL INFLOW OF PERCHED GROUNDWATER, THE CONCRETE SHALL BE PLACED BY A TREMIE TUBE DISCHARGING AT THE BASE OF THE EXCAVATION, SO THAT ANY WATER IN THE BORED EXCAVATION IS DISPLACED UPWARDS. TAKE CARE NOT TO ENTRAIN ANY WATER WITHIN THE PLACED CONCRETE.
15. UNATTENDED BORED EXCAVATIONS SHALL BE COVERED AND/OR BARRICADED AT ALL TIMES TO PREVENT POTENTIAL INJURY TO PERSONS. UNATTENDED BORED EXCAVATIONS SHALL BE COVERED AND PROTECTED FROM SURFACE WATER RUN-OFF, PRIOR TO AND DURING FORECASTED RAIN EVENTS.
16. IF REQUIRED, TEMPORARY STEEL CASING SHALL BE PROVIDED TO LATERALLY SUPPORT ANY WEAK OR UNSTABLE LAYERS EXPOSED ON THE SIDE OF THE BORED EXCAVATION, UNTIL CONCRETE IS PLACED. TAKE CARE TO PREVENT FALL-IN OF SURFACE MATERIAL INTO THE BORED EXCAVATION.
17. REINFORCEMENT AND CONCRETE ARE TO BE PLACED AS SOON AS POSSIBLE AFTER COMPLETION OF THE BORED EXCAVATION, AND IN ALL CASES WITHIN 24 HOURS UNLESS OTHERWISE APPROVED BY THE PRINCIPAL'S REPRESENTATIVE. CONCRETE SHALL BE PLACED THE SAME DAY AS THE FINAL CLEAN-UP, ENGINEERING INSPECTION AND PLACEMENT OF THE REINFORCEMENT CAGE.
18. CONCRETE SHALL BE PLACED THROUGH A CENTRAL DISCHARGE FUNNEL OR SIMILAR, TO MINIMISE POTENTIAL FOR SEGREGATION FROM THE POURED CONCRETE STRIKING STEEL REINFORCEMENT BARS. VIBRATOR TO BE USED TO ENSURE THAT PLACED CONCRETE FILLS ALL VOIDS.
19. REFER TO THE GEOTECHNICAL REPORT PREPARED BY AURECON FOR CIVIL GROUP (REPORT REF. 252890-04, REV. 0, DATED 23 MARCH 2018) FOR GEOTECHNICAL INFORMATION FOR THE SITE.
20. REFER TO THE DESIGN REPORT PREPARED BY AURECON FOR CONSOLIDATED POWER PROJECTS (REPORT REF. 502372, REV. 3, DATED 2 MAY 2018) FOR ASSUMED GROUND PROFILE USED AT EACH POLE SITE.
21. FOR ANY UNEXPECTED SITE GROUND CONDITIONS, SEEK TECHNICAL ADVICE FROM THE GEOTECHNICAL DESIGN ENGINEER (AURECON).

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NO.	REVISIONS	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE
1	ISSUED FOR CONSTRUCTION		VDL	MD	HH	18/05/2018
2	ISSUED FOR VERIFICATION		VDL	MD	HH	08/05/2018
3	ISSUED FOR DESIGN REVIEW		VDL	MD	HH	26/04/2018



PROJECT
 LINCOLN GAP WIND FARM PROJECT

DRAWING TITLE
 275KV OVERHEAD LINE FOOTING DETAILS POLE TYPE T1 TO T6

DRAWN	V DE LEO	26/04/2018	AT SCALE	PROJECT No.
DESIGN	M DOUTHY	26/04/2018	DRAWING No.	10634
APPROV	H DANG	26/04/2018	DRAWING No.	LGWF-OH-DR-7803
			SHEET No.	1
			REV	0

DIMENSIONS IN MILLIMETRES DO NOT SCALE



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71153

Electricity Infrastructure Declaration

To: State Commission Assessment Panel
From: Lincoln Gap Wind Farm Pty Ltd


Date of application: 22 November 2019		
Location of proposed development: S2 and S4 of H540400 and Q1 of D37168		
House no.:	Lot no.:	Street: Eyre Highway
Town/Suburb: Lincoln Gap		
Section no.: Various	Hundred: Handyside	
Volume: Various	Folio: Various	

Nature of proposed development: Construction of a 42 turbine wind farm and ancillary infrastructure, adjacent to an existing wind farm at Lincoln Gap. The project is located across three land parcels: S4 H540400 of CT 6138/334, S2 H540400 of CT 6138/388, and Q1 D37168
--

I: Enamul Latif

- being the applicant
- a person acting on behalf of the applicant

for the development described above declare that the proposed development will involve the construction of a building which would, if constructed in accordance with the plans submitted, not be contrary to the regulations prescribed for the purposes of section 86 of the *Electricity Act 1996*. I make this declaration under clause 6(1) of Schedule 8 of the Planning, Development and Infrastructure (General) Regulations 2017.

Signed:  Date: 22 Nov 2019

If being lodged electronically please tick to indicate agreement to this declaration.

Note 1

This declaration is only relevant to those development applications seeking authorisation for a form of development that involves the construction of a building (there is a definition of 'building' contained in section 3(1) of the *Planning, Development and Infrastructure Act 2016*), other than where the development is limited to –

- a) an internal alteration of a building; or
- b) an alteration to the walls of a building but not so as to alter the shape of the building.

Note 2

The requirements of section 86 of the *Electricity Act 1996* do not apply in relation to:

- a) an aerial line and a fence, sign or notice that is less than 2.0 m in height and is not designed for a person to stand on; or
- b) a service line installed specifically to supply electricity to the building or structure by the operator of the transmission or distribution network from which the electricity is being supplied.

Note 3

Section 86 of the *Electricity Act 1996* refers to the erection of buildings in proximity to powerlines. The regulations under this Act prescribe minimum safe clearance distances that must be complied with.

Note 4

The majority of applications will not have any powerline issues, as normal residential setbacks often cause the building to comply with the prescribed powerline clearance distances. Buildings/renovations located far away from powerlines, for example towards the back of properties, will usually also comply.

Particular care needs to be taken where high voltage powerlines exist; or where the development:

- is on a major road;
- commercial/industrial in nature; or
- built to the property boundary.

Note 5

An information brochure: 'Building Safely Near Powerlines' has been prepared by the Technical Regulator to assist applicants and other interested persons.

This brochure is available from council and the Office of the Technical Regulator. The brochure and other relevant information can also be found at sa.gov.au/energy/powerlinesafety

Note 6

In cases where applicants have obtained a written approval from the Technical Regulator to build the development specified above in its current form within the prescribed clearance distances, the applicant is able to sign the form.



Our ref: PS113707-ENV-LTR- RevA

Your ref: Lodgement Letter

By email and post
scapadmin@sa.gov.au

22 November 2019

State Commission Assessment Panel
Department of Planning Transport and Infrastructure
Level 5, 50 Flinders Street
Adelaide SA 5000

Dear Sir/Madam

Lodgement of Section 131 Development Application for the Lincoln Gap Wind Farm Stage 3

WSP Australia Pty Limited is pleased to submit this Development Application on behalf of the proponent, Lincoln Gap Wind Farm Pty. Ltd., a subsidiary of Nexif Energy Australia Pty. Ltd., for the proposed Lincoln Gap Wind Farm Stage 3. The Development Application is being lodged under Section 131 of the *Planning, Development and Infrastructure Act 2016* (PDI Act). The project proposes the construction of a 42 turbine wind farm and ancillary infrastructure; with a total maximum generation capacity of up to 252 Megawatt (MW) (dependent on the final selection of turbine model).

The project is to be located adjacent to the existing Lincoln Gap Wind Farm, and will be situated over the following three parcels of land:

- Q1 DP37168 in CT 6138/331
- S2 H540400 in CT 6138/388
- S4 H540400 in CT 6138/334

This application for public infrastructure received State Agency sponsorship from the Chief Executive of the Department for Energy and Mining (DEM), in a letter dated 11 July 2019; allowing lodgement of the project under Section 131 of the PDI Act. Furthermore, given that the project proposes the development of an electricity generator of greater than 5 MW capacity, to be connected to the State's energy system, a certificate has been received from the Office of the Technical Regulator, dated 26 June 2019, demonstrating that the project will contribute to the security and reliability of the State's power system.

This Development Application, containing a signed Crown Development Application Form and Electricity Act Declaration Form, sponsorship letter from the DEM, certificate from the OTR, Development Application Report and supporting appendices, has been submitted to the State Commission Assessment Panel both electronically to SCAPadmin@sa.gov.au and will be delivered in hard copy to Level 5, 50 Flinders Street, Adelaide (3x copies).

Level 1, 1 King William Street
Adelaide SA 5000
GPO Box 398
Adelaide SA 5001

Tel: +61 8 8405 4300
Fax: +61 8 8405 4301
www.wsp.com



Should you have any questions regarding this application, please do not hesitate to contact me on 08 8405 4421, or via email at Bronte.Nixon@wsp.com.

Yours faithfully

A handwritten signature in black ink, consisting of a stylized 'B' followed by a horizontal line that ends in a small arrowhead pointing to the right.

Bronte Nixon
Principal Environmental Scientist/Planner



Ref: D19071588

26th June 2019

Bronte Nixon
Principal Environmental Scientist/Planner
WSP Australia Pty Ltd
Level 1, 1 King William street
Adelaide SA 5000
bronte/nixon@wsp.com

Energy and Technical
Regulation

Office of the
Technical Regulator

Level 8, 11 Waymouth Street
Adelaide SA 5000

GPO Box 320
Adelaide SA 5001

Telephone: 08 8226 5500
Facsimile: 08 8226 5866

www.sa.gov.au/otr

Dear Bronte,

RE: Lincoln Gap 3, 42 turbine wind farm project.

The development of the Lincoln Gap 3 Project has been assessed by the Office of the Technical Regulator (OTR) under Section 37 of the Development Act 1993.

The *Development Regulations 2008* prescribe if the proposed development is for the purposes of the provision of electricity generating plant with a generating capacity of more than 5 MW that is to be connected to the State's power system – a certificate from the Technical Regulator is required, certifying that the proposed development complies with the requirements of the Technical Regulator in relation to the security and stability of the State's power system.

In making a decision on your application, our office has taken the following information into account:

- Your letter dated 10th May 2019.
- Presentation delivered to the OTR 24th May 2019.
- Your letter dated 27th May 2019.

After assessing the information provided, I advise that approval is granted for the proposed generator on the understanding that the shortfall in inertia of the turbines will be compensated for via a FFR solution. It is noted that should a synthetic inertia solution be provided via the wind turbines, the synthetic inertia is not considered as real inertia but is supplying a special form of FFR, so shall be measured and evaluated in MW as opposed to MW.s.

Energy and Technical Regulations

Level 8, 11 Waymouth Street Adelaide SA 5000 | GPO Box 320 Adelaide SA 5001 | DX541
Tel (+61) 8 8226 5500 | Fax (+61) 8 8226 5866 | www.dpc.sa.gov.au | ABN 83 524 915 929



It should be noted that should the shortfall in inertia not be addressed this will have impact on the ESCOSA license for the proposed generator.

Should you have any questions regarding this matter, please do not hesitate to call Mark Burns on (08) 8429 2707.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Rob Faunt'.

Rob Faunt
TECHNICAL REGULATOR

Certificate of Title - Volume 6138 Folio 331

Parent Title(s) CT 5179/927
Creating Dealing(s) DDA 12113954
Title Issued 27/05/2014 Edition 3 Edition Issued 19/12/2017

Estate Type

FEE SIMPLE

Registered Proprietor

NUTT BROS NOMINEES PTY. LTD. (ACN: 079 738 659)
OF 1ST FLOOR 187 WAKEFIELD STREET ADELAIDE SA 5000

Description of Land

ALLOTMENT COMPRISING PIECES 1, 2, 3 AND 4 DEPOSITED PLAN 37168
IN THE AREA NAMED LINCOLN GAP
HUNDRED OF HANDYSIDE

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO HER MAJESTY THE QUEEN (AS 2861764)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED D AND E TO THE ELECTRICITY TRUST OF SOUTH AUSTRALIA (TG 7065720 AND RE 7609633 RESPECTIVELY)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED B AND C TO THE PIPELINES AUTHORITY OF SOUTH AUSTRALIA (TG 6328754 AND TG 6328755 RESPECTIVELY)

Schedule of Dealings

Dealing Number	Description
9404306	MORTGAGE TO RURAL BANK LTD.
12841088	LEASE TO ELECTRANET PTY. LTD. (ACN: 094 482 416) COMMENCING ON 07/11/2017 AND EXPIRING ON 06/11/2045 OF PORTION (AREA S IN F253174) TOGETHER WITH CERTAIN RIGHTS
12841089	LEASE TO LINCOLN GAP WIND FARM PTY. LTD. (ACN: 133 372 595) COMMENCING ON 07/11/2017 AND EXPIRING ON 06/11/2037 OF PORTION (AREA A, AREA B, AREA C, AREA D, AREA E1 AND AREA E2 IN F253174)
12841090	MORTGAGE OF LEASE 12841089 TO NATIONAL AUSTRALIA BANK LTD. (ACN: 004 044 937)
13097600	LIEN BY CONSOLIDATED POWER PROJECTS AUSTRALIA PTY. LTD. (ACN: 075 411 219) AND NACAP PTY. LTD. (ACN: 006 306 994) OVER LEASE 12841089 G.R.O. 22209
13097603	LIEN BY CONSOLIDATED POWER PROJECTS AUSTRALIA PTY. LTD. (ACN: 075 411 219) AND NACAP PTY. LTD. (ACN: 006 306 994) OVER LEASE 12841089 G.R.O. 22210

Notations

Dealings Affecting Title NIL

Priority Notices

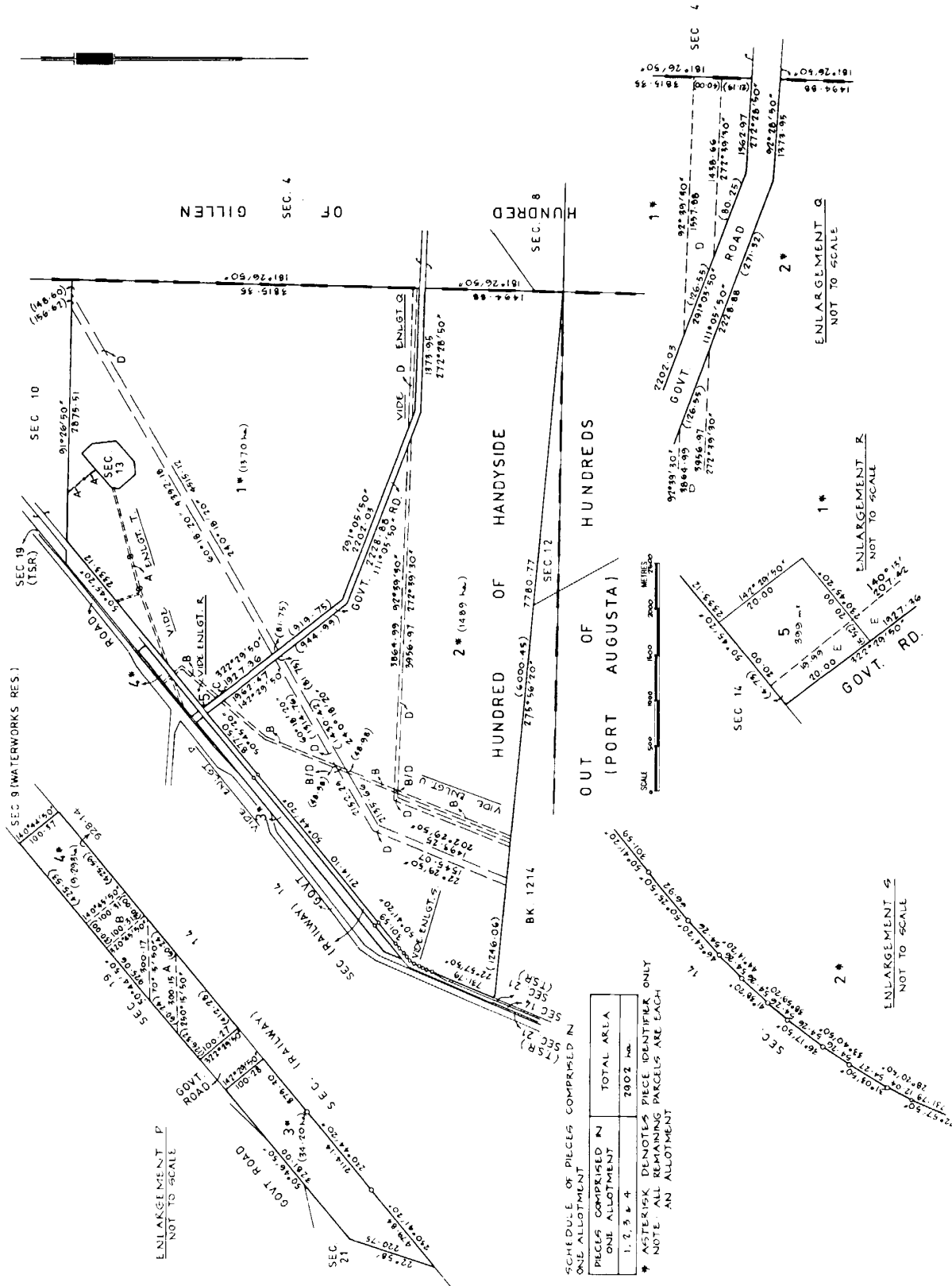
Lodgement Date	Priority Notice ID	Expiry Date	Status
17/04/2019	PN019536	17/06/2019	Completed
17/04/2019	PN019535	17/06/2019	Completed
17/04/2019	PN019533	17/06/2019	Withdrawn
16/04/2019	PN019532	17/06/2019	Withdrawn
16/04/2019	PN019513	17/06/2019	Withdrawn
16/04/2019	PN019512	17/06/2019	Withdrawn

Notations on Plan NIL

Registrar-General's Notes

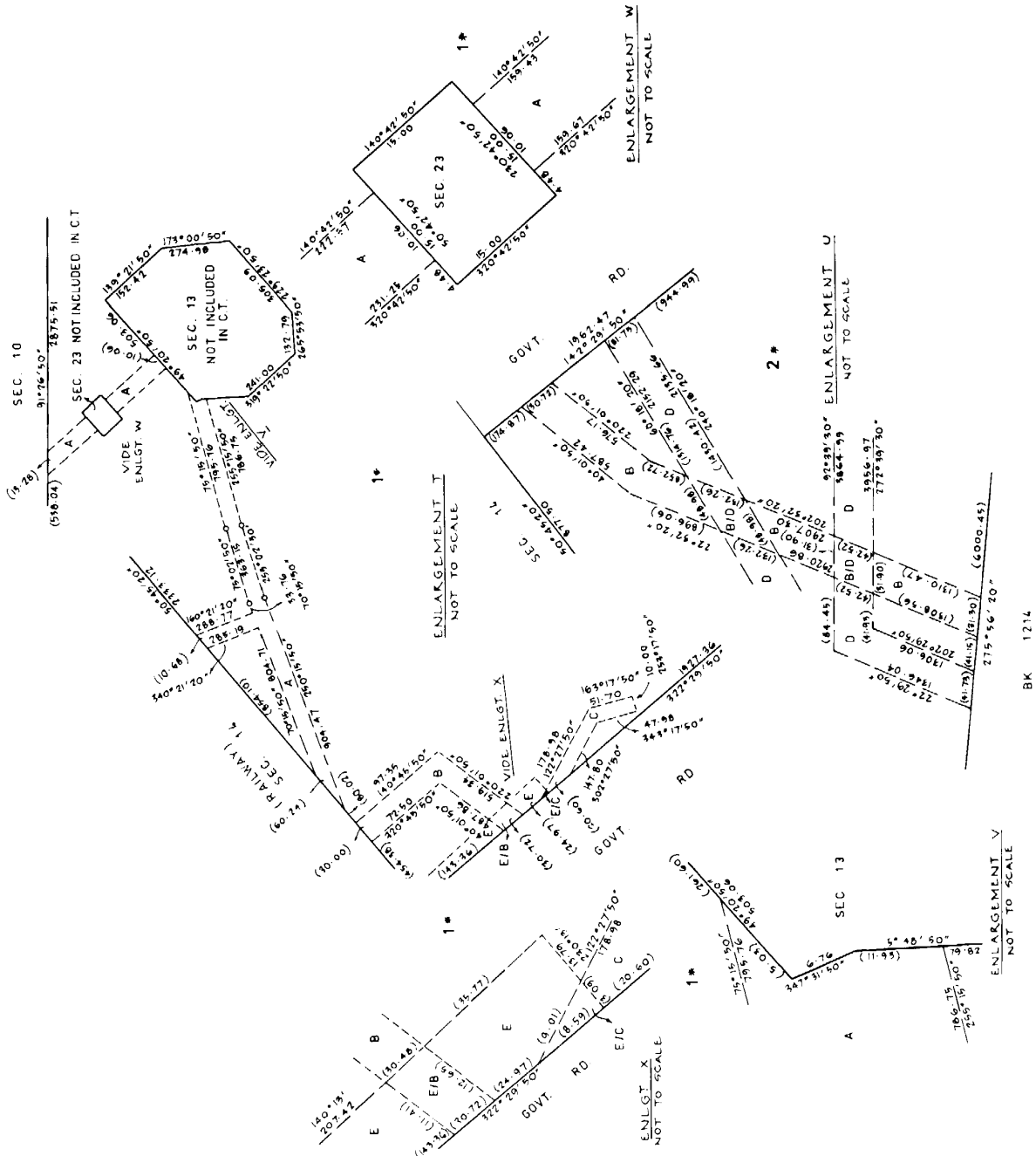
APPROVED FILED PLAN FOR LEASE PURPOSES FX253174

Administrative Interests NIL



PIECES COMPRISED IN ONE ALLOTMENT	TOTAL AREA
1, 2, 3 & 4	2802 ha

* ASTERISK DENOTES PIECE IDENTIFIER ONLY
 NOTE: ALL REMAINING PARCELS ARE EACH AN ALLOTMENT



BK 1214



The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.



Certificate of Title - Volume 6138 Folio 334

Parent Title(s) CT 5270/320
Creating Dealing(s) DDA 12113954
Title Issued 27/05/2014 **Edition** 3 **Edition Issued** 19/12/2017

Estate Type

FEE SIMPLE

Registered Proprietor

NUTT BROS NOMINEES PTY. LTD. (ACN: 079 738 659)
 OF 1ST FLOOR 187 WAKEFIELD STREET ADELAIDE SA 5000

Description of Land

SECTION 313
 HUNDRED OF COPLEY
 IN THE AREA NAMED LINCOLN GAP

SECTION 4
 HUNDRED OF HANDYSIDE
 IN THE AREA NAMED LINCOLN GAP

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO THE PIPELINES AUTHORITY OF SOUTH AUSTRALIA (T 6328754)

Schedule of Dealings

Dealing Number	Description
9404306	MORTGAGE TO RURAL BANK LTD.
12841089	LEASE TO LINCOLN GAP WIND FARM PTY. LTD. (ACN: 133 372 595) COMMENCING ON 07/11/2017 AND EXPIRING ON 06/11/2037
12841090	MORTGAGE OF LEASE 12841089 TO NATIONAL AUSTRALIA BANK LTD. (ACN: 004 044 937)
13097600	LIEN BY CONSOLIDATED POWER PROJECTS AUSTRALIA PTY. LTD. (ACN: 075 411 219) AND NACAP PTY. LTD. (ACN: 006 306 994) OVER LEASE 12841089 G.R.O. 22209
13097603	LIEN BY CONSOLIDATED POWER PROJECTS AUSTRALIA PTY. LTD. (ACN: 075 411 219) AND NACAP PTY. LTD. (ACN: 006 306 994) OVER LEASE 12841089 G.R.O. 22210

Notations

Dealings Affecting Title NIL

Priority Notices

Lodgement Date	Priority Notice ID	Expiry Date	Status
17/04/2019	PN019536	17/06/2019	Completed



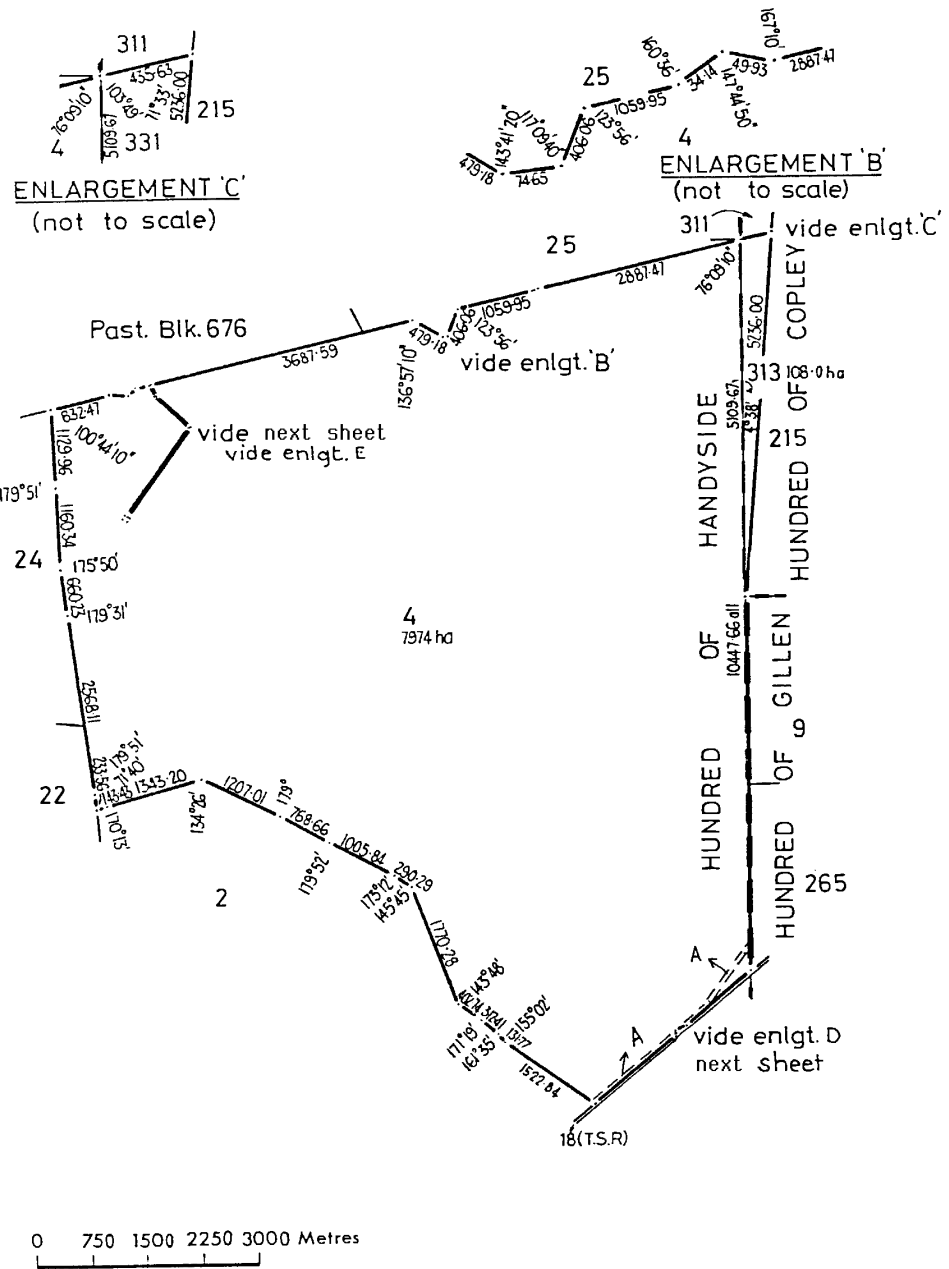
Product Register Search (CT 6138/334)
Date/Time 30/04/2019 02:57PM
Customer Reference Title search
Order ID 20190430008326

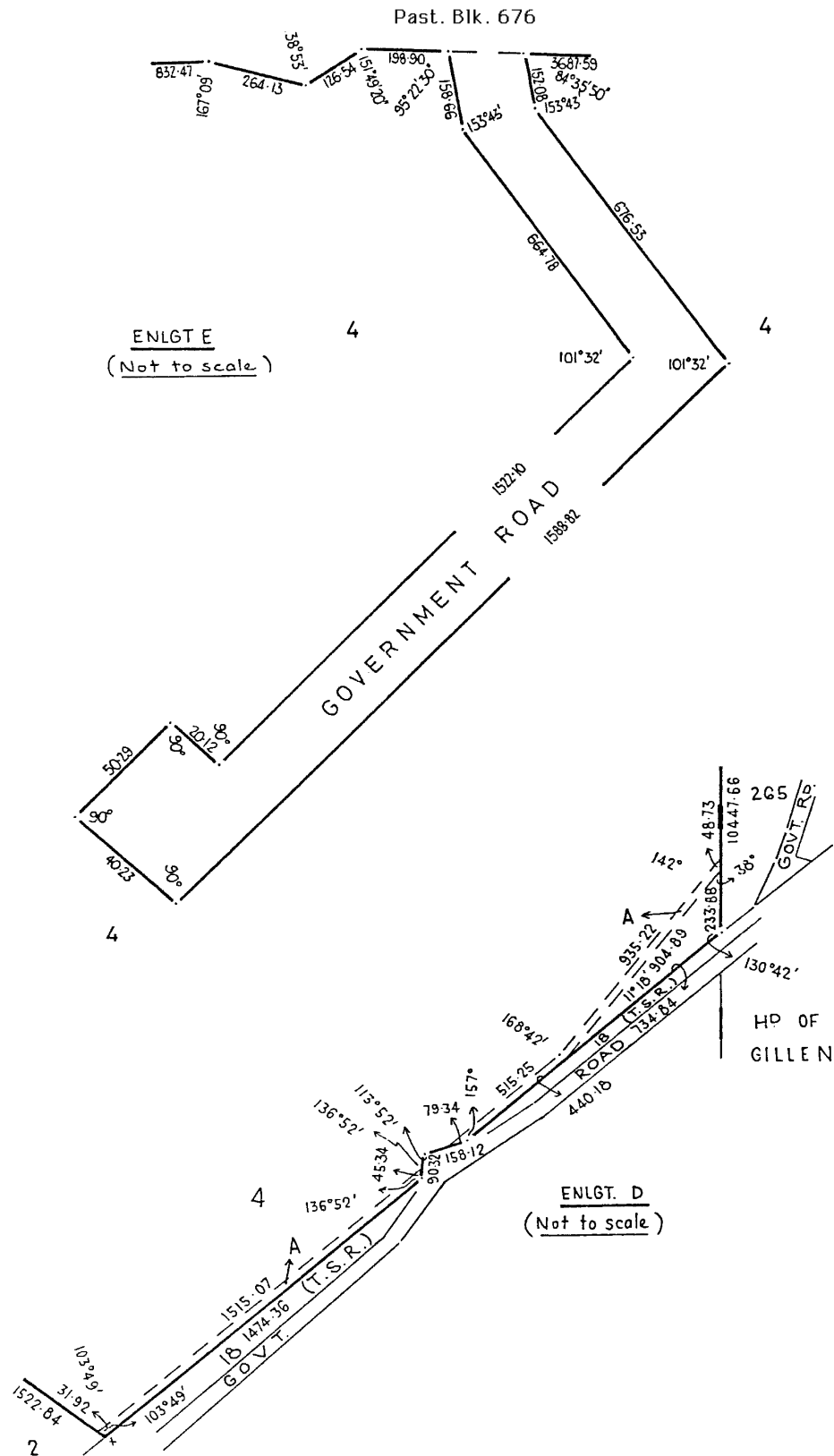
17/04/2019	PN019535	17/06/2019	Completed
17/04/2019	PN019533	17/06/2019	Withdrawn
16/04/2019	PN019532	17/06/2019	Withdrawn
16/04/2019	PN019513	17/06/2019	Withdrawn
16/04/2019	PN019512	17/06/2019	Withdrawn

Notations on Plan NIL

Registrar-General's Notes NIL

Administrative Interests NIL





REAL PROPERTY ACT, 1886



The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.



Certificate of Title - Volume 6138 Folio 388

Parent Title(s) CT 6066/920
Creating Dealing(s) DDA 12113954
Title Issued 27/05/2014 **Edition** 3 **Edition Issued** 19/12/2017

Estate Type

FEE SIMPLE

Registered Proprietor

NUTT BROS NOMINEES PTY. LTD. (ACN: 079 738 659)
OF PMB 15 PORT AUGUSTA SA 5170

Description of Land

SECTIONS 2 AND 8
HUNDRED OF HANDYSIDE
IN THE AREA NAMED LINCOLN GAP

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO THE AUSTRALIAN NATIONAL RAILWAYS COMMISSION (SL 4743588)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED B TO THE NATURAL GAS AUTHORITY OF SOUTH AUSTRALIA (T 6328754)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED D FOR WATER SUPPLY PURPOSES TO THE SOUTH AUSTRALIAN WATER CORPORATION (TG 11439438)

SUBJECT TO RIGHT(S) OF WAY OVER THE LAND MARKED C TO THE AUSTRALIAN NATIONAL RAILWAYS COMMISSION (SL 4743588)

Schedule of Dealings

Dealing Number	Description
9404306	MORTGAGE TO RURAL BANK LTD.
12841089	LEASE TO LINCOLN GAP WIND FARM PTY. LTD. (ACN: 133 372 595) COMMENCING ON 07/11/2017 AND EXPIRING ON 06/11/2037
12841090	MORTGAGE OF LEASE 12841089 TO NATIONAL AUSTRALIA BANK LTD. (ACN: 004 044 937)

Notations

Dealings Affecting Title NIL
Priority Notices NIL
Notations on Plan NIL

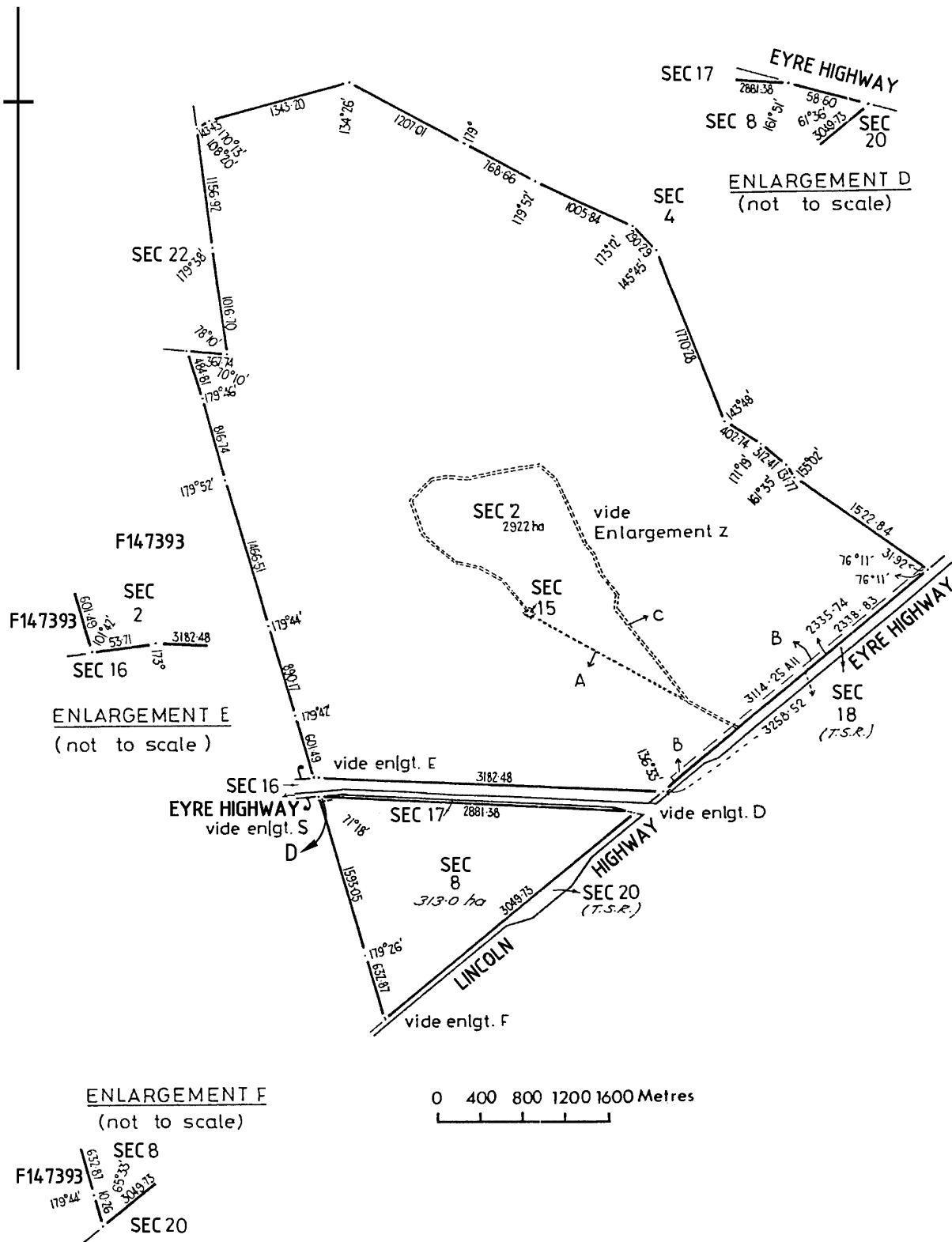
Registrar-General's Notes



Product	Register Search Plus (CT 6138/388)
Date/Time	02/11/2018 03:21PM
Customer Reference	PS111460
Order ID	20181102008866
Cost	\$34.50

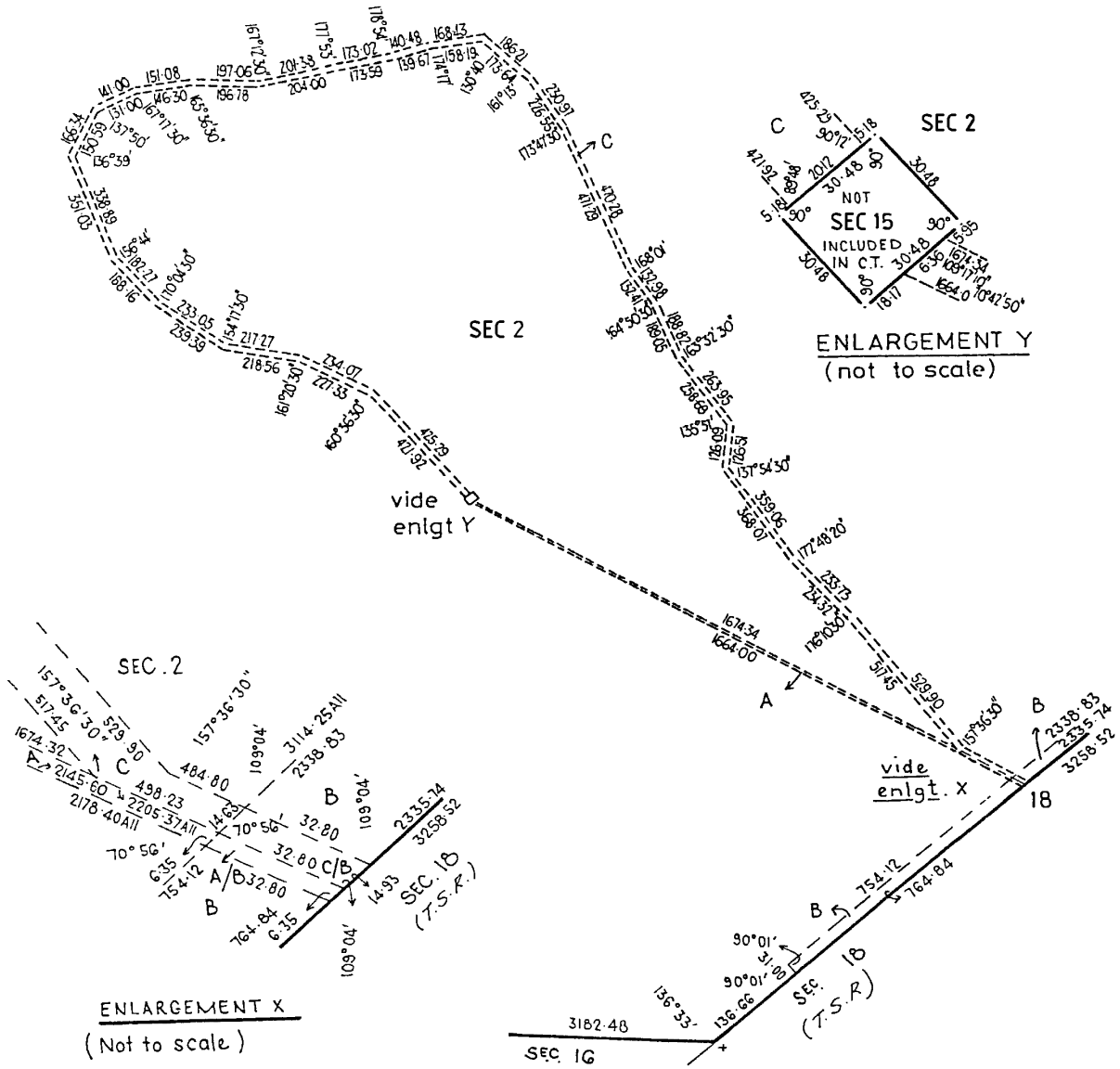
APPROVED FILED PLAN FOR LEASE PURPOSES FX48516

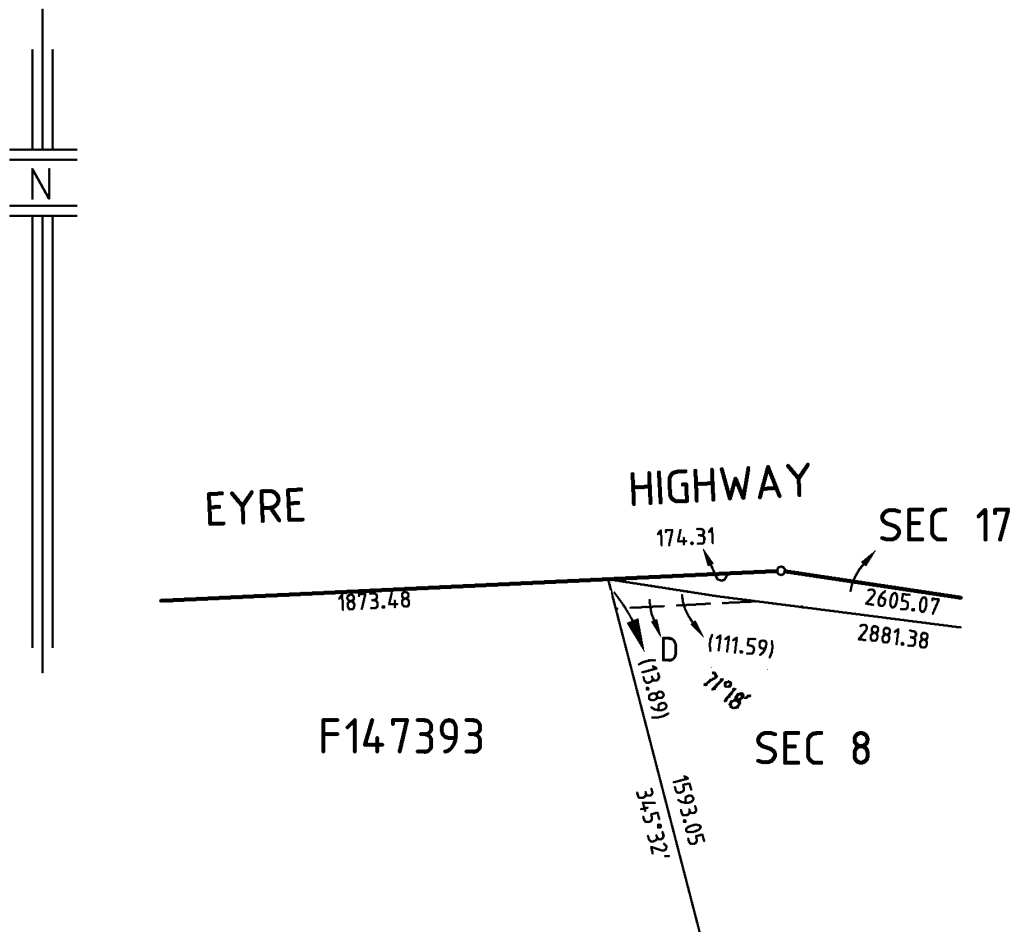
Administrative Interests NIL





ENLARGEMENT Z
(not to scale)





ENLARGEMENT S
 NOT TO SCALE

LINCOLN GAP WIND FARM PTY LTD

NOVEMBER 2019

CONFIDENTIAL

LINCOLN GAP WIND FARM STAGE 3 DEVELOPMENT APPLICATION REPORT

wsp



Question today Imagine tomorrow Create for the future

Lincoln Gap Wind Farm Stage 3 Development Application Report

Lincoln Gap Wind Farm Pty Ltd

WSP

Level 1, 1 King William Street
Adelaide SA 5000
GPO Box 398
Adelaide SA 5001

Tel: +61 8 8405 4300

Fax: +61 8 8405 4301

wsp.com

REV	DATE	DETAILS
00	30/09/2019	Draft
01	26/10/2019	Final Draft
02	22/11/2019	Final

	NAME	DATE	SIGNATURE
Prepared by:	Erin Fitzner; Tenille Anderson; Rebecca Koch	22/11/2019	
Reviewed by:	Bronte Nixon	22/11/2019	
Approved by:	Bronte Nixon	22/11/2019	

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GLOSSARY

Approval corridor	The land within which the project infrastructure will be located. The proposed approval corridor is 250 m wide to allow for micro-siting of wind turbine generators. The approval corridor was used in the environmental assessments to assess possible impacts.
Background noise level	The noise level in the absence of intermittent noise sources.
BDBSA	Biological Database of South Australia (BDBSA) is an integrated collection of corporate databases including data from the Department of Environment, Water and Natural Resources, Birds Australia, Birds SA, Australasian Wader Study Group, SA Museum and other State Government Agencies.
dB(A)	A-weighted noise or sound power level in decibels. A-weighting is a frequency adjustment applied to measured noise levels to replicate the frequency response of the human ear.
Fresnel Zone	Radio frequency line of sight is defined by Fresnel Zones which are ellipse shaped areas between any two radios (Proxim Wireless, 2017).
IBRA	Interim Biogeographical Regionalisation of Australia (IBRA) is a landscape based approach to classifying the land surface across a range of environmental attributes, which is used to assess and plan for the protection of biodiversity (Department of the Environment and Energy, n.d.)
Landscape characterisation	The assessment of the character and quality of the landscape. Elements comprising landscape character include landform, land use and cultural influences.
Maximum blade chord length	The longest straight line joining the leading and trailing edges of the blade.
Point-to-multipoint radio communication	A central location transmits to, and sometimes receives from, a number independent of locations. Television and radio broadcasting and reception, mobile phones (to the cell site mast) and land mobile systems fall under this category.
Point-to-point radio communication	Radio links that transmit and receive between two fixed points fall under this category. For example, network backhaul commonly utilises point-to-point communication.
Project site	The land defined by the project boundary.
Realistic case model	A shadow flicker assessment model that assumes: <ul style="list-style-type: none">— the turbine faces into the wind based upon measured direction data— the turbines operates when the wind speed is between the minimum and maximum operational wind speeds, based upon measured wind speed data— cloud cover reduction factor is applied based upon average sunshine hours.
Receptor window	A vertical rectangle facing each turbine
SCAP	The State Commission Assessment Panel (SCAP) is established under South Australia's <i>Planning, Development and Infrastructure Act 2016</i> . The SCAP has assumed the functions, powers and duties of the Development Assessment Commission.

Worst case model (shadow flicker)	<p>A shadow flicker assessment model that assumes</p> <ul style="list-style-type: none"> — the turbine faces the sun to cast the largest shadow — the turbines are always operating — all days are cloudless.
Worst case scenario (noise)	Conditions resulting in the highest noise level at, or inside, dwellings.
Yaw	The rotation motion of the nacelle about the tower that allows the turbine to face into the wind.

ABBREVIATIONS

ABS	Australian Bureau of Statistics
AH Act	<i>Aboriginal Heritage Act 1988</i>
AHD	Australian Height Datum
AIS	Aeronautical Information Service
ASRIS	Australian Soil Resource Information System
ASS	Acid Sulfate Soils
BDAC	Barngarla Determination Aboriginal Council
BDBSA	Biological Databases of South Australia
BESS	Battery Energy Storage System
BOP	Balance of Plant
CAR	<i>Civil Aviation Regulations 1988</i>
CASA	Civil Aviation Safety Authority
CEMP	Construction Environmental Management Plan
CFS	Country Fire Service
COEMP	Construction and Operation Environmental Management Plan
CT	Certificate of Title
DA	Development Application
DAC	Development Assessment Commission
DCPF VI	Denham Commodity Partners Fund VI LP
DEM	Department for Energy and Mining
Development Act	<i>Development Act 1993</i>
Development Regulations	<i>Development Regulations 2008</i>
DoD	Department of Defence
DPC-AAR	Department of the Premier and Cabinet Aboriginal Affairs and Reconciliation Division
DPTI	Department of Planning, Transport and Infrastructure
EMF	Environmental Management Framework
EMI	Electromagnetic Interference
EPA	Environment Protection Authority of South Australia
EPBC Act	<i>Environment Protection Biodiversity Conservation Act 1999</i>

HP Act	<i>Heritage Places Act 1993</i>
IBRA	Interim Biogeographical Regionalisation of Australia
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IOA	Institute of Acoustics
IOA guide	<i>A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (2013)</i>
IUCN	International Union for Conservation of Nature and Natural Resources
LGWF	Lincoln Gap Wind Farm
LGWF P/L	Lincoln Gap Wind Farm Pty Ltd
LSALT	Lowest Safe Altitude
MNES	Matters of National Environmental Significance
MOS	Civil Aviation Safety Authority Manual of Standards
MW	Megawatt
NASAG	National Airports Safeguarding Advisory Group
Nexif Energy	Nexif Energy Australia Pty Ltd
NOTAMs	Notices to Airmen
NPW Act	<i>National Parks and Wildlife Act 1972</i>
NRM Act	<i>Natural Resources Management Act 2004</i>
NV Act	<i>Native Vegetation Act 1991</i>
NVC	Native Vegetation Council
OEMP	Operational Environmental Management Plan
OLS	Obstacle Limitation Surface
OTR	Office of the Technical Regulator
PCA	Potentially contaminating activity
PD Code	Planning and Design Code
PDI Act	<i>Planning, Development and Infrastructure Act 2016</i>
PDI Regulations	<i>Planning, Development and Infrastructure (General) Regulations 2017</i>
PO	Performance Outcome
PPE	Personal Protective Equipment
PSI	Preliminary Site Investigation
RAAF	Royal Australian Air Force

SA	South Australia
SARIG	South Australian Resources Information Gateway
SCAP	State Commission Assessment Panel
SEB	Significant Environmental Benefit
SEDMP	Soil Erosion and Drainage Management Plan
SR	Sensitive Receptor/Receiver
SSP	State Planning Policies
SWL	Standing water level
TEC	Threatened Ecological Communities
TIS	Traffic Impact Statement
VFR	Visual Flight Rules
VP	Viewpoint
WSP	WSP Australia Pty Ltd
WTG	Wind Turbine Generator

EXECUTIVE SUMMARY

PROJECT DESCRIPTION

Lincoln Gap Wind Farm Pty Ltd (LGWF P/L), a subsidiary of Nexif Energy, are proposing to develop Stage 3 of the Lincoln Gap Wind Farm (the Project) at Lincoln Gap, in the north of the Eyre Peninsula in South Australia. The Project involves the construction of 42 wind turbine generators (WTG) and ancillary infrastructure.

The initial stages of the Lincoln Gap Wind Farm (LGWF) involved the construction of 59 wind turbines, approved in 2018 (this initial project will hereby be referred to as Stage 1 and 2). To make use of the remaining available land, Stage 3 is proposed as an extension of the Project, and requires a separate Development Application. The proposed Project will position additional turbines across two areas; within, and south, of the LGWF Stage 1 and 2 site.

The Project will contribute to Australia's clean energy industry by providing up to 252 Megawatt (MW) of generating capacity, and will also contribute to the reliability and stability of South Australia's energy system.

SITE DESCRIPTION

The Project site (the Site) is located 15 km south-west of Port Augusta in South Australia. The Site is located across three allotments, and is intersected by the Eyre Highway. The allotments are as follows:

- Area 1, north of the Eyre Highway: Section 4 of Hundred Plan 540400, in the Hundred of Handyside – Title reference: CT6138/344. Plus Section 2 of Hundred Plan 540400, in the Hundred of Handyside – Title reference: CT 6138/388 (this allotment will be used for site access only)
 - Area 2, south of the Eyre Highway: Piece 1 in Deposited Plan 37168, in the Hundred of Handyside – Title reference: CT 6138/331.
-

ENVIRONMENTAL ASSESSMENT AND SPECIALIST STUDIES

The following environmental assessments and technical studies were undertaken to support the Development Application.

PLANNING AND LAND USE

The Project site is located within the Remote Areas Zone under the Planning and Design Code (PD Code) as applying to Land Not Within a Council Area. The proposed Site is located adjacent to the existing LGWF Stage 1 and 2, and was used primarily as pastoral grazing prior to the approval of the LGWF project. Wind farms are generally considered compatible with pastoral grazing, and as such, it is anticipated the land will continue to be utilised for such activities during the operation of the Project. All turbines will be located more than 2 km away from residential land use areas. The Project is deemed not to have irreparable consequences to the amenity of the location.

VISUAL AND LANDSCAPE

The existing landscape comprises open arid scrubland and intermittent grazing land. The horizon brings troughs and peaks of faceted slopes from the plateau to the north before intersecting a flatter foreground and then observing gentler slopes of the lower south plateau. From the perspective of the nearest sensitive receptor (being a residential dwelling belonging the landowner of the Project site), the Project was deemed to result in only a slightly adverse change to the visual landscape from the property.

The view of the area from Port Augusta Waterside Recreational Park, located along the foreshore of Port Augusta, is that of expansive local hills; with the existing LGWF Stage 1 and 2 turbines barely visible to the naked eye. The project was deemed to have no impact on the visual amenity from the Recreational Park.

ABORIGINAL CULTURAL HERITAGE

A walkthrough of the Site was undertaken with representatives from the Barngarla Determination Aboriginal Council (BDAC). During this walkthrough, Aboriginal heritage sites were inspected and consideration was given to a creek and gorge lined with mature native vegetation as well as stone outcrops and clay pans.

With any ground disturbing works, there is the risk that unexpected archaeological materials may be uncovered during ground disturbing activities. An Archaeological Inspection Report was completed, which made recommendations on how to avoid and manage potential risks to Aboriginal Cultural Heritage. It has been requested that the final inspection report not be made public, and as such, this report has been deemed confidential and has been provided to SCAP separately.

FLORA AND FAUNA

The Site sits within the Gawler Bioregion and comprises low chenopod shrub land, bardi bush (*Acacia victoriae*) with Western Myall (*Acacia papyrocarpa*) woodland adjacent. The Project site has been subject to grazing activities with the remnant vegetation in the area representative of normal pastoral conditions.

A search of threatened flora species found:

- twelve (12) nationally threatened flora species; none of which were deemed likely to occur within the site
- sixty-eight (68) State threatened flora species of which eleven (11) had potential to occur within the project alignment.

It was inferred that the low cover of native vegetation on the Site is largely due to the presence of invasive exotic species and lack of perennial grass tussocks.

A search of threatened fauna species found:

- thirty-five (35) nationally threatened fauna species; of which one may potentially occur within the project area, the Western Grasswren (*Amytornis textilis myall*)
- forty-five (45) State threatened fauna species of which ten (10) had potential occur within the project area.

A survey of the Project site found three groups of (Western) Slender-billed Thornbills (*Acanthiza iredalei iredalei*), consisting of five, four and two individuals. The (Western) Slender-billed Thornbill has a stable population and is widely distributed. The Project is deemed to have a negligible impact on the species.

Several weed species declared under the *Natural Resources Management Act 2004* (NRM Act) were identified during investigations, including:

- Wards weed (*Carrichtera annua*)
- African Boxthorn (*Lycium ferocissimum*)
- Onion weed (*Asphodelus fistulosus*).

NOISE

A background noise assessment was not undertaken for the Project, as one had already been completed at the Site for the earlier LGWF Stage 1 and 2. Alternatively, noise modelling was undertaken to compare the cumulative effects of LGWF Stage 3, in consideration alongside LGWF Stage 1 and 2, as well as the noise generated solely by LGWF Stage 3. The assessment noted that the Project would increase current noise levels by one decibel at sensitive receivers, and that the Project would not exceed prescribed noise levels. Thus, the Project was deemed to have a negligible impact on noise. It should be noted that only one noise sensitive receiver is located in the vicinity of the Project, and in addition, this sensitive receiver has a commercial relationship with the Project.

SHADOW FLICKER

A shadow flicker assessment was undertaken to determine the impacts of shadow flicker on sensitive receptors in the area. The assessment was undertaken using a single indicative layout consisting of one WTG model with a maximum tip-height of 206 m. The cumulative shadow flicker impact of all three stages were not assessed under the scope.

The assessment determined that the proposed WTGs would have a 1.14 km maximum distance of influence, and that no sensitive receptors were present within this area. As such, it was recommended the no sensitive receptor would experience the effect of shadow flicker as a result of the Project.

ELECTROMAGNETIC INTERFERENCE

An assessment was undertaken to determine the potential Electromagnetic Interference (EMI) impacts of the Project on radio communication services surrounding the Site. The licences were identified using the data registered with the ACMA.

Three (3) fixed, point-to-point, links were identified to intersect with the approximate Project site. The 2nd Fresnel zones were calculated for each link and it was observed that one WTG is located within one blade length of the 2nd Fresnel zone.

Point-to-multipoint licences, point-to-area licences and broadcast services were assessed in the vicinity of the Site. It was recommended that nearby residences may experience some interference to their TV services if they are located in a region of marginal coverage.

The possible cumulative impacts of all three stages of the LGWF were assessed, and determined to be unlikely to cause significant impacts to identified radio communication services. However, it was recommended that in the event the EMI impacts did occur, that there would be options to mitigate most interference issues should they occur.

AVIATION

An aviation impact assessment was undertaken for the Project; which considered aviation operations and aerodromes in the vicinity of the Project site.

The Port Augusta aerodrome is closest to the Project site, and as a result of the assessment, it was deemed unlikely that there would be adverse impacts to this aerodrome as a result of the Project. Furthermore, the Whyalla and Tregalana airstrips, as well as several nearby unlicensed aerodromes were also assessed, and determined unlikely to be impacted.

There is no evidence of nearby airstrips which would be affected by any downstream wind turbulence from any planned WTGs. Furthermore, the Project is also clear of the airspace control zone. The project will not impact Precision/Non-Precision Navigational Aids, HV/VHF Communications, Advanced Surface Movement Guidance and Control Systems, Radar or Satellite/Links. No Prohibited, Restricted or Danger zones were evident in the vicinity of the Project, nor were there any known Notices to Airman (NOTAM) which may have impacted development. In the worst case scenario, a change in the Lowest Safe Altitude (LSALT) for one route which passes over / within 10nm of the project area may be required.

Consultation with CASA, Airservices and the Department of Defence is recommended; with particular regard to the number and height of the WTGs.

TRAFFIC AND ACCESS

A Traffic Impact Assessment (TIA) was conducted for the Project. The objective of the TIA is to identify any key traffic operational and safety issues that may arise out of the Project (during and after construction) and to suggest measures that may mitigate these. The TIA was undertaken both by a desktop assessment and site inspection of the surrounding road network.

Traffic related impacts due to construction traffic movement (light vehicles) were not deemed significant. The assessment recommended that the Eyre Highway has spare capacity to accommodate the anticipated increase in traffic during the construction period. However, it was recommended that a detailed route assessment should be undertaken at the time of transporting wind turbine tower components and that special permits were likely to be required to transport these components.

It was further recommended that an assessment of an existing rail crossing south of Lincoln Gap station to access the southern site should be undertaken to determine any upgrades/changes required to the unsealed road and at the rail crossing.

SOCIO-ECONOMIC

A socio-economic impact assessment was undertaken to establish a baseline summary of the current socio-economic conditions of Lincoln Gap and the Far North region prior to the construction of the proposed Project. The assessment then provided recommendations of the potential impacts, both positive and negative, that may result to the social community environment and the regional economy as an outcome of the Project.

The assessment recommended that the Project would generate considerable environmental, economic and social benefits to Lincoln Gap and the local region of Port Augusta, including by providing employment opportunities, increasing demand for local goods and services, and potentially drawing increased tourism to the area.

Whilst the Project was recommended to provide positive impacts on the existing social and economic environment of Lincoln Gap, it was also noted that there is always a risk that a Project can impact negatively on a community. As such, it was recommended that potential negative impacts be appropriately managed through the formulation of a social management plans and through engagement with key community stakeholders.

GEOTECHNICAL

A desktop geotechnical study was undertaken to better understand the likely subsurface conditions which could be encountered across the Site.

The Site is characterized by two separate, raised rocky landforms known as tablelands and are separated by a low-lying flat plain). This desktop study recommended that the Site is likely to consist of tablelands of rock strength material with soil strength material predominantly in low lying areas. It was suggested that variability in soil profile be considered in foundation and pavement design, along with earthquake considerations in accordance with Australian Standards.

Furthermore, it was recommended a methodology specification and/or technical specification be developed to allow for unforeseen ground conditions and adjustments to site specific conditions during construction, and that excavations and fill, retention systems and any engineered slope constructions, pile footings, hardstands and roads and other pavements be inspected at appropriate stages of their construction by an experienced geotechnical practitioner in accordance with the developed specifications.

STORMWATER AND FLOODING

Earthmoving activities and removal of topsoil will be required for the project, namely for the construction of access tracks, hardstand areas and trenching of underground cables. These works are likely to disrupt existing drainage lines and water catchment areas. During the construction phase a Soil Erosion and Drainage Management Plan is recommended to outline measures that will be undertaken to minimise sediment movement and prevention of site soils entering downstream waterbodies.

NON-INDIGENOUS HERITAGE

There are no registered non-Indigenous heritage places located in close proximity to the Project site, however during an archaeological survey, a stone cairn (a structure built by early surveyors to act as reference points) was identified within the Site. The structure is 2 m in height and diameter and located at the end of the access track in Area 1. Plant and vehicles utilising the access track should be made aware of the structure and avoid as necessary. Overall it is unlikely there will be impacts on non-heritage sites during construction and operation phases of the Project.

SITE CONTAMINATION

A Preliminary Site Investigation (PSI) was undertaken for the Project site. The PSI identified that there were no notifications of site contamination or Environmental Authorisations recorded across the Site, though authorisations relating to waste have been issued to the adjacent property in the past. Although no formal Potentially Contaminating Activities (PCAs) were confirmed to have occurred at the Site there is a possibility that PCAs may have occurred onsite, including:

- use of imported/impacted fill materials
- use of agricultural chemicals including:
 - use of arsenic based weedicides/herbicides at (North western boundary in Area 1)
 - use of arsenic based pesticides within a possible sheep dip (north-west portion of Area 1)
 - use of termicides beneath a former woolshed (Area 1)
- railway activities:
 - transport of fuel or material/ores (north west boundary of Area 1)
 - use of asbestos train brakes (north west boundary of Area 1).

Overall the risk of site contamination was recommended to be minor due to the localized nature and confinement of the potential contamination to shallow soils. The sheep dip is the most likely potentially contaminating activity (PCA) identified onsite however there is no confirmation that the sheep dip was present and the likely area is some 400 m from the proposed development, and thus unlikely to be disturbed.

1 INTRODUCTION

1.1 BACKGROUND TO THE LINCOLN GAP WIND FARM

The Lincoln Gap Wind Farm (LGWF) Project was originally submitted to the Development Assessment Commission (DAC) as the relevant authority in 2006 (DA 010/0011/06). The original Development Application consisted of 59 wind turbine generators (WTGs) with a maximum tip height of 124 m and a maximum combined generating capacity of 118 MW.

Following several variations and additional applications for ancillary infrastructure, the LGWF received Development Approval from the State Commission Assessment Panel (SCAP) in December 2018 (DA 010/U053/17 V1) and has substantially commenced construction. Development Approval has been granted for:

- 59 wind turbine generators (WTG) with a maximum tip height of 180 m and a total generating capacity of 212 MW
- internal ancillary infrastructure, including meteorological masts, operation/maintenance building, switchyard, transmission lines and temporary construction compound and concrete batching plant
- off-site substation
- 10 MW on-site battery energy storage system (BESS).

Please note that for the remainder of this report, the abovementioned 59 wind turbines will be referred to as LGWF Stage 1 and 2.

Lincoln Gap Wind Farm Pty Ltd (LGWF P/L) now propose to construct the LGWF Stage 3 across two areas within and south of the site for LGWF Stage 1 and 2 (shown below in Figure 1.1).

1.2 LINCOLN GAP WIND FARM STAGE 3

The LGWF Stage 3 proposal incorporates 42 WTGs with a maximum 252 MW capacity and ancillary infrastructure. At the time of writing this report, three potential wind turbine models were under consideration. These consist of:

- GE 5.3 MW model; with a rated capacity of 5.3 MW, hub height of 121 m, rotor diameter of 158 m, and maximum tip height of 200 m
- Vestas 5.6 MW model; with a rated capacity of 5.6 MW, hub height of 125 m, rotor diameter of 162 m, and a maximum tip height of 206 m
- Siemens Gamesa, SG 6.0-155 model; with a rated capacity of 6.0 MW, hub height of 107.5 m, rotor diameter of 155 m, and maximum tip height of 185 m.

As such, where impacts have been assessed throughout this report and supporting technical studies, the worst-case scenario impacts, based on the characteristics of the three potential models, were captured and assessed. Furthermore, assessments have been based on an indicative turbine layout within an Approval Corridor (refer Section 1.3).

A Development Application for LGWF Stage 3 is being submitted to SCAP as the relevant authority. To support the planning approval process, a number of specialist or technical studies have been undertaken, and are discussed in Section 5).

1.3 THE APPROVAL CORRIDOR CONCEPT

A significant degree project detail certainty is required for development approval, however changes are often required as the project progresses (e.g. WTG design and technology, wind farm layout design, ancillary infrastructure design and alignment or planning changes). The need to return to the SCAP with planning variations for changes can complicate project approvals and cause inefficiencies. LGWF Stage 1 and Stage 2 underwent four significant variations since the original Development Application was lodged in 2006.

To mitigate the need for planning variations for LGWF Stage 3, LGWF P/L is seeking SCAP support of an Approval Corridor. This will be a nominal 125 m either side of the development lines (in total; a 250 m wide corridor), shown in Figure 1.2 throughout the wind farm and will provide an approval area within which issues of concern have been assessed and cleared.

It is envisaged that the Approval Corridor will provide a level of flexibility and certainty for the Project and remove the need for the future assessment of minor WTG micro-siting, if required. WSP has found that this process has worked well for similar projects, such as the Barn Hill Wind Farm which was approved by the Port Wakefield and Port Pirie Regional Councils in 2017.


1.4 SCOPE OF THIS REPORT

The scope of this report is to provide an assessment of LGWF Stage 3 against the relevant provisions of the Planning and Design Code as applying to Land Not Within a Council Area (the PD Code), the *Planning, Development and Infrastructure Act 2016* (the PDI Act) and the associated *Planning, Development and Infrastructure (General) Regulations 2017* (the PDI Regulations).



Legend	
	Highways
	Railway
	Site Boundary

Map: PS113707_GIS_008_A1	Author: MO
Date: 18/06/2019	Approved by:




1:300,000

Data source - Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), Magyris, NCCO, © OpenStreetMap contributors, and the GIS User Community

Coordinate system: GDA 1994 MGA Zone 53
Scale ratio correct when printed at A3



Lincoln Gap Wind Farm Stage 3

Figure 1.1
Site Location Plan

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1.5 STRUCTURE AND CONTENT OF THIS REPORT

This report contains the necessary information for assessment of the Development Application, pursuant to the requirements of the PDI Act, the PDI Regulations and the relevant provisions of the PD Code.

- 1 **Section 1 – Introduction** provides an overview of the proposal, the approval process and the proponent.
- 2 **Section 2 – Strategic context** provides an overview of the rationale for the proposal and outlines the Project’s consistency with Commonwealth and State targets, guidelines and strategic directions. It also outlines the key benefits associated with the construction and operation of the Project.
- 3 **Section 3 – Project alternatives** provides an overview of the alternatives considered in developing the proposal to minimise potential impacts and how the current proposal was reached.
- 4 **Section 4 – Project site** provides an overview of the site locality and existing infrastructure present.
- 5 **Section 5 – Project description** describes the details of the proposed development, including key components of the proposal, capital investment and the power purchasing agreement.
- 6 **Section 6 – Key stakeholder consultation** provides an overview of the key stakeholders for the proposal and the consultation activities undertaken to date.
- 7 **Section 7– Environmental assessment** details the results of the environmental assessments completed for the proposal, including: planning and land use, visual and landscape, Aboriginal cultural heritage, flora and fauna, noise, shadow flicker, electromagnetic interference (EMI), aviation, traffic and access, socio-economic, geotechnical, stormwater and flooding, non-Indigenous heritage and site contamination.
- 8 **Section 8 – Construction, operation and decommissioning** has been structured to provide details on how the Project will generally be managed during the construction and operation phase. These details include fire / bushfire management, emergency management and site security measures.
- 9 **Section 9 – Conclusion and recommendations** concludes the assessment, reviewing the development against the provisions of the relevant provisions of the Planning and Design Code as applying to Land Not Within a Council Area, the PDI Act and the PDI Regulations.
- 10 **Section 10 – Limitations** identifies the limitations of the assessment undertaken for this proposal.

1.6 APPROVAL PATHWAY

The PDI Act and PDI Regulations are the new, primarily pieces of legislation that will facilitate planning and development approval across South Australia. The PDI Act is being implemented across South Australia in a staged approach. In July 2019, the PDI Act repealed the *Development Act 1993* as the relevant development legislation in areas of South Australia not covered by a Council. The PDI Act will be implemented across the remaining areas of South Australia, including regional Council Areas and Metropolitan Council Areas, by July 2020.

The PDI Act requires that Development Approval must be sought and obtained prior to undertaking any form of development as defined under the Act. The Project consists of both ‘building work’ and a ‘change in land use’ and as such, constitutes Development under the Act.

The Project is seeking Approval from SCAP under Section 131 (Crown Development) of the PDI Act, given that the Project is for the purpose of the generation of electricity, and as such, is considered ‘essential infrastructure’. The Project secured Section 131 (Crown Development) status under the PDI Act, with the Department for Energy and Mining (DEM) providing sponsorship/endorsement. The letter from DEM has been provided in Appendix A.

1.6.1 CERTIFICATE FROM THE OFFICE OF THE TECHNICAL REGULATOR

In accordance with Regulation 107(2)(c) of the PDI Regulations, if a Development Application seeks Approval under Section 131 of the PDI Act, and proposes the development of an electricity generating plant with a capacity of greater than 5 MW and where it is to be connected to the State's power system, the proponent must submit a statement to the Office of the Technical Regulator (OTR) seeking a certificate to confirm that the project will contribute to the security and reliability of the State's power system, prior to lodgement of the Development Application with SCAP (Office of the Technical Regulator, 2017).

A statement was therefore submitted to the OTR on 10 May 2019; outlining how the Project intends to meet the technical requirements of the OTR and contribute to the security and reliability of the State's power system. A certificate from the OTR was issued for the Project on 26 June 2019, and is provided in Appendix B.

1.7 OTHER APPROVALS

Other environmental approvals, authorisations and permits may be required in both the pre-construction and construction phases of the Project under the following acts of legislation:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Environment Protection Act 1993*
- *Natural Resources Management Act 2004* (NRM Act)
- *Native Vegetation Act 1991*
- *National Parks and Wildlife Act 1972* (NPW Act)
- *Aboriginal Heritage Act 1988*
- *Native Title Act 1993*.

1.7.1 EPBC RISK ASSESSMENT

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. It applies to all Australian territory and waters. Under the EPBC Act, actions that are likely to have a significant impact upon defined Matters of National Environmental Significance (MNES) are subject to an assessment and approval process. A company proposing to take an action that may have a significant impact on a MNES must refer that action to the Commonwealth Minister for the Environment.

In order to decide whether an action is likely to have a significant impact, it is necessary to take into account the nature and magnitude of potential impacts. In determining this, it is important to consider:

- all on-site and off-site impacts
- all direct and indirect impacts
- the frequency and duration of the action
- the total impact, which can be attributed to that action over the entire geographic area affected, and over time
- the sensitivity of the receiving environment
- the degree of confidence with which the impacts of the action are known and understood.

The EPBC Act prescribes nine MNES as triggers for Commonwealth assessment. In order to assess whether an EPBC referral would be required for this Project, an EPBC risk assessment was completed to determine the likelihood of the proposal impacting on a MNES (Appendix C). Of the nine matters, there are three which could potentially trigger a Commonwealth assessment for the LGWF Stage 3 project:

- nationally threatened species
- threatened ecological communities
- migratory species protected under international agreements.

The EPBC risk assessment process was informed by a desktop assessment, including a review of previous ecological studies undertaken for the Site, the generation of an EPBC Act Protected Matters Report using the Protected Matters Search Tool (PMST), a review of the Biological Databases of South Australia (BDBSA) data and results from the flora and fauna survey undertaken for the Project by EBS Ecology (Appendix G).

A search of the EPBC protected matters search tool, using a 50 km buffer distance from the Site, identified three threatened ecological communities, 51 threatened species and 45 migratory species that may relate to the search area (Department of the Environment and Energy, 2019). This information was cross referenced with records held in the BDBSA. Of the species identified, only two were considered 'possible' of occurring on the Site. Of these two species, one was further assessed to be unlikely to occur on the Site, while the other was assessed to be a possible occasional visitor, but unlikely to be impacted by the Project. Furthermore, the three identified ecological communities identified as unlikely to occur within the Project area and have not been recorded in any of the previous ecological assessments undertaken for the Site.

A field survey, including a vegetation and bird assessment, was undertaken from 15–19 June 2019 across the Site, and did not record any threatened ecological communities or nationally threatened species, including migratory species. The Slender-billed Thornbill (western) (*Acanthiza iredalei iredalei*) was recorded within the project area in three groups of five, four and two individuals, however this species was removed from the EPBC Act list of threatened species on 14 December 2013 (Department of the Environment, 2019).

The EPBC risk assessment found that, based on the EPBC Act Significant Impact Guidelines, the Project is not considered to have a significant impact on any EPBC Act listed flora, fauna or ecological communities, for the following reasons:

- No Threatened Ecological Communities (TEC) were identified within the Project area.
- No nationally threatened flora species observed within the project area and flora species identified in the PMST are not considered likely to occur.
- The Slender-billed Thornbill, which was recorded during the field survey, was de-listed from the EPBC Act in December 2013.

As such, it was considered that the submission of a referral under the EPBC Act for the Project would not be required.

1.7.2 ANCILLARY APPROVALS

The construction of the Project will be subject to secondary and ancillary environmental and Project approvals under predominantly State-based legislation, including:

- a range on Environmental Authorisations (e.g. licence for earthworks drainage) for prescribed activities under the *Environment Protection Act 1993*
- potential approvals under the *Aboriginal Heritage Act 1988* (refer section 5.3)
- applications to remove native vegetation under Regulation 12(34) – Infrastructure or Regulation 12(27) – Major Projects exemptions of the *Native Vegetation Act 1991* (refer section 5.5 and Appendix G)
- permits under Sections 79 and 80 and Regulations 33-46 of the *Fire and Emergency Services Act 2005*
- wells, groundwater and water-related permits under the *Natural Resources Management Act 2004*
- road transport permits under the *Road Traffic Act 1961*
- Dangerous Goods Licenses under the *Dangerous Substances Act 1979*.

1.8 PROJECT TIMING

Construction of the Project will take approximately 24 months, subject to planning Approval and other statutory approvals requirements. Further detail regarding the indicative construction timeline is provided in Section 6.1.

1.9 KEY STAKEHOLDER CONSULTATION

Stakeholder engagement is a fundamental part of the planning process. Since the commencement of the planning stage for the Project, LGWF P/L have undertaken consultation and engagement activities with the following key stakeholders:

- landholders of the Project site
- representatives from Department for Trade, Tourism and Investment
- representatives from ElectraNet
- Energy Minister Dan van Holst Pellekaan (during a site visit to the broader LGWF site).

1.10 THE PROPONENT

The proponent for the LGWF Stage 3 is Lincoln Gap Wind Farm Pty Ltd (LGWF P/L), a subsidiary of Nexif Energy Australia Pty Ltd (Nexif Energy). Nexif Energy is an independent power producer with conventional and renewable power generation assets across Australia and South/South-east Asia. LGWF P/L are also the owners of LGWF Stage 1 and 2.

The LGWF P/L Project Manager for the LGWF Stage 3 is:

Torb Stolpe

Senior Development Manager
Nexif Energy Australia Pty Ltd

Phone: +61 491 253 052

Email: Torb.Stolpe@Nexif.com

This Development Application Report has been prepared by WSP Australia Pty Limited (WSP) on behalf of LGWF P/L. Contact details are as follows:

Ms Bronte Nixon

Principal Environmental Scientist and Planner
WSP Australia Pty Ltd

Phone: 08 8405 4421

Mobile: 0416 159 355

Email: Bronte.Nixon@wsp.com

2 STRATEGIC CONTEXT

2.1 PROJECT RATIONALE

LGWF P/L is a subsidiary of Nexif Energy. Nexif Energy is an independent power producer established to develop, finance, construct and opportunistically acquire conventional and renewable power generation assets across Australia and South/Southeast Asia. Nexif Energy is joint venture of Nexif Pty. Ltd. (Nexif), a Singapore incorporated and based independent power development and management company, and funds advised by Denham Capital Management LP (Denham Capital), a leading global energy-focused private equity firm.

Nexif was established by experienced professionals with a track record in global and regional power companies in the development, finance, acquisition, restructuring, construction and operation of conventional and renewable power projects industries and has offices and extensive networks across Australia and Asia. From 2010 to 2015, as manager of InfraCo Asia, Nexif originated, developed and financed several power generation projects.

Denham Capital is a leading energy and resources-focused global private equity firm with more than US\$9 billion of invested and committed capital across eight fund vehicles with offices in London, Boston, Houston and Perth. The firm makes direct investments in the energy and resources sectors, including businesses involving power generation, oil and gas, and mining, across the globe and across all stages of the project lifecycle.

As of 31 March 2018, the gross asset value of Denham Commodity Partners Fund VI LP (DCPF VI), the fund vehicle through which Denham Capital holds more than 95% equity stake in Nexif Energy, was US\$2.76 billion. If successful, the development and acquisition will be completed by an Australian incorporated subsidiary (or subsidiaries) of Nexif Energy.

2.2 PROJECT OBJECTIVES

It is anticipated that the Project would generate approximately 960 GWh of clean energy per year (based in the largest turbine model under consideration). This equates to a saving of approximately 500,000 tonnes of CO₂ emission annually.

The Project would contribute to the reliability and stability of South Australia's energy supply, as discussed in Section 1.6.1, and would also contribute to achieving renewable energy objectives at a State level, as discussed in Section 2 below.

Furthermore, it is estimated that up to 120–140 workers will be employed as a direct result of the Project over the approximate 24-month construction period. It is estimated that 12 permanent staff will be employed during the operation phase of the project, increasing up to 20 staff during periods of outages and high service level. Staff will be sourced locally where possible.

2.3 STRATEGIC CONTEXT

2.3.1 STATE PLANNING POLICIES

State Planning Policies (SPP) are a planning instrument under the PDI Act; which create a framework for land use in South Australia (Department of Planning, Transport and Infrastructure, 2019). The key objective of the State Planning Policies is to promote liveability, sustainability and prosperity across the State. The following State Planning Policies are relevant to this Project:

- *SPP 4. Biodiversity*
 - *4.1. Minimise impacts of development on areas with recognised natural character and values, such as native vegetation and critical habitat so that critical life-supporting functions to our state can be maintained.*
 - *4.5. Where impacts to biodiversity cannot be avoided, these impacts should be minimised and where possible, offset.*
- *SPP 5. Climate Change*
 - *5.6. Facilitate green technologies and industries that reduce reliance on carbon-based energy supplies and directly or indirectly reduce our greenhouse gas emissions.*
 - *5.9. Encourage development that does not increase our vulnerability to, or exacerbate the impacts of climate change and which makes the fullest possible contribution to mitigation.*
- *SPP 7. Cultural Heritage*
 - *7.2. Recognise and protect Indigenous cultural heritage sites and areas of significance.*
- *SPP 12. Energy*
 - *12.1. Development of energy assets and infrastructure (including ancillary facilities) where the impact on surrounding land uses, regional communities and the natural and built environment can be minimised.*
- *SPP 15. Natural Hazards*
 - *15.1. Identify and minimise the risk to people, property and the environment from exposure to natural hazards including extreme heat events; bushfire; terrestrial and coastal flooding; soil erosion; drought; dune drift; acid sulfate soils; including taking into account the impacts of climate change.*

2.3.2 PLANNING STRATEGY FOR SOUTH AUSTRALIA

The Planning Strategy for South Australia (the Planning Strategy) guides land use and development across the State. The Planning Strategy is presented across eight volumes, each covering a distinct geographical region. The Planning Strategy has been developed to guide the formulation of Development Plans for local areas, and as such, can provide an indication of the envisaged land use and development for a region. The relevant volume of the Planning Strategy for this project area is the Far North Region Plan (Department of Planning and Local Government, 2010). The following principle from the Far North Region Plan is relevant to this project:

- *Principle 14: Foster sustainable alternative energy and water supply industries.*

2.3.3 SOUTH AUSTRALIA'S CLIMATE CHANGE STRATEGY 2015–2050

South Australia's Climate Change Strategy 2015 – 2050 (the Climate Change Strategy) sets out South Australia's framework and initiatives to meet the targets established under the *Climate Change and Greenhouse Emissions Reduction Act 2007 (SA)* (Government of South Australia, 2015). This project contributes to two of the five targets set out in the document:

- *Achieve net zero emissions by 2050*
- *Generate 50% of our electricity from renewable sources by 2025.*

2.4 ASSESSMENT GUIDELINES

The following guidelines were consulted in the assessment for the Project:

- Wind Farm Development Guidelines for Developers and Local Government Planners, June 2014
- South Australian Planning Requirements for New Electricity Generation, July 2014
- Best Practice Guidelines for Implementation of Wind Energy Projects in Australia, June 2018.

The Project would be developed in accordance with the requirements of these guidelines (as relevant to South Australia). Previous wind farm studies were also reviewed to ensure potential assessment requirements were addressed.

3 PROJECT SITE

3.1 LOCATION

The proposed LGWF Stage 3 is situated in Lincoln Gap, at the top of the Eyre Peninsula in South Australia. The site is approximately 15 km south-west of Port Augusta. The proposed LGWF Stage 3 is located across three allotments, separated into north and south parcels by the Eyre Highway; referred to as Area 1 and area 2 respectively. Area 1 is also the site of LGWF Stage 1 and 2. Site details for LGWF Stage 3 are provided in Table 3.1. Relevant Certificates of Title are provided in Appendix D.

Table 3.1 Project site details

	AREA 1 (NORTH)	AREA 2 (SOUTH)
Road	Eyre Highway	Lincoln Highway
Suburb	Lincoln Gap	Lincoln Gap
Postcode	5715	5715
Council	Out of council area	Out of council area
State Electorate	Giles	Giles
Federal Electorate	Grey	Grey
Hundred	Handyside	Handyside
Title Reference	CT 6138/334 and CT 6138/388	CT 6138/331
Plan No.	Sections 2 (for access only) and 4 of Hundred Plan 540400	Piece 1 in Deposited Plan 37168
Current owner	Nutt Bros Nominees Pty Ltd	Nutt Bros Nominees Pty Ltd
Current occupier	Partially occupied by LGWF P/L, under lease	Partially occupied by LGWF P/L, under lease

3.2 LAND MANAGEMENT AND TENURE

LGWF P/L have a Lease agreement in place with Nutt Bros Nominees Pty. Ltd. to allow use of the site for the Lincoln Gap Wind Farm project. The lease agreement has been registered with the Land Titles Office.

It is anticipated that project infrastructure will remain owned and operated by LGWF P/L.

It is anticipated that pastoral activities, being considered a land use compatible with wind farms, will continue across the site during the operation of the Project.

3.3 SITE DESCRIPTION

The Project site (the Site) will be located at Lincoln Gap, approximately 15 km west of Port Augusta. Development will be located on land parcels previously approved for use as a wind farm: for LGWF Stage 1 and 2, approved by SCAP under Development Application 010/U053/17.

The Site is intersected by the Eyre Highway. WTGs for the Project will be located to the east of previously approved wind farm infrastructure on the northern side of Eyre Highway (Area 1), and south of the previously approved substation to the south of Eyre Highway (Area 2).

The topography of the Site is defined by flat plains and distinct ridgelines. The Site, and much of the surrounding area, has a long history of pastoral use. Vegetation mostly consists of *Maireana sedifolia* Low Shrubland, though other vegetation associations exist across the varied topography.

Drainage lines have formed across the site's ridgelines. The area along the eastern border of Area 1 (an area not earmarked for development) is subject to flooding. The site contains a number of public and private dams.

Prior to the recent approval of the site for use as a wind farm, land use on the site was predominantly for grazing livestock. Being a compatible land use, it is anticipated that grazing will continue in conjunction with the operation of the wind farm.

Key physical features of the Site are displayed in Figure 3.1.

3.4 SITES SELECTION

The Project site makes efficient use of the remaining, available land within the wider LGWF site. The preliminary turbine layout has taken into account available access to wind resources.

Micro-siting of turbines will be informed by technical studies, and should aim to:

- avoid areas of intact native vegetation and areas of potential fauna habitat
- avoid identified Aboriginal heritage sites
- avoid unsuitable geotechnical conditions, unstable sloping land.

3.5 DEVELOPMENT PLAN ZONING

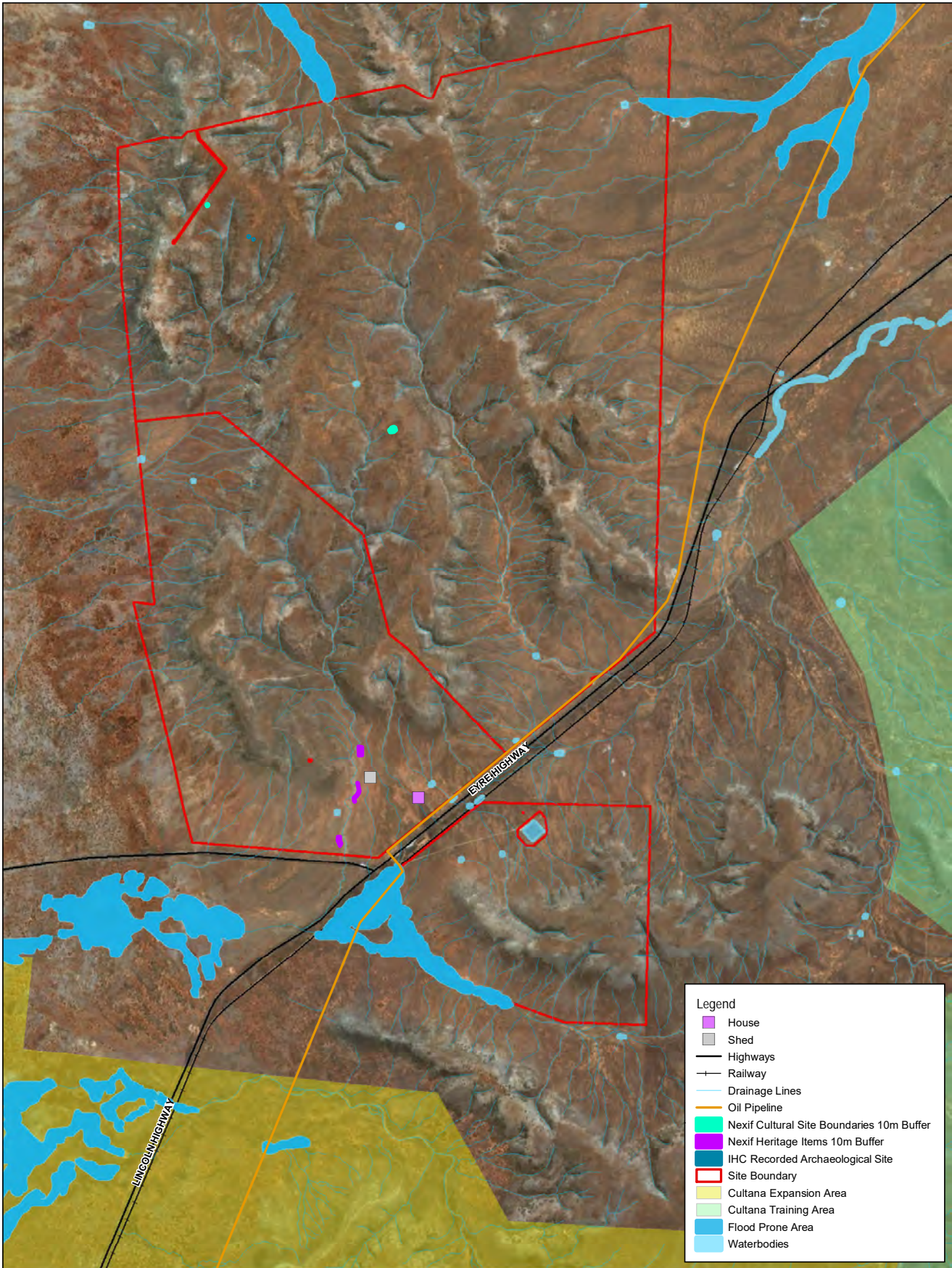
The Site is located within the Remote Areas Zone of the Planning and Design Code (Phase 1) (PD Code).

The Remote Areas Zone has a desired range of activities, including pastoral, agricultural, mining, energy generation, infrastructure, aerospace and defence, tourism, remote settlements, Aboriginal lands and related rural land activities.

Under the zone, wind farms constitute 'Performance Assessed Development', and are to be assessed against a number of Performance Outcomes covering design and sighting, clearance from overhead powerlines, infrastructure and renewable energy facilities, interface between land uses, and transport, access and parking. Additionally, the sighting and design of all development, should aim to protect natural features and conservation values of the area (State Planning Commission, 2019). Refer to Section 5.1 for an assessment of the Project against the Project against the relevant provisions of the PD Code.

Land directly to the east of the Project Site is located under the Primary Industry Zone of the Port Augusta City Development Plan, and is currently still governed by the *Development Act 1993*.

Land use zoning for the Site is displayed Figure 3.2 below.

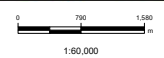


Map: PS113707_GIS_003_A1

Author: MO

Date: 27/05/2019

Approved by:



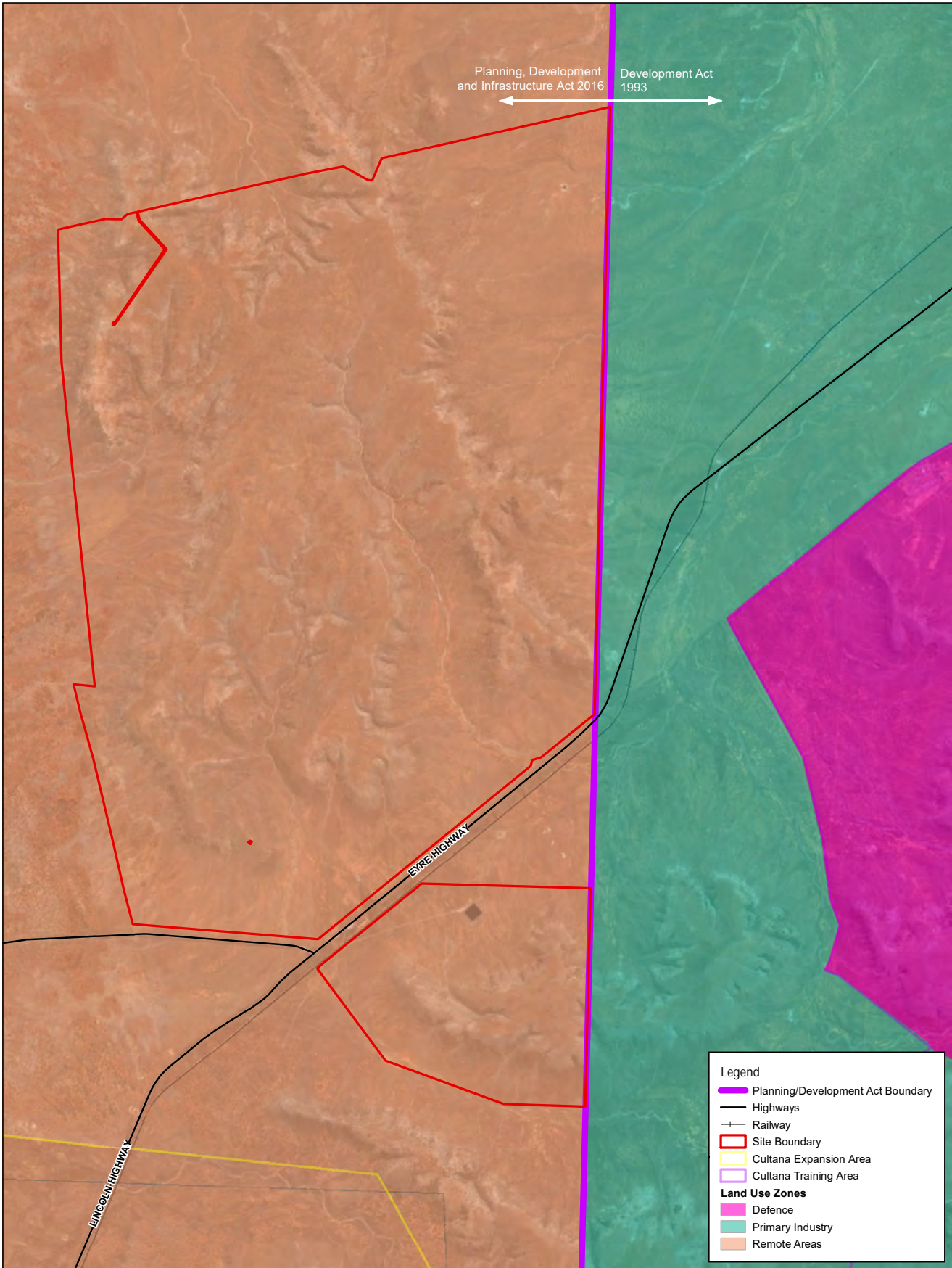
Coordinate system: GDA 1994 MGA Zone 53
Scale ratio correct when printed at A3

Data sources: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Lincoln Gap Wind Farm Stage 3

Figure 3.1
Key Physical Features



Planning, Development and Infrastructure Act 2016 ← → Development Act 1993

Legend

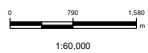
- Planning/Development Act Boundary
- Highways
- + Railway
- Site Boundary
- Cultana Expansion Area
- Cultana Training Area

Land Use Zones

- Defence
- Primary Industry
- Remote Areas

Map: PS113707_GIS_015_A1

Author: MO



Lincoln Gap Wind Farm Stage 3

Date: 6/08/2019

Approved by:

Data sources: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate system: GDA 1994 MGA Zone 53
Scale ratio correct when printed at A3



Figure 3.2
Land Use Zoning

3.6 EXISTING INFRASTRUCTURE

Existing infrastructure on Site is mostly associated with LGWF Stage 1 and 2, as well as pastoral activities for the Pandurra Station. Existing infrastructure (consisting of both constructed and pending structures) includes:

- 59, 180 m-tall WTGs
- meteorological masts
- an internal substation and switchroom
- an external Electranet substation
- an operations and maintenance building
- 33 kV underground cables
- 275 kV overhead line and associated poles and terminals
- internal access tracks
- temporary construction facilities including a site office, concrete batching plant and parking
- BESS and associated equipment (including foundation works and structures to house battery array)
- a dwelling, currently occupied by the owners of the land
- a shearing shed.

3.7 ADJACENT LAND USES

The land use within the Site is mostly livestock grazing, comprising the Pandurra Station pastoral lease. Adjacent land use for the north and south parcels comprising the site is outlined in Table 3.2 and Figure 3.3.

Table 3.2 Adjacent land use

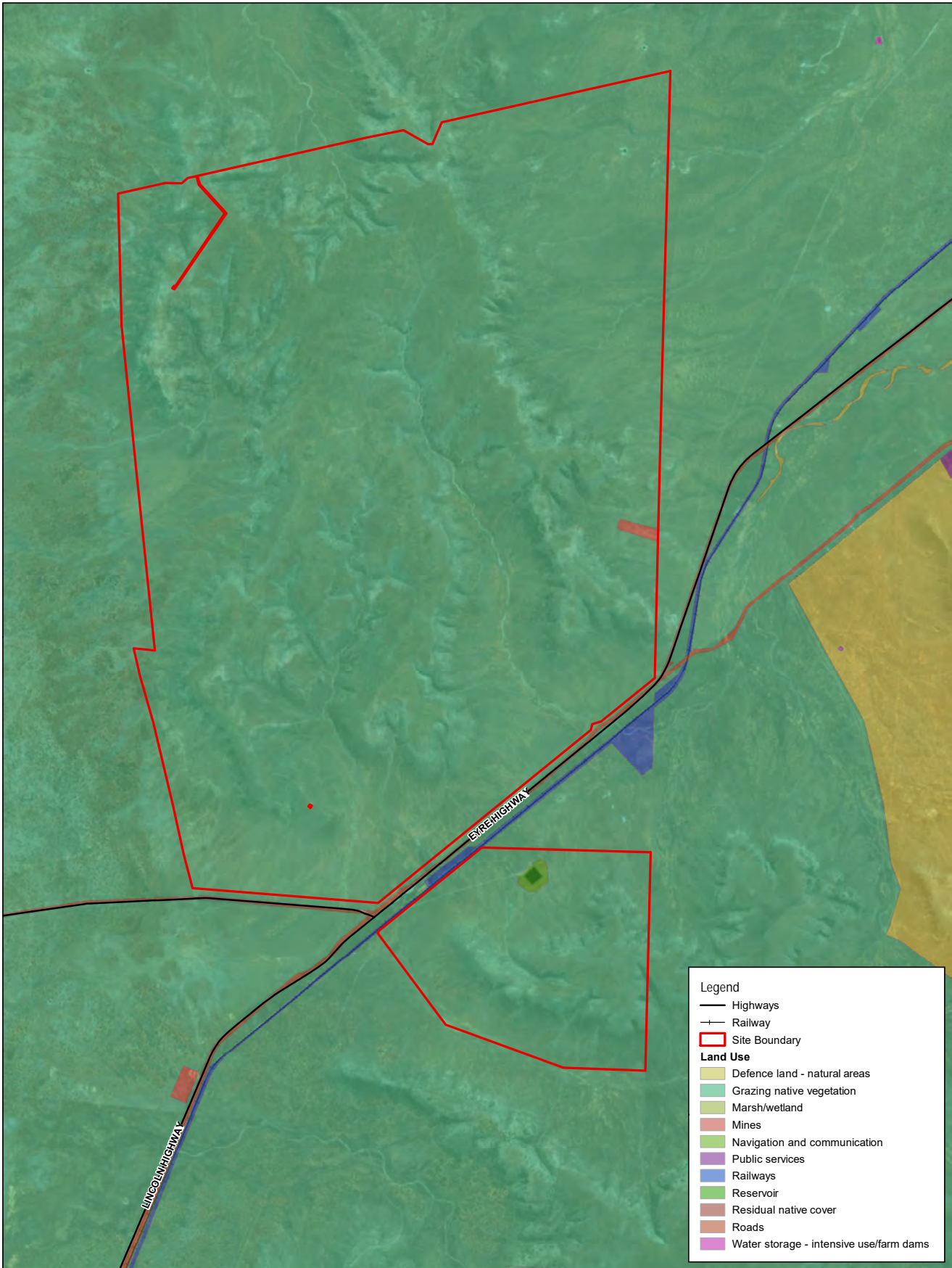
NORTH	North parcel: Livestock grazing South parcel: ARTC railway
SOUTH	North parcel: Livestock grazing, under crown lease South parcel: Non-identified parcel (public road or tenure)
EAST	North parcel: Livestock grazing South parcel: Livestock grazing, under crown lease
WEST	North parcel: Livestock grazing South parcel: Non-identified parcel (public road or tenure)

3.8 BROADER SITE CONTEXT

The Site is located on the north-east Eyre Peninsula, approximately 15 km west of Port Augusta and 12 km west of the Spencer Gulf. The Cultana Training Area (including the Cultana Expansion Area) sits approximately 1.8 km from the nearest boundary. Remaining land use in the area is mostly pastoral.

The Eyre Highway; a state maintained road, intersects the Site; between Area 1 and Area 2. An ARTC railway is located adjacent and parallel to the Eyre Highway.

Key features of the Site locality are shown in Figure 3.4.



Legend

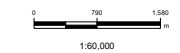
- Highways
- +— Railway
- Site Boundary

Land Use

- Defence land - natural areas
- Grazing native vegetation
- Marsh/wetland
- Mines
- Navigation and communication
- Public services
- Railways
- Reservoir
- Residual native cover
- Roads
- Water storage - intensive use/farm dams

Map: PS113707_GIS_010_A1

Author: MO



Coordinate system: GDA 1994 MGA Zone 53
Scale ratio correct when printed at A3

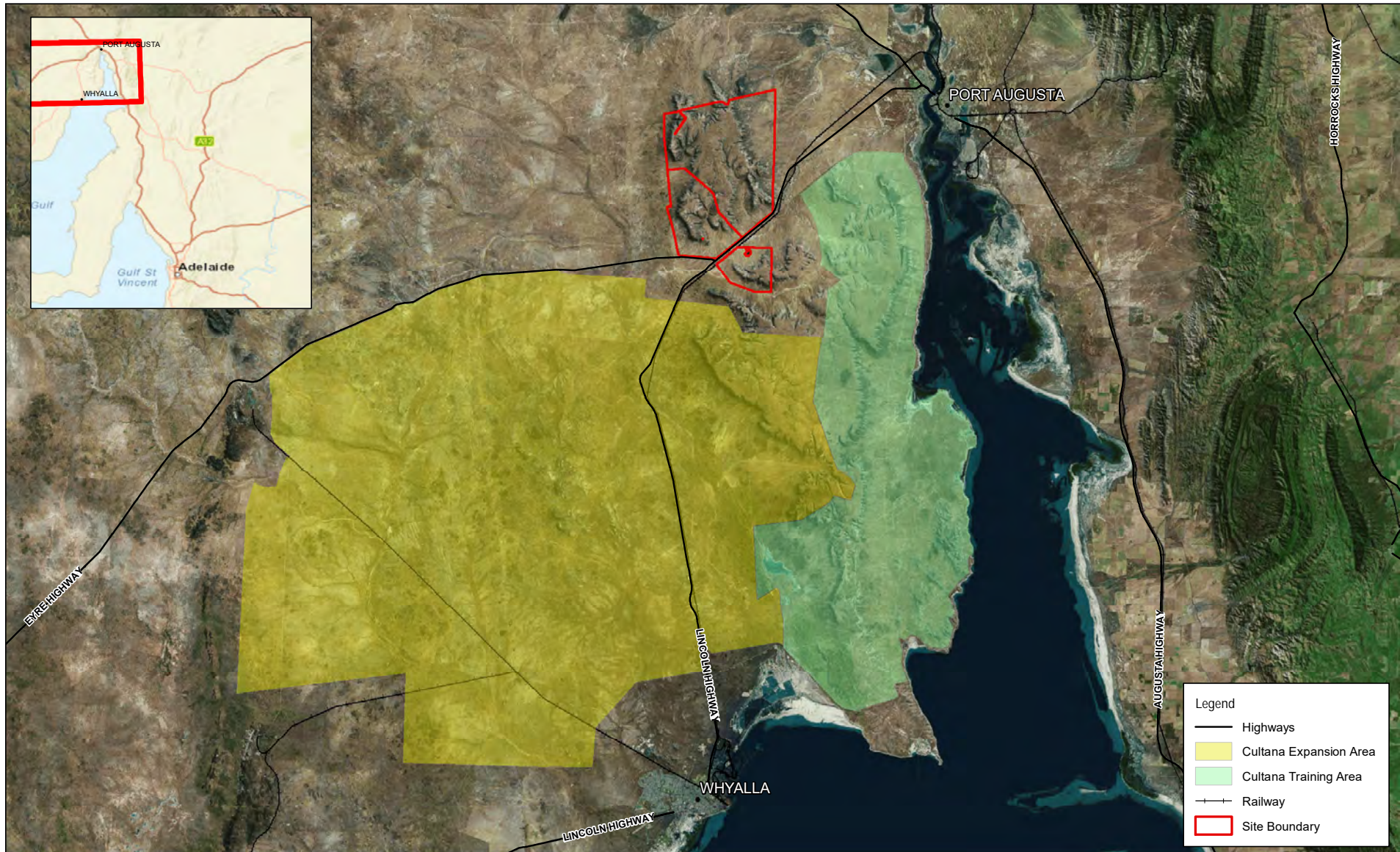
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Approved by:

Data source: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Lincoln Gap Wind Farm Stage 3

Figure 3.3
Land use within the project area



Legend

- Highways
- Cultana Expansion Area
- Cultana Training Area
- Railway
- Site Boundary

Map: PS113707_GIS_002_A2 Author: MO
 Date: 27/05/2019 Approved by:




1:300,000

Data source -
 Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), Magnolia, NCCO, © OpenStreetMap contributors, and the GIS User Community

Coordinate system: GDA 1994 MGA Zone 53
 Scale ratio correct when printed at A



Lincoln Gap Wind Farm Stage 3

Figure 3.4
 Site Location

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4 PROJECT DESCRIPTION

4.1 NATURE OF DEVELOPMENT

The Project proposes the construction of a 42-turbine wind farm. The Project will form an expansion to the Approved, partially constructed Lincoln Gap Wind Farm, and will be connected to South Australia's energy network; with electricity generated to be used for the sale of electricity to the Public.

4.2 KEY COMPONENTS

The Project involves the construction of a 42-turbine wind farm and associated infrastructure. WTG suppliers are still being finalised, however in considering short-listed options, WTGs will have a maximum tip height of 206 m and a maximum generating capacity of 6.0 MW. The maximum combined generating capacity of the project would be 252 MW. Associated infrastructure will include:

- meteorological masts (Approved under separate development application, SCAP reference DA 010/U017/19)
- access tracks, laydown areas and turbine hardstands (note that the project will utilise existing access points off Eyre Highway, and will not require the creation of new access points)
- 33 kV overhead powerline and associated poles
- 275 kV overhead powerline and associated poles
- 33/275 kV substation
- 33 kV underground cables
- an internal substation and switch room
- operations and maintenance buildings
- a storage shed
- security fencing
- temporary construction facilities including a site office, concrete batching plant and parking
- BESS and/or Synchronous Condenser units and associated equipment (including foundation works and structures to house the equipment) or any other technology that are able to deliver compliance with the OTR's technical requirements.

A preliminary site layout is displayed in Figure 4.2.

LGWF P/L request that the final design of the Project be withheld as a Reserved Matter, in order to allow for individual requirements of the construction contractor. Furthermore, please be aware that although the OTR have issued a certificate, LGWF P/L are still negotiating the solution to meet the OTR's requirements; hence, both a BESS and Synchronous Condenser (or combination) solution have been identified here. As such, LGWF P/L request that these details also be withheld as a Reserved Matter.

4.2.1 WIND TURBINE GENERATORS

WTGs consist of a rotor with blades, a tower and a nacelle (refer Figure 4.1). The function of the WTGs is to generate electricity by harnessing energy from the wind. WTGs consist of a rotor comprised of three blades which is mounted on top of a steel tower. The energy captured by the rotating blades is transferred to a generator housed within the nacelle of the turbine, which is bolted to the top of the turbine's tower. The turbine will have three blades and a variable speed.

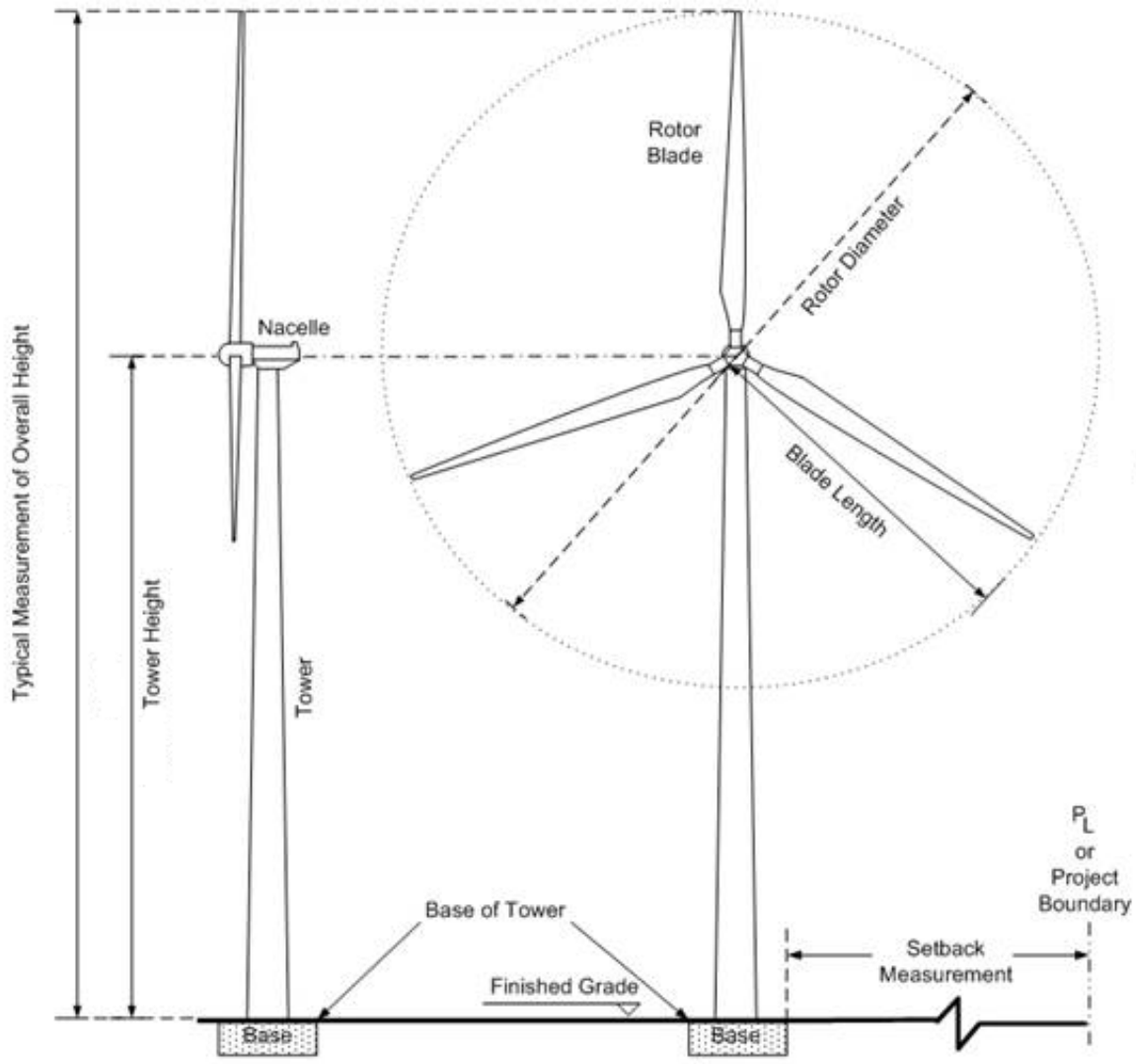


Figure 4.1 Generic wind turbine generator

As discussed above in Section 1.2, the final turbine model is still to be determined. Based on the three models under consideration (refer Table 4.1), the wind turbine towers will have a height of 107–125 m, accommodating a rotor which will have a maximum diameter of 162 m. Typically, the towers comprise a tubular steel structure that will be wider in diameter at the base; tapering in diameter at the top. The towers are generally comprised of several sections, with an internal lift and access ladder, power and control cables.

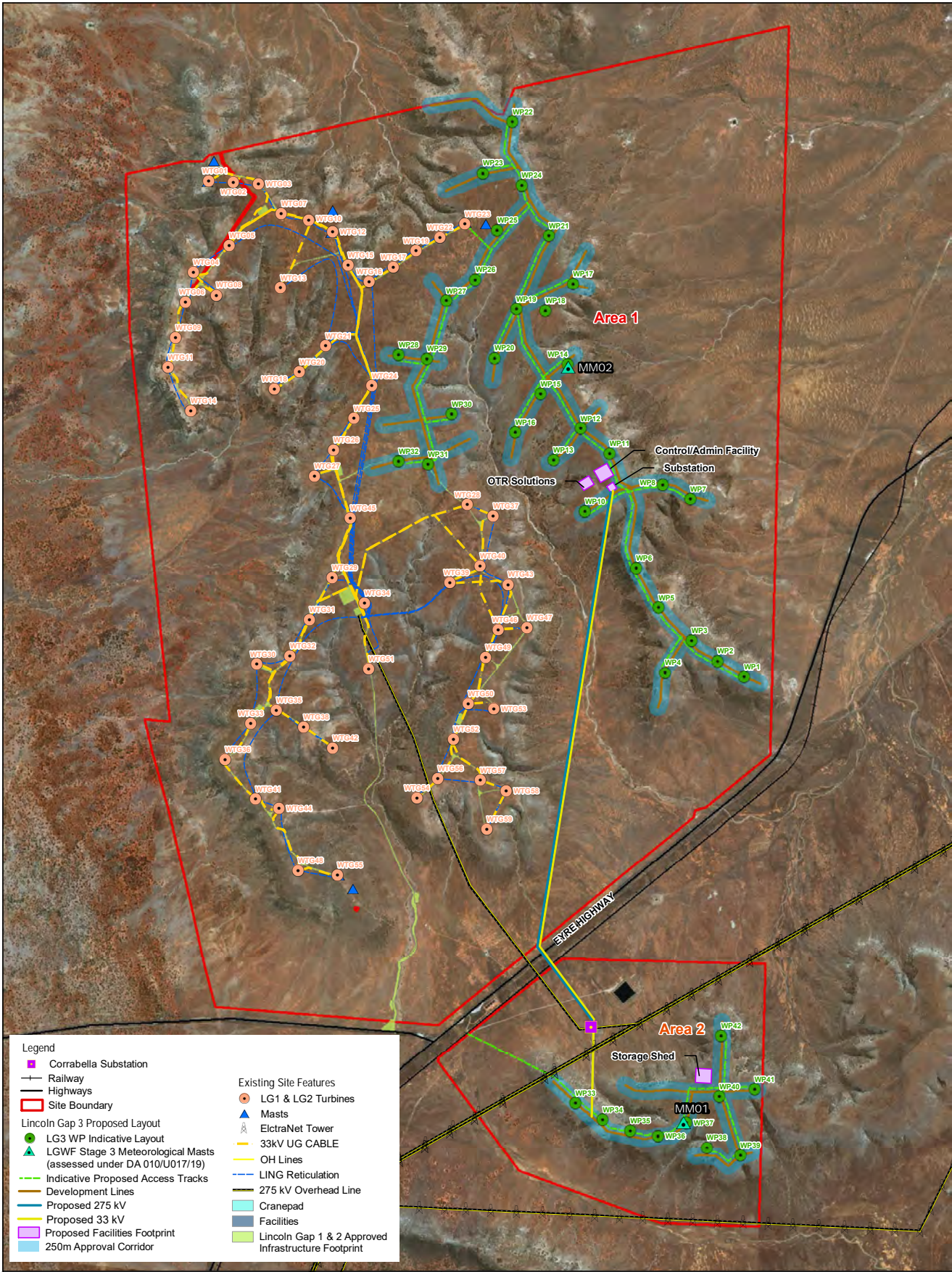
The nacelle, located at the top of the tower, contains the generator, gearbox and control gear; including hydraulics, pumps, brakes and electrical components.

The rotor hub acts as the connecting point for the 3 rotor blades and the main shaft. The hub is attached to the nacelle at one end.

A hardstand area is required at each WTG site to provide a level surface with sufficient bearing capacity for the safe operation of cranes and laydown areas. The area of cleared hardstand will be determined prior to construction. The hardstand will remain after construction to allow for routine operation and maintenance.

Table 4.1 Turbine characteristics

MODEL	MW	BLADE LENGTH (m)	HUB HEIGHT (m)	DIAMETER (m)	TOTAL HEIGHT (m)
GE 5.3 MW	5.3	79	121	158	200
Vestas 5.6 MW	5.6	81	125	162	206
Siemens Gamesa SG 6.0-155	6.0	78	107.5	155	185



Legend

- Corrabella Substation
- Railway
- Highways
- ▭ Site Boundary

Lincoln Gap 3 Proposed Layout

- LG3 WP Indicative Layout
- ▲ LGWF Stage 3 Meteorological Masts (assessed under DA 010/U017/19)
- Indicative Proposed Access Tracks
- Development Lines
- Proposed 275 kV
- Proposed 33 kV
- ▭ Proposed Facilities Footprint
- ▭ 250m Approval Corridor

Existing Site Features

- LG1 & LG2 Turbines
- ▲ Masts
- ▲ ElectraNet Tower
- 33kV UG CABLE
- OH Lines
- LING Reticulation
- 275 kV Overhead Line
- ▭ Cranepad
- ▭ Facilities
- ▭ Lincoln Gap 1 & 2 Approved Infrastructure Footprint

Map: PS113707_GIS_012_A6	Author: MO		0 600 1200 1:50,000
Date: 11/11/2019	Approved by:		

Data sources: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and

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Lincoln Gap Wind Farm – Stage 3 – Technical Assessment

Figure 4.2
Site Plan

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5 ENVIRONMENTAL ASSESSMENT

The following section outlines the assessment methodologies and findings of all environmental technical studies undertaken for the Project.

5.1 PLANNING AND LAND USE

This section assesses the planning and land use requirements for the Project.

5.1.1 LEGISLATIVE AND POLICY REQUIREMENTS

The following legislation and policy are relevant to the planning and land use assessment of the proposed Project:

- *Planning, Development and Infrastructure Act 2016*
- Planning, Development and Infrastructure (General) Regulations 2017 (PDI Regulations)
- The Planning and Design Code (PD Code) (as applying to Land Not Within a Council Area).

5.1.2 ASSESSMENT METHODOLOGY

A planning and land use assessment was prepared for LGWF Stage 3, and has been attached in Appendix E. The following methodology was used for the assessment:

- ongoing consultation with Nexif Energy
- review of project documentation and plans, as supplied by Nexif Energy
- review of specialist or technical assessments undertaken to support the Development Application Report for the Project
- review of high level strategies, including State Planning Policies and the Planning Strategy for South Australia
- assessment of the Project Against the relevant assessment provisions of the PD Code as Applying to Land Not Within a Council Area: Version 1 – Published 1 July 2019.

5.1.3 EXISTING CONDITIONS

The Project site is located within the Remote Areas Zone under the Planning and Design Code (PD Code) as applying to Land Not Within a Council Area.

The Desired Outcome of the Remote Areas Zone of the PD Code seeks a diverse range of activities including pastoral, grazing and farming activities, agricultural processing and transportation, mining and petroleum (and associated settlement activities), the generation and storage of energy, pipelines or infrastructure, aerospace and defence related facilities (and associated settlement activities), tourism, remote settlements, Aboriginal lands and related rural land activities. The Project, constituting an energy generator, is consistent with the forms of development envisaged under the Desired Outcome of the Zone.

5.1.4 POTENTIAL IMPACTS

The Project is listed as Performance Assessed Development under the Remote Areas Zone and is to be assessed on its merits against the relevant provisions of the PD Code. Table 5.1 provides a summarised assessment of the Project against the relevant Performance Outcomes of the Remote Areas Zone, and general sections of the PD Code.

Table 5.1 Assessment of the Project against the relevant policies of the PD Code

PERFORMANCE OUTCOME (PO)	COMMENT
<i>Built Form and Character</i> PO 1.1 and PO 1.2	<p>The Project will be located adjacent to the existing and approved earlier stages of the LGWF. Land use in the area prior to the Approval of the earlier stages of the LGWF, consisted predominantly of pastoral grazing.</p> <p>The Project site has been selected due the availability of wind resources and connecting electrical infrastructure.</p> <p>A Landscape Character and Visual Impact Assessment has been undertaken for the Project, and has recommended that the construction of the Project would not have ‘irreparable consequences’ to the visual amenity of the locality.</p>
<i>Hazard Risk Minimisation</i> PO 2.1	<p>The Project site is situated within a Hazards (Bushfire Outback) Overlay and Sloping Land Overlay.</p> <p>Measures should be taken to manage the risk of bushfire, both originating within and outside of the site, during construction and operation of the Project. This could be implemented through the Construction Environmental Management Plan and/or an Emergency Management Plan.</p> <p>WTGs will largely be positioned on the top of ridgelines. All cut and fill undertaken for the Project should be suitably informed to also ensure a geotechnically stable development to minimise risk on personal safety and property resulting from development on sloping land.</p> <p>Flooding, site contamination, and aviation risks have all been assessed as part of the technical studies undertaken for the Project. Key risks have been outlined in the reports, with management and mitigation measures recommended where required.</p>
<i>Clearance from Overhead Powerlines</i> PO 1.1	<p>The Project site is intersected by a number of overhead powerlines of varying voltage, both associated with the LGWF and non-associated activities.</p> <p>To minimise the hazard of overhead powerlines on people and property, the construction of new powerlines could be placed underground where practical, such as the use of underground cables between WTGs.</p> <p>Buildings and structures established as part of the project, should comply with the setbacks prescribed under the Electricity (General) Regulations 2012, unless otherwise approved by the Technical Regulator.</p>
<i>Design and Siting</i> PO 1.1	<p>The Project will be sited within an existing pastoral station, with a long history of sheep grazing. It is anticipated that the pastoral activities will continue on the site throughout operation of the Project.</p> <p>A vegetation survey and Aboriginal cultural survey has been undertaken for the Site (refer to Sections 5.3 and 5.5) and will be used to inform the detailed design of the Project to avoid potential damage to Aboriginal cultural heritage, as well as native vegetation where practical.</p>

PERFORMANCE OUTCOME (PO)	COMMENT
<p><i>Infrastructure and Renewable Energy Facilities</i></p> <p>PO 1.1</p> <p>PO 2.1, PO 2.2 and PO 2.3</p> <p>PO 3.1</p> <p>PO 4.1 and PO 4.3</p> <p>PO 5.1</p> <p>PO 7.1</p> <p>PO 8.1, PO 8.2, PO 8.3, PO 8.4 and PO 8.5</p> <p>PO 12.1 and PO 12.2</p>	<p>The detailed design of the Project will be informed by a series of technical specialist studies, that have been undertaken to assist in the identification and mitigation of potential impacts, such as hazards or environmental nuisance.</p> <p>Given the need to locate the WTGs in prominent areas assessable to wind, there is limited ability to conceal the proposed WTGs from the broader locality. The turbines will be visible from Eyre Highway, but were assessed not to be detrimental to the amenity of the area. The nearest dwelling will be greater than 2 km from any proposed turbine, and is occupied by the owner of the Site.</p> <p>Disturbed areas should be rehabilitated after the completion of construction, and after the decommissioning of the Project.</p>
<p><i>Interface Between Land Uses</i></p> <p>PO 1.2</p> <p>PO 3.4</p> <p>PO 4.1</p> <p>PO 6.1</p> <p>PO 7.1</p> <p>PO 8.1</p>	<p>All turbines proposed under the Project will be located greater than 2 km from residential land uses.</p> <p>The Site and surrounds are located on pastoral land. Wind farms are generally considered a compatible land use with pastoral grazing. It is not anticipated that the operation of the Project will impact the continuing land use within the locality.</p> <p>Technical studies, covering Noise, shadow flicker and EMI have been undertaken for the Project (refer to Sections 5.5, 5.7 and 5.7). The assessments found that Project impacts would be acceptable and in line with relevant guidelines.</p>
<p><i>Transport, Access and Parking</i></p> <p>PO 1.1 and PO 1.4</p> <p>PO 2.1 and PO 2.2</p> <p>PO 3.1 and PO 3.3</p>	<p>Access to the Site is gained off the Eyre Highway. The Eyre Highway is a State maintained road and is part of the Australian National Land Transport Network. A Traffic Impact Statement (TIS) has been prepared for the Project, and has recommended that the road system has sufficient capacity to accommodate the anticipated traffic volumes during construction. Traffic generated during operation of the Project is likely to be negligible.</p> <p>The Site has sufficient space to allow loading, unloading and turning of vehicles onsite; to avoid disruption to the road network.</p> <p>Access to Area 1, north of the Eyre Highway, can be safely gained from an existing access point, approved under the earlier stages of the LGWF. The TIS has recommended that an assessment of a rail crossing at the entrance to Area 2, south of Eyre Highway, be undertaken to determine any upgrades required.</p> <p>The nearest access point belongs to the landowner, and is located approximately 800 m east of the proposed access to Area 2 and approximately 1800 m east of the proposed access to Area 1. The nearest access point to a neighbouring property, not associated with the Project, is greater than 9 km away. As such, it is unlikely that the location of access points will impact on neighbouring properties.</p>

PERFORMANCE OUTCOME (PO)	COMMENT
<p>Key Outback and Rural Routes Overlay</p> <p>PO 1.1, PO 1.2, PO 1.3 and PO 1.4</p> <p>PO 2.1 and PO 2.2</p>	<p>The Site is partially located under the Key Outback and Rural Routes Overlay.</p> <p>Access to the site will be gained from existing access points.</p> <p>Access to Area 1 is via a sealed access, which has recently been upgraded to Department of Planning, Transport and Infrastructure (DPTI) standards to support the construction of LGWF Stage 1 and 2. Access to Area 2 is via an unsealed access, and will require crossing a rail line.</p> <p>The TIS undertaken for the Project has made the recommendation that an assessment of the access to Area 2 should be undertaken to determine if any upgrades are required.</p>
<p>Sloping Land Overlay</p> <p>PO 1.1, PO 1.2 and PO 1.3</p> <p>PO 2.1 and PO 2.2</p> <p>PO 3.1</p> <p>PO 4.1, PO 4.2 and PO 4.3</p>	<p>The Site is partially located under the Sloping Land Overlay.</p> <p>Given the need for the WTG to have access to wind resources, the WTGs will be positioned on top of ridges. Access tracks will need to be constructed on sloping land in order to provide access to the WTGs. It is understood that access tracks are to be frequented utilised by heavily loaded specialised vehicle construction traffic and will be used as access tracks for maintenance vehicles following construction. A Geotechnical Desktop Study undertaken for the Project recommended slope stability and rockfall risk should be considered as part of the design, and that a slope risk assessment should be undertaken by a suitably experienced geotechnical practitioner as part of the investigation and/or construction phase to manage subsequent risk.</p>
<p>Water Resources Overlay</p> <p>PO 1.1, PO 1.2, PO 1.3, PO 1.4, PO 1.5, PO 1.6, PO 1.7, PO 1.8, PO 1.9 and PO 1.10</p>	<p>Drainage lines exist along the slopes of the ridges across the Site. These drainage lines are mapped under the Water Resources Overlay.</p> <p>A Hydrology and Drainage Desktop Study was undertaken for the Project, and recommended that drainage crossings should be installed where access tracks cross depressions in the topography.</p> <p>It was recommended that the slight increase in paved areas resulting from the development should be reviewed, but that the impact on downstream catchments from increased runoff was likely to be negligible. It was recommended that downstream scour protection should be designed into the downstream edge of hardstands.</p>

5.1.5 MANAGEMENT AND MITIGATION MEASURES

To comply with the relevant statutory requirements, a Construction Environmental Management Plan (CEMP) should be prepared for the Project prior to the commencement of construction.

The Project should operate in accordance with all plans and supporting documents submitted and approved under this Development Application Report.

5.1.6 KEY RECOMMENDATIONS

On assessment of the Project against the relevant provisions of the PD Code, it is recommended that the Project is not at variance with the PD Code and the granting of approval is warranted.

5.2 VISUAL AND LANDSCAPE

The following section summarises the outcomes of the Landscape Character and Visual Impact Assessment. The full report has been attached in Appendix F.

5.2.1 LEGISLATIVE AND POLICY REQUIREMENTS

The following key legislation and policy define the visual amenity requirements for the Project:

- PDI Act
- PDI Regulations
- PD Code.

5.2.2 ASSESSMENT METHODOLOGY

The Landscape Character and Visual Impact Assessment for the Project was conducted by a Registered Landscape Architect and undertaken using the following methodology:

- review of previous visual impact assessments undertaken to date for earlier stages of the LGWF
- a site visit to four pre-determined viewpoints within the immediate and wider contextual landscape of the Site (as identified in previous reports), and the identification of two sensitive receptors and two viewpoints to assess likely visual impact for the purpose of this Project
- determination of the likely ‘Zone of Visual Influence’, with which modification to the contextual landscape as a result of the proposed upgrade could be potentially discernible to the naked eye
- a qualitative landscape character assessment consistent with best practice, as prescribed by the *Guidelines for Landscape and Visual Impact Assessment* (third edition). The assessment considered the likely visual impact of the LGWF Stage 3 and the likely cumulative visual impact of the proposed LGWF Stage 1 and 2 and LGWF Stage 3 development within the contextual landscape from the identified sensitive receptors sensitive receptors and the two viewpoints. The location of sensitive receptors and viewpoints are shown in Figure 5.1.

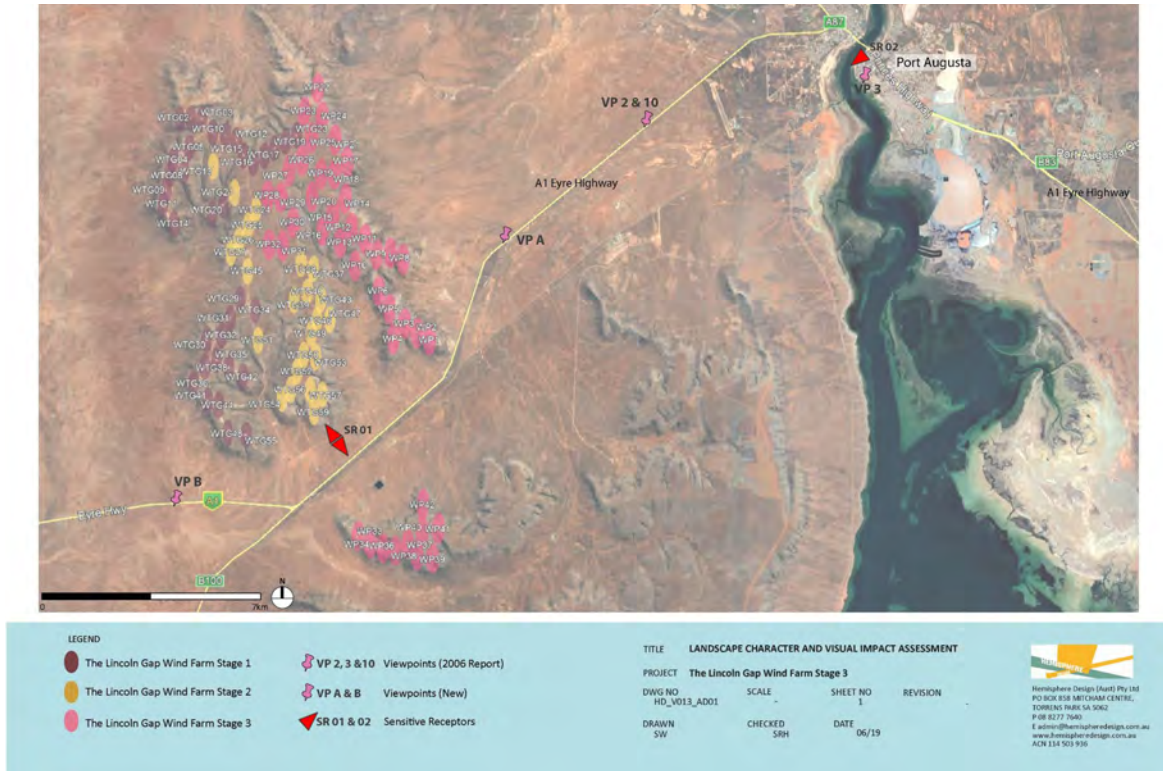


Figure 5.1 Location of sensitive receptors and viewpoints

5.2.3 EXISTING CONDITIONS

From the Eyre Highway travelling west, the landscape offers vistas comprised of open arid scrubland and intermittent grazing land. The vista draws the eye of the observer to the troughs and peaks of the faceted slopes of the plateau to the north which command the horizon view and envelope Lincoln Gap. Orientating the view south, the eye of the observer is drawn over a much flatter foreground before pausing at the mid-ground of the gentler slopes of the lower plateau to the south of Lincoln Gap. Within this vista the vertical forms of powerlines, and transmission and telecommunication towers ‘trace’ over the landform in a linear progression east – west. The area is a planar landscape devoid of large trees. The vertical structures of LGWF Stages 1 and 2, including WTGs, associated power poles and transmission lines and other power poles and telecommunication towers provide a man-made component to the landscape, though the visual impact of human ‘adaption’ is secondary to the gentle and steep sloped plateaus and hills surrounding Lincoln Gap.

The nearest occupied dwelling, being a participating landowner for the Project, was identified as Sensitive Receptor 01 (SR 01). Within close proximity to Goat Hill, Bald Hill and Old Man Hill, the dwelling is enveloped by the imposing steep sided slopes of the western and central plateau ‘arms’ which are the approved location for the LGWF Stages 1 and 2. Whilst the WTGs will be an obvious and notable feature of the skyline and horizon, the scale of the erected WTGs are proportional to and appropriate within the expansive contextual landscape. It was recommended that the WTGs only slightly diminish the inherent visual qualities of the locality and the contextual landscape. Notwithstanding the generally positive contribution the WTGs make to the immediate locality, the scenic amenity is somewhat diminished by the more imposing presence of the large grey steel poles comprising the existing transmission line to the existing substation to the south and the proposed location for Area two. The view from SR 01 toward the Site are shown in Photo 5.1.

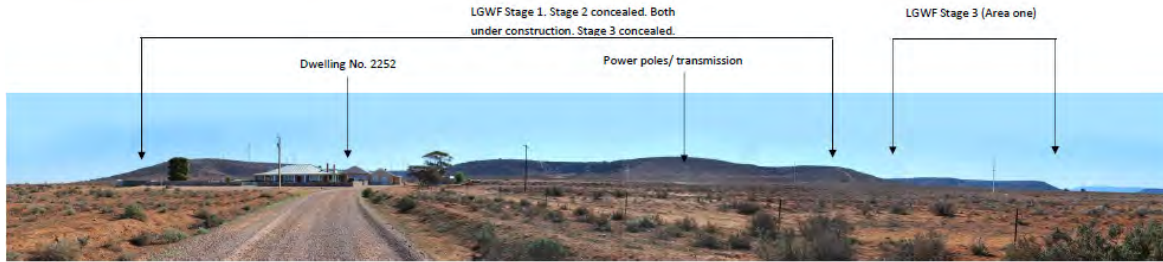


Photo 5.1 View from SR 01

The Port Augusta waterside recreational park (foreshore at Port Augusta) was identified as Sensitive Receptor 02 (SR 02). SR 02 is located some 18 kms to the east of the Site. From SR 02, the collective massing of the Stage 1 and Stage 2 LGWF are barely discernible to the naked eye; the expansive vista of local hills dominates the view. The area is a highly modified destination where the degree of urbanisation is illustrated through adjacent land use activities which include a hotel and restaurant, a high proportion of irrigated lawn and exotic plantings and a jetty area for the landing of motorised tenders to give access to moored yachts. It is a manicured environment, in sharp contrast to arid outback landscape beyond the township. The view from SR 02 toward the Site are show in Photo 5.2 below.



Photo 5.2 View from SR 02

5.2.4 POTENTIAL IMPACTS

It was determined that when considering the impacts of the Project individually on the visual landscape of the area (not considering cumulative impacts), from the two sensitive receptors identified, the Project would result in no change to slightly adverse at SR 01 and no change at SR 02. In considering impacts from a viewpoint along Eyre Highway (representing views typically afforded when travelling along the road) it was recommended that there would be no change to slightly adverse.

When considering the cumulative impacts of the Project on the visual landscape, in combination with LGWF Stage 1 and 2, it was determined that there would be no change to slight adverse at SR 01 and no change at SR 02. In considering impacts from a viewpoint along Eyre Highway (representing views typically afforded when travelling along the road) it was recommended that impacts would be only slightly adverse.

Photo montages from SR 01 and viewpoints along Eyre Highway are provided in Photo 5.3, Photo 5.4 and Photo 5.5.



Photo 5.3 Photomontage of proposed Project, from SR 01 (view north-west – south-west)

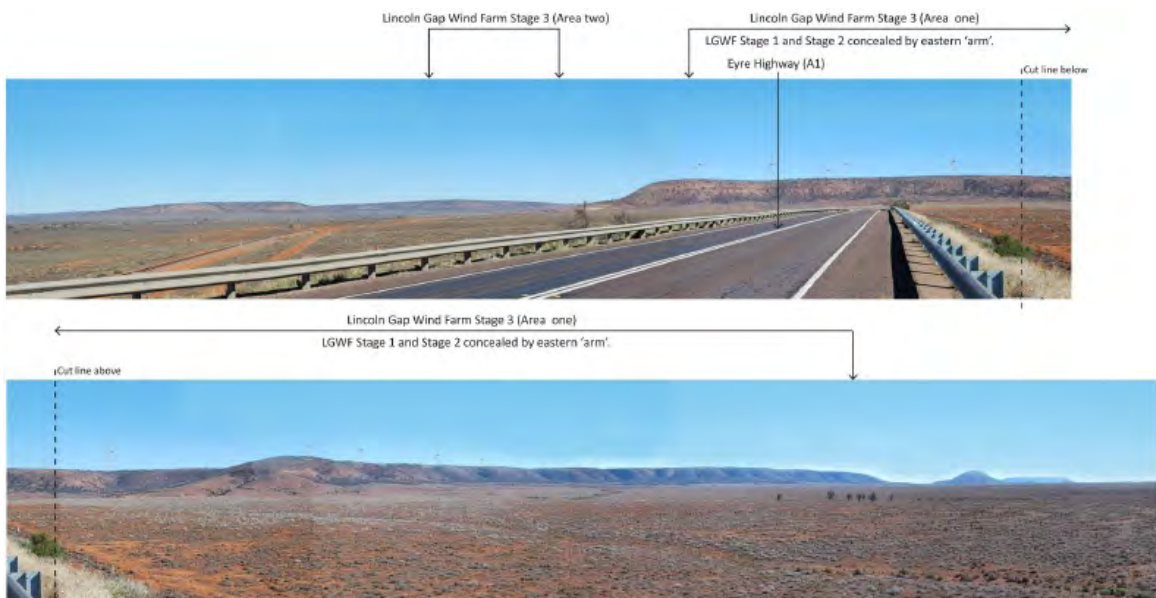


Photo 5.4 View from Eyre Highway VP 1 (north-west – south-west)

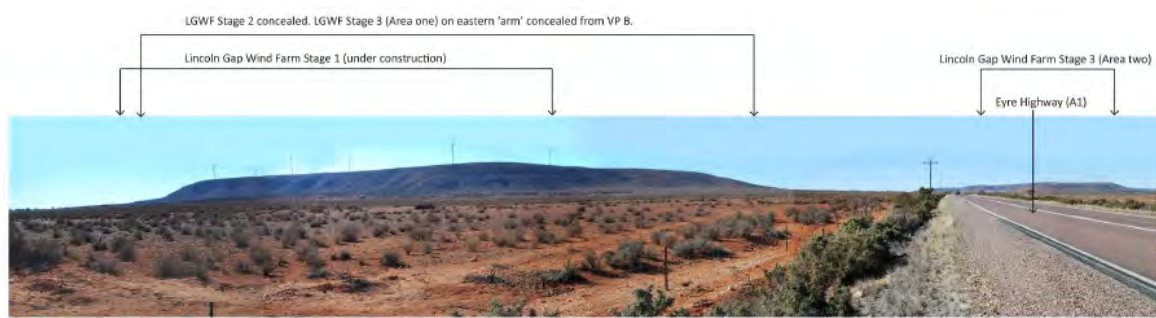


Photo 5.5 View from Eyre Highway VP 2 (north-east – south-east)

5.2.5 MANAGEMENT AND MITIGATION MEASURES

Given the low potential for impact from the project, management and mitigation measures were not proposed in the report.

5.2.6 KEY RECOMMENDATIONS

The assessment recommended that the construction of LGWF Stage 3 will not have irreparable consequences for the visual amenity of the locality and wider contextual landscape.

5.3 ABORIGINAL CULTURAL HERITAGE

5.3.1 LEGISLATIVE AND POLICY REQUIREMENTS

The following legislation is relevant to the Aboriginal cultural heritage aspects of the Project:

- *Aboriginal Heritage Act 1988*
- *Native Title Act 1993*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *Environment Protection and Biodiversity Conservation Act 1999.*

5.3.2 ASSESSMENT METHODOLOGY

An Archaeological Inspection Report was undertaken for the Project, to identify potential heritage constraints that may be present at the Site. The report assessed both Aboriginal cultural heritage and non-Indigenous heritage. Note that non-Indigenous heritage outcomes are discussed in Section 5.4.

The following methodology was used:

- Desktop study using the Central Archive Register of Aboriginal Sites and Objects maintained by Department of the Premier and Cabinet Aboriginal Affairs and Reconciliation Division (DPC-AAR), literature, previous reports, satellite imagery and other supporting documents of the developing history from the area.
- An archaeological and anthropological survey was also conducted. The archaeological survey consisted of a site consultation and an on-foot survey with traditional owners from the Barngarla Determination Aboriginal Corporation (BDAC) at each of the proposed 42 WTG sites. Anthropology surveys were also conducted with the assistance of the Barngarla on site.

5.3.3 EXISTING CONDITIONS

Existing conditions are described in the Archaeological Inspection Report which is not attached with this Development Application Report. It has alternatively been provided directly to SCAP.

5.3.3.1 POTENTIAL IMPACTS

Potential impacts are described in the Archaeological Inspection Report which has been provided to SCAP.

5.3.3.2 MANAGEMENT AND MITIGATION PROCEDURES

A site discovery procedure will be implemented to manage any events of unexpected discoveries of archaeological/anthropological artefacts/remains.

Risks to Aboriginal cultural heritage can be minimised by implementing site inductions for construction workers, as well as providing appropriate training on how to manage a site in the event of an unexpected discovery.

Having an archaeologist on call in the event of a discovery is recommended, in order to quickly identify any potential Indigenous or non-Indigenous heritage items/remains that may be discovered.

5.3.3.3 KEY RECOMMENDATIONS

Construction plans should be reviewed and revised to avoid potential areas of Aboriginal cultural heritage.

Damage to the creek lines, stone outcrops, clay pans and native vegetation should be minimised.

Workers should be prepared for the possibility of unexpected remains or discoveries on site. Appropriate procedures should be implemented before construction begins. Education of construction workers is suggested and strict protocol be followed in the event of a find. Archaeologists should be contacted at earliest convenience if a find is to occur.

5.4 NON-INDIGENOUS HERITAGE

Three pieces of legislation apply to the non-Indigenous heritage context of the site and locality, in relation to the project:

- EPBC Act
- *Heritage Places Act 1993*
- Development Act and the PDI Act.

The *Heritage Places Act 1993* (HP Act) makes provision for the identification, recording and conservation of places and objects of non-Indigenous heritage significance in South Australia. The HP Act establishes the South Australian Heritage Council, and allows for the identification and protection of places of heritage significance under the South Australian Heritage Register; which lists all places of heritage significance in South Australia. Once registered, State heritage places are protected under both the HP Act and the Development Act/PDI Act.

5.4.1 ASSESSMENT METHODOLOGY

An assessment was undertaken to determine the potential impacts of the Project on any non-Indigenous heritage values within the Project site and surrounding locality. The assessment involved a review of the following registers, databases and documents:

- The Australian Heritage Database
- The South Australian Heritage Places Database.

5.4.2 EXISTING CONDITIONS

5.4.2.1 BROAD LANDSCAPE DESCRIPTION

There are no listed Commonwealth, State or Local heritage places within 5 km of the Project site.

During the archaeological survey undertaken on the Site, one new European archaeological site was recorded towards the south-east portion of Area 1. This site consists of a stone cairn. The cairn is a structure built by early surveyors or explorers, and was used to act as reference point during surveying or navigating activities. This structure is approximately 2 m in height and diameter, and is situated on top of a Spinifex Bluff, south of the range, at the end of the proposed access track past the proposed location of WTG1 (the south-east most turbine in Area 1).

5.4.3 POTENTIAL IMPACTS

5.4.3.1 CONSTRUCTION

It is a requirement of the HP Act that all non-Indigenous heritage and archaeological features, whether listed or not, be protected.

Impacts on non-Indigenous heritage sites during construction are unlikely, however it is important to note the location of the identified European archaeological site for avoidance purposes. This site is parallel to a proposed access road, so it will be important to ensure that heavy vehicles and contractors proceed with caution when transporting materials in this area.

Potential sources of impacts include:

- heavy machinery/vehicles movements on the construction line
- vibrations from Heavy machinery/vehicles.

Whilst vibration levels can generate structural damage, this is generally limited to a proximity of 25 m. The site is situated approximately 200 m south-east of the currently proposed location for WTG01, and as such, impacts from vibration would be unlikely.

5.4.3.2 OPERATION

The potential for impacts to non-Indigenous heritage interests in the area during the operation of Project is low.

5.4.4 MANAGEMENT AND MITIGATION MEASURES

The identified non-Indigenous heritage site should be avoided, where possible. Where this site cannot be avoided, an archival recording should be carried out under section 27 of the HP Act prior to the disturbance of the area.

5.4.5 KEY RECOMMENDATIONS

- The Project is unlikely to impact on non-Indigenous heritage interests.
- Any new identified heritage or archaeological deposit of significance uncovered by the proposed development must be reported to Heritage SA.
- It is suggested that the non-Indigenous heritage site identified during the archaeological survey be avoided. If this site is unable to be avoided during construction of the project, an archival recording should be carried out under section 27 of the HP Act prior to the disturbance of the area.

5.5 FLORA AND FAUNA

5.5.1 LEGISLATIVE AND POLICY REQUIREMENTS

The following legislation is relevant to flora and fauna matters for the Project:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *Native Vegetation Act 1991*
- *National Parks and Wildlife Act 1972*
- *Natural Resources Management Act 2004.*

5.5.1.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The EPBC Act is the Australian Government's central piece of environmental legislation. It applies to all Australian territory and waters. Under the EPBC Act, actions that are likely to have a significant impact upon defined Matters of National Environmental Significance (MNES) are subject to an assessment and approval process.

Under the EPBC Act, a company proposing an action that may have a significant impact on a matter of national environmental significance must prepare and submit a Referral that will help the Commonwealth decide whether the proposal requires further assessment.

An EPBC Act risk assessment was undertaken for the Project, and is discussed in Section 1.7.1.

5.5.1.2 NATIVE VEGETATION ACT 1991

Under the *Native Vegetation Act 1991* (NV Act), all clearance of native vegetation requires the approval of the *Native Vegetation Council* (NVC) unless it is covered by a specific exemption contained within the *Native Vegetation Regulations 2017*.

Under the NV Act, the NVC considers applications to clear native vegetation under ten principles. Native vegetation should not be cleared if it is significantly at odds with these principles:

- it contains a high level of diversity of plant species
- it is an important wildlife habitat
- it includes rare, vulnerable or endangered plant species
- the vegetation comprises a plant community that is rare, vulnerable or endangered
- it is a remnant of vegetation in an area which has been extensively cleared
- it is growing in, or association with, a wetland environment
- it contributes to the amenity of the area
- the clearance of vegetation is likely to contribute to soil erosion, salinity, or flooding
- the clearance of vegetation is likely to cause deterioration in the quality of surface or underground water
- after clearance, the land is to be used for a purpose which is unsustainable.

The principles apply in all cases, except where the vegetation has been considered exempt under the *Native Vegetation Regulations 2017* or can be classified as an 'intact stratum'. 'Intact stratum' means that applications will usually be denied when the vegetation has not been seriously degraded by human activity within the last 20 years.

All approved vegetation clearance must also be conditional on achieving a Significant Environmental Benefit (SEB) to offset the clearance. The requirement for a SEB also applies to several of the exemptions. The project is likely to fall under Regulation 12(34) – Infrastructure or 12(27) – Major Projects.

5.5.1.3 NATIONAL PARKS AND WILDLIFE ACT 1972

Vascular plants and vertebrate animals (e.g. mammals, birds, reptiles and amphibians) are protected in South Australia under the threatened species schedules of the *National Parks and Wildlife Act 1972* (NPW Act): Schedule 7 (endangered species), Schedule 8 (vulnerable species) and Schedule 9 (rare species). The criteria used to define threatened species in South Australia are generally based on categories and definitions from the International Union for Conservation of Nature and Natural Resources (IUCN) Red List Categories and Criteria.

The current schedules do not include non-vascular plants, fish, insects, butterflies, spiders, scorpions and other invertebrates, fungi and other life forms which do not have a current legal conservation status in South Australia.

Under the NPW Act, persons must not:

- take a native plant from a reserve, wilderness protection area, wilderness protection zone, land reserved for public purposes, a forest reserve or any other Crown land
- take a native plant of a prescribed species from private land
- take a native plant from private land without the consent of the owner (such plants may also be covered by the *Native Vegetation Act 1991*)
- take a protected animal or the eggs of a protected animal without approval
- keep protected animals unless authorised to do so
- kill a protected animal without approval.

5.5.1.4 NATURAL RESOURCES MANAGEMENT ACT 2004

Under the *Natural Resources Management Act 2004* (NRM Act), landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation.

Key functions of the NRM Act include the establishment of regional Natural Resource Management (NRM) Boards and the development of regional NRM Plans; the ability to control water use through prescription, allocations and restrictions; and the requirement to control pest plants and animals, and activities that might result in land degradation.

A 'duty of care' is a fundamental component of the NRM Act, i.e. ensuring one's environmental and civil obligation by taking reasonable steps to prevent land and water degradation. Persons can be prosecuted if they are considered negligent in meeting their obligations.

The Project area is situated within the South Australian Arid Lands Management Board Region.

5.5.2 ASSESSMENT METHODOLOGY

A flora and fauna assessment was undertaken for the proposed Project, and is attached in Appendix G. The assessment involved:

- extensive background research, including reviewing current literature/reports and databases such as the EPBC Act Protected Matters Search Tool (PMST) and Biological Database of South Australia (BDBSA)
- mapping of vegetation to determine the biological status, and to determine the extent of vegetation communities and their overall biological significance. This vegetation survey was conducted in accordance with NVC methodology
- visual assessment of habitat value for native fauna and opportunistic fauna survey
- a desktop assessment for threatened flora, fauna and ecological communities which may be present within the project area
- avifauna surveys within the project area
- vegetation surveys for the proposed footprint area of the Project.

5.5.3 EXISTING CONDITIONS

5.5.3.1 CURRENT LANDSCAPE

The Project site is situated near Port Augusta, and is fits within the Gawler bioregion as per the Interim Biogeographical Regionalisation of Australia (IBRA) zones classification. The Gawler bioregion has an area of 123 605 km² and is characterised by rocky hills, rounded landscapes, plains and salt-encrusted lake beds. Dominant vegetation cover includes spinifex grasslands, open woodland and chenopod shrubs.

Predominately, the site has a cover of low chenopod shrub land, bardi bush (*Acacia victoriae*) tall shrub land with fringing Western Myall (*Acacia papyrocarpa*) woodland.

5.5.3.2 FLORA SPECIES

A search of the PMST and BDBSA identified twelve (12) nationally threatened flora species within a 50 km buffer of the Project area. None of the twelve species were deemed likely to occur in the Project area

A total of sixty-eight (68) State threatened flora species within a 50 km buffer of the Project area. It was deemed that eleven (11) State threatened flora species were considered as possibly occurring in the Project area.

5.5.3.3 FAUNA SPECIES

A search of the PMST and BDBSA identified thirty-five (35) nationally threatened fauna species within a 50 km buffer of the Project area. Of the thirty-five (35) species identified, only one species was considered as potentially occurring in the Project area; this being the Western Grasswren (*Amytornis textilis myall*).

A total of forty-five (45) State threatened fauna species were recorded within a 50 km buffer Project area. Of which, eight species were considered to potentially occur within the Project area.

A total of 148 individuals from 20 bird species were recorded over the field assessment period. The most abundant bird species recorded over the Project area were the White-fronted Chat (*Epthianura albifrons*) (43 individuals), Black-faced Woodswallow (*Artamus cinereus*) (21 individuals), White-winged Fairywren (*Malurus leucopterus*) (21 individuals) and White-browed Babbler (*Pomatostomus superciliosus*) (15 individuals). One introduced species, the Common Starling (*Sturnus vulgaris*) (10 individuals) was recorded in the Project area. The State Rare (Western) Slender-billed Thornbill (*Acanthiza iredalei iredalei*) was the only species with a conservation status to be recorded in the Project area.

One reptile species; the Gidgee Skink (*Egernia stokesii*) was observed in the Project area. This species was recorded at a rocky outcrop, which comprises the preferred habitat for the Gidgee Skink.

5.5.3.4 VEGETATION ASSOCIATIONS

Seven vegetation associations were identified within the 250 m 'Approval Corridor' across the Project site; covering an area of 913.04 ha. These associations were often noted to overlap, and were dependent on the presence of dominant species or absence of a particular species. No threatened regional, state or national level vegetation associations were observed in the study area.

The seven vegetation associations recorded within Project area consist of:

- *Atriplex vesicaria* (Bladder Saltbush) and *Tecticornia medullosa* (Samphire) Low Shrubland
- *Maireana sedifolia* (Pearl Bluebush) and *Rhagodia ulicina* (Intricate Saltbush) Low Shrubland
- *Casuarina pauper* (Belah) Low Open Woodland
- *Casuarina pauper* (Belah) and *Myoporum platycarpum* ssp. (False Sandalwood), *Alectryon oleifolius* (Bullock Bush) *Senna* sp. (Senna) Mixed Open Woodland
- *Eucalyptus socialis* ssp. *socialis* (Red Mallee) Open Mallee
- *Triodia irritans* (Spinifex) Hummock Grassland
- *Dodonaea lobulata* (Lobe-leaved Hop-bush) +/- *Maireana sedifolia* (Pearl Bluebush) Low Shrubland.

Vegetation associations are displayed in Figure 5.2.

The identification of these vegetation association will be used in the calculations for the required Native Vegetation Clearance application, which will be addressed in a subsequent report once the project layout and refinements have been finalised.

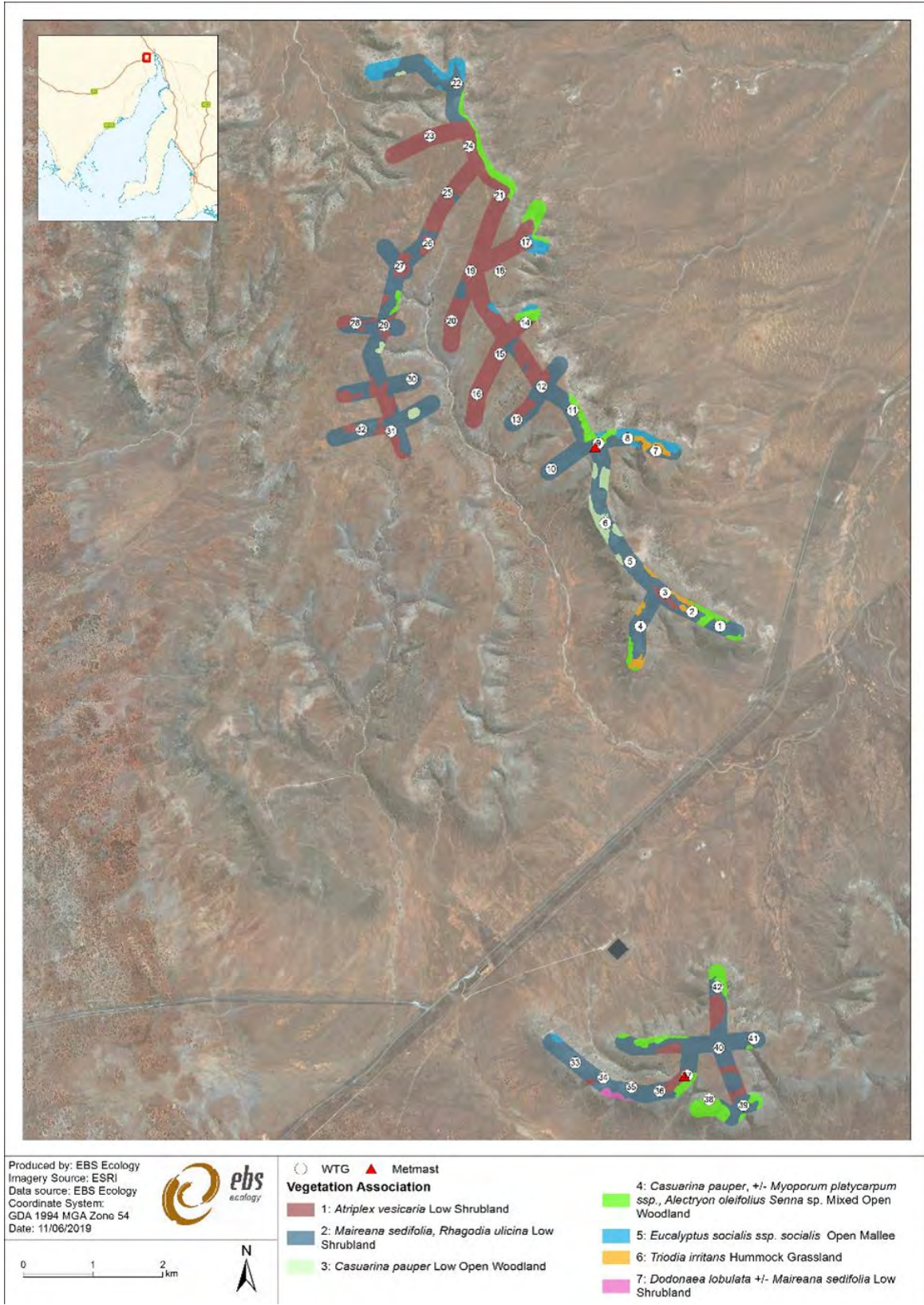


Figure 5.2 Vegetation Association identified within the 250 m 'Approval Corridor'

5.5.3.5 WEED SPECIES

Under the *Natural Resources Management Act 2004* (NRM Act), landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation.

During the fauna and flora survey, several weeds declared under the NRM Act were identified; these include (but are not limited to) *Carrichtera annua* (Wards Weed), *Lycium ferocissimum* (African Boxthorn) and *Asphodelus fistulosus* (onion weed).

5.5.4 POTENTIAL IMPACTS

5.5.4.1 FLORA

The impact on defined areas of native vegetation is unavoidable within the footprint which is entirely comprised of native vegetation communities. No communities were observed to contain threatened flora species at the time of the survey, however some species were deemed as possibly occurring within the Project area; mostly on the edges of escarpments, steep slopes and areas which contain and retain resources such as water, litter, food and shelter.

Remnant vegetation in the area is representative of normal pastoral conditions. Whilst most shrubs had evidence of grazing, there was little to no evidence of overgrazing in the project area. Biological soil crust (Microphytic crust) was observed intact, which is an indicator of appropriate grazing regimes, and/or signs of low fauna interference.

The Site was assessed to have low vegetation scores due to the presence of invasive exotic species and lack of perennial grass tussocks. Dry seasonal conditions make perennial grass highly palatable to species, which has caused them to be grazed out. Western Grey (*Macropus fuliginosus*) and Red Kangaroos (*Macropus rufus*) were observed in the project area, and paired with normal stocking rates have increased the effects of grazing. Goats (*Capra hircus*) were also prevalent in the project site, and observed in moderate numbers. Perennial grasses are expected to recover with no anthropogenic influence with the return of normal season conditions.

The construction and operation of the Project is not expected to impact on vegetation communities other than through direct loss from clearance in areas required for WTG and infrastructure development.

5.5.4.2 FAUNA

Three groups of (Western) Slender-billed Thornbills, consisting of five, four and two individuals were observed within the Project area. These groups of birds were observed in two different vegetation associations; *Atriplex vesicaria* (Bladder Saltbush) / *Tecticornia medullosa* (Samphire) Shrubland and *Casuarina pauper* (Belah) Open Woodland.

The vegetation associations were mapped to cover 753 ha, of which 107 ha is potential habitat for the (Western) Slender-billed Thornbill. The (Western) Slender-billed Thornbill has a stable population, is widely distributed and the extensive size of suitable habitat within the project area has deemed a negligible impact on the species.

Seven other State listed species were considered to potentially occur within the Project area. The impact of the Project on the species will be negligible due to their uncommon to rare frequency of occurrence, widespread distribution and the availability of extensive areas of comparable habitat elsewhere in the region.

No Wedge-tailed Eagle (*Aquila audax*) nests were identified during the survey, however nesting may occur within the project area, if new nests are established or previously inactive areas are re-occupied by Wedge-tailed Eagles.

5.5.4.3 WEEDS

No increase in weed species would be expected as part of construction and operation if standard weed management measures are implemented.

5.5.5 MANAGEMENT AND MITIGATION MEASURES

5.5.5.1 PLANNING AND DESIGN

The layout of the Project should be concentrated in ecological communities without multi-layer structures and overstorey canopy and exclude infrastructure from all areas of woodland. In particular, infrastructure should also avoid areas of *Triodia* grassland.

While no Wedge-tailed Eagle nests were identified, it should be noted that nesting may still occur within the Project area. If any new nest are located, it is recommended that each nest is protected with a 500 m buffer, in order to reduce the risk of bird collision and nest disturbance. Furthermore, it is thus recommended that additional survey is undertaken for at-risk raptors during their breeding season (i.e. spring) to gain a better picture of activity levels across the Project area, and potential breeding locations.

Approval will be required from the NVC for any vegetation clearance that may be required for the Project. Once the infrastructure design is finalised, the extent of vegetation removal required will need to be determined to calculate the required SEB offset. The provision of an SEB can be undertaken in several forms including managing and conserving areas of native vegetation, undertaking native vegetation restoration activities or making a payment into the Native Vegetation Fund.

An environmental management plan should be developed and implemented, and should include flora and fauna management, which identifies, but is not limited to, best practice principles for the management of vegetation, fauna, threatened species and weeds.

Weed management strategies should be implemented early, in order to reduce the risk of weed spreading/introduction from construction vehicles, movement on site or ground disturbance.

5.5.5.2 CONSTRUCTION

Where impact on native vegetation cannot be avoided (e.g. cable routes across roads), infrastructure should be sited to avoid intact native vegetation and areas of potential fauna habitat. Micro-siting prior to construction should be undertaken to ensure any impact is minimised.

Areas of intact native vegetation, areas of vegetation in good condition and areas containing threatened flora should be buffered by a suitable distance (ideally 100 m) to ensure these areas will not be subject to indirect impacts from ongoing, increased activity and maintenance activities onsite (e.g. dust issues from use of vehicle access tracks). Micro-siting of infrastructure will be required for areas where native vegetation will be impacted upon or infrastructure is to be located within the buffer areas. Any infrastructure within the buffer area will need to be assessed at a site level to ensure potential impacts are minimised.

Staff training and awareness of ecological issues, flora and fauna species, their values and threats should be undertaken to minimise impacts during construction and operation. Staff working in the Project area should be aware of the significance of the native vegetation and fauna species present and potentially present, and the potential and actual impacts of construction, operation and maintenance of the proposed wind farm on flora and fauna species and habitats. Training and inductions for on-site personnel should reinforce staff expectations to minimise potential impacts related to on-site works, and encourage staff to report significant flora and fauna sightings.

A detailed Construction and Operation Environmental Management Plan (COEMP) should be developed and implemented.

5.5.5.3 OPERATION

A review of the proposed final layout should be undertaken to quantify the actual impact of the proposed wind farm after the design has been finalised. This includes the actual vegetation clearance and the condition of the impacted vegetation.

Weed management strategies should be implemented to ensure that weed species are not introduced to or spread throughout the Site. Targeted control of isolated priority weed occurrences should be undertaken.

An ongoing fauna monitoring program should be developed (commencing prior to construction) with a focus on migratory and at risk bird species, bats, and threatened flora species, as outlined in the flora and fauna report. If the wind farm is designed so that there are no impacts on native vegetation or threatened flora species, a monitoring program will not be required for threatened flora, but bird and bat monitoring will be required.

The bird monitoring program will enable site management to be informed by collated data on bird movements, including potential flight and migration paths, and nesting locations of raptors at risk of collision. Such a program will allow site specific management to be implemented (e.g. buffers, radar monitoring, turning off turbines at higher risk times), if issues or significant impacts are identified.

5.5.6 KEY RECOMMENDATIONS

The following key management/mitigation measures should be put in place to minimise impact to fauna and flora on the Project site:

- The design of the Project should avoid areas of high ecological value, where possible. Furthermore, these areas should be buffered to ensure that they will not be subject to indirect impacts from ongoing, increased construction activity and maintenance activities onsite (e.g. dust issues from use of vehicle access tracks).
- An additional survey should be undertaken to identify potential risk to raptors. This would preferably be undertaken during their breeding season (i.e. spring).
- Approval will be required for any clearance of Native Vegetation.
- An environmental management plan should be developed and implemented, and should include flora and fauna management.
- Weed management strategies should be implemented during construction and operation of the Project. .
- Training and inductions for on-site personnel should reinforce staff expectations to minimise potential impacts related to on-site works, and encourage staff to report significant flora and fauna sightings.
- A detailed COEMP should be developed and implemented.
- An ongoing fauna monitoring program should be developed (commencing prior to construction) with a focus on migratory and at risk bird species, bats, and threatened flora species, as mentioned in this report.

5.6 NOISE

A review of operational noise impact of the Project was undertaken, and is attached in Appendix H. Please note that this assessment did not consider potential noise impacts during construction.

5.6.1 LEGISLATIVE AND POLICY REQUIREMENTS

The noise requirements for the Project are managed under the following legislation and policy:

- *Environment Protection Act 1993*
- *South Australian Environment Protection Authority Wind Farms Environmental Noise Guidelines (2009)*.

5.6.2 ASSESSMENT METHODOLOGY

An acoustic assessment was undertaken to identify potential noise impacts that may arise during the operation of the proposed WTGs. This assessment predicts noise levels at the identified noise sensitive receivers due to:

- the proposed LGWF Stage 3
- the cumulative effects of LGWF Stages 1, 2, and 3
- the cumulative effects of LGWF Stages 1, 2, and 3 with allowance for 250 m micro-siting of the Stage 3 turbines.

The assessment was undertaken in accordance with the Institute of Acoustics (IOA) method incorporating the standard *Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation (2007)* (ISO 9613-2:2007). The IOA method was used as described in *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (2013)* (IOA guide).

This assessment utilised SoundPLAN Version 8.0 noise modelling software, which was used to undertake the noise level predictions. Noise prediction methods were propagated using ISO9613-2, and incorporated the IOA modifications.

No correction for background noise created for meteorological conditions were applied in the implementation of ISO9613-2:2007. Predictions will account for typical downwind propagation.

The Vestas V162 5.6 MW model has the highest maximum sound power level at 106.8 dBA, and was therefore assessed as the works case turbine, from a noise perspective. Manufacturer supplied expected noise data for the Vestas V162 5.6 MW model was assessed for each integer wind speed from cut-in speed (3 m/s) to cut-out speed (20 m/s) and at a hub height of 125 m. A +2 dBA correction factor for uncertainty has been applied to the Vestas 5.6 MW expected noise data in this assessment. Therefore, the maximum sound power level assessed was 108.8 dBA at hub height.

5.6.3 EXISTING CONDITIONS

Two noise sensitive receivers were identified in the area of the Project. These location of these sensitive receivers are displayed in Figure 5.3, and consist of a house (H1) and a shearer's quarters (S1).

The South Australian Environment Protection Authority (SA EPA) *Wind farms Environmental Noise Guidelines (2009)* (the Guidelines) provides guidance for undertaking assessments of environmental noise impacts from wind farms in South Australia, and states that the predicted equivalent noise level ($L_{Aeq,10min}$) should not exceed a level 5 dBA above the background noise level. It is understood that the landowner of the two noise sensitive receiver locations has a commercial interest in the Project.

The assessment has adopted a 45 dBA $L_{Aeq,10min}$ noise criterion for outdoors localities belonging to the financial stakeholder. The commercial relationships between wind farm developers and private land owners is considered in the Guidelines if there is no unreasonable interference with the landowner's enjoyment of the area. The 45 dBA $L_{Aeq,10min}$ noise criterion is considered appropriate in this instance.

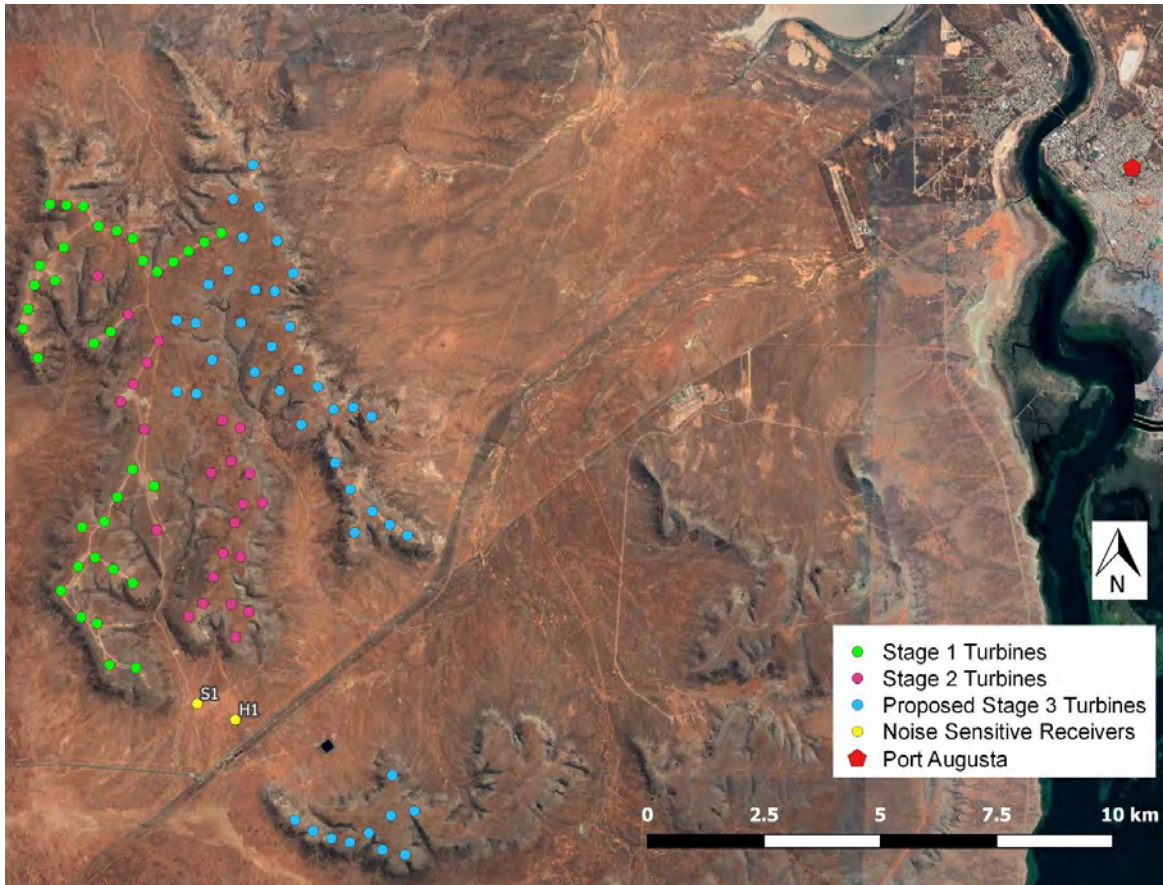


Figure 5.3 Location of sensitive receivers

Furthermore, the Guidelines state that if tonality is a characteristic of the wind turbine noise at the receiver, a 5 dBA penalty is added to the predicted or measured noise. Tonal audibility noise data is not available for all the models being considered for the Project. If the selected wind turbine model is determined to have a tonal characteristic in accordance with *Wind turbines – Part 11: Acoustic noise measurement techniques* (IEC 61400-11), and the tonal noise is detected at the receivers, the 5 dBA penalty will need to be applied to predicted levels.

Before assessment with the IOA method, WSP confirmed consistency with the methodology of the previous assessment completed by Sonus by modelling Stages 1 and 2 of the LGWF, with the CONCAWE propagation method. The outcomes are displayed in Table 5.2, below.

Table 5.2 Comparison of CONCAWE and ISO-9613-2 modelling results for Lincoln Gap Stages 1 and 2

	H1	S1
Sonus CONCAWE	41	44
WSP CONCAWE	41	44
WSP ISO-9613-2	41	43

The WSP model of LGWF Stage 1 and 2 exhibits consistency with the Sonus model, as the differences between predicted values are less than 1 dBA when the CONCAWE propagation model was used. The WSP implementation of ISO-9613-2 and the IOA modifications was found to provide consistent results as the differences between the CONCAWE and ISO-9613-2 predicted values are less than 2 dBA.

5.6.4 POTENTIAL IMPACTS

Table 5.3, below, displays the maximum predicted noise levels at the relevant noise receivers due to the proposed Stage 3 only, the cumulative effects of Lincoln Gap Stages 1, 2, and 3, and the cumulative effects of Lincoln Gap Stages 1, 2, and 3 with allowance of 250 m micro-siting for Stage 3. The predicted noise levels have been rounded up to the nearest integer. Appendix H contains detailed results for hub height wind speed integers 3 m/s through 20 m/s.

Table 5.3 Maximum predicted noise level from assessment of wind speeds 3 m/s–20 m/s

CONFIGURATION	RECEIVER LOCATION	MAXIMUM PREDICTED $L_{Aeq,10min}$ NOISE LEVEL (dBA)	NOISE CRITERION (dBA)
Stage 3 only	House, H1	33	45
	Shearer's Quarters, S1	32	
Stages 1, 2, and 3	House, H1	41	45
	Shearer's Quarters, S1	43	
Stages 1, 2, and 3 with micro-siting	House, H1	41	45
	Shearer's Quarters, S1	43	

Due to the relatively low noise contribution of the WTGs proposed as part of LGWF Stage 3, the cumulative result of all stages of the LGWF (1, 2, and 3) is predicted to increase noise levels by less than 1 dBA at the receiver locations as compared to Stages 1 and 2 only. Micro-siting Stage 3 turbines 125 m closer to the receivers is predicted to increase noise levels at the receivers by less than 1 dBA. Sound levels predictions for all assessed configurations achieve the nominated criterion of 45 dBA LAeq at the house and shearer's quarters.

5.6.5 KEY RECOMMENDATIONS

The cumulative noise emissions of the LGWF, as resulting from the proposed addition of LGWF Stage 3, was determined to be relatively low; resulting in an increase of less than 1 dBA at the relevant noise sensitive receivers.

Sound levels as a result of the Project are predicted to achieve the nominated criterion of 45dBA LAeq at the relevant noise receivers for all configurations assessed. As such, no management or mitigation measures have been recommended.

5.7 SHADOW FLICKER

5.7.1 LEGISLATIVE AND POLICY REQUIREMENTS

The following policy and guidelines are relevant to the shadow flicker requirements for the Project:

- *Environment Protection and Heritage Council's National Wind Farm Development (NWFd) Guidelines - Draft July 2010*
- Draft Planning Bulletin – Wind Farms, Planning SA
- CLGR Wind Farm Development Guidelines for Developers and Local Government Planners.

5.7.2 ASSESSMENT METHODOLOGY

A shadow flicker assessment was undertaken for the Project, and has been attached in Appendix I.

The assessment was undertaken using a single indicative layout, and considered the WTG model which presented the worst case scenario; being the Vestas 5.6 MW with the largest maximum tip height of 206 m. The details of this model considered in the assessment are displayed in Table 5.4, below.

Table 5.4 WTF configuration for Vestas 5.6 MW model used for assessment.

HUB HEIGHT [m]	ROTOR DIAMETER [m]	BLADE LENGTH [m]	NUMBER OF WTGS	MAX. CHORD WIDTH [m]	WTG TIP HEIGHT [m]
125	162	81	42	4.3	206

It should be noted that the cumulative shadow flicker impacts of all three stages of LGWF were not assessed.

The NWFDD Guidelines suggest that the effects of shadow flicker are dependent on the WTG blade dimensions, and recommend an assessment distance of 265 times the maximum blade chord be used when investigating shadow flicker. The WTG blades of the model considered in the assessment have a maximum chord length of 4.3 m. Therefore, the effective assessment distance considered was 1.140 km.

The assessment used WindPro v.3.2 to model the potential shadow flicker impacts on identified sensitive receptors near the Project site. The model applied a mathematical model of the sun's position in the sky for a given location and time of year, and considered the three-dimensional positions and sizes of the proposed WTGs. This information was then used to calculate the times for which the WTG rotors would cast shadows over the locations of interest.

A model was constructed that simulated both worst-case and realistic shadow flicker scenarios for the WTGs. These scenarios were assessed against the National Wind Farm Development (NWFDD) Guidelines, outlined below:

- Shadow flicker duration taken as the maximum within 50 m of building centre:
 “Shadow flicker duration can be very sensitive to location, varying by up to approximately 0.8 hours per metre of horizontal displacement. Thus, in an extreme case, one end of a house may experience no shadow flicker while the other end may exceed the limit. For this reason, the assessment method requires reporting of the maximum value of shadow flicker duration within 50 m of the centre of a dwelling.”
- Worst-case scenario shadow flicker duration limit of 30 hours per year:
 “In most circumstances where a dwelling experiences a ‘modelled’ level of shadow flicker less than 30 hours per year, no further investigation is required. However, if this level is exceeded in the modelled scenario, mitigation measures may be introduced and the ‘actual’ or ‘measured’ level of shadow flicker will need to be determined.”
- Realistic scenario shadow flicker duration limit of 10 hours per year:
 “The modelling approach includes a number of assumptions and, as such, the ‘modelled’ exposure limit is set higher to account for these conservatisms. The assumptions used in the modelling approach should produce an outcome equivalent to 10 hours per year actual exposure.”

Several assumptions were used across the two scenarios discussed above; pertaining to sunlight cover, WTG operational hours, WTG orientation, maximum distance for influence, visibility, minimum sun height, and dimensions of receptor window. Furthermore, a cloud cover factor was included, to convert the worst-case scenario results to a more realistic annual estimate. This was factored in due to sun and cloud cover data taken from Woomera Aerodrome station (Station ID: 016001), as part of data off the Bureau of Meteorology (BoM) (2019).

5.7.3 EXISTING CONDITIONS

Shadow flicker occurs when the sun passes behind the blades of a WTG, casting an intermittent shadow. This effect is known to cause annoyance when this shadow is received at a building.

In order for a WTG to cause shadow flicker at a given location, the following conditions have to be satisfied:

- The sun must be in the correct position in the sky to cast a shadow of the WTG onto the location. This will only occur for certain times of day and days of the year.
- Wind direction will have an impact on shadow flicker impact, as the area of the shadow cast by the WTG will depend on which direction the WTG is pointing (yaw), which in turn is dependent on the wind direction.
- There has to be unobstructed line of sight between the WTG and the location.
- The sun must not be significantly obscured by cloud or diffused by the atmosphere (significant diffusion typically occurs for angles of less than 3° above the horizon).
- The WTG has to be operating (i.e. the blades rotating).
- The dimension of the part of the blade causing the shadow has to be large enough to cast significant shadow. The largest dimension of blades is the chord near the root, which may be up to 4.5 m on large WTGs, and the smallest is the depth of the blade near the tip, which may be 0.3 m or less. The latter is not sufficient to cast any noticeable shadow. If the blade is edge-on to the sun, then the shadow will be very small.
- The shadow must fall over most of a room's natural light source, i.e. window or skylight. If the windows are large (compared to the size of the shadow), or do not face the WTG, then the room's light levels will not vary significantly.
- If any one of the abovementioned conditions is not met, then shadow flicker will not occur, or will have a diminished impact, at that location.

The sun's position varies with the time of day and the time of year. This means that the locations affected by shadow flicker from WTGs vary with the time of day and time of the year.

The shadow flicker usually occurs to the east and west of the WTGs or to the south if there is a large height difference between the WTGs and the observer location.

Two sensitive receptors were identified for the purpose of the shadow flicker assessment. These are displayed in Table 5.5, below.

Table 5.5 Receptor locations considered in this assessment – WGS84 UTM Zone 53

RECEPTOR ID	EASTING	NORTHING
Shearing Sheds	741052	6389727
Landowner House	741879	6389280

5.7.4 POTENTIAL IMPACTS

5.7.4.1 CONSTRUCTION

Shadow flicker on residential areas will be unlikely throughout the construction phase of the Project.

5.7.4.2 OPERATION

The results from the shadow flicker modelling on the two identified sensitive receptors are displayed in Table 5.6, below. It should be noted that the two sensitive receptor locations were analysed in the assessment, however both were deemed to be outside of the 1.14 km zone of influence.

Table 5.6 Project shadow flicker results on each receptor location (UTM WGS84 Zone 53)

ID	LOCATION		WORST CASE h/year [hh:mm]	MAXIMUM SHADOW HOURS PER DAY h/day [hh:mm]	REALISTIC CASE h/year [hh:mm]	DISTANCE TO NEAREST LGWF3 WTG [km]
	Easting	Northing				
Shearing Sheds	741052	6389727	00:00	00:00	00:00	2.4
Landowner House	741879	6389280	00:00	00:00	00:00	3.3

5.7.5 MANAGEMENT AND MITIGATION MEASURES

5.7.5.1 PLANNING AND DESIGN

WTG position is important in alleviating shadow flicker. As such, micro-siting within the limits of the 250 m 'Approval Corridor' has the potential to change the duration and effect of shadow flicker at varying locations. Following micro-siting, the NWFD Guidelines recommend that shadow flicker be reassessed, and changes be submitted to the relevant authority.

If the assessment of the micro-sited layout results in the exposure limits being exceeded, mitigation measures should be introduced. The primary mitigation method is to relocate WTGs to a distance where the impacts of shadow flicker become negligible.

5.7.5.2 CONSTRUCTION

Shadow flicker does not occur during construction phases. Therefore, no management and mitigation measures are required during construction.

5.7.5.3 OPERATION

The NWFD Guidelines recommend that independent modelling of shadow flicker, using as-constructed WTG positions is undertaken. If the results of this assessment show that the wind farm does not comply with the NWFD Guidelines, mitigation strategies such as planting of vegetation or scheduling turbine operation should be implemented to achieve compliance.

In the event where a complainant is not satisfied by the outcome of this approach, an observational study may be required. When completing an observational study, it is difficult to gauge the level of shadow flicker. This is due to a range of variables (especially cloud cover) which will reduce the duration of the observed shadow flicker to below modelled durations. Additionally, a full year of monitoring against which the annual exposure can be judged is likely to be impractical. As an alternative, it is recommended that an observational study of shadow flicker be carried out during a chosen day when shadow flicker is present and there is no cloud cover.

This observational assessment should be carried out using a video recorder placed at the receptor and monitored by an independent observer. A comparison of the time and duration of shadow flicker on that day would effectively validate or invalidate the predictions of the shadow flicker model, (which will need to be modelled for the same day).

Validation of the model (within a tolerance of ± 3 minutes) should be considered to demonstrate compliance with the NWFD Guidelines. In the unlikely scenario where a wind farm is shown to comply with the NWFD Guidelines but a nearby dwelling is dissatisfied by the amount shadow flicker, the resident should be recommended to take the following steps:

- plant screening vegetation between their property and the turbine(s)
- install heavy blinds or shutters on affected windows.

5.7.6 KEY RECOMMENDATIONS

The shadow flicker assessment identified that neither receptors is within the 1.14 km maximum distance of influence. Therefore, it is expected that neither receptor will experience effective shadow flicker as per the NWFD guidelines.

5.8 EMI

An assessment has been undertaken to determine the potential Electromagnetic Interference (EMI) impacts of the Project on radio communication services surrounding the Site. The assessment is attached in Appendix J, and has been summarised in the following section.

5.8.1 LEGISLATIVE AND POLICY REQUIREMENTS

The following industry standard guidelines were used to guide the EMI assessment for the Project:

- fixed link WTG exclusion zone method
- draft National Wind Farm Development Guidelines
- Guidelines for Minimizing the Impact of Wind Farms on the SAGRN (Doc: TR049-SA).

5.8.2 ASSESSMENT METHODOLOGY

The EMI assessment included an analysis of potential impacts to the following radio communication services surrounding Project area:

- fixed point-to-point radio communication links in the vicinity of the proposed WTG locations
- fixed point-to-multipoint licences within 30 km of the site
- radar operations within 250 nautical miles of the site
- television (TV) and radio broadcasting services in operation around the Project site
- mobile phone services
- internet services
- licences operated by emergency services in proximity to the Project site.

The turbine model presenting the worst-case scenario was utilised for assessment purposes; this consisted of the Vestas 5.6 MW with the largest maximum tip height of 206 m, and a rotor diameter of 162 m.

The cumulative EMI impact of earlier stages of the LGWF were also considered under the assessment.

5.8.3 EXISTING CONDITIONS

Communication systems using radio waves are heavily utilised in Australia. Mobile phones, television (TV), commercial radio, land mobile radio and emergency radio are common examples of systems that rely on radio and telecommunication. These systems generally use radio towers to transmit and receive signals across a wide area. In the context of wind farm development and operation, electromagnetic interference (EMI) is the impact of a wind farm on surrounding communication services resulting in an unacceptably detrimental effect to the communication service. Radar services (civil and weather) can potentially be impacted by wind farms also.

5.8.4 POTENTIAL IMPACTS

ACMA is the Australian government body that regulates the use of Australia's radio spectrum. ACMA maintains a register of radio licences, radio communication towers and radio services (RADCOM). The RADCOM database was accessed and used to identify all licences in operation within 75 km of the Project area, and formed the basis of the analysis. The search identified 249 communication towers within 75 km of the Project area; with approximately 72 of these being within 30 km of the site boundaries. A summary of potential impacts are summarised below:

- Two (2) communication towers were identified within 2 km of any WTG on the Project site; one was located 0.7 km away, whilst the other was 1.6 km away. It is recommended that a WTG-communication tower separation distance equal to the maximum of either the calculated near field exclusion zone or at least 500 m, be implemented. It is also noted that one of these towers is located within the site boundary, approximately 700 m northwest of WTG 33. According to the RADCOM database, there are no operators and assignment IDs associated with this tower. It is likely that this tower is currently not in use by the operators servicing this area.
- Three (3) point-to-point links were identified in the vicinity of the proposed WTG locations. The 2nd Fresnel exclusion zones for each line was identified. To avoid potential EMI impacts on the links, it is recommended that no WTG encroach the 2nd Fresnel zones of the identified links. A set-back distance of one blade length is also recommended from the 2nd Fresnel zones to avoid blade overhang. It is expected that one (1) of the three (3) identified licensees will be impacted by the development and operation of the Project.
- Seven (7) Point-to-multipoint links were identified within 30 km of the Project area. These links are similarly susceptible to EMI impacts, however due to the nature of many uses of point-to-multipoint licences, the likelihood of a wind farm causing unacceptable impacts is generally low. There may be point-to-multipoint services with fixed receivers that can be impacted.
- The impact on AM and FM radio broadcasting reception is considered to be negligible beyond the boundary of the wind farm. It is not anticipated that there will be any impact to AM services as a result of the Project. FM signals, being more susceptible to interference from nearby obstacles such as WTGs, may be impacted, but can be mitigated through measures such as the installation of high gain antenna.
- Based on the ABC Reception Coverage Estimator, there is currently no ABC Digital Radio services available to the Project area. As such, due to the inexistence of digital radio within the area, it is anticipated that the Project will have negligible impact on digital radio services.
- Mobile radio may be affected by the shadowing effects of the Project. However, if this is the case, any problems can usually be rectified through a minor adjustment in the position of the receiver.
- Areas of marginal Mobile reception coverage may be affected by the construction and operation of the Project. As such, feedback should be sought from the relevant service providers.
- There are two dwellings identified in proximity to the Project area. WTGs can obstruct the line of sight of nearby broadcast stations, and could potentially cause these residences to experience interference to their TV services. Should this be the case, there are a number of mitigation measures that can be put in place. It is recommended that a ground survey of TV signal strength is undertaken with the residents surrounding Project area prior to the construction of the wind farm to confirm the current status of TV signal strength.

- A number of point-to-area services were identified within 30 km of the Project area. It is recommended that the organisations operating the licences are contacted for comments on potential EMI impacts to their services as a result of the proposed development.
- Two weather stations were identified within 30 km of the Project site. It is recommended that the BoM is contacted to seek feedback on any potential EMI impacts on their services and operations.
- The nearest major airport to the Project site is Adelaide Airport, located approximately 270 km southeast, while the nearest regional airport is Port Augusta Airport, located approximately 10 km east. It is expected that potential impacts on aviation radar services, if any, are not likely to be of operational significance. However, it is recommended that consultation is undertaken with the relevant airports to assess the potential EMI impact arising from the Project.
- 16 licences belonging to emergency service providers, were identified within 30 km of the Project site; operated by South Australian Country Fire Service, South Australian State Emergency Service and St John Ambulance Australia Incorporated.

5.8.5 MANAGEMENT AND MITIGATION MEASURES

Generally, mitigation of radio impacts involves manipulation of the WTG layout so that impacts are acceptably controlled. However, the wind farm proponent's consideration may make other options feasible (providing there is agreement amongst the relevant parties). The Draft National Wind Farm Development Guidelines provides the following hierarchy of mitigation options to manage and mitigate potential impacts (in order of most preferable to least preferable):

- 1 re-location/removal of WTGs
- 2 replacement of existing radio communications service equipment with another less affected type (e.g. replace UHF link with microwave link)
- 3 re-location of radio communications services to another existing radio communications site
- 4 re-location of radio communications services to a new telecommunications site
- 5 substitute radio communication for underground or overhead optical fibre
- 6 enhance radar filters.

5.8.5.1 CONSTRUCTION, MAINTENANCE AND DECOMMISSIONING

It is recommended that the exclusion distances, which are established and applied to the final layout, be respected during construction, maintenance and decommissioning. These exclusions should be agreed upon by the licence holders and the wind farm proponent. Crane booms and the raising and lowering of WTG parts may also cause interference. It is recommended that management plans for these activities include these considerations.

NEAR FIELD INTERFERENCE

Identified licensees within 30 km of the Project area should be contacted seeking feedback regarding potential EMI impacts on their services and operations. At this stage, it is deemed unlikely that the proposed Project layout will cause near field effects to the nearby towers holding registered licences.

Should the Project be found to cause EMI impacts, the first mitigation technique to be considered should be to microsite or relocate WTGs to locations outside of the near field exclusion zones. The specific requirements of near field zones should be discussed with the affected licensees to minimise disruption to the WTG layout and to avoid radio interference.

In the event that relocation of WTGs is not possible or preferable, it may be possible to modify or upgrade affected services to new apparatus or frequencies with smaller near field zones. If this mitigation technique is not possible, the next option will be to re-locate and/or re-direct services to alternative existing sites.

Further mitigation techniques (including commission of new radio towers and fibre optic cabling) are possible beyond the options discussed; however significant cost may be incurred if these options are undertaken.

POINT-TO-POINT LINK INTERFERENCE

It is recommended that the identified point-to-point link licensees identified in the vicinity of the Project area are contacted to seek feedback regarding potential EMI impacts on their services and operations arising from the development and operation of the Project.

Assuming that each of the links (and corresponding assignments) are currently active, and the locations given by the ACMA are accurate, the first mitigation technique to be considered is to ensure WTG locations, including their blades and towers, do not intrude on the 2nd Fresnel exclusion zone. It is noted that one WTG is currently encroaching one of the three (3) identified links, based on the maximum WTG dimensions provided. WSP recommends that the licensees are consulted to verify the location of the identified towers as well as the frequencies associated with the point-to-point links.

In the event that relocation of WTGs is required but not possible or preferable, it may be possible to modify or upgrade affected services to new apparatus or frequencies with narrower 2nd Fresnel exclusion zones. If this mitigation technique cannot be performed, then the next option will be to re-locate and/or re-direct services to alternative existing sites.

Further mitigation techniques (including commissioning of new radio towers and fibre optic cabling) are possible beyond the options discussed, however, significant cost may be incurred if these options are undertaken.

BROADCASTING SERVICES

TV broadcast services across Australia are now digital broadcast. Digital TV signals are usually less prone to interference from WTGs. However, in areas where the digital TV signals are considered marginal, it is possible that TV signals can be subject to some interference from nearby obstacles, like WTGs.

For such instances, a number of mitigation options are available, such as:

- 1 retuning the antenna to another tower, not within the line of sight of the WTGs
- 2 the use of a higher gain antenna
- 3 moving the existing antenna to a less affected position
- 4 installation of satellite TV at the affected residence.

A ground survey of TV signal strength is undertaken with the residents surrounding the Project area prior to the commencement of construction.

5.8.6 KEY RECOMMENDATIONS

The following key recommendations were made at the conclusion of the EMI assessment:

- Three (3) fixed, point-to-point, links were found to intersect with the approximate Project area. The 2nd Fresnel zones were calculated for each link and it was observed that one WTG is located within one blade length of the 2nd Fresnel zone. As such, WTG exclusion zones should be established in order to avoid impacts to identified services and operations.
- Licensees should be consulted to verify the location of identified towers as well as the frequencies associated with point-to-point links.
- A ground survey of TV signal strength should be undertaken amongst the residences surrounding the Project area prior to the construction of the Project.
- In considering the possible cumulative impacts of all stages of the LGWF (1, 2 and 3), it is unlikely that cumulative EMI impacts will arise from the development and operation of the LGWF. However, the possibility of cumulative impacts to television, mobile phone reception and emergency services may occur; though options exist to mitigate most interference issues, should they occur.

5.9 AVIATION

5.9.1 PREVIOUS ASSESSMENTS

Aviation assessments previously prepared for the LGWF are outlined in Table 5.7. The previous Aviation Impact Statements concluded that the LGWF would not impact on the safe conduct of civil or military aircraft operations, provided mitigation measures are implemented.

Table 5.7 Aviation impact statements previously prepared for the LGWF

ASSESSMENT	PREPARED BY	DEVELOPMENT APPLICATION REFERENCE
2014 Obstacle Lighting Assessment (including Aviation Impact Statement)	Aviation Projects Pty Ltd (2014)	010/0011/06 V1
2014 Aviation Impact Statement	IDS Australasia	010/0011/06 V1
2017 Aviation Impact Statement	Landrum & Brown Worldwide (Aust) Pty Ltd	010/U053/17

5.9.2 LEGISLATIVE AND POLICY REQUIREMENTS

The following legislation and policy requirements are relevant to aviation matters for the proposed LGWF Stage 3:

- *Civil Aviation Regulations 1988 (CAR)*
- Civil Aviation Safety Authority Manual of Standards (MOS) 139
- International Civil Aviation Organisation (ICAO) Annex 14
- National Airports Safeguarding Framework Principles and Guidelines – Guideline D: Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation.

5.9.2.1 CIVIL AVIATION REGULATIONS 1988

The CAR, Part 9, Subpart 95, provide for the marking or removal of hazardous objects within the Obstacle Limitation Surface (OLS) of any aerodrome. For major aerodromes, the OLS could extend up to 15 km from the aerodrome.

The regulations require:

- aerodrome operators to monitor the surrounding airspace for any object that might infringe the OLS and to notify CASA
- any person who proposes to construct any structure which will be ≥ 110 m above ground level to inform CASA.

CASA may determine whether the proposed structure(s) will be a hazardous object because of its location, height or lack of marking or lighting.

The Civil Aviation Regulations also define the Lowest Safe Altitude (LSALT) for aircraft. Aircraft undertaking Visual Flight Rules (VFR) operations are required to maintain a minimum height of 500 feet above ground level outside of built up areas and 1,000 feet over built up areas. Instrument Flight Rules (IFR) or a Night VFR aircraft operation must not be flown at a height less than 1,000 feet above the highest obstacle within a 10 nm radius of the aircraft in flight. There are exceptions in respect of operations that require low flying (e.g. during take-off and landing, search and rescue and agricultural spraying operations).

5.9.2.2 CASA MANUAL OF STANDARDS (MOS) 139

The CASA MOS provides specifications for the intensity and placement of obstacle lighting for WTGs.

5.9.2.3 INTERNATIONAL CIVIL AVIATION ORGANISATION ANNEX 14

The ICAO Annex 14 provides recommendations regarding objects outside the OSL as well as markings and lighting of WTGs.

5.9.2.4 NATIONAL AIRPORTS SAFEGUARDING FRAMEWORK PRINCIPLES AND GUIDELINES

The National Airports Safeguarding Advisory Group (NASAG) Obstacle Lighting Standard for Wind Turbines and Wind Monitoring Towers provide recommendations regarding obstacle lighting standards for WTGs, alternatives to fixed obstacle lighting and marking and lighting of wind monitoring towers.

5.9.3 ASSESSMENT METHODOLOGY

An aviation assessment was prepared for LGWF Stage 3 (Appendix K) through the following methodology:

- assessment and review of charts, maps, airspace (including Prohibited, Restricted and Danger areas), airfield and airstrip guides/directories, en-route and visual terminal charts, Notices to Airmen (NOTAMs) etc
- review of all civil and military aviation activities, including potential aviation activities, occurring or likely to occur within the Project area
- assessment and review of relevant Australian regulatory authority requirements and international standards, recommendations and guidelines
- assessment of the risks associated with aviation operations and the requirement for obstacle lighting.

5.9.4 EXISTING CONDITIONS

The proposed LGWF Stage 3 would be located within and immediately south of the existing LGWF site (currently under construction). Aviation operations present within 30 nautical miles (nm) (approximately 55.5 km) of the Project area are:

- Port Augusta aerodrome – approximately 10 km north/north-east of the closest edge of the site
- Whyalla aerodrome – approximately 55.5 km south of the site
- Tregalana airstrip – located on military land approximately 20 km south of the site
- three unlicensed aerodromes:
 - Illeroo Station – approximately 10 km west of the site
 - Carrierloo Station – approximately 30 km west/north-west of the site
 - El Alamein Army Base – approximately 8–10 km east of the site.

5.9.5 POTENTIAL IMPACTS

No aviation operations within 30 nm would be adversely impacted by the proposed LGWF Stage 3.

A summary of the potential operational impacts of the project on the aviation operations within the project area are summarized in Table 5.8 below.

Table 5.8 Summary of potential operational impacts of LGWF Stage 3 on aviation operations

ISSUE	POTENTIAL IMPACT
Licensed aerodromes	<p>Port Augusta aerodrome is the closest licensed aerodrome and would not be impacted by the project. This aerodrome has one runway and operations to the south are required to turn right to avoid any potential conflict with the El Alamein Army Base.</p> <p>Nominated missed approach procedures are required to be used on the eastern side of the aerodrome and minimum circling heights towards the wind farm development are 2,500 ft, well clear of the proposed WTGs.</p> <p>The Whyalla aerodrome and Tregalana airstrip are too far away to be impacted by the project.</p>
Unlicensed aerodromes	<p>Illeroo Station and Carriewerloo Station airstrips are both closed and would not be impacted. The El Alamein Army base airstrip is rarely used and operations are not expected to be impacted by the project.</p>
VFR operations	<p>VFR aircraft operations should be above the level of the proposed WTGs (based on the heights outlined by the CAR) and clearly visible to pilots.</p>
IFR and night VFR operations	<p>IFR and night VFR operations should be above the level of the proposed WTGs (based on the heights outlined by the CAR). The altitude limitations set by the CAR are important in determining the requirement, or otherwise, for obstacle lighting.</p>
Gliding operations	<p>Gliding operations are not known to occur within the vicinity of the project area. If gliding operations did occur, they would be subject to the constraints set by the CAR and should not be impacted by the project.</p>
Hang gliding and paragliding operations	<p>Hang gliding and paragliding operations are not known to occur within the vicinity of the project area. However, hang gliding and paragliding operations are often launched from ridges on hills, similar to those in the landscape surrounding the LGWF.</p>
Ultralight operations	<p>Ultralight operations are not known to exist in the vicinity of the project. However, should such operations occur, they would be subject to the same limitations as per VFR aircraft and. Therefore, the project is considered unlikely to impact on such operations.</p>
Effect of downstream turbulence	<p>There is no evidence of any airstrip nearby which would be affected by any downstream wind turbulence from any of the planned WTGs.</p>

ISSUE	POTENTIAL IMPACT
Airspace considerations	<p>The project is well clear of any of the airspace control zone and the operating height of aircraft over the area is such that the presence of the wind farm would have no effect at all. There are no aircraft traffic control issues nor is there any potential influence on any instrument approach procedures or aeronautical navigation aids.</p> <p>No Prohibited, Restricted or Danger zones were evident in the vicinity of the project.</p> <p>Further, there are no known Notices to Airmen (NOTAM) which might impact on the development of the wind farm.</p> <p>The worst-case scenario may require a change in the Lowest Safe Altitude LSALT for one route which passes over or within 10 nm of the proposed wind farm.</p> <p>The project will not impact on Precision/Non-Precision Navigational Aids, HV/VHF Communications, Advanced Surface Movement Guidance and Control Systems, Radar or Satellite/Links.</p>
Aerial fire-fighting activities	<p>Helicopter or fixed wing aircraft operations within the confines of any windfarm and below the top of the WTGs are potentially hazardous and not recommended. It is also possible that aerial fire-fighting could be undertaken above the level of the WTGs however dropping water or retardant from this height may reduce its effectiveness.</p>
Aerial agricultural operations	<p>Aerial agricultural operations from any airstrips which might be established on the fringes of the LGWF and clear of any WTGs could be undertaken satisfactorily as agricultural operators are familiar with operating from constrained areas. Aerial spraying, seeding or fertilising operations, undertaken by either helicopter or fixed wing aircraft, is potentially hazardous and not recommended.</p>
Rural ambulance services	<p>The existing of WTGs could potentially limit the flexibility of operations of aircraft within the site however would not be an issue outside of the site.</p>

5.9.6 MANAGEMENT AND MITIGATION MEASURES

Management and mitigation measures to address aviation related issues are as follows:

- Consultation with CASA, Airservices and the Department of Defence should be undertaken, particularly to:
 - alert CASA to the number and heights of the WTGs
 - allow Air services to review the LSALTs for routes which pass over or within 10 nm of the proposed wind farm
 - allow Land Planning and Spatial Information to undertake an independent assessment of the project for Defence, including any impact on the aviation activities of the RAAF, Army and Navy as well as any impact on Defence communications and the operation of Defence Radars.
- The relevant sports aviation bodies, in particular the Hang Gliding Federation of Australia, Recreation Aircraft Australia and Sport Aircraft Association of Australia should be notified of the project.

5.9.7 KEY RECOMMENDATIONS

- Operations from identified airfields in the vicinity of LGWF Stage 3 will not be affected.
- Aviation operations, generally, are unlikely to be affected.
- The proposed WTGs will penetrate navigable airspace. Despite this, aircraft operations in the vicinity are considered to be so low as to not warrant the provision of obstacle lights.
- Reference towers for meteorological monitoring are difficult to see and such should be marked in accordance with the recommendations of NASAG Guideline D, with the exception that a flashing strobe light is considered unnecessary.

- LSALTs are adjudged as not being affected but Airservices should be advised of the proposed LGWF Stage 3 for an independent assessment, relevant NOTAM action, when necessary, and to eventually record the presence of the wind farm on relevant aviation maps.
 - Department of Defence (DoD) operations should not be affected but both the DoD and RAAF AIS should be advised of the project for an independent assessment and to eventually record the presence of the wind farm on relevant military aviation maps.
 - The position in respect of the proposed LGWF Stage 3 regarding aerial fire-fighting activities and rural ambulance services is not different to any other wind farm.
 - Aerial agricultural operations may occur in the region. Aerial spraying, seeding or fertilising operations, undertaken by either helicopter or fixed wing aircraft, is potentially hazardous and not recommended.
 - The effect of downstream turbulence from the WTGs is not considered to be an issue of concern.
 - It is considered that micro-siting should be approved in principle by SCAP.
-

5.10 TRAFFIC AND ACCESS

5.10.1 LEGISLATIVE AND POLICY REQUIREMENTS

The following legislation and policy documents are relevant to traffic and access requirements for the Project:

- *Road Traffic Act 1961*
- *Environment Protection Act 1993*
- *Heavy Vehicle National Law Act 2013*
- PD Code.

5.10.2 ASSESSMENT METHODOLOGY

A Traffic Impact Assessment (TIA) was undertaken for the Project, and has been attached in Appendix L. The objective of the TIA was to identify any key traffic operational and safety issues that may arise as a result of the Project, and provide suitable mitigation measures.

The assessment was based on a desktop assessment and site inspection undertaken on 27 June 2019, and considered roads and traffic operations at, and surrounding, the proposed Project site. The assessment was informed by information on construction activities provided by Nexif Energy.

The assessment approach included:

- determining the existing (baseline) road and traffic conditions near the Project site, that may be impacted by the proposed Project
- developing an understanding of the construction staging and traffic generating activities
- identifying and assessing options for access to the Project site
- estimating the volume, type, frequency and patterns of traffic movements associated with the construction and ongoing operations activities of the Project
- assessing the impacts of the traffic generated by the Project on the existing (baseline) road and traffic operations
- identifying and suggesting mitigation measures that may be implemented to minimise or eliminate these impacts.

5.10.3 EXISTING CONDITIONS

The Project site is located approximately 14 km to the west of Port August. The LGWF site (Stages 1, 2 and 3) comprises two main parcels of land intersected by the Eyre Highway (Figure 5.4):

- 1 Area 1: is situated immediately to the north of Eyre Highway.
- 2 Area 2: is situated to the south-east of an active rail line (which runs parallel to Eyre Highway in the vicinity of the site).

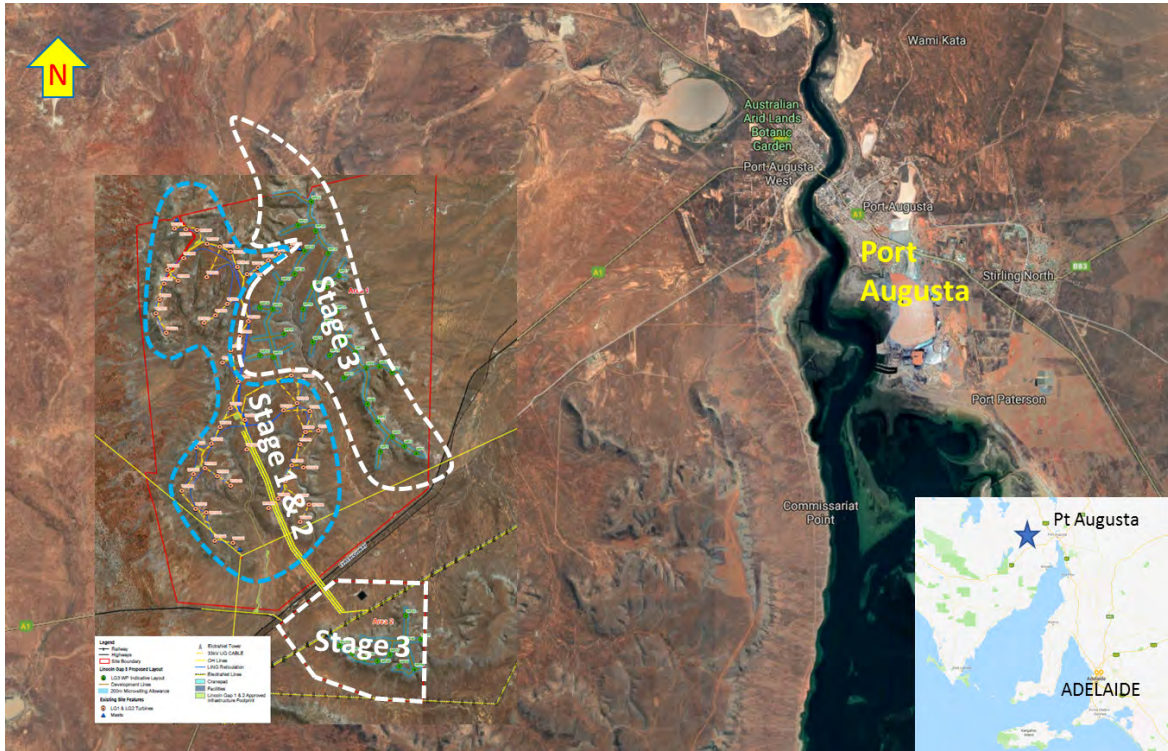


Figure 5.4 Site location, with reference to the TIA

The topography of the land in the immediate vicinity of the Project site may be described as escarpments with plateau atop and limited accessibility by road. The area is sparsely populated and the existing land use is predominantly Primary Industry/Primary Production activities. Natural vegetation in the form of trees and shrubs is generally located along the ridges and road corridors; with lower native chenopod shrublands atop hill flats where turbine towers will be located.

An inspection of the surrounding road network was conducted on Thursday 27 June 2019 to determine current conditions and identify any existing safety hazards. This inspection, together with traffic usage data, provides a basis for the assessment of any traffic related impacts associated with the proposed Project.

The proposed access to Area 1 (north-east side) is located approximately 600 m west of Eyre Highway junction with Lincoln Highway. Access to Area 2 (southern side) is via an existing unsealed road immediately south of the Tank Access Rest Area, approximately 640 m north of Eyre Highway junction with Lincoln Highway. The subject unsealed access road provides access to a substation constructed for the LGWF Stage 1 and 2, as well as and the Lincoln Gap water storage facility. The subject access road crosses an ARTC single train track; which runs between Port Augusta and Port Lincoln, and parallel to and 200 metres west of the Eyre Highway.

5.10.3.1 ROAD NETWORK

Key features of the surrounding road network are detailed below:

EYRE HIGHWAY

The Eyre Highway is part of the Australian National Land Transport Network. Eyre Highway is sealed, with formed shoulders and line marking. Eyre Highway is a gazetted PBS Level 3B route which allows for use by vehicles up to 42.0 m in length (double road train).

LINCOLN HIGHWAY

The Lincoln Highway is a Rural Arterial road connecting Port Lincoln with Port Augusta. Lincoln Highway is sealed, with formed shoulders and line marking. Lincoln Highway is a gazetted PBS Level 2A route which allows for use by vehicles (either up to 26 m or less than 30 m) metres in length (B-double).

EYRE HIGHWAY AND LINCOLN HIGHWAY INTERSECTION

The Eyre Highway and Lincoln Highway intersection was inspected to determine any restrictions in sight distance and/or physical constraints that may pose safety hazards for vehicles accessing the Project site, or exacerbate any existing safety risks.

The subject T-junction of two major highways is in a 110 kph posted speed limit zone. Warning signs to encourage reduced speeds on Eyre Highway are located approximately 575 m west of the junction with Lincoln Highway. The visibility of oncoming traffic from both directions along Lincoln Highway and Eyre Highway was deemed sufficient and clear of any physical obstructions.

SOUTHERN SITE ACCESS ROAD

Inspection of the existing roads and junction identified that access to the southern site requires crossing the operational Port Augusta to Port Whyalla rail track (ARTC). The subject rail crossing is only passively controlled. Traffic generated during the construction period will require daily access across the rail line to the southern site.

5.10.3.2 TRAFFIC

Classification counts on the Eyre and Lincoln Highways were sourced from DPTI and are summarised in Figure 5.5, below. Counts were provided for three count locations; all of which were located less than 10 km distance from the proposed Project site. The counts also show the proportion of traffic that are heavy vehicles. The volume of traffic using the Eyre Highway west of the Lincoln Highway intersection is about 750 vehicles per day; of which about 35% are heavy vehicles. Growth in traffic volumes is expected to be low, as there is not a lot of development or population growth in the general area to generate any significant increase.

Eyre Highway/Lincoln Highway carries 2,200 to 2,700 vehicles per day; of which up to 21% are heavy vehicles. It is not evident from these daily traffic counts whether there is any particular peak period of traffic flow during any time of the day. The majority of traffic movement along Eyre and Lincoln Highway appears to be occurring during daylight hours, with minimal traffic movements during evening and early hours.

There is no information on traffic volumes available for the unsealed roads near the southern site. This road currently services a water storage facility on the south-eastern side of the rail track. A very low traffic usage of this road is envisaged under existing conditions.

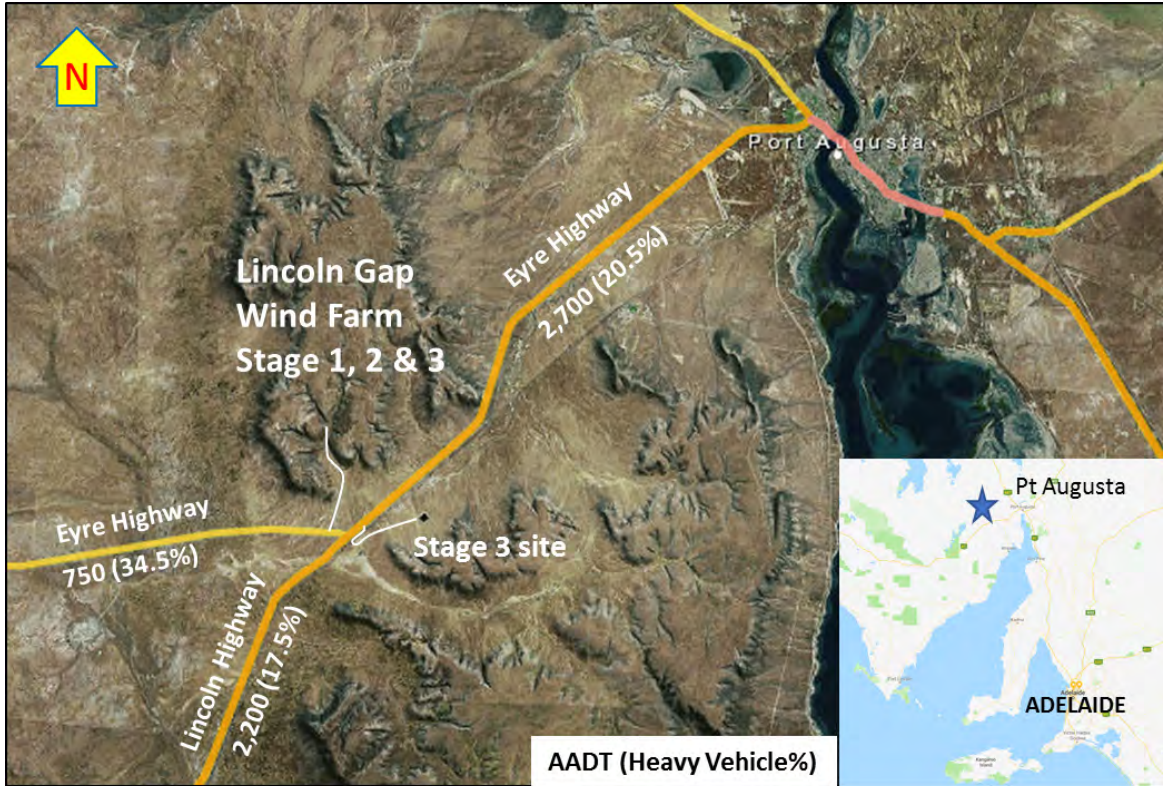


Figure 5.5 Traffic volumes on surrounding road network (Department of Planning, Transport and Infrastructure, n.d.)

5.10.3.3 CRASHES

Crashes reported over the most recent five years between 2013 and 2017 were reviewed, to identify any specific trends in crash events or locations where crashes are frequent. Crashes of relevance to the Project site are summarised in Table 5.9, and discussed in detail below. The general location of reported crashed is displayed in Figure 5.6.

Table 5.9 Crash record summary (2013–17)

LOCATION (REF FIGURE 2.2)	TOTAL CRASHES	PDO	INJURY	SERIOUS INJURY	FATALITY	HIT FIXED OBJECT	NIGHT TIME
1	1	✓	–	–	–	1	1
2	2	✓	✓	–	–	2	2
3	1	–	✓	–	–	1	1

Along the section of Eyre Highway west of the junction with the Lincoln Highway, only one crash was reported. This crash involved hitting a fixed object at night time and resulted in property damage only.

Two crashes were reported at the junction of Eyre Highway and Lincoln Highway in the five years between 2013 and 2017. Both crashes occurred at night time, and involved hitting a fixed object. One crash resulted in injury and the other resulted in property damage only.

One crash was reported on Eyre Highway approximately 1.3 km north-east of the junction with Lincoln Highway. This involved hitting a fixed object at night time and resulted in injury. There were no casualties.



Figure 5.6 Crash locations near the LGWF site (Government of South Australia, n.d.)

5.10.4 POTENTIAL IMPACTS

5.10.4.1 TRAFFIC GENERATION

The general layout of the Project is split across two areas, as shown in Figure 5.4, above. 32 of the proposed 42 WTGs will be located north of the Eyre Highway in Area 1, and 10 of the proposed 42 WTGs will be located south of the Eyre Highway in Area 2.

The Project will be constructed over approximately 24 months. The stages will include preliminary accommodation works (site set out for example), earthworks to prepare the site, development of the internal road network, external roadworks, preparation of foundations for turbine towers and other structures, and first and second fix trades of the turbine assembly. The construction activities may commence in the north-eastern site before moving into the southern site. Each of these construction activities will generate specific traffic movements; including staff movements to and from the site each day; transportation of plant and equipment (including earthmoving and lifting plant, temporary structures, and project components such as turbine blades, nacelles etc.) and delivery of materials (e.g. quarry rubble, steel and concrete).

It is anticipated that up to 92 workers will be present on-site during peak construction activity; with workers travelling to and from the Project site each day, most likely from Port Augusta and Whyalla.

Indicative estimates of the specific delivery schedules and staffing arrangements are included in Table 5.10:

Table 5.10 Construction activity, equipment and workforce details

ITEM	ESTIMATED NUMBER/VOLUME	LOADS	NOTES
Crane	6 no.	12 loads	Delivered at the start of Stage 1 and removed at the end of Phase 2
Plant	23	23 loads	
Employees	92	90 cars /day	Daily movements in Phase 1 & 2
Crushed stone	5,500 tonnes	275 loads	Regular deliveries throughout Phase 1 – corresponding to construction schedule
Bedding sand	3,660 tonnes	183 loads	
Steel	2,772 tonnes	168 loads	
Concrete	24,570 m ³	3,510 loads	
Building materials	Various	92 loads	
Fuel	92,000 litres	46 loads	
Towers	42	126 loads	
Nacelles	42	42 loads	
Blades	126	126 loads	
Tower bases	42	42 loads	
Containerised WTG parts	252	252 loads	
Electrical components	Various items	24 loads	

Site access will be provided via Eyre Highway, as shown in Figure 5.7. It is anticipated that these access point will be used for the daily workforce, delivery of components and equipment as well as oversize plant and equipment.

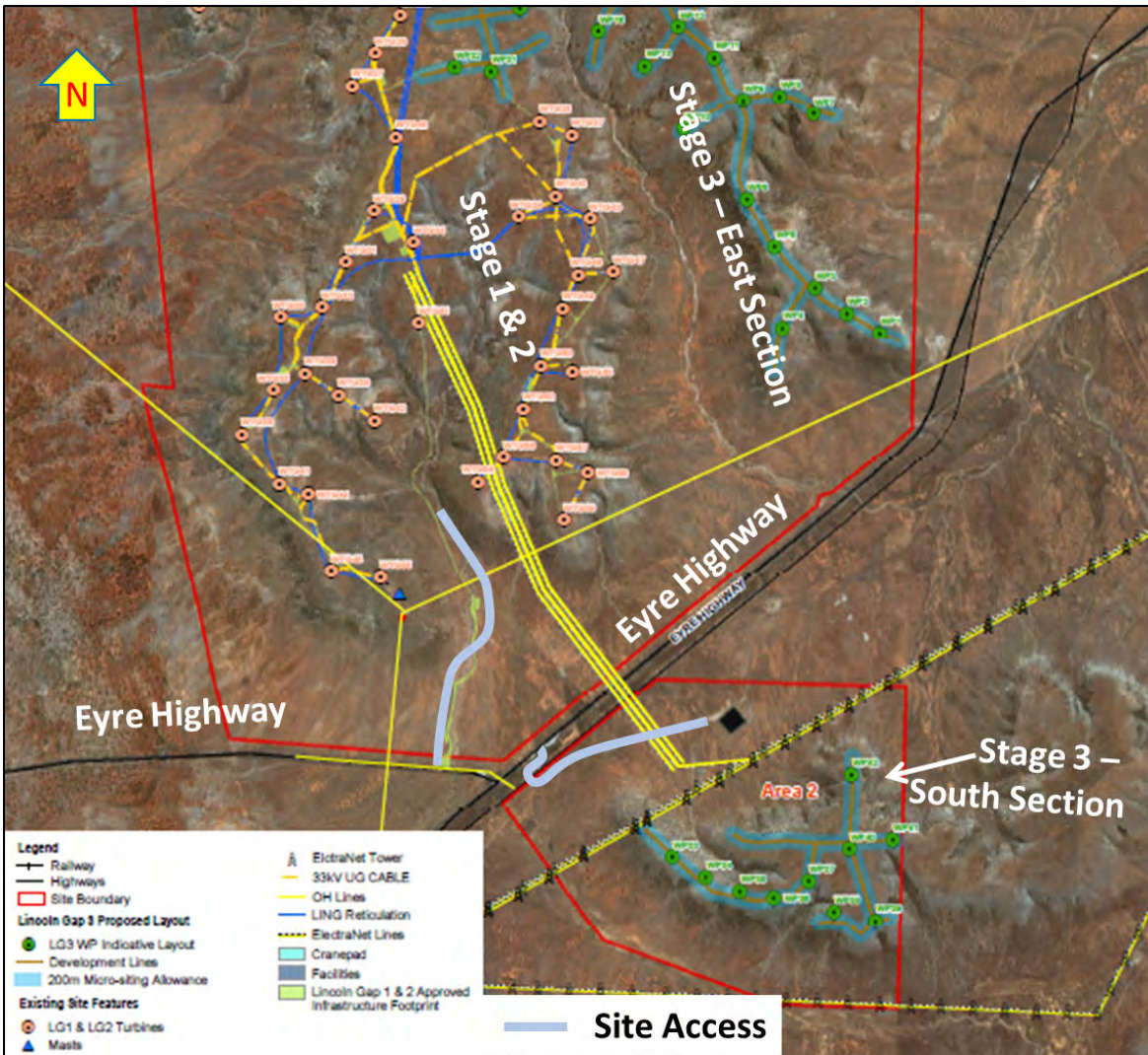


Figure 5.7 Site access from Eyre Highway

Access to Area 1 will use existing access off Eyre Highway approximately 600 m west of junction with Lincoln Highway. The subject access was, and is still, being used for LGWF Stage 1 and 2 construction activities and was deemed to be easily visible and accessible from Eyre Highway. Access Area 2 would be from Eyre Highway via an existing unsealed road, approximately 650 m north of junction with Lincoln Highway. The subject unsealed access road has an at-grade level crossing of an ARTC rail track between Pt Augusta and Pt Whyalla.

It is anticipated that the wind farm will employ up to 12 staff once operational. It is estimated that the vehicular traffic generated by the daily operating activities will be very low, and be predominantly light vehicles. The additional traffic movements are envisaged to be from/to Port Augusta.

CONSTRUCTION SCHEDULE

For the purpose of estimating traffic generated during construction, construction tasks were split into two Phases:

- Phase 1: Design, Mobilisation, and BOP Construction
- Phase 2: WTG Manufacture, transportation and installation, and commissioning

High-level estimates of traffic generation for each of the two construction Phases were based on information provided by Nexif Energy, and have been summarised by movement type and construction phase in Table 5.11, below. Note that testing and documentation and practical completion tasks were deemed to require minimal workforce present at site and thus excluded from traffic generation estimate.

Table 5.11 Traffic generation summary – Lincoln Gap Stage 3 (Phase 1 & 2)

EYRE HIGHWAY PT AUGUSTA TO PROJECT SITE	EXISTING SITUATION	PHASE 1 TRAFFIC ESTIMATE DURATION 1-17 MONTHS	EXISTING + PHASE 1	% INCREASE
Shift Start (vph)	50	90	142	284%
Shift End (vph)	200	90	292	146%
During work shift – staff*	–	60	60	–
During work shift – deliveries	–	35	35	–
Daily (vpd)	2,700	275	2,975	110%
EYRE HIGHWAY PT AUGUSTA TO PROJECT SITE	EXISTING SITUATION	Phase 2 Traffic estimate Duration 12-24 months	Existing + Phase 2	% increase
Shift Start (vph)	50	90	142	284%
Shift End (vph)	200	90	292	146%
During work shift – staff*	–	60	60	–
Turbine components	–	5	5	–
Daily (vpd)	2,700	215	2,915	109%

* staff movements for lunch/coffee breaks resulting in travel outside Project site (e.g. Nuttbush Retreat or Port Augusta)

LIGHT VEHICLE MOVEMENTS

The numbers of light vehicle movements trips shown in Table 5.11 represent conservative upper limit estimates assuming workers travelling individually in a private vehicle to and from the site. The Project site is remote and it is unlikely that the majority of workers will live close by. Accordingly, it can be expected that a high proportion of workers will reside in nearby townships (e.g. Port Augusta) and would likely share rides to and from the Project site. A higher proportion of ride sharing (e.g. 3 workers per car) would reduce the estimated number of light vehicle movements to 80 trips (two-way movements) per day during construction (Phase 1).

It is understood that there will be one working shift between 7 am–6 pm Monday to Friday and 8 am to 1 pm on Saturdays. As such arrival and departure of construction staff in light vehicles will be concentrated at the start of shift (6.30–7.30 am) and end of shift (5–6 pm).

The nearest food place, the Nuttbush Retreat, is located approximately 13 km to the west of the Project site, along Eyre Highway. Construction workers will have the option to travel to the Nuttbush Retreat or to Port Augusta for lunch/coffee breaks. Trips related to lunch/coffee breaks are deemed relatively low, with a higher anticipated level of ride sharing.

As mentioned above, a higher-level car ride sharing will reduce the overall traffic movements by light vehicles.

HEAVY VEHICLE MOVEMENTS

Construction materials such as steel, bedding sand, crushed stone etc. will be transported in bulk at regular intervals. Other construction materials (e.g. concrete) will be transported at a regular interval consistent with construction schedule.

Components for the wind turbines (e.g. tower, nacelles, blades and base) are expected to be manufactured and/or assembled and shipped from interstate/overseas. Wind turbine components will be shipped to Port Augusta and then transported by road (Eyre Highway) to the Project site.

Transportation of the wind turbine components is expected to be predominantly by 19.5 m semi-trailers (general access vehicles) with larger sized equipment (e.g. tower, nacelles, blades and tower bases) requiring special/longer vehicles with special permits. Any such permit requirements will be addressed at the time of detailed design.

Components delivered in bulk to the site are anticipated to be unloaded at a single location on the individual site (the north-eastern and the southern site). Individual components will then be moved to specific tower locations within the Project site by smaller trucks or utilities/cranes.

Heavy vehicles will likely include 19.5 m semi-trailers and tray top trucks, however B-doubles may be considered for transporting bulk items. Heavy vehicle will utilise Note that the Eyre Highway is part of the Australian National Land Transport Network and is a gazetted PBS Level 3B route which allows for use by vehicles up to 42.0 m in length (double road train).

This should be adequate to accommodate the majority of truck deliveries of plant and equipment using B-Doubles to the site during the construction phase of the Project. Special permits will be required to transport larger/longer parts of the wind turbines; such as nacelles, blades and tower parts.

5.10.4.2 TRAFFIC DISTRIBUTION AND IMPACT ON SURROUNDING ROAD NETWORK

There is an overlap of six months between Phase 1 and Phase 2 tasks which run concurrently. However, the number of daily light vehicle trips would drop significantly from 180 during Phase 1 to Phase 2 to below 100 as construction of tower bases nears completion towards the end of Phase 1. This estimate could be reduced if higher level of ride sharing between construction staff is realised.

The estimates of traffic volumes for Phase 1 represent about a 10% increase in the daily volumes of traffic using the Eyre; which currently carries 2,700 vehicles per day. The increase in traffic will likely occur over two short periods of time in the day, when construction workers travel to and from the Project site before the start and at the end of the working shift. The morning hour traffic could then increase from about 50 to 150 (3 times) at the time of shift start (7 am) and the evening hour traffic could increase from about 200 to 300 (1.5 times) at the time of shift end (5 pm) during Phase 1. Increase in morning and evening hour traffic volumes would be similar at the start of Phase 2, but estimated to decrease significantly as construction activities are completed and installation/assembly of tower is in progress.

For the purpose of estimating impacts on the road network, additional traffic, related to transporting tower components in Phase 2 was assumed to not coincide with construction shift start/end times. This will reduce the overall impact on development generated traffic on the surrounding road network. An estimated 660 trips associated with transporting of turbine components would be spread over a period of 12 months. If averaged over the number of working days over six months there would be an average of 2 large deliveries every day.

It is further assumed that construction material and tower components will be delivered to respective sites (north eastern and the southern) proportionate with the number of towers in each site. This will minimise inter-site transporting of construction/tower material which requires passing through junction of Eyre Highway and Lincoln Highway and level crossing at ARTC train line.

Eyre Highway has the capacity to carry this extra traffic.

TRAFFIC IMPACT ON ROAD NETWORK IN PORT AUGUSTA

Traffic movements relating to construction workers (up to 180 two-way trips per day) are expected to be dispersed through the local network in Port Augusta and not deemed likely to adversely impact on local road network.

Increasing traffic movements through Port Augusta, in particular special permit vehicles carrying wind turbine components will require detailed route assessment at the time of detailed design.

SAFETY AND CRASHES

The safety record of Eyre and Lincoln Highway near the Project site is good; with 5 crashes in 5 years occurring on Eyre Highway, and 4 out of 5 occurring at night time.

Construction activities including the majority of deliveries, will be scheduled during daylight (work shift) hours, thus minimising crash risks during evening/night times.

5.10.4.3 SOUTHERN SITE ACCESS ROAD – RAIL CROSSING

The increase in both light vehicles and heavy vehicles on the unsealed road access to the southern site will undoubtedly accelerate the deterioration of the road surface conditions. The condition of the road, at-grade rail crossing and the extent of additional traffic use suggest that increased maintenance alone may not be sufficient and will likely require road treatment to carry construction traffic movements.

Movement of large vehicles transporting turbine components will require careful planning and liaison with ARTC regarding schedule of trains using rail track between Port Lincoln and Port Augusta to minimise any risks associated with large vehicles crossing rail crossing. This will need to be addressed in the detailed design stage.

5.10.5 MANAGEMENT AND MITIGATION MEASURES

The following management and mitigation measures have been recommended as an outcome of the TIA:

- Special permits will be required for the transport of larger/longer parts of the wind turbines; such as nacelles, blades and tower parts.
- Construction material and tower components should be delivered to respective sites, proportionate with the number of towers on each site, in order to minimise the need for inter-site transporting of construction/tower material.
- A detailed route assessment should be undertaken at the time of detailed design, to manage the increase in traffic movements through Port Augusta, in particular for special permit vehicles.
- Construction activities should be scheduled during daylight hour, to minimise crash risks during evening/night times.
- Road treatments may be required for the unsealed road access to the southern site, in order to accommodate the anticipated increase in traffic. Liaison with ARTC should be undertaken; to assist in planning any required upgrades and also in planning for the movement of large vehicles transporting turbine components.

5.10.6 KEY RECOMMENDATIONS

Traffic related impacts due to construction traffic movement (light vehicles) are not deemed significant. It has been assessed that the Eyre Highway has spare capacity to accommodate the anticipated increase in traffic during the construction period.

A detailed route assessment should be undertaken at the time of transporting wind turbine tower components. Furthermore, special permits are likely to be required to transport these components.

An assessment of an existing rail crossing south of Lincoln Gap station to access the southern site should be undertaken to determine any upgrades/changes required to the unsealed road and at the rail crossing. It is also recommended that a schedule of transporting large components be discussed with ARTC, to minimise any impacts on the rail crossing located on the access road to the southern site.

It is strongly recommended that no construction related travel be undertaken outside of daylight hours, unless otherwise warranted.

5.11 SOCIO-ECONOMIC

5.11.1 LEGISLATIVE AND POLICY REQUIREMENTS

The project will be assessed under Section 131 of the PDI Act. Following the approval pathway, invitation for public comment is required on all major projects and is given through public advertisement. Comments can be made within 15 days from the date of the initial notification. After this period the proponent is given the opportunity to respond to the submissions/comments received. A response document may be made available to the public.

5.11.2 ASSESSMENT METHODOLOGY

A Socio-economic impact assessment was undertaken for the Project, and has been attached as Appendix M. The assessment utilised qualitative and quantitative sources to assess perceived and actual impacts the Project may cause. The assessment was undertaken using the following key sources of information:

- statistical information from the Australian Bureau of Statistics (ABS) 2016 Census data
- social service providers' websites including the Outback Communities Authority and Port Augusta City Council
- review of relevant reports and recent literature concerning the social and economic impacts of wind farms
- review of the preliminary corridor area for the proposed LGWF Stage 3.

5.11.3 EXISTING CONDITIONS

5.11.3.1 FLINDERS RANGES

The Project is located in the Far North Region in an unincorporated area of South Australia, in the suburb of Lincoln Gap. The suburb forms part of the wider Flinders Ranges. The predominant land use of the Flinders Ranges area is livestock grazing; which contributes 13% of the State's total farm-gate value of livestock. The area is also subject to sporadic mining operations; accounting for around 70% of South Australia's mining outputs. The area is a major tourist attraction for the Ranges themselves and outback landscapes. Although there are conflicting interests in the Flinders Ranges from pastoralists, miners, tourists and conservationists, the community values ensuring attractive features of the Ranges are preserved for future generations.

5.11.3.2 LINCOLN GAP

The population of Lincoln Gap is sparse, with 17 permanent residents recorded in the 2016 Census. The Project site is situated within predominantly arid pastoral land, and also contains the existing LGWF project (Stages 1 and 2). The Project is anticipated to be situated over two parcels of land, (intersected by the Eyre Highway). One area is located to the east of existing turbines (Area 1) and the other is south of the existing turbines, on that site of an association substation (Area 2).

The two areas of land are owned by sole landowners. Nexif has entered into a lease agreement with these landowners. The boundaries of Area 1 contain an occupied dwelling (occupied by the landowners), an operational shearing shed, a dam and several other small buildings associated with pastoral activities.

The site forms part of the Pandurra Station; an operating sheep grazing station. The Nutbush Retreat Caravan and Function Centre is also within Pandurra Station, and located approximately 14 km west of the Project site. The Retreat also contains a historic woolshed, which, although is not a registered heritage site, is significant in representing the historic and continuing pastoral use of the land. Non-Indigenous heritage is discussed further in Section 5.4.

The Site is covered by a Native Title Claim from the Barnjarla peoples. Previous Aboriginal heritage studies undertaken for the greater LGWF project concluded that there are known heritage items onsite. Aboriginal heritage impacts are discussed further in Section 5.3.

The city of Port Augusta is located to the west of the Site, and is considered the key community of interest for the Project.

5.11.3.3 COMMUNITY CONSULTATION

Nexif Energy have undertaken consultation activities with the landowners of the proposed Project site. The host landowners have been engaged under lease agreements and are supportive of the proposed Project.

5.11.4 POTENTIAL IMPACTS

5.11.4.1 PUBLIC PERCEPTION

Large scale renewable energy developments can sometimes be viewed negatively by the local population, particularly if the project has the potential to impact on the amenity and landscape of the area. In addition, how the benefits of the project are shared by local residents can also impact public perception. For this project, however, the landscape being largely pastoral grazing with only one landowner in the immediate area, means that the Project is unlikely to impact on social cohesion. Impacts may however be felt in the nearby areas, such as Port Augusta.

5.11.4.2 DEMAND ON PUBLIC SERVICES

Remote projects often result in an increase in the local population during the construction period, which for this project will likely be the City of Port Augusta. A population influx can often lead to a boost in demand on local and public services, particularly accommodation and food outlets. This can be beneficial to the local economy but can also mean local services can become overstretched. Port Augusta is already subject to influxes in population from tourism. Changes in population from the Project are only expected to have a minor impact on local services.

5.11.4.3 PROPERTY PRICES

Wind farms have the potential to impact on property prices in the surrounding area. For this Project, the current land use is primarily used for livestock grazing, which is considered compatible with wind farm developments. It is therefore not expected that the Project will impact on the existing revenue potential for livestock grazing. Furthermore, as concluded in the visual amenity of this report (Section 5.2) the Project is not likely to impact on the visual landscape and amenity of the surrounding area, including Port Augusta.

5.11.4.4 SAFETY

Health and safety concerns during construction may include the risk of bushfires and emergency response. These risks should be managed under the CEMP.

5.11.4.5 BENEFITS

Wind farm projects often result in several benefits to the local community and surrounding area. Wind farms inject revenue to the community through direct payment to landholders hosting the wind turbines and provide farmers with the opportunity to diversify their income streams without sacrificing existing land uses. Local employment can be another benefit; with Nexif anticipating up to 140 staff to be employed during the construction phase of the project and up to 12 permanent staff during operation. This number may increase to up to 20 during periods of outages or high service levels.

During operation, the wind farm may also become an attraction for tourists. An increase in tourism aligns with Port Augusta's key strategy to promote the area as a central point for visitors to regional South Australia.

The Project will assist in meeting the State and Commonwealth energy emissions reduction targets through provision of an emissions free source of renewable energy. Meeting these targets can benefit the community by reducing the cost of adapting to the impacts of climate change.

5.11.5 MANAGEMENT AND MITIGATION MEASURES

Although the Project is not situated within a local council area, early consultation with the nearby Port Augusta City Council, as well as local representatives and industry, should be undertaken. This will improve public perception and allow discussions for accommodation options to be explored prior to commencement of construction. Notification and ongoing updates of the Project should also be provided to the Outback Communities Authority as best practice.

The Project should consider appropriate emergency access points to the Site, and consider surfaces and appropriate gradients for slopes to allow access for emergency vehicles. Further consultation with the CFS, to establish if any additional mitigation measures are required for the site (in addition to those established during the previous Stages), is recommended.

During construction, it is recommended that LGWF P/L develop and implement a Community and Stakeholder Engagement Plan to manage potential impacts, including:

- techniques for facilitating ongoing engagement and updates with Outback Communities Authority and City of Port Augusta
- methods for undertaking early engagement and communication with local residents in Port Augusta and nearby Commissariat Point to ensure concerns are managed appropriately with regards to visual amenity
- develop procedures for management of complaints or concerns raised by the community
- develop a Local Industry Participation Plan to maximise benefits to the local economy in the region and Port Augusta. The plan should be prepared in consultation with the Port Augusta City Council and key stakeholders.

Continued engagement with Council and local service providers is also recommended, in order to mitigate potential impacts or concerns and to maximise opportunities for provision of services during construction.

Construction works should aim to minimise disruption to existing land uses, as well as to ensure appropriate hygiene practices are in place to manage and prevent compromised biosecurity for surrounding properties. This can be done through mitigation measures developed in the Traffic Management Plan and the CEMP.

5.11.6 KEY RECOMMENDATIONS

Several key mitigation measures are recommended to minimise negative associations with the Project, including:

- early engagement with Port Augusta City Council and Outback Communities Authority will ensure management of expectations and provide a “no surprises” approach to development
- engagement with key stakeholders should include aviation stakeholders, CFS, Department of Defence, ARTC and Santos
- consultation with local service providers and utilities to maximise use of local contractors, manufacturing facilities and materials
- consult with local businesses to explore accommodation options
- early communication with nearest residential areas such as those in Port Augusta and Commissariat Point to ensure there is sufficient opportunity to raise and manage concerns appropriately
- develop and implement a Community Stakeholder Engagement Plan for ongoing engagement with the community and key stakeholders. The plan should include processes for managing and responding to complaints
- develop a Local Industry Participation Plan to maximise economic benefits for the region surrounding the Project
- prepare a Traffic Management Plan to measure and mitigate potential impacts
- prepare a CEMP Plan to manage and mitigate noise, air quality, visual and glare, flora and fauna, erosion and stormwater, waste, Cultural heritage and emergency and fire.

5.12 GEOTECHNICAL

This section discusses the findings from a desktop geotechnical study that was undertaken to for the Project, to better understand the likely subsurface conditions which could be encountered across the Site. The full report is provided in Appendix N.

5.12.1 LEGISLATIVE AND POLICY REQUIREMENTS

The following legislation and Codes are relevant for the geotechnical aspects of the Project:

- *Planning, Development and Infrastructure Act 2016*
- *Work Health and Safety Act 2012*
- The Building Code of Australia
- Excavation Work Code of Practice.

5.12.2 ASSESSMENT METHODOLOGY

The desktop geotechnical study included a review of selected available information to assess the expected subsurface conditions. Information reviewed included, but was not limited to, subsurface materials, historically recorded groundwater levels, the likelihood of encountering acid sulfate soils, earthquake site classification and identification of any other reasonably expected site issues. The following historical geotechnical reports were also made available and have been considered as part of this desktop study:

- Golder Associates, 8 November 2017, Geotechnical Investigation - Lincoln Gap Wind Farm, 1786773-003-R-Rev0
- Aurecon, 23 March 2018, Lincoln Gap Wind Farm Transmission Line – Geotechnical Report, LGWF-EL-RP-9029.

It is noted the above reports predominately cover Area 1.

5.12.3 EXISTING CONDITIONS

5.12.3.1 REGIONAL GEOMORPHOLOGY

The proposed wind farm site is characterised by two separate raised rocky landforms, known as tablelands aligned north south. These landforms are divided by a low-lying flat plain known as Lincoln Gap. These two tableland areas comprise a section of landform that covers approximately 33,000 hectares. The elevation of the tablelands are generally consistent at approximately 300 mAHD. The surrounding low-lying plains have an approximate elevation of 20 mAHD to the east of the tablelands and to 80 mAHD to the west of the tablelands.

The tablelands are incised with numerous drainage lines and resulting alluvial fans. Recent satellite imagery (Google Earth 2019) suggests that the area is sparsely vegetated with a higher concentration of vegetation on the steep slopes of the tablelands.

5.12.3.2 REGIONAL GEOLOGY AND GEOTECHNICAL CONDITIONS

A review of geological data sets published on the South Australian Resources Information Gateway (SARIG) and the 1:250,000 Geological Map of the Port Augusta Region accessed on the 7 May 2019 indicates that the plateau areas of the tablelands are likely to comprise the following geological formations:

- **Q/Nsts** – Simmens Quartzite Member of the Tent Hill Formation: “Quartzite, blocky; sandstone, cream.”
- **Nste** – Corraberra Sandstone Member of the Tent Hill Formation: “Sandstone, red, purple, slumped, silty. Some shale”
- **Nsts** – “Pleistocene sand and gravel of high angle alluvial fans.”

Lower lying areas surrounding the tablelands may typically be underlain by various alluvial deposits consisting clay, sand and gravel.

ACID SULFATE SOILS

Based on a review of the Australian Soil Resource Information System (ASRIS), it is unlikely that the site is underlain by Acid Sulfate Soils (ASS).

ASRIS lists the site as having an ‘extremely low probability of occurrence’ (a confidence level of 4) for ASS in the near surface materials of the natural soil profile.

REGIONAL GROUNDWATER

A review of the WaterConnect database for historical boreholes within a 12-km radius of the centre point of the sites indicates a depth to groundwater generally greater than 10 m below ground level. It should be noted that most of the boreholes previously drilled were in the lower lying areas and not on top of the tablelands. The only borehole that was located on the top of the tablelands indicated that groundwater was encountered at depths greater than 27 m.

EARTHQUAKE SITE CLASSIFICATION

A review of the Geoscience Australia Earthquake Database (2019) indicated that four earthquakes have been recorded since 1979 within a 20 km radius of the site, with the most recent occurring in 2012. The earthquakes in the area generally ranged between a magnitude of 1.1 to 1.9.

Based on the published geological information, we recommend adopting the following Site Sub-Soil Class in accordance with Table 4.1 of AS 1170.4-2007 *Structural design actions Part 4: Earthquake actions in Australia* as follows.

- Tablelands: Be (Shallow rock site)
- Lower lying areas: Ce (Shallow soil site).

As per the contours presented in Figure 3.2(B) in AS 1170.4-2007, the site is in an area with a hazard factor (Z) of 0.11.

5.12.4 PREVIOUS GEOTECHNICAL INVESTIGATIONS

It is understood that four geotechnical investigations have been undertaken at the proposed Site. These are summarised in below.

Table 5.12 Geotechnical investigations previously undertaken for the LGWF Site

ASSESSMENT	PREPARED BY	RELEVANT DEVELOPMENT APPLICATION STAGE
2018 Lincoln Gap Wind Farm Transmission Line	Aurecon Australasia	DA 010/U032/15
2017 Geotechnical Investigation – Lincoln Gap Wind Farm	Golder Associates	DA 010/U053/17
2012 preliminary geotechnical investigation for the Lincoln Gap Wind Farm	Wallbridge & Gilbert Consulting Engineers Pty Ltd	DA 010/0011/06
2011 geotechnical investigation for a previously proposed substation and transmission line at Lincoln Gap	Coffey Geotechnics	N/A

Findings from each report are summarised below.

AURECON – 2018

The investigation outlined in the Aurecon (2018) report comprised drilling 15 boreholes. The borehole locations are understood to encompass sections of Area 1 and small section within the northern part of Area 2. The boreholes are spread along the length of a 2785 kV transmission line route from the wind farm gantry at Lincoln Gap substation to the gantry at the new grid connection at Corraberra Hills Substation.

The boreholes were advanced using rotary air blasting drilling techniques with data acquisition and data processing capability. Boreholes were advanced to depths between 10 mBGL to 13 mBGL generally within quartzitic sandstone. No groundwater was encountered in any of the boreholes. The subsurface profile encountered during the investigation is consistent with the previous investigations and the expected regional geology.

GOLDER INVESTIGATION – 2017

The Golder investigation (2017) comprised 15 boreholes advanced using HQ coring drilling techniques and 45 test pits, with locations generally within Area 1 of the site. Boreholes were generally terminated between 8 mBGL and 11 mBGL. Test pits were terminated between 0.7 mBGL and 2.4 mBGL due to refusal on rock strength material. The subsurface profile encountered during the investigation is presented in the Golder investigation (2017) report. Five standpipe piezometers were also installed with groundwater encountered in one borehole (BH50) at 9.0 mBGL in the south-eastern extent of Area 1.

Results from the Emerson dispersion test undertaken by the Golder investigation (2017) indicate that soils on the site are relatively non-susceptible to erosion, however it was recommended that surface erosion was a potential risk due to sparse vegetation cover and should be taken into consideration throughout the life of the Project.

The Golder investigation (2017) report suggests shallow gravity footings as a feasible option for wind turbine generators and pad and strip footings for substations and lightweight buildings.

WALLBRIDGE AND GILBERT – 2012

The W&G (2012) report was not available for consideration at the time of completing this desktop study but is understood to have comprised the excavation of 10 test pits across the Area 1 site.

COFFEY GEOTECHNICS – 2011

The Coffey Geotechnics (2011) report was not available for consideration at the time of completing this desktop study. It is understood from a summary provided in the Aurecon report (2018) that the investigation comprised 12 boreholes drilled using a lightweight drill rig with push tube and auger refusal encountered between depths ranging from 0.5 mBGL to 4.8 mBGL. It is understood that the investigation area extended across Areas 1 and 2.

5.12.5 POTENTIAL IMPACTS

The subsurface conditions detailed in this report are based on interpretation of the available geotechnical data and, therefore, actual conditions may vary from those described. The analyses may need to be reassessed and intrusive geotechnical investigation carried out to enable detailed design of footings and infrastructure.

Geotechnical considerations for planning are provided below.

5.12.5.1 CONSTRUCTION AND OPERATION

DATA GAPS

Previous geotechnical investigations have been concentrated in Area 1 with limited investigation undertaken in Area 2. Given the existing data gap it is important that further investigation be carried out as part of the planning phase to understand the expected subsurface profile, groundwater depths and potential geotechnical risks.

VARIABILITY IN SUBSURFACE PROFILE

Rock strength materials have been encountered at shallow depths. Potential variability is to be considered in design, should soil strength material soils be encountered at founding depths during construction. Several footing types may need to be considered based on founding material.

GROUNDWATER

Groundwater was encountered at one test location during the Golder investigation (2017) and desktop data suggests that it is unlikely that footings up to 9 m depth would be subject to groundwater effects within Area 1 of the proposed development.

Information for Area 2 is limited and will require further investigation to provide information relating to likely groundwater levels.

It should be noted that groundwater levels are subject to seasonal and climatic variations, and that perched water may be present depending on the extent of permeable layers within the subsurface profile and should be considered as part of the design.

SOIL EROSION

The existing surficial soils are not considered at risk of significant erosion based on historical laboratory testing of selected samples. However, evidence on-site in the form of existing drainage lines and lack of vegetation suggest that erosion still may be an issue and the risk should not be discounted. Furthermore, erosion of topsoil may be further exacerbated if soils are disturbed by site works. Subsequently we suggest that an erosion management plan is developed and any excavated/un vegetated surfaces are protected.

FOUNDATION EXCAVATIONS

The Golder investigation (2017) indicates that the upper 2.5 m of the subsurface profile on the tablelands largely consist of residual soils over the area that was investigated. This material, if encountered, is expected to be excavated using conventional earthmoving equipment such as bucket-type excavators.

The underlying rock varies from low to very high strength. Excavation using a ripping tynes may be possible depending on the rock strength, degree of weathering and defect patterns, but consideration should be given to progress rates should this approach be adopted. Alternative excavation methodologies may include use of a hydraulic rock breaker or blasting. Should blasting be undertaken, consideration should be given to the potential for damage to the founding rock and subsequent over excavation/associated costs of remediation.

SURFACE CHARACTERISTIC MOVEMENTS

Surface characteristic movements are expected to impact the design of shallow foundations and access roads. Materials with higher reactivity may generally be encountered in the lower lying areas such that excavation or treatment of reactive materials may need to be considered to meet serviceability requirements.

The expected surface characteristic movements should be assessed in accordance with the methods presented in AS 2870 for shallow footing performance.

DIFFERENTIAL SETTLEMENTS

Differential settlements across the width of gravity footings and between footings and electrical cabling may be considered as a potential hazard during operation and should be considered as part of the design.

SUPPORT OF EXCAVATIONS/BATTER SLOPES

The subsurface material that are expected to be encountered included cohesive, non-cohesive soils and rock. Cohesive soils and non-cohesive soils may not be able to retain a sub vertical face in the short or long term and must be either battered or supported. The rock that is likely to be encountered may be able to retain a sub-vertical face dependent on weathering and the prevalence of defects within the rock.

Further geotechnical investigation should be used to inform benching/battering, or shoring design in accordance with Safework Australia Excavation Work Code of Practice (2015).

Excavation stability is affected by erosion or accumulation of water in the soil. Appropriate drainage should be provided around the excavation to reduce the risk of instability.

SLOPE INSTABILITY AND ROCKFALL

The Golder investigation (2017) noted that there was evidence of rockfalls and significant weathering on the slopes of the tablelands. It is understood that access tracks and work areas may be constructed near steep slopes and that construction of access tracks may result in exposed rock cuts.

Slope stability and rockfall risk should be considered as part of the design. It is recommended that a slope risk assessment be undertaken by a suitably experienced geotechnical practitioner as part of the investigation and/or construction phase to manage subsequent risk.

REUSE OF SITE MATERIALS

Findings from the Golder investigation (2017) indicates that natural clays, sands, gravels and weathered calcareous materials are expected to be suitable for re-use as engineering fill. The report also indicated that rock materials may require crushing to break the rock into particle sizes of less than 75 mm for use within engineering fill. It is recommended that material reuse is considered in the development of the technical specification and verified on site for suitability by a suitably qualified geotechnical practitioner.

TRAFFICABILITY / SCHEDULING OF EARTHWORKS

During the wetter months of the year, particularly during winter and spring when evaporation rates are low, it is anticipated difficulties in conducting earthworks will be exacerbated at the site due to the exposure of shallow clays. Where possible all earthworks should be scheduled during the drier months of the year.

It is also recommended that allowance be made for the construction of working platforms/hardstands (crushed rock material), the use of sufficiently rigid bog mats, and/or pavements across the proposed trafficable areas to protect the surface against changed weather conditions and trafficking. Further discussion is provided in the following section.

ACCESS TRACKS

Access tracks will be required both during construction and for subsequent maintenance of the wind farm. Subgrade conditions are expected to comprise clayey soils and weathered rock. It is understood that access tracks are to be frequented by heavily loaded specialised vehicle construction traffic and will be used as access tracks for maintenance vehicles following construction. Pavement design should consider design for specialised vehicle loading.

WORKING PLATFORM/HARDSTAND CONSTRUCTION

Working platforms/hardstands will be required both during construction and for subsequent maintenance of the wind farm. Subgrade conditions are expected to comprise residual soils and weathered rock. It is understood that working platforms/hardstands are to be frequented by heavily loaded specialised vehicle construction traffic during construction and maintenance following construction. Design should consider design for specialised vehicle loading and stability of raised embankments.

5.12.6 MANAGEMENT AND MITIGATION MEASURES

The following management and mitigation measures were proposed as an outcome of the study:

- Further investigation should be carried out as part of the planning phase to understand the expected subsurface profile, groundwater depths and potential geotechnical risks in Area 2.
- Several footing types may need to be considered based on founding material, to account for potential variability.
- The seasonal and climatic variations in groundwater levels, as well as the potential for perched water to be present (depending on the extent of permeable layers within the subsurface profile), should be considered as part of the Project design.
- An erosion management plan should be developed for the Project, and should include measures to protect excavated and unvegetated surfaces.
- Excavation using a ripping tyne may be possible for underlying rock, depending on the rock strength, degree of weathering and defect patterns, however, consideration should be given to progress rates should this approach be adopted. Alternative excavation methodologies may include use of a hydraulic rock breaker or blasting. Should blasting be undertaken, consideration should be given to the potential for damage to the founding rock and subsequent over excavation/associated costs of remediation.
- Surface characteristic movements are expected to impact the design of shallow foundations and access roads. Materials with higher reactivity may generally be encountered in the lower lying areas such that excavation or treatment of reactive materials may need to be considered to meet serviceability requirements.

- The expected surface characteristic movements should be assessed in accordance with the methods presented in AS 2870 for shallow footing performance.
- Differential settlements across the width of gravity footings and between footings and electrical cabling may be considered as a potential hazard during operation and should be considered as part of the design.
- Cohesive soils and non-cohesive soils may not be able to retain a sub vertical face in the short or long term and must be either battered or supported. The rock that is likely to be encountered may be able to retain a sub-vertical face dependent on weathering and the prevalence of defects within the rock.
- Further geotechnical investigation should be used to inform benching/battering, or shoring design in accordance with Safework Australia Excavation Work Code of Practice (2015).
- Appropriate drainage should be provided around excavated areas to reduce the risk of instability.
- Slope stability and rockfall risk should be considered as part of the design. It is recommended that a slope risk assessment be undertaken by a suitably experienced geotechnical practitioner as part of the investigation and/or construction phase to manage subsequent risk.
- Material reuse should be considered in the development of the technical specification and verified on site for suitability by a suitably qualified geotechnical practitioner. Suitable materials will include natural clays, sands, gravels and weathered calcrete.
- Where possible, all earthworks should be scheduled during the drier months of the year, to minimise potential difficulties in conducting earthworks involving shallow clays.
- It is also recommended that allowance be made for the construction of working platforms/hardstands (crushed rock material), the use of sufficiently rigid bog mats, and/or pavements across the proposed trafficable areas to protect the surface against changed weather conditions and trafficking.
- Access tracks will be required both during construction and for subsequent maintenance of the wind farm. Subgrade conditions are expected to comprise clayey soils and weathered rock. Pavement design should consider design for specialised vehicle loading.
- Working platform/hardstand design should consider design for specialised vehicle loading and stability of raised embankments.

5.12.7 KEY RECOMMENDATIONS

The recommendations and discussion within this report is generally limited to investigation undertaken with Area 1. It is recommended that further investigation be undertaken in Area 2 to address data gaps.

This desktop study indicates that the site is likely to consist tablelands of rock strength material with soil strength material predominantly in low lying areas. It is suggested that variability in soil profile be considered in foundation and pavement design, along with earthquake considerations in accordance with Australian Standards.

Further considerations in design should include specialised vehicle loading for pavements and stability of raised embankments. The stability of excavations and embankments are to be undertaken in accordance with safe work practices.

Consideration for construction should include excavation in rock strength material, trafficability of soils in wet weather, surface erosion and slope stability.

It is suggested that a methodology specification and/or technical specification be developed to allow for unforeseen ground conditions and adjustments to site specific conditions during construction. It is also recommended that excavations and fills, retention systems and any engineered slope constructions, pile footings, hardstands and roads and other pavements be inspected at appropriate stages of their construction by an experienced geotechnical practitioner in accordance with the developed specifications.

5.13 STORMWATER AND FLOODING

5.13.1 LEGISLATIVE AND POLICY REQUIREMENTS

Legislation and policy documents relevant to stormwater and flooding requirements for the Project are:

- *Environment Protection Act 1993*
- The Environment Protection (Water Quality) Policy 2015 (under the *Environment Protection Act 1993*)
- Environmental Protection Agency Government of South Australia (EPA) 1999, *Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry 1999*
- Environmental Protection Authority Government of South Australia 1999, *EPA Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry 1999*.

5.13.2 ASSESSMENT METHODOLOGY

A civil assessment of flooding erosion and drainage was conducted to analyse the site's topography and drainage characteristics, and to identify relevant potential impacts and mitigation measures. This assessment has been attached in Appendix O.

The civil assessment was characterised by the following components:

- desktop Hydrological Analysis
- review existing services across the Site
- assessment of modifications to the Site
- assessment of potential risks
- identify mitigation measures
- understanding of potential construction impacts.

5.13.3 EXISTING CONDITIONS

5.13.3.1 BROAD LANDSCAPE DESCRIPTION

Covering approximately 33,000 hectares of land south-west of Port Augusta, the location of the Project site is characterised by two raised landforms (tablelands) comprising two distinct parcels of land; one north, and one south of the Eyre Highway. Elevations on the tablelands were estimated to be as high as 300 mAHD, as low as 20 mAHD, and moderately at 80 mAHD.

Using satellite imagery from Google Earth (2019), it was indicated that the dominant vegetation type are small saltbush plants. Vehicle tracks and overland flow paths are also noted, as well as the Eyre Highway dividing the Northern and Southern hills.

The steeper areas of higher elevation have increased bulk density of vegetation, compared to the lower tablelands that are predominately covered in soil.

5.13.3.2 ISSUE-SPECIFIC SITE DESCRIPTION/BASELINE

The Project site is located on rocky landforms at elevations ranging from 230 m to 300 mAHD.

A search of the WaterConnect database identified bore holes within 12 km of the Site. Groundwater depth was estimated to be greater than 10 m below ground level, thus the study has synthesized the effect of the project construction on groundwater to be minimal. Surface drainage and the effect on access roads are also likely to be minimal.

A combination of publicly available sources was used in locating existing utility services and constraints on Site. Information source are listed below:

- dial before you dig search
- location SA Map Viewer, and
- general site inspection
- Google Earth and Google Maps.

Identified service utilities which may be affected by the works are shown in Table 5.13 below.

Table 5.13 Affected utilities

SERVICE UTILITY	AREA 1	AREA 2
Water	x	✓ 600 MSCL
Sewer	x	x
Telstra	✓	✓
Fibre Optic Optus	✓	x
AARNet Fibre	✓	x
Epic Energy (liquid gas)	✓	x
Electricity LV – UG	x	x
Electricity HV – OH	✓	✓

Across area 2, it was identified that the traffic route would be crossing existing water mains and Telstra networks; while there were not threats to services identified in Area 1.

5.13.4 POTENTIAL IMPACTS

5.13.4.1 CONSTRUCTION

Several earth moving activities are required for the project. Constructing an internal access road, trenching for underground cables and groundwork preparation prior to the solar panel installation will involve heavy earthmoving machinery.

The removal of topsoil is important to ensure the access road is re-graded and accessible to all vehicles. The earthworks will disrupt and impact the local land run off and water catchments/bodies.

Storm events during the construction of the Project may result in sediment entering the water bodies if appropriate prevention measures are not in place prior to commencing construction. Contractors on site will need to adhere to the Soil Erosion and Drainage Management Plan (SEDMP) prepared by the Construction Contractor.

The stormwater network is vulnerable during construction processes with the use of pollutants. A list of the pollutants can be found under the *Environment Protection (Water Quality) Policy 2015*. This Act also states that persons are not permitted to release pollutants into water catchments/bodies or onto land where they can enter the stormwater network. Significant penalties may apply if the policy is not adhered to.

5.13.4.2 OPERATION

All contractor's vehicles used on site must be appropriately maintained, and inspection activities will be undertaken in accordance to the maintenance specifications guidelines for the Project area.

Access to the Site should be restricted given the existing topography, unsealed access roads and the current weather conditions. Extreme weather events will see the closure of the access tracks, and post weather events if the site is deemed unsafe to access.

Land runoff will be increased due to an increase in impervious surfaces due to the hardstand zones and access tracks that will be constructed. The increase in land runoff will need to be monitored and prevention measures in place such as detention basins.

5.13.5 MANAGEMENT AND MITIGATION MEASURES

5.13.5.1 PLANNING AND DESIGN

The following management and mitigation measures should be implemented during the planning and design phase of the Project:

- The key factor in designing the access tracks across a wind farm site, is to allow for the large swept vehicle paths for the transportation of the long turbine blades and turbine masts on long low loader vehicles. As such, a strong desire to minimise the number of horizontal bends (to accommodate the large swept vehicle path), and provide smooth vertical transitions (to avoid the bottoming out of these long vehicles) are sought in any access road layout. Furthermore, the connecting of access roads along the ridge lines to the lower Eyre Highway and supporting road networks needs careful consideration given the change in elevation and the smooth transitions required for the long loader transport vehicles.
- The specifics of the critical transport vehicles shall require confirmation prior to detailed design of access tracks being undertaken.
- The existing access to Area 1 should be utilised to access the northern group of turbines. The layout of the access to Area 1 should be reviewed against current Road Design Guidelines and Standards.
- The existing access to Area 2 should be reviewed for suitability for both construction and the vehicle swept paths requirements of the low loaders which transport the long turbine blades to the turbine hardstands. The design of access to Area 2 is to be in accordance with the current Austroad Design Guidelines and Standards, and subject to DPTI approval; given access is via the Eyre Highway. Appropriate slip lanes, signage, widening of the highway and other traffic control measures may be required to meet DPTI design standards. This access should cater for large vehicle swept paths of vehicles. The vehicle type is to be confirmed by the developer prior to commencing the detailed design of access roads, given the critical nature of the turning movements of these larger vehicles.
- The slight increase in paved areas from the development shall need to be reviewed, however most likely the effect on downstream catchments will be negligible in terms of increased runoff.
- A high level indicative access track layout for Area 1 (displayed in red in Figure 5.8 below) and nominal turbine hardstand locations are situated at elevations ranging from 230 m to 300 m. The track layout for this stage of works proposes to link to the existing wind farm stages to the west, with a track connection near WTG23. Utilising the existing wind farm access track network to access the new works zone provides significant savings and presents sound engineering design. It eliminates the need for a costly access track to be constructed from the high terrain to the lower terrain near the Eyre Highway.

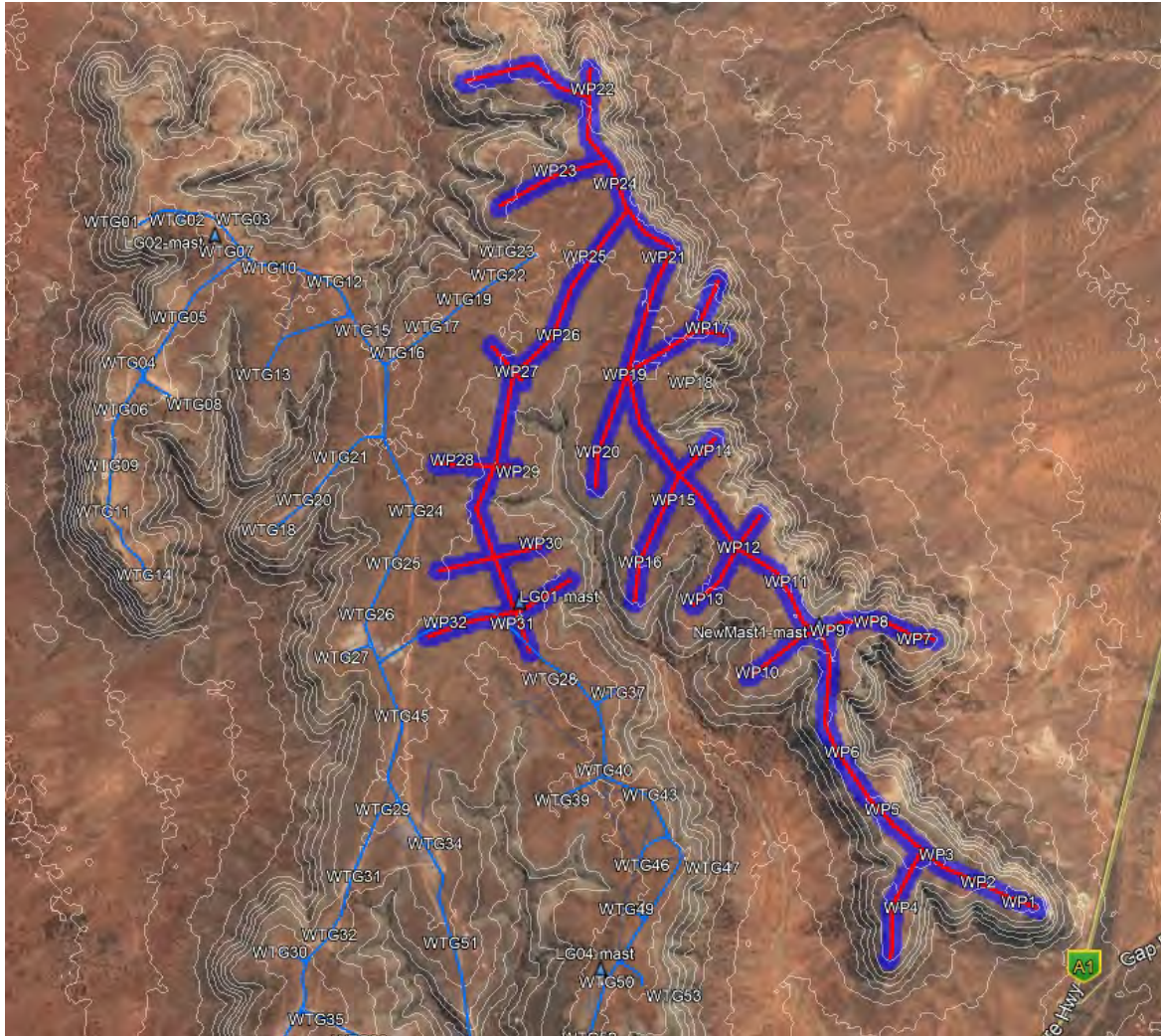


Figure 5.8 Area 1 indicative site access track plan (in red)

- In the event of track drainage crossings being required at localised depressions in the topography across Area 1, a 450 mm wide x 375 mm deep reinforced concrete box culvert will typically suffice given the minimal catchment areas along and around the ridge lines at this location. The box culvert sections shall be designed to carry all vehicle loads including construction traffic. For the access track that connects the lower topography to this higher terrain, a number of drainage crossings may be required, along with rock lined swales given the likely gradients along this connecting track. In the unlikely event of an access track crossing a creek of significance, a suitably designed floodway with scour protection and flood markers would be required. Low level culverts may be appropriate to provide minor storm flows without inundating the track above, subject to Site specifics.
- A high level indicative access track layout (displayed in red in Figure 5.9 below) and nominal Turbine hardstand locations are situated at elevations ranging from 220 m to 270 m. The lower zones around the mountain/hills range in elevations ranging from 120 m to 140 m typically. The access track linking low to high land at a nominal 15% gradient will require approximately 700 m in road length to accommodate such a change in elevation, concept road modelling and options shall need to be reviewed given the likely earthworks required to construct such an access. A 15% gradient is the maximum accepted road gradient for such traffic manoeuvres with a desirable gradient of 12% or lower most suited.

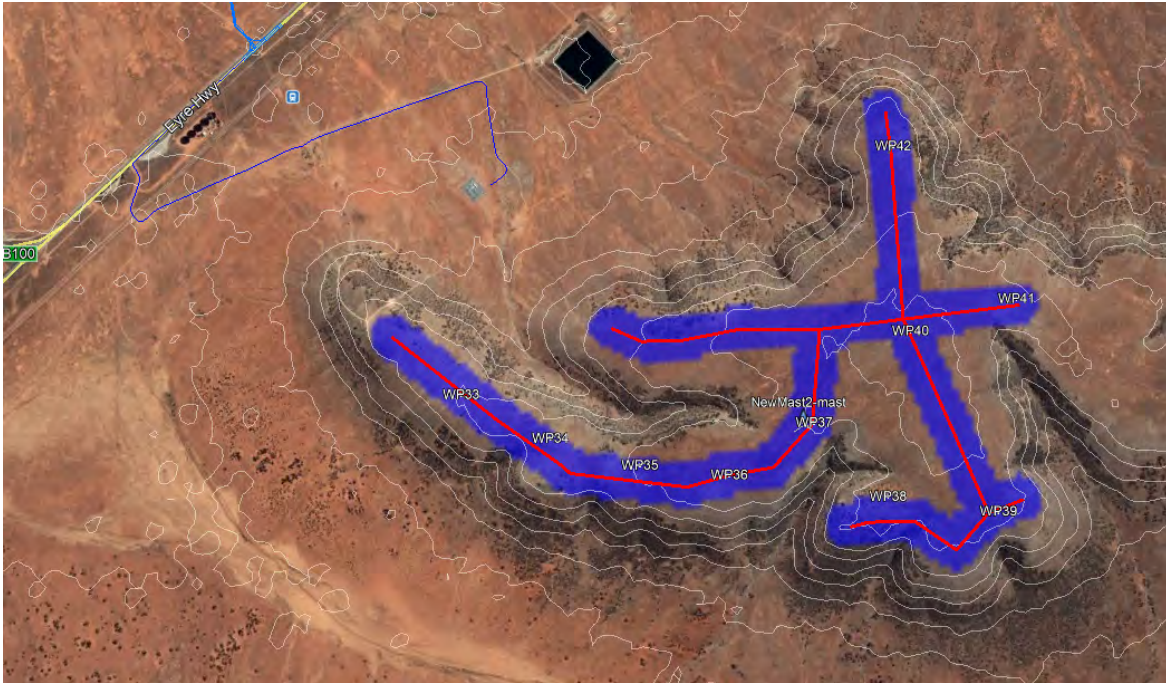


Figure 5.9 Area 2 indicative site access track plan (in red)

- In the event of track drainage crossings being required at localised depressions in the topography across Area 2, a 450 mm wide x 375 mm RCBC (reinforced concrete box culvert) will typically suffice given the minimal catchment areas along and around the ridge lines at this location, refer Figure 5.10 below for typical road crossing culvert treatment. Stormwater network sizing shall be reviewed during the next design phase.

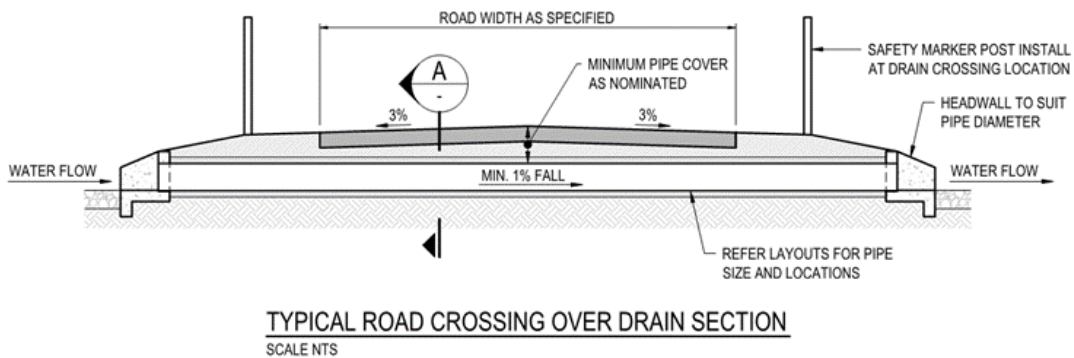


Figure 5.10 Typical culvert crossing detail

- For the access track that connects the lower topography to this higher terrain of Area 2, a number of drainage crossings may be required, along with rock lined swales given the likely gradients along this connecting track. For the likely 700 m plus long connecting track, equalisation drains or cross drainage may be required at 50 m to 100 m centres. If the track can be located perpendicular to the contours then cross drainage requirements will be minimised. This needs to be checked against the earthwork volumes to help guide a cost-effective solution. Vegetation or culturally significant areas should be protected where possible.
- In the unlikely event of an access track crossing a creek of significance, a suitably designed floodway with scour protection, and flood markers would be required. Low level culverts may be appropriate to provide minor storm flows without inundating the track above, subject to site specifics.
- Despite the generally dry and arid nature of the area, intense and brief storm events will need to be designed for across all civil works for the development. During the next phase of the design, major and minor storm average recurrence intervals (ARI's) should be reviewed on a risk-based approach, to identify critical events, in consultation with the asset owner who will maintain the Project site.
- Hardstands should be designed with downstream scour protection along the downstream edge of the hardstand. In instances where significant road catchment is also directed to the hardstands, small detention ponds may be required.
- The use of rock checks along track table drains are recommended along steeper sections of access tracks and at outfalls from hardstand drainage lines. This slows down peak flows and assists in addressing soil erosion, refer Figure 5.11 below for typical rock check sections.

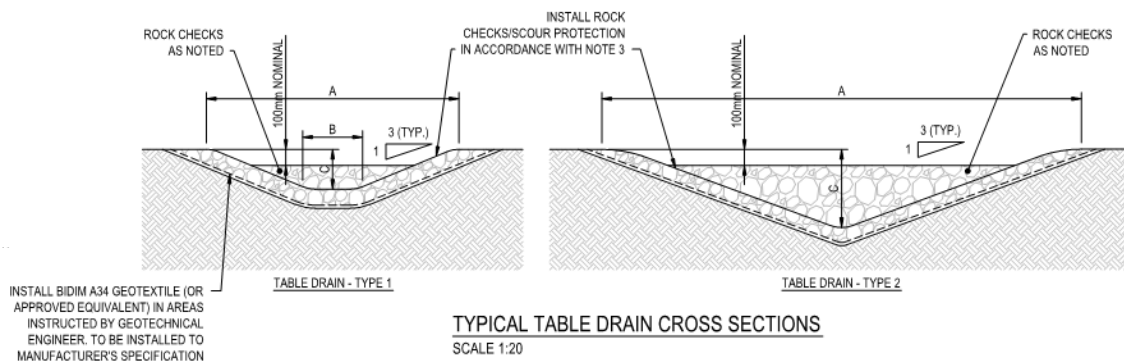


Figure 5.11 Typical rock check details

5.13.5.2 CONSTRUCTION

The following measures should be put in place to manage and mitigate impacts during the construction phase of the Project:

- Sediment and erosion controls should be implemented, and may include preserving as much grasses area as possible; directing construction vehicles to enter and leave the Site by an access driveway to limit the tracking of mud and/or soil onto roads, as well as providing wash areas; diverted upstream catchments around the Site onto stable areas and should not be diverted into neighbouring properties unless written permission is obtained from the landowner(s); and ensuring that all areas disturbed by construction are promptly stabilized.
- If a significant rainfall event has been forecasted, all work may need to be temporarily halted until the storm has passed. It is also advisable to secure loose materials including construction waste and equipment, or to alternatively remove them from the site. Any washing of site vehicles and equipment should also be prohibited on-site to prevent stormwater contamination, unless an appropriate facility is provided.
- The Environment Protection (Water Quality) Policy 2015 must be complied with, in protecting waters and land from listed pollutants.

- If there is a risk that contaminants have entered the waterway, it is recommended that water quality tests be undertaken immediately. If there is any trace of contamination, works should be suspended until an appropriate treatment is implemented.
- All exposed soil batters should be top dressed with topsoil and re-seeded with native grasses following completion of construction works, providing benefits to stormwater runoff quality. In locations of rock, no further surface works are required.
- The reuse of materials onsite should be investigated as to reduce the ecological footprint of the works, reusing excavated materials won onsite for pavements and access tracks reduces demand for importing material.
- In the event material is to be removed from the Site or re-used, appropriate laboratory testing should be undertaken to characterise the material to ensure a suitability for re-use or for selection of a suitable disposal facility.

5.13.5.3 OPERATION

The following measures should be put in place to manage and mitigate impacts during the operation phase of the Project:

- Stormwater runoff from developed zones across the site should be addressed in accordance with planning conditions, limiting flows from the site to pre-development peak flow levels, and the provision of suitable erosion control for new earthwork zones. The location, siting, design and operation of renewable energy facilities should be completed such that the ‘adverse impacts to the natural environment and other land uses’ are minimised. Any development must also be ‘located and designed to minimise the risks to safety and property from flooding’ during a 1% AEP (1 in 100 year ARI equivalent event).
- A “buffer zone” may be created around waterways to prevent works being undertaken in areas which may be subject to localised flooding.
- It may also be necessary to establish stormwater detention ponds to ensure post-development flows match pre-development flows from the Site (subject to further detailed investigation).
- A SEDMP shall be lodged for approval with SCAP, along with the engineering design drawings.
- Maintenance of drainage crossings and floodways will be required, inspection to be undertaken at regular intervals and after storm events.
- Appropriate maintenance of the local environment of the pavement over the life of the pavement is essential to maximising pavement performance and to ensure accessibility to turbines for maintenance.
- Given the location of the Site, and low annual rainfalls, flood mapping analysis is not deemed required.

5.13.6 KEY RECOMMENDATIONS

The civil assessment provided the following key recommendations:

- SCAP must review and approve a Soil Erosion and Drainage Management Plan prior to the commencement of any construction.
- Stormwater detention requirements are to be investigated during detailed design phase.
- Work should be temporarily halted if a significant storm is forecast; making sure to secure any loose materials, including construction waste and equipment, or alternatively removing them from the site.
- The washing of vehicles and equipment should be prohibited onsite (other than where an appropriate facility can be provided).
- Erosion and sediment controls should be implemented.
- New earth batters (in cut or fill) should be reseeded with native grasses following construction works. Exposed rock batters do not require revegetation works.
- It should be ensured that local access tracks are designed with appropriate consideration of all drainage requirements.

5.14 SITE CONTAMINATION

This section provides an overview of the site contamination risks for the proposed Project Site.

5.14.1 LEGISLATIVE AND POLICY REQUIREMENTS

Site contamination risks and responsibilities for the Project are primarily governed managed under the *Environment Protection Act 1993*. Under the Act, a person has a duty of care not undertake an activity that pollutes, or might pollute the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm.

5.14.2 ASSESSMENT METHODOLOGY

A Preliminary Site Investigation (PSI) was undertaken for the project Site. The PSI was prepared in accordance with the guidance provided in the following documents:

- National Environment Protection Council (NEPC 2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended in 2013 (ASC NEPM).
- Planning SA (2001) *Site Contamination*. Planning Advisory Notice 20.
- Standards Australia (2005) *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-Volatile and Semi-Volatile Compounds*. AS4482.1-2005 Homebush NSW.

The research components of the report considered site characterisation, review of previous site investigation report and a review of historical information about the site.

Three reports were produced by Lotsearch to provide an overview of some of the site history, environmental risk and planning information. The reports referred to herein are as follows:

- Lotsearch (2019a) *Lotsearch Enviro Lite, Lincoln Highway, Lincoln Gap, SA 5715*, dated 29 May 2019, reference LS006523 EL.
- Lotsearch (2019b) *Lotsearch Enviro Lite, Eyre Highway, Lincoln Gap, SA 5715*, dated 29 May 2019, reference LS006524 EL.
- Lotsearch (2019c) *Lotsearch Enviro Lite, 2252 Eyre Highway, Lincoln Gap, SA 5715*, dated 29 May 2019, reference LS006525 EL.

The full PSI report is attached in Appendix P.

5.14.3 EXISTING CONDITIONS

The southern part of the Site (Area 2) contains predominantly saltbush and low-growing shrubs. A newly constructed sub-station is present in the central-northern portion of the parcel and powerlines traverse the parcel. A reservoir (not part of the parcel) surrounded by a high embankment is present north-west of the sub-station. West of the sub-station is a farmhouse ruin with some trees adjacent the former dwelling.

The northern part of the Site (Area 1) contains predominantly saltbush and low-growing shrubs. A dirt road from Eyre Highway leads to a farmhouse some 400 m from the highway in the southern portion of the parcel. New powerlines are present north-east/east of the farmhouse, crossing Eyre Highway and onto the southern area of the Site.

The Site is located in a pastoral area of Lincoln Gap. A small unnamed ephemeral stream is located at the southern end of Area 1 and Cockatoo Creek is located approximately 2.5 km south/south-west of Area 2 (at its closest point). A dam or reservoir is located in the northern portion of Area 2 (CT 6138/331) but is not part of the CT and an unnamed water body (dry) is present at the western boundary of Area 2 extending off-site to the west and south-west. The closest marine water body is the Spencer Gulf, located approximately 10 km east of the Site. Sensitive human and environmental receptors located within the vicinity of the site are considered likely to include the following:

- unnamed ephemeral stream in Area 1 and the dam/reservoir in Area 2
- future users of and maintenance workers on the site
- adjacent site users
- workers who may undertake excavation, maintenance or construction work within the surrounding area (i.e. to the site developments, underground services).

The area of Lincoln Gap that includes the Site is recorded as having an extremely low probability of acid sulfate soils occurring.

Several registered bores were listed as being located within the parcel boundaries and standing water level (SWL) recorded for four of the on-site bores ranged from 18–27 mBGL. The purposes listed for four of the on-site bores were investigation, observation and stock.

Review of historical aerial images generally indicated that the Site was vacant and undeveloped from at least 1954, with the exception of dirt access tracks through the area. Construction of a reservoir (outside the site boundary) in Area 2 occurred by at least 1965 with structures present around the reservoir from at least 1998. In Area 2, two buildings were present in the south-east portion and what appeared to be a tower in the southern portion from at least 1984. In the current 2019 image, WTGs were present across Area 1 as part of the Stage 1 development. Whilst outside the range of the targeted image selected for the historical aerial photographs, the Historical Map c. 1958 and c. 1955 presented in the Lotsearch report for Area 2 showed a woolshed and yards in the north-west portion of the parcel.

No notifications of site contamination or environmental authorisations (licences, exemptions and works approvals) had been recorded for the site, however one record was found for an adjacent property (adjacent Area 2, immediately to the north along Eyre Highway) for a licence for the prescribed activities waste or recycling depots (waste for resource recovery or transfer), waste transport business (Category B), grinding or milling works (chemical or rubber), and crushing. An Environment Protection Order was issued for the property in 2017 for failing to comply with an environmental authorisation licence condition.

The historical certificate of title search indicated that as early as 1892 until today the three parcels operated as farm land and had several private owners. From 1978 all three parcels were transferred to Cooyerdoo Nominees Pty. Ltd., whose name changed to Nutt Bros Nominees Pty. Ltd. in the early 1990s. The main use for the site and the surrounding area was grazing (sheep).

5.14.4 POTENTIAL IMPACTS

No potentially contaminating activities were confirmed to have occurred at the site.

It is considered possible that the following potentially contaminating activities *may* have occurred at the site:

- use of imported, and potentially impacted fill materials
- historical use of agricultural chemicals, herbicides and termiticides, including:
 - possible use of arsenic based weedicides/herbicides in the vicinity of the rail infrastructure at the north-western boundary of Area 1
 - possible use of pesticides (including arsenic-based) within a sheep dip in the vicinity of the former woolshed and yards in the north-west portion of Area 1
 - possible use of termiticides beneath the woolshed/associated sheds in Area 1
- railway activities
 - use and transportation of fuel or minerals/ores (north-western boundary of Area 1)
 - use of asbestos train brakes (north-western boundary of Area 1).

5.14.5 *MANAGEMENT AND MITIGATION MEASURES*

Based on the activities undertaken on site, as identified in the PSI, and associated potential contaminants, the risk of encountering contaminants is considered to be minor.

As a precaution, procedures for the potential discovery of contaminated soils during site disturbing works could be incorporated in the CEMP.

5.14.6 *KEY RECOMMENDATIONS*

The PSI did not confirm whether potentially contaminating activities had had occurred at the site. However, based on the activity and associated potential contaminants the risk has generally been considered to be minor due to the general localised nature and confinement of the potential contamination to shallow soils.

The presence of a sheep dip is not confirmed, however this activity is considered to be the most significant of those potentially contaminating activities identified. The likely location would be close to the woolshed and sheep yards in the north-west portion of Area 2. Given this area is some 400 m from any proposed development and construction activity associated with LGWF Stage 3, the resulting risk to future users of and maintenance workers on the site is considered to be low.

6 CONSTRUCTION, OPERATION AND DECOMMISSIONING

6.1 CONSTRUCTION

6.1.1 INDICATIVE TIMELINES

Critical timelines for the project are outlined below:

- pre-construction, project planning and development approval – 12 months
- tender process to confirm equipment supplier and contractors for construction – 6 months
- financing and internal approvals – 6 months
- construction, as per Figure 6.1 – 24 months.

Figure 6.1 Construction schedule

TASK	MONTHS																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Design	x	x	x	x																					
Mobilisation				x	x																				
BOP Construction						x	x	x	x	x	x	x	x	x	x	x									
WTG Manufacture										x	x	x	x	x	x	x	x								
WTG Installation												x	x	x	x	x	x	x	x	x	x	x	x		
WTG Commissioning															x	x	x	x	x	x	x	x	x		
Testing and Documentation																							x	x	x
Practical Completion																								x	

6.1.2 CONSTRUCTION ACTIVITIES AND STAGING

Construction activities will include:

- site preparation works, including fencing, preliminary civil works and drainage, access road and internal track construction, construction facilities
- construction of hardstand areas and turbine footings
- construction of buildings, ancillary infrastructure, installation of underground cabling (trenching), and connection of communications equipment
- construction of turbines
- removal of temporary construction facilities and rehabilitation of disturbed areas.

Construction activities should be undertaken between the hours of 7.00 am to 7.00 pm Monday to Saturday (inclusive) and not before 9.00 am or after 7.00 pm on Sundays and Public Holidays; as per the EPA SA Construction Noise Information Sheet and the Environment Protection (Noise) Policy 2007.

6.1.3 RESOURCING REQUIREMENTS

It is estimated that up to 120–140 workers required over the 24-month construction phase of the Project.

Equipment required for construction would include earth moving equipment, trucks and cranes. Materials required will include gravel, concrete and the infrastructure components.

6.1.4 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Framework (EMF) should be prepared for the Project to identify the environmental management and monitoring measures that would need to be implemented during the construction phase. The framework should aim to:

- provide a framework for the management of potential environmental impacts
- provide guidance to the contractor(s) and help them meet their obligations; particularly under the *Environment Protection Act 1993*, as well as other relevant statutory requirements
- provide an overview of all environmental values of the Project area in association with the implications of the construction methodology, and provide detail of the individual environmental commitments of the Project
- outline and discuss the implications of all relevant legislation and State and Commonwealth guidelines that will need to be incorporated into management measures
- guide the preparation of the Construction Environmental Management Plan (CEMP).

Following the completion of the EMF, a CEMP should be prepared in line with the EMF, prior to the commencement of construction. At a minimum, the CEMP should cover the following key issues:

- Aboriginal heritage; including a site discovery procedure and/or an individual Cultural Heritage Management Plan
- air quality and dust suppression
- emergency and fire management
- flora and fauna
- materials, fuels and waste management
- noise and vibration
- storage of hazardous substances
- traffic and access; including an individual Traffic Management Plan
- water quality protection; including an individual Soil Erosion and Drainage Management Plan
- weeds, pests and diseases control.

6.1.5 HEALTH AND SAFETY

The Project should be designed in accordance with the *South Australian Work Health and Safety Act 2012*.

Health and Safety Plan should be developed to manage safety risks to site personnel.

Road safety would be managed through the selection of an appropriate site access route for construction vehicles and personnel. This route should be selected in consultation with key stakeholders. An information line is open for community members to report incidents, near-misses, concerns and feedback. Furthermore, a Traffic Management Plan should be prepared to the satisfaction of DPTI, prior to the commencement of construction.

All site personnel should be inducted on to the Project, including safety requirements and responsibilities. Site personnel should be equipped with appropriate Personal Protective Equipment (PPE). Machinery and equipment used should be maintained and regularly checked for functionality and safety.

Although the Site is located in a remote area, appropriate security should be implemented on site, to ensure there is no risk to public safety.

6.2 OPERATION

It is anticipated that the Project will have an operational lifespan of 30 years.

The operation and ongoing maintenance of the wind farm should be managed through a framework which looks at the maintenance and operational requirements of wind turbines, access, roads, hazards, risks and security.

An Operational Environmental Management Plan (OEMP) should be developed prior to the commencement of operation of the Project. The plan should outline the environmental management requirements for operation, and include an Emergency Response Sub-plan to manage any potential emergency incidents that could occur onsite.

The operation and ongoing maintenance of the WTGs should be undertaken in line with the manufacturers specification.

6.2.1 HOURS OF OPERATION

The Project will operate intermittently, across a 24 hour/7-day a week period.

6.2.2 MAINTENANCE

During the operation phase, all infrastructure associated with the Project will remain the responsibility of the proponent or any subsequent owner/operator. All internal access tracks used by the wind farm will be maintained by the wind farm operator as part of the operation of the wind farm. A number of core activities will be undertaken on site during the operation of the project including scheduled and un-scheduled maintenance of turbines and plant comprising the wind farm. Maintenance works will include monitoring of equipment, cleaning, repairs, and replacement of worn or broken parts and maintenance of access tracks.

6.2.3 LAND MANAGEMENT

It is unlikely that there will be conflict between the operation of the Project of the wind farm and ongoing agricultural land uses and the landholdings surrounding the site would continue to be operated for agricultural purposes by the current landowners.

All areas disturbed during the construction of the Project (that are not required for operational activities) should be rehabilitated to their pre-construction condition. The OEMP should include weed management measures to control the establishment and dispersal of weed species on site.

6.2.4 BUSHFIRE MANAGEMENT

Bushfire risk should be managed through a Bushfire Management Plan, developed in consultation with the Country Fire Service (CFS) and surrounding landowners. Measures contained within the plan should include:

- the operation and maintenance of the site in a manner that no bushfire originates from the site and/or any approaching bushfire does not intensify because of excessive fuel loads within the site
- maintaining an Asset Protection Zone from the Site boundary
- requirements for water supply on site
- fuel load reduction measures (e.g. mechanical slashing)
- regular maintenance of on-site fire-fighting equipment and staff training
- ensuring that all site personnel would be trained and have access to the appropriate emergency and safety equipment in the event of an emergency at the facility
- the prohibition of on-site.

6.2.5 EMERGENCY MANAGEMENT

An Emergency Management Plan should be developed for the Project, in accordance with the relevant requirements of Safe Work Australia. At a minimum, the plan should include the following key items:

- key responsibilities and authorities
- emergency contacts
- evacuation plan
- incident and injury management
- emergency preparedness information
- emergency response actions
- post emergency investigations, rehabilitation and records.

The plan is based on various relevant Australian Standards (including AS 3745:2010 “Planning for Emergencies in Australian Facilities”).

All site personnel and visitors should undertake a site induction prior to entering the facility, which should include an induction of key emergency management procedures.

6.2.6 RESOURCING REQUIREMENTS

It is estimated that 12 permanent staff will be employed during the operation phase of the Project. This may increase to up to 20 staff during periods of outages and high service level.

6.2.7 SITE SECURITY AND SAFETY

A three-metre-high wire mesh security fence, topped with barbed wire, will be constructed around the perimeter of key infrastructure components; with security gates installed at access points. The location and design of fencing is to be confirmed at the detailed design stage.

The Emergency Management Plan, as discussed in Section 6.2.5, should include response actions for site security breaches.

6.3 DECOMMISSIONING

At the end of the project lifespan, the Site will be decommissioned and dismantled. All components should be removed from site and the site restored to its original condition; to the satisfaction of SCAP. Consideration should be given for infrastructure components that may be suitable for recycling or re-use.

LGWF P/L should ensure that environmental protection measures are implemented through a Decommissioning and Rehabilitation Plan. This plan should be developed with the objective to minimise disturbance of topsoil and to rehabilitate native vegetation; to remedy the site to its former condition, suitable for pastoral land uses.

7 CONCLUSIONS AND RECOMMENDATIONS

This Development Application Report outlines LGWF P/L's proposal to develop the LGWF Stage 3 Project, at Lincoln Gap, near Port Augusta. The Project will utilise available space at the existing LGWF, and proposes the construction of 42 WTGs with a maximum tip height of 206 m, and a maximum generating capacity of 252 MW.

The Project has secured sponsorship from the DEM, to allow the lodgement of the Development Application under Section 131 of the PDI Act. Furthermore, a certificate has been attained from the OTR, to confirm that the Project will contribute to the security and stability of the State's energy system, and to allow lodgement of the Development Application for an electricity generating project with SCAP.

This Development Application Report provides a detailed description of the Project and Project site, detail of the benefit and rationale of the Project, and an assessment of the potential environmental impacts that may arise from the development of the Project.

A planning and land use assessment was undertaken, to assess that Project against the relevant provisions of the PD Code. The assessment found that the proposed development of a wind farm is consistent, and not at variance, with the relevant policy provisions set out in the PD Code (Version 1 – Published 1 July 2019), warrants the granting of Development Approval.

Technical environmental assessments were undertaken to assess the potential impacts of the Project, and to provide recommendations on the management and mitigation of identified impacts. Assessments covered visual amenity, Aboriginal and non-Indigenous heritage, shadow flicker, EMI, aviation, socio-economic, geotechnical, stormwater and flooding and site contamination impacts. Based on the assessments undertaken, no major environmental impacts were identified that could not be appropriately managed, mitigated or avoided through implementation of appropriate measures. Key management and mitigation measures have been recommended, covering the planning and design phases, through to decommissioning.

LGWF Stage 3 would generate considerable environmental, economic and social benefits for the Port Augusta region, and would work to contribute to State and Commonwealth energy targets. The project has been assessed as complying with the PDC and as such, WSP recommend it for approval.

8 LIMITATIONS

This Report is provided by WSP Australia Pty Limited (*WSP*) for Nexif Energy Australia Pty Ltd (*Client*) in response to specific instructions from the Client and in accordance with WSP's proposal dated 15 February 2019 and agreement with the Client dated 14 March 2019 (*Agreement*).

8.1 PERMITTED PURPOSE

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (*Permitted Purpose*).

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Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (*Conclusions*) are based in whole or in part on information provided by the Client and other parties identified in the report (*Information*), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

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APPENDIX A

CROWN SPONSORSHIP LETTER





**Government
of South Australia**

Department for
Energy and Mining

D19076876

Ms Bronte Nixon
Principal Environmental Scientist/Planner
WSP Australia Pty Ltd
Level 1, 1 King William Street
ADELAIDE SA 5000

Dear Ms Nixon

Thank you for your letter of 27 May 2019 on behalf of Nexif Energy Australia Pty Ltd (Nexif) requesting Crown Sponsorship under Section 131 of the *Planning, Development and Infrastructure Act 2016* to assist with Nexif's proposed Lincoln Gap Stage 3 Wind Farm Project (Project).

The Project has been considered within the South Australian Department for Energy and Mining (DEM) with input from the Department of Planning, Transport and Infrastructure, the Department for Environment and Water, and the Environment Protection Authority. In principle, the Project is supported, recognising the possible environmental and community issues that will need to be addressed through the development assessment process.

On balance, the development of the Project has the potential to benefit South Australia and can be considered essential infrastructure. Accordingly I, as Chief Executive of DEM, will support the development and specifically endorse a Development Application to construct the Project comprising up to 243.6 MW of wind generation and 10MW/12MWh of battery storage for the provision of 'essential infrastructure' pursuant to Section 131(2)(c) of the *Planning, Development and Infrastructure Act 2016* (the Act).

It is the responsibility of Nexif to prepare all documentation as required by Section 131 of the Act. This includes all costs in the preparation, lodgement and assessment of the Development Application and satisfying any prescribed particulars outlined in Regulation 107(2) of the *Planning, Development and Infrastructure (General) Regulations 2017*.

A certificate from the Office of the Technical Regulator must also accompany your Development application to ensure that your project meets either Real Inertia or Fast Frequency Response criteria to safeguard the stability and reliability of the state's electricity network.

Chief Executive

Address Level 12, 11 Waymouth Street, Adelaide 5000 | GPO Box 320 Adelaide SA 5001 | DX452
Tel (+61) 08 8429 3216 | Email DEM.OCE@sa.gov.au | www.energymining.sa.gov.au | ABN 83 768 683 934



A development application must then be lodged with the State Commission Assessment Panel (SCAP). These lodgement documents can be provided in electronic form or made available via download link. Any development fee levied by SCAP is the responsibility of Nexif.

It is also a requirement that you contact Mr Mark Jackson, Senior Industry Development Officer, on (08) 8429 2722 or via email: mark.jackson@sa.gov.au prior to the lodgement of your Development Application to ensure all relevant statutory requirements are met.

DEM makes no representations and gives no warranties in relation to the outcome of the Development Application or the time that it takes to secure a planning outcome. It is the responsibility of Nexif to obtain all other statutory approvals, licences, connection agreements and permits from relevant authorities, manage community expectations and to fund the Project. The South Australian Government makes no commitment to purchase any product or service related to the Project.

If the Development Application has not been received electronically, by mail or in person by the SCAP within 12 months from the date of this letter, my support for this Crown Sponsorship under Section 131(2)(c) of the *Planning, Development and Infrastructure Act 2016* for the Project will lapse.

Yours sincerely



Paul Heithersay
CHIEF EXECUTIVE

11/7/2019

Chief Executive

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APPENDIX B

CERTIFICATE FROM THE OFFICE OF THE
TECHNICAL REGULATOR





Ref: D19071588

26th June 2019

Bronte Nixon
Principal Environmental Scientist/Planner
WSP Australia Pty Ltd
Level 1, 1 King William street
Adelaide SA 5000
bronte/nixon@wsp.com

Energy and Technical
Regulation

Office of the
Technical Regulator

Level 8, 11 Waymouth Street
Adelaide SA 5000

GPO Box 320
Adelaide SA 5001

Telephone: 08 8226 5500
Facsimile: 08 8226 5866

www.sa.gov.au/otr

Dear Bronte,

RE: Lincoln Gap 3, 42 turbine wind farm project.

The development of the Lincoln Gap 3 Project has been assessed by the Office of the Technical Regulator (OTR) under Section 37 of the Development Act 1993.

The *Development Regulations 2008* prescribe if the proposed development is for the purposes of the provision of electricity generating plant with a generating capacity of more than 5 MW that is to be connected to the State's power system – a certificate from the Technical Regulator is required, certifying that the proposed development complies with the requirements of the Technical Regulator in relation to the security and stability of the State's power system.

In making a decision on your application, our office has taken the following information into account:

- Your letter dated 10th May 2019.
- Presentation delivered to the OTR 24th May 2019.
- Your letter dated 27th May 2019.

After assessing the information provided, I advise that approval is granted for the proposed generator on the understanding that the shortfall in inertia of the turbines will be compensated for via a FFR solution. It is noted that should a synthetic inertia solution be provided via the wind turbines, the synthetic inertia is not considered as real inertia but is supplying a special form of FFR, so shall be measured and evaluated in MW as opposed to MW.s.

Energy and Technical Regulations

Level 8, 11 Waymouth Street Adelaide SA 5000 | GPO Box 320 Adelaide SA 5001 | DX541
Tel (+61) 8 8226 5500 | Fax (+61) 8 8226 5866 | www.dpc.sa.gov.au | ABN 83 524 915 929



Government of South Australia
Department for Energy and Mining

It should be noted that should the shortfall in inertia not be addressed this will have impact on the ESCOSA license for the proposed generator.

Should you have any questions regarding this matter, please do not hesitate to call Mark Burns on (08) 8429 2707.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Rob Faunt'.

Rob Faunt
TECHNICAL REGULATOR

Energy and Technical Regulations

Level 8, 11 Waymouth Street Adelaide SA 5000 | GPO Box 320 Adelaide SA 5001 | DX541
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APPENDIX C

EPBC RISK ASSESSMENT



**Design
for a better
*future /***

LINCOLN GAP WIND FARM PTY LTD

**LINCOLN GAP
WIND FARM STAGE 3**

EPBC RISK
ASSESSMENT

wsp

NOVEMBER 2019

Question today Imagine tomorrow Create for the future

Lincoln Gap Wind Farm Stage 3 EPBC Risk Assessment

Lincoln Gap Wind Farm Pty Ltd

WSP

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REV	DATE	DETAILS
00	26/07/2019	Draft
01	18/11/2019	Final

	NAME	DATE	SIGNATURE
Prepared by:	Erin Fitzner	18/11/2019	
Reviewed by:	Bronte Nixon	18/11/2019	
Approved by:	Bronte Nixon	18/11/2019	

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ABBREVIATIONS

BDBSA	Biological Database of South Australia
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
LGWF P/L	Lincoln Gap Wind Farm Pty Ltd
LGWF	Lincoln Gap Wind Farm
MNES	Matters of National Environmental Significance
Nexif Energy	Nexif Energy Australia Pty Ltd
PMST	Protected Matters Search Tool
SCAP	State Commission Assessment Panel
TEC	Threatened Ecological Community
WTGs	Wind turbine generators

1 INTRODUCTION

Lincoln Gap Wind Farm Pty Ltd (LGWF P/L), a subsidiary of Nexif Energy Australia Pty Ltd (Nexif Energy), is proposing to develop the Lincoln Gap Wind Farm Stage 3 (LGWF Stage 3) within and south of the LGWF Stage 1 and 2.

The proposed LGWF Stage 3 is situated at Lincoln Gap, at the top of the Eyre Peninsula in South Australia, approximately 20 km south-west of Port Augusta

The LGWF Stage 3 proposal incorporates up to 42 wind turbine generators (WTGs) with a maximum 252 MW capacity and ancillary infrastructure. Assessments have been based on an indicative turbine layout within an Approval Corridor to allow for micro-siting. The specifications of the largest turbine model under consideration (Vestas 5.6 MW) have been used where necessary to ensure that worst-case scenario impacts were captured and assessed. This includes a maximum tip-height of 206 m and rotor diameter of 162 m.

A Development Application for LGWF Stage 3 is being submitted to the State Commission Assessment Panel (SCAP) as the relevant authority. To support the planning approval process, a number of specialist or technical studies have been undertaken.

1.1 THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. It applies to all Australian territory and waters. Under the Act, actions that are likely to have a significant impact upon defined Matters of National Environmental Significance (MNES) are subject to an assessment and approval process. A company proposing to take an action that may have a significant impact on a MNES must refer that action to the Commonwealth Minister for the Environment.

The EPBC Act can be triggered when an action:

- is taken anywhere in Australia and has, or is likely to have a significant impact on a matter of national environmental significance; or
- is taken on Commonwealth land or in a Commonwealth marine area and has, or is likely to have a significant impact on the environment; or
- is taken outside Commonwealth land or marine areas and has, or is likely to have a significant impact on the environment on Commonwealth land or waters; or
- is taken by the Commonwealth and has, or is likely to have a significant impact on the environment.

In order to decide whether an action is likely to have a significant impact, it is necessary to take into account the nature and magnitude of potential impacts. In determining this, it is important to consider:

- all on-site and off-site impacts
- all direct and indirect impacts
- the frequency and duration of the action
- the total impact, which can be attributed to that action over the entire geographic area affected, and over time
- the sensitivity of the receiving environment
- the degree of confidence with which the impacts of the action are known and understood.

The EPBC Act prescribes nine matters of national environmental significance as triggers for Commonwealth assessment. These are:

- World Heritage sites
- National Heritage places
- Ramsar Wetlands of international importance
- nationally threatened species and ecological communities
- migratory species protected under international agreements
- the Commonwealth marine environment
- the Great Barrier Reef Marine Park
- nuclear actions, including uranium mining
- a water resource, in relation to coal seam gas development and large coal mining development.

Of these nine matters, there are two which could potentially trigger a Commonwealth assessment for the LGWF Stage 3 project:

- nationally threatened species and ecological communities
- migratory species protected under international agreements.

Under the EPBC Act, a company proposing an action that may have a significant impact on a matter of national environmental significance must prepare and submit a Referral that will help the Commonwealth decide whether the proposal requires further assessment. The Commonwealth Environment Minister will consider the Referral and is required to decide within 20 business days whether the action requires approval via a higher level of assessment. This is either through:

- assessment on preliminary documentation
- assessment by public environment report
- assessment by environmental impact assessment
- assessment by Public Inquiry.

1.2 PREVIOUS ASSESSMENTS

Flora and fauna assessments previously prepared for the LGWF are outlined in Table 1.1.

The 2005 preliminary assessment of ecological issues recommended that an EPBC referral be made due to the potential impact on three nationally threatened fauna species; the Thick-billed Grasswren (*Amytornis modestus*), Slender-billed Thornbill (Western) (*Acanthiza iredalei iredalei*) and Greater Long-eared Bat (*Nyctophilus corbeni*).

A subsequent risk assessment for bird species was undertaken in 2006, which identified the risk to the two nationally threatened bird species as moderate.

Further ecological assessments, including a desktop assessment, avifauna surveys and vegetation surveys were undertaken by EBS Ecology in 2016 and 2017 to incorporate changes to the proposed wind farm layout. The surveys identified one EPBC listed bird species as potentially occurring within the project area, the Western Grasswren (*Amytornis textilis myall*). One species of national conservation significance was recorded during the avifauna surveys, the Rainbow Bee-eater (*Merops ornatus*). The ecological assessments considered that the LGWF is not likely to have any impact on any MNES. In particular, the LGWF was not considered to have a significant impact on the only listed conservation rated or migratory/marine species that is known to occur (Rainbow Bee-eater) or considered to possibly occur (Western Grasswren) within the project area.

Accordingly, it was considered that an EPBC referral was not required for the previous stages of the LGWF.

Table 1.1 Flora and fauna assessments previously prepared for the LGWF

YEAR	ASSESSMENT	PREPARED BY
2005	Port Augusta Wind Farm development: Identification of Ecological Issues	Ecological Associates
2005	Preliminary Route Assessment: Port Augusta Wind Farm Development	Ecological Associates
2006	Risk to Birds from the Port Augusta Wind Farm Development: Impact Assessment Proposal	Ecological Associates
2016	Lincoln Gap Wind Farm Avifauna Report	EBS
2016	Lincoln Gap Vegetation Survey and Wedge-tailed Eagle Nest Inspection	EBS
2017	Lincoln Gap Wind Farm Native Vegetation Clearance Assessment	EBS
2017	Lincoln Gap Wind Farm Ecological Assessment (EBS Ecology 2017b)	

2 LGWF STAGE 3 FLORA AND FAUNA ASSESSMENT

The relevant findings of the flora and fauna survey undertaken for the LGWF Stage 3 in June 2019, are summarised below.

2.1 DATABASE SEARCHES

The Protected Matters Search Tool (PMST) provides guidance on MNES or other matters protected by the EPBC Act that are likely to occur within a search area. The PMST was used to generate a report for the LGWF Stage 3 project area with a fifty-kilometre buffer (EBS, 2019). Information from the PMST was cross-referenced against records within the Biological Database of South Australia (BDBSA).

The PMST identified three threatened ecological communities, 51 threatened species and 45 migratory species that may relate to the search area (DotEE 2019) (refer Table 2.1).

Table 2.1 Summary of the results of the EPBC Act Protected Matters Search

SEARCH AREA (50 km BUFFER)	MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE UNDER THE EPBC ACT 1999	IDENTIFIED WITHIN THE SEARCH AREA
	Threatened Species	51
	Migratory Species	45
	Threatened Ecological Communities	3
	Nationally Important Wetlands	1
	Commonwealth Lands	8
	Listed Marine Species	79
	Whales and other Cetaceans	8
	State and Territory Reserves	5
	Invasive Species	32

2.1.1 THREATENED, MIGRATORY AND LISTED MARINE SPECIES

Twelve nationally threatened flora were identified in the PMST and BDBSA extraction as potentially relating to the search area (Table 2.2). None of these species are considered likely to occur within the LGWF Stage 3 project area.

Thirty-five nationally threatened fauna species were identified by the PMST and BDBSA data extraction as potentially relating to the search area (Table 2.3). Of these, the Western Grasswren (*Amytornis textilis myall*) was the only nationally threatened species considered to potentially occur within the project area.

An additional 20 migratory species (38 including migratory species that were also threatened) were identified by the PMST and BDBSA data extraction as potentially relating to the search area (Table 2.3). Of these, the Fork-tailed Swift (*Apus pacificus*) is considered to potentially occur within the project area.

The Rainbow Bee-eater (*Merops ornatus*), which was the only nationally threatened fauna species to be recorded in previous assessments for the LGWF, was identified by the PMST only as a listed marine species. Marine listed species under the EPBC Act, which are not also listed as threatened or migratory, were excluded from the desktop assessment as they only trigger the need for an EPBC referral if they will be significantly impacted within a Commonwealth Marine Area. As Commonwealth Marine Areas commence three nautical miles from shore, marine species are not relevant to the project. Whales and other Cetaceans were not included in the assessment as the project is entirely land-based and will not have marine impacts.

Table 2.2 Nationally threatened flora species identified as potentially occurring within the search area (DEW 2019; DotEE 2019)

SCIENTIFIC NAME	COMMON NAME	CONSERVATION STATUS		SOURCE	LAST RECORD (YEAR)	LIKELIHOOD OF OCCURRENCE
		Aus	SA			
<i>Caladenia gladiolata</i>	Bayonet Spider-orchid	EN	E	1, 2	1994	Unlikely
<i>Caladenia tensa</i>	Greencomb Spider-orchid	EN		1		Unlikely
<i>Caladenia woolcockiorum</i>	Woolcock's Spider-orchid	VU	E	1		Unlikely
<i>Caladenia xantholeuca</i>	White Rabbits	EN	E	1		Unlikely
<i>Frankenia plicata</i>	Frankenia	EN	V	1		Possible
<i>Hibbertia crispula</i>	Ooldea Guinea-flower	VU	V	1		Unlikely
<i>Olearia pannosa ssp. pannosa</i>	Silver Daisy-bush	VU	V	2	1996	Unlikely
<i>Prasophyllum pallidum</i>	Pale Leek-orchid	VU	R	1, 2	2009	Unlikely
<i>Prasophyllum validum</i>	Sturdy Leek-orchid	VU	V	1, 2	1994	Unlikely
<i>Pterostylis xerophila</i>	Desert Greenhood	VU	V	1		Unlikely
<i>Senecio megaglossus</i>	Large-flower Groundsel	VU	E	1, 2	2009	Unlikely
<i>Veronica parnkalliana</i>	Port Lincoln Speedwell	EN	E	1		Unlikely

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare. Source: 1 EPBC, 2: BDBSA

Table 2.3 Nationally threatened and migratory fauna species identified as potentially occurring within the search area (DEW 2019; DotEE 2019)

SCIENTIFIC NAME	COMMON NAME	CONSERVATION STATUS		SOURCE	LAST RECORD (YEAR)	LIKELIHOOD OF OCCURRENCE
		Aus	SA			
AVES	BIRDS					
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi	R	1,2	2004	Unlikely
<i>Amytornis merrotsyi merrotsyi</i>	Short-tailed Grasswren (Flinders Ranges)	VU		1,2	2001	Unlikely
<i>Amytornis textilis myall</i>	Western Grasswren (Gawler Ranges)	VU		1, 2	2002	Possible
<i>Apus pacificus</i>	Fork-tailed Swift	Mi		1, 2	2000	Possible
<i>Ardenna carneipes</i>	Flesh-footed Shearwater	Mi	R	1		Unlikely
<i>Arenaria interpres</i>	Ruddy Turnstone	Mi	R	1, 2	1998	Unlikely
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi		1, 2	2006	Unlikely
<i>Calidris alba</i>	Sanderling	Mi	R	1		Unlikely
<i>Calidris canutus</i>	Red Knot	EN, Mi		1, 2	2000	Unlikely
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE, Mi		1, 2	2000	Unlikely
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi	R	1		Unlikely
<i>Calidris ruficollis</i>	Red-necked Stint	Mi		1, 2	2006	Unlikely
<i>Calidris tenuirostris</i>	Great Knot	CE, Mi		1		Unlikely
<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU, Mi	R	1		Unlikely
<i>Charadrius veredus</i>	Oriental Plover	Mi		1, 2	1996	Unlikely
<i>Diomedea antipodensis</i>	Antipodean Albatross	VU, Mi		1		Unlikely
<i>Diomedea epomophora</i>	Southern Royal Albatross	VU, Mi	V	1		Unlikely
<i>Diomedea exulans</i>	Wandering Albatross	VU, Mi	V	1		Unlikely
<i>Diomedea sanfordi</i>	Northern Royal Albatross	EN, Mi	E	1		Unlikely
<i>Gallinago hardwickii</i>	Latham's Snipe	Mi	R	1		Unlikely
<i>Gallinago stenura</i>	Pin-tailed Snipe	Mi		1		Unlikely
<i>Grantiella picta</i>	Painted Honeyeater	VU	V	1		Unlikely
<i>Hydroprogne caspia</i>	Caspian Tern	Mi		2	2005	Unlikely
<i>Leipoa ocellata</i>	Malleefowl	VU	V	1		Unlikely
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit (baueri)	VU, Mi	R	1		Unlikely
<i>Limosa lapponica menzberi</i>	Bar-tailed Godwit (menzberi)	CE, Mi		1		Unlikely

SCIENTIFIC NAME	COMMON NAME	CONSERVATION STATUS		SOURCE	LAST RECORD (YEAR)	LIKELIHOOD OF OCCURRENCE
		Aus	SA			
<i>Limosa limosa</i>	Black-tailed Godwit	Mi	R	1, 2	1984	Unlikely
<i>Macronectes giganteus</i>	Southern Giant Petrel	EN, Mi	V	1, 2	2000	Unlikely
<i>Macronectes halli</i>	Northern Giant Petrel	VU, Mi		1		Unlikely
<i>Motacilla cinerea</i>	Grey Wagtail	Mi		1		Unlikely
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CE	E	1, 2	1992	Unlikely
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CE, Mi	V	1, 2	2004	Unlikely
<i>Pachyptila turtur subantarctica</i>	Fairy Prion (Southern)	VU		1		Unlikely
<i>Pandion haliaetus</i>	Osprey	Mi	E	1		Unlikely
<i>Pedionomus torquatus</i>	Plains-wanderer	CE	E	1		Unlikely
<i>Pezoporus occidentalis</i>	Night Parrot	EN	E	1		Unlikely
<i>Philomachus pugnax</i>	Ruff (Reeve)	Mi	R	1		Unlikely
<i>Phoebastria fusca</i>	Sooty Albatross	VU, Mi	E	1		Unlikely
<i>Pluvialis squatarola</i>	Grey Plover	Mi		2	1999	Unlikely
<i>Rostratula australis</i>	Australian Painted Snipe	EN	V	1		Unlikely
<i>Sternula nereis</i>	Fairy Tern	VU	E	1, 2	2002	Unlikely
<i>Sternula nereis nereis</i>	Australian Fairy Tern	VU	E	1, 2	2002	Unlikely
<i>Thalassarche cauta cauta</i>	Shy Albatross	VU, Mi	V	1		Unlikely
<i>Thalassarche cauta steadi</i>	White-capped Albatross	VU, Mi		1		Unlikely
<i>Thalassarche impavida</i>	Campbell Albatross	VU, Mi	V	1		Unlikely
<i>Thalassarche melanophris</i>	Black-browed Albatross	VU, Mi		1		Unlikely
<i>Thalasseus bergii</i>	Greater Crested Tern	Mi		2	2006	Unlikely
<i>Tringa nebularia</i>	Common Greenshank	Mi		1, 2	2006	Unlikely
<i>Tringa stagnatilis</i>	Marsh Sandpiper	Mi		1, 2	2006	Unlikely
<i>Zoothera lunulata halmaturina</i>	Bassian Thrush (South Australian)	VU	R	1		Unlikely
MAMMALIA	MAMMALIA					
<i>Petrogale xanthopus xanthopus</i>	Yellow-footed Rock Wallaby (SA and NSW)	VU		1, 2	2015	Unlikely
<i>Bettongia leueur</i>	Burrowing Bettong	EX		2	1900	Unlikely
<i>Dasyurus viverrinus</i>	Eastern Quoll	EN	E	2	1909	Unlikely

SCIENTIFIC NAME	COMMON NAME	CONSERVATION STATUS		SOURCE	LAST RECORD (YEAR)	LIKELIHOOD OF OCCURRENCE
		Aus	SA			
REPTILIA	REPTILES					
<i>Aprasia pseudopulchella</i>	Flinders Range Worm-lizard	VU		1, 2	2017	Unlikely
<i>Notechis scutatus ater</i>	Kreffit's Tiger Snake (Flinders Ranges)	VU		1		Unlikely

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare. Source: 1 EPBC, 2:BDBSA

2.1.2 THREATENED ECOLOGICAL COMMUNITIES

Three threatened ecological communities (TECs) were identified in the PMST within the search area (Table 2.4). All three TECs are unlikely to occur within the project area and have not been recorded in any of the previous ecological assessments undertaken for the project.

Table 2.4 Threatened ecological communities identified by the PMST within the search area (DotEE 2019)

COMMUNITY	CONSERVATION STATUS	LIKELIHOOD OF OCCURRENCE
	Aus	
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	EN	Unlikely
Peppermint Box (<i>Eucalyptus odorata</i>) Grassy Woodland of South Australia	CE	Unlikely
Subtropical and Temperate Coastal Saltmarsh	VU	Unlikely

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

2.1.3 NATIONALLY IMPORTANT WETLANDS

The PMST report identified one nationally important wetland as potentially relating to the search area, i.e. the Upper Spencer Gulf area. The LGWF Stage 3 project area is approximately 15 km inland from the Spencer Gulf estuary and will have no impact on this wetland.

2.1.4 COMMONWEALTH LANDS

The PMST identified the eight Commonwealth land areas within the search area, including Defence, Housing Authority, Minister of Aboriginal Affairs, Aboriginal and Torres Strait Islander Commission, Australian National Railways Commission and unidentified land. None of these Commonwealth land areas are impacted by the LGWF Stage 3.

2.2 FIELD SURVEY

A field survey, including a vegetation and bird assessment, was undertaken from 15–19 June 2019 and did not record any threatened ecological communities or nationally threatened species, including migratory species.

The field survey also included targeted bird surveys for the Western Grasswren (*Amytornis textilis myall*) which was not recorded (discussed further in section 3.1).

The Slender-billed Thornbill (western) (*Acanthiza iredalei iredalei*) was recorded within the project area in three groups of five, four and two individuals, however this species was removed from the EPBC Act list of threatened species on 14 December 2013 (DoE 2019a).

3 RISK ASSESSMENT

The EPBC Act Significant Impact Guidelines (DoE 2013) provide overarching guidance on determining whether an action is likely to have a significant impact on a matter of national environmental significance. A self-assessment against the Significant Impact Guidelines for the MNES which could potentially trigger a Commonwealth assessment for the LGWF Stage 3 is provided below.

3.1 NATIONALLY THREATENED SPECIES AND ECOLOGICAL COMMUNITIES

No flora species of national conservation significance were identified in the flora and fauna assessment as likely to occur within the LGWF Stage 3 project area.

One nationally vulnerable fauna species, the Western Grasswren (*Amytornis textilis myall*) was identified as potentially occurring within the project area

The likelihood of the Western Grasswren occurring within the project area was downgraded from ‘possible’ to ‘unlikely’ following the field survey, based on the suitability of available habitat. The Western Grasswren is generally found in low-lying areas of Blackbush and spiny shrubs, either as a Shrubland or as an understorey of Western Myall Low Open Woodland. The presence of this species can be largely predicted by the total cover of Blackbush, Australian Boxthorn, spiny shrubs, Ruby Saltbush and taller shrubs (over 0.75 m). No vegetation associations dominated by these species were recorded across the project area. As such, habitat within the project area was considered unsuitable for the Western Grasswren (EBS Ecology 2019).

An assessment against the criteria outlined within the Significant Impact Guidelines to determine whether the LGWF Stage 3 project is likely to have a significant impact on the Western Grasswren is provided in Table 3.1.

Table 3.1 Assessment against significant impact criteria for vulnerable species

AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A VULNERABLE SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:	APPLICABLE TO THE WESTERN GRASSWREN
lead to a long-term decrease in the size of an important population of a species	No
reduce the area of occupancy of an important population	No
fragment an existing important population into two or more populations	No
adversely affect habitat critical to the survival of a species	No
disrupt the breeding cycle of an important population	No
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species’ habitat	No
introduce disease that may cause the species to decline	No
interfere substantially with the recovery of the species	No

None of the three threatened ecological communities identified in the PMST were identified in the flora and fauna survey or are considered likely to occur.

3.2 MIGRATORY SPECIES PROTECTED UNDER INTERNATIONAL AGREEMENTS

One migratory species, the Fork-tailed Swift (*Apus pacificus*) may occur within the LGWF Stage 3 project area.

The Fork-tailed Swift is a non-breeding visitor to Australia, arriving in Australia between September and October and departing from its breeding grounds in April. The breeding grounds of the Fork-tailed Swift extend from northern India to western Russia. The distribution of the Fork-tailed Swift in Australia extends the entire continent, with records most common around the coastal and sub-coastal regions, however, the species also frequents inland areas. Fork-tailed Swifts are highly mobile in Australia, and their movements are influenced by weather patterns, with large flocks observed to precede and follow low pressure systems (DotE 2019). Although Fork-tailed Swifts are nearly exclusively aerial in Australia, the species has been observed to roost in cliffs and large trees, however, may spend nights flying (Pizzey and Knight 2014).

The Fork-tailed Swift was not recorded during the June 2019 field survey or previous surveys. While it is possible this species may occur as an occasional visitor to the site between September-April, it is unlikely that the Fork-tailed Swift would be significantly impacted by the LGWF Stage 3. An assessment against the significant impact criteria for migratory species is provided in Table 3.2.

Table 3.2 Assessment against significant impact criteria for migratory species

AN ACTION IS LIKELY TO HAVE A SIGNIFICANT IMPACT ON A MIGRATORY SPECIES IF THERE IS A REAL CHANCE OR POSSIBILITY THAT IT WILL:	APPLICABLE TO THE FORK-TAILED SWIFT
substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No
seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

4 RECOMMENDATION

An EPBC referral is not required for the LGWF Stage 3 project based on the current infrastructure layout and Approval Corridor. This recommendation is based on the following reasons:

- An EPBC referral was not required for LGWF Stages 1 and 2.
- There were no nationally threatened flora species observed within the project area and flora species identified in the PMST are not considered likely to occur.
- The Slender-billed Thornbill, which was recorded during the 2019 field survey, was de-listed from the EPBC Act in December 2013.
- The Greater Long-eared Bat (*Nyctophilus corbeni*) has not been recorded in any of the assessments undertaken for the LGWF and was not identified in the PMST as potentially relating to the search area.
- The Thick-billed Grasswren (*Amytornis modestus*) has not been recorded in any of the assessments undertaken for the LGWF and is considered unlikely to occur within the LGWF Stage 3 project area based on available habitat. The LGWF Stage 3 is unlikely to have a significant impact on this nationally vulnerable species.
- The Fork-tailed Swift (*Apus pacificus*) has not been recorded in any of the assessments undertaken for the LGWF. The LGWF Stage 3 is unlikely to have a significant impact on this migratory species.
- The Rainbow Bee-eater (*Merops ornatus*) was identified by the PMST only as a listed marine species. Marine listed species under the EPBC Act, which are not also listed as threatened or migratory, only trigger the need for an EPBC referral if they will be significantly impacted within a Commonwealth Marine Area. This is not the case for the LGWF Stage 3.

5 LIMITATIONS

This Report is provided by WSP Australia Pty Limited (*WSP*) for Nexif Energy Australia Pty Ltd (*Client*) in response to specific instructions from the Client and in accordance with WSP's proposal dated 15 February 2019 and agreement with the Client dated 14 March 2019 (*Agreement*).

5.1 PERMITTED PURPOSE

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (*Permitted Purpose*).

5.2 QUALIFICATIONS AND ASSUMPTIONS

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (*Conclusions*) are based in whole or in part on information provided by the Client and other parties identified in the report (*Information*), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

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Pizzey, G. and Knight, F. (2014). Birds of Australia. Gibbon Multimedia Pty Ltd. Victoria, Australia.

ABOUT US

WSP is one of the world's leading engineering professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors, environmental specialists, as well as other design, program and construction management professionals. We design lasting Property & Buildings, Transportation & Infrastructure, Resources (including Mining and Industry), Water, Power and Environmental solutions, as well as provide project delivery and strategic consulting services. With approximately 48,000 talented people globally, we engineer projects that will help societies grow for lifetimes to come.



APPENDIX D

CERTIFICATES OF TITLE



Certificate of Title - Volume 6138 Folio 331

Parent Title(s) CT 5179/927
Creating Dealing(s) DDA 12113954
Title Issued 27/05/2014 Edition 3 Edition Issued 19/12/2017

Estate Type

FEE SIMPLE

Registered Proprietor

NUTT BROS NOMINEES PTY. LTD. (ACN: 079 738 659)
OF 1ST FLOOR 187 WAKEFIELD STREET ADELAIDE SA 5000

Description of Land

ALLOTMENT COMPRISING PIECES 1, 2, 3 AND 4 DEPOSITED PLAN 37168
IN THE AREA NAMED LINCOLN GAP
HUNDRED OF HANDYSIDE

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO HER MAJESTY THE QUEEN (AS 2861764)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED D AND E TO THE ELECTRICITY TRUST OF SOUTH AUSTRALIA (TG 7065720 AND RE 7609633 RESPECTIVELY)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED B AND C TO THE PIPELINES AUTHORITY OF SOUTH AUSTRALIA (TG 6328754 AND TG 6328755 RESPECTIVELY)

Schedule of Dealings

Dealing Number	Description
9404306	MORTGAGE TO RURAL BANK LTD.
12841088	LEASE TO ELECTRANET PTY. LTD. (ACN: 094 482 416) COMMENCING ON 07/11/2017 AND EXPIRING ON 06/11/2045 OF PORTION (AREA S IN F253174) TOGETHER WITH CERTAIN RIGHTS
12841089	LEASE TO LINCOLN GAP WIND FARM PTY. LTD. (ACN: 133 372 595) COMMENCING ON 07/11/2017 AND EXPIRING ON 06/11/2037 OF PORTION (AREA A, AREA B, AREA C, AREA D, AREA E1 AND AREA E2 IN F253174)
12841090	MORTGAGE OF LEASE 12841089 TO NATIONAL AUSTRALIA BANK LTD. (ACN: 004 044 937)
13097600	LIEN BY CONSOLIDATED POWER PROJECTS AUSTRALIA PTY. LTD. (ACN: 075 411 219) AND NACAP PTY. LTD. (ACN: 006 306 994) OVER LEASE 12841089 G.R.O. 22209
13097603	LIEN BY CONSOLIDATED POWER PROJECTS AUSTRALIA PTY. LTD. (ACN: 075 411 219) AND NACAP PTY. LTD. (ACN: 006 306 994) OVER LEASE 12841089 G.R.O. 22210

Notations

Dealings Affecting Title NIL

Priority Notices

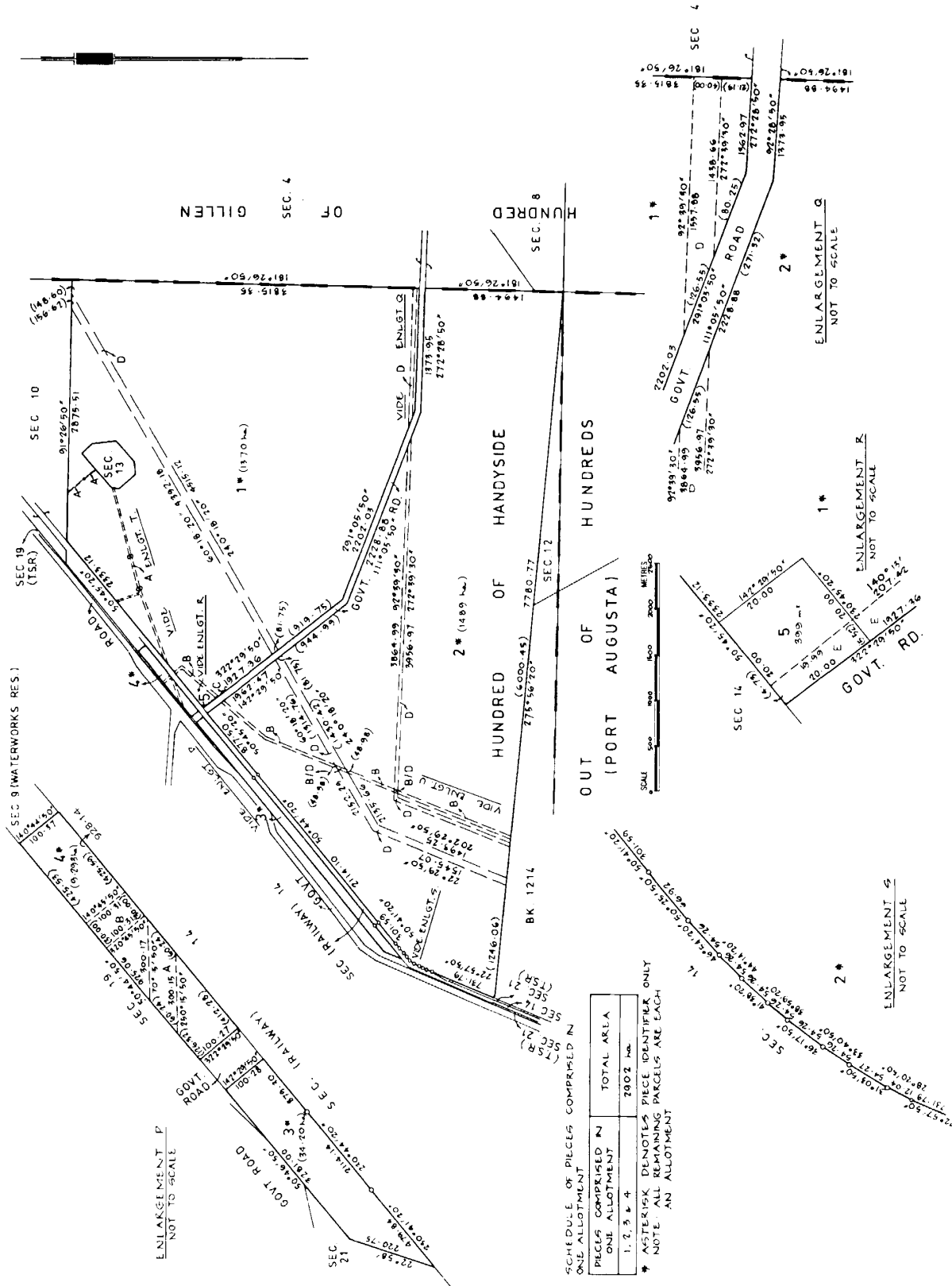
Lodgement Date	Priority Notice ID	Expiry Date	Status
17/04/2019	PN019536	17/06/2019	Completed
17/04/2019	PN019535	17/06/2019	Completed
17/04/2019	PN019533	17/06/2019	Withdrawn
16/04/2019	PN019532	17/06/2019	Withdrawn
16/04/2019	PN019513	17/06/2019	Withdrawn
16/04/2019	PN019512	17/06/2019	Withdrawn

Notations on Plan NIL

Registrar-General's Notes

APPROVED FILED PLAN FOR LEASE PURPOSES FX253174

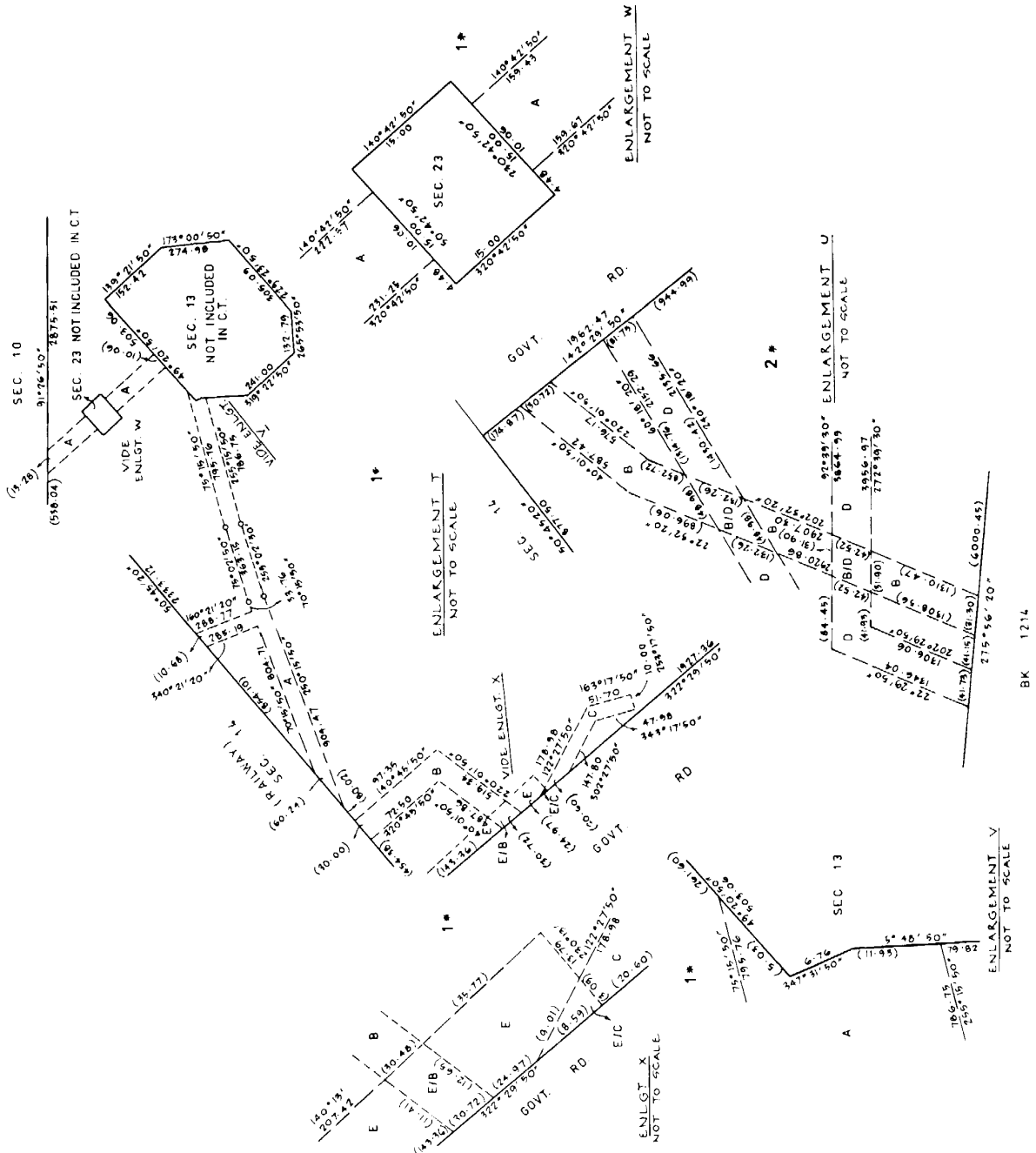
Administrative Interests NIL



SCHEDULE OF PIECES COMPRISED IN ONE ALLOTMENT

PIECES COMPRISED IN ONE ALLOTMENT	TOTAL AREA
1, 2, 3 & 4	2802 ha.

* ASTERISK DENOTES PIECE IDENTIFIER ONLY
 NOTE: ALL REMAINING PARCELS ARE EACH AN ALLOTMENT





The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.



Certificate of Title - Volume 6138 Folio 334

Parent Title(s) CT 5270/320
Creating Dealing(s) DDA 12113954
Title Issued 27/05/2014 **Edition** 3 **Edition Issued** 19/12/2017

Estate Type

FEE SIMPLE

Registered Proprietor

NUTT BROS NOMINEES PTY. LTD. (ACN: 079 738 659)
 OF 1ST FLOOR 187 WAKEFIELD STREET ADELAIDE SA 5000

Description of Land

SECTION 313
 HUNDRED OF COPLEY
 IN THE AREA NAMED LINCOLN GAP

SECTION 4
 HUNDRED OF HANDYSIDE
 IN THE AREA NAMED LINCOLN GAP

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO THE PIPELINES AUTHORITY OF SOUTH AUSTRALIA (T 6328754)

Schedule of Dealings

Dealing Number	Description
9404306	MORTGAGE TO RURAL BANK LTD.
12841089	LEASE TO LINCOLN GAP WIND FARM PTY. LTD. (ACN: 133 372 595) COMMENCING ON 07/11/2017 AND EXPIRING ON 06/11/2037
12841090	MORTGAGE OF LEASE 12841089 TO NATIONAL AUSTRALIA BANK LTD. (ACN: 004 044 937)
13097600	LIEN BY CONSOLIDATED POWER PROJECTS AUSTRALIA PTY. LTD. (ACN: 075 411 219) AND NACAP PTY. LTD. (ACN: 006 306 994) OVER LEASE 12841089 G.R.O. 22209
13097603	LIEN BY CONSOLIDATED POWER PROJECTS AUSTRALIA PTY. LTD. (ACN: 075 411 219) AND NACAP PTY. LTD. (ACN: 006 306 994) OVER LEASE 12841089 G.R.O. 22210

Notations

Dealings Affecting Title NIL

Priority Notices

Lodgement Date	Priority Notice ID	Expiry Date	Status
17/04/2019	PN019536	17/06/2019	Completed



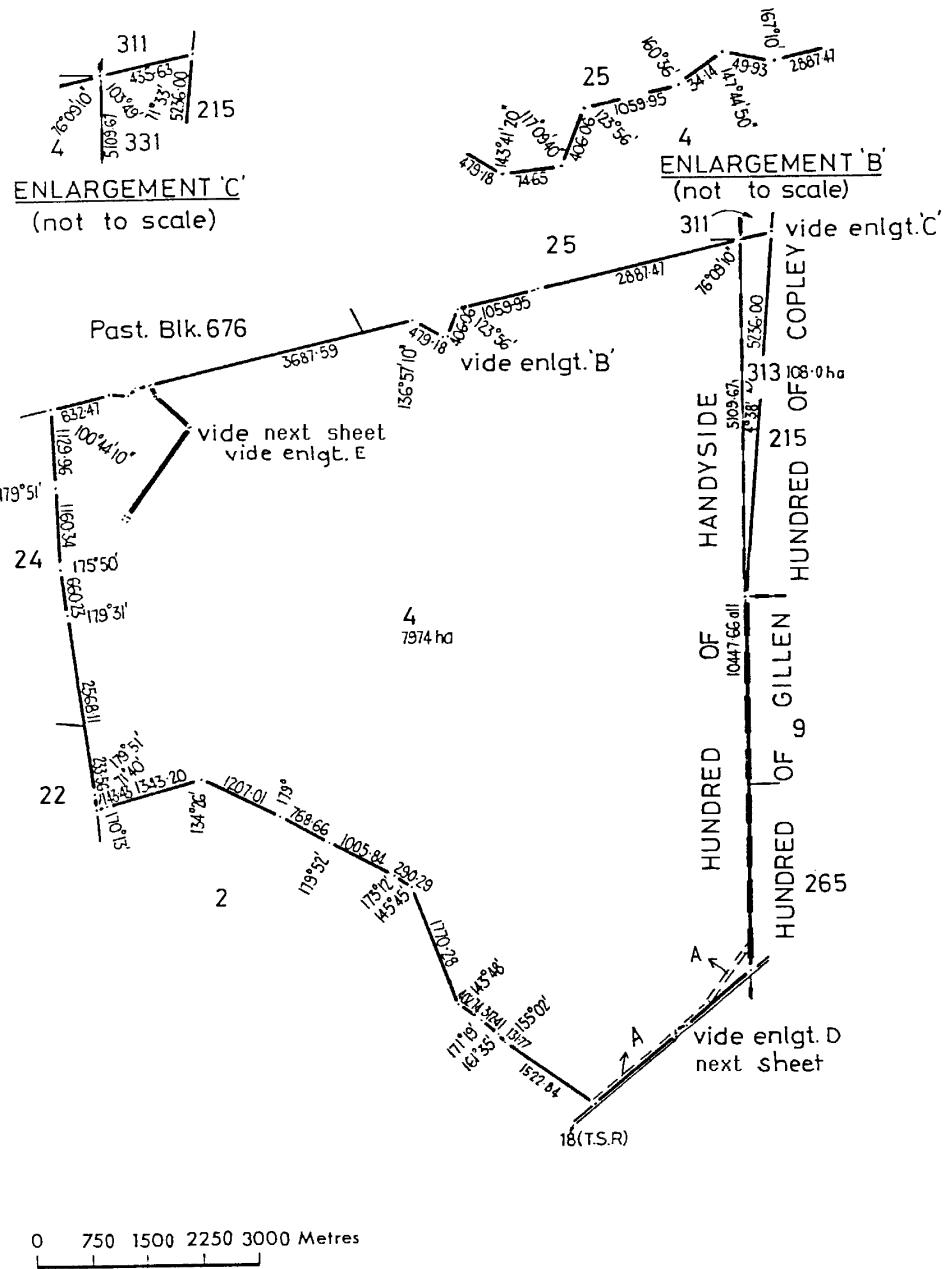
Product Register Search (CT 6138/334)
Date/Time 30/04/2019 02:57PM
Customer Reference Title search
Order ID 20190430008326

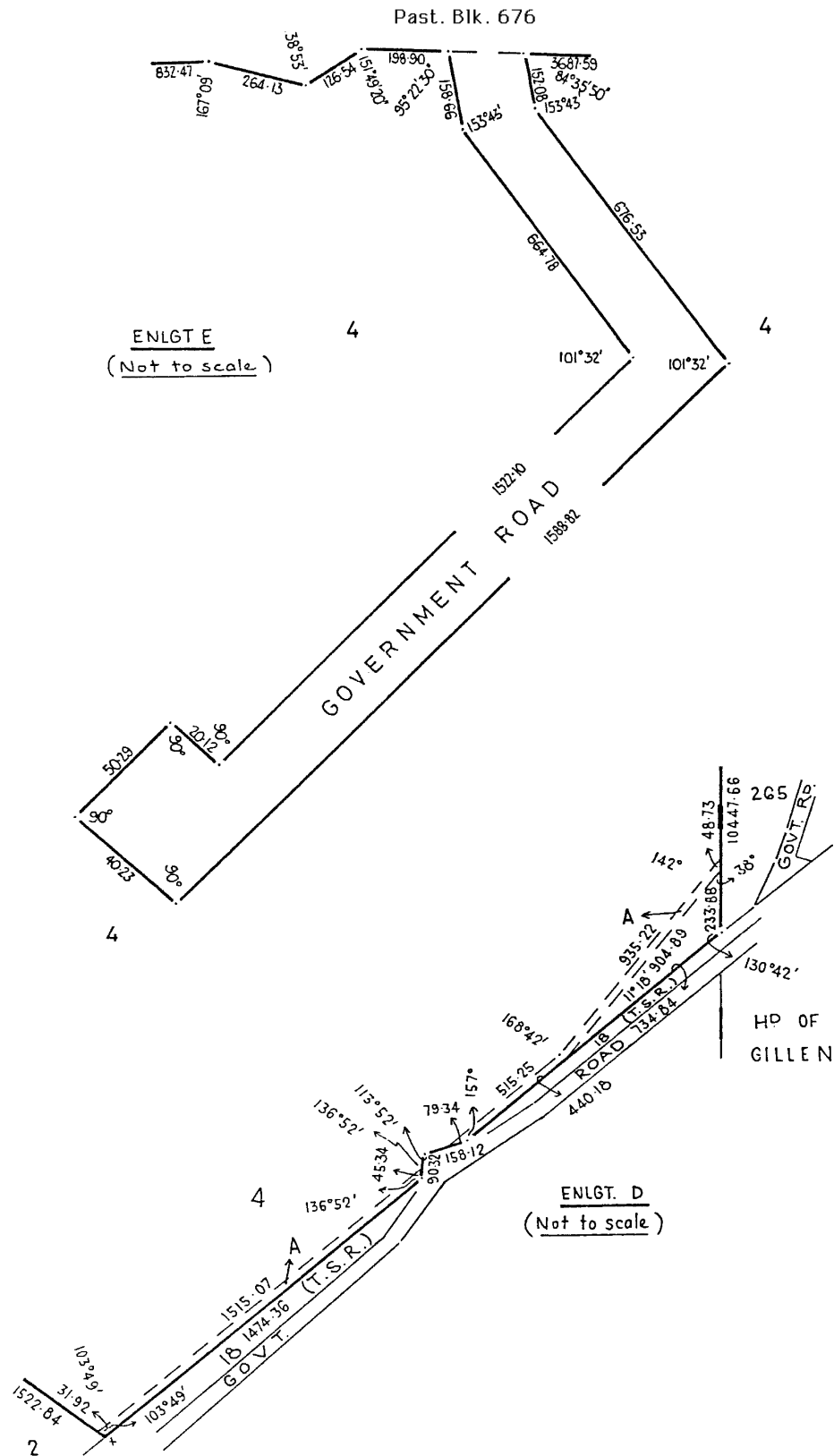
17/04/2019	PN019535	17/06/2019	Completed
17/04/2019	PN019533	17/06/2019	Withdrawn
16/04/2019	PN019532	17/06/2019	Withdrawn
16/04/2019	PN019513	17/06/2019	Withdrawn
16/04/2019	PN019512	17/06/2019	Withdrawn

Notations on Plan NIL

Registrar-General's Notes NIL

Administrative Interests NIL





REAL PROPERTY ACT, 1886



The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.



Certificate of Title - Volume 6138 Folio 388

Parent Title(s) CT 6066/920
Creating Dealing(s) DDA 12113954
Title Issued 27/05/2014 **Edition** 3 **Edition Issued** 19/12/2017

Estate Type

FEE SIMPLE

Registered Proprietor

NUTT BROS NOMINEES PTY. LTD. (ACN: 079 738 659)
OF PMB 15 PORT AUGUSTA SA 5170

Description of Land

SECTIONS 2 AND 8
HUNDRED OF HANDYSIDE
IN THE AREA NAMED LINCOLN GAP

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO THE AUSTRALIAN NATIONAL RAILWAYS COMMISSION (SL 4743588)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED B TO THE NATURAL GAS AUTHORITY OF SOUTH AUSTRALIA (T 6328754)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED D FOR WATER SUPPLY PURPOSES TO THE SOUTH AUSTRALIAN WATER CORPORATION (TG 11439438)

SUBJECT TO RIGHT(S) OF WAY OVER THE LAND MARKED C TO THE AUSTRALIAN NATIONAL RAILWAYS COMMISSION (SL 4743588)

Schedule of Dealings

Dealing Number	Description
9404306	MORTGAGE TO RURAL BANK LTD.
12841089	LEASE TO LINCOLN GAP WIND FARM PTY. LTD. (ACN: 133 372 595) COMMENCING ON 07/11/2017 AND EXPIRING ON 06/11/2037
12841090	MORTGAGE OF LEASE 12841089 TO NATIONAL AUSTRALIA BANK LTD. (ACN: 004 044 937)

Notations

Dealings Affecting Title NIL
Priority Notices NIL
Notations on Plan NIL

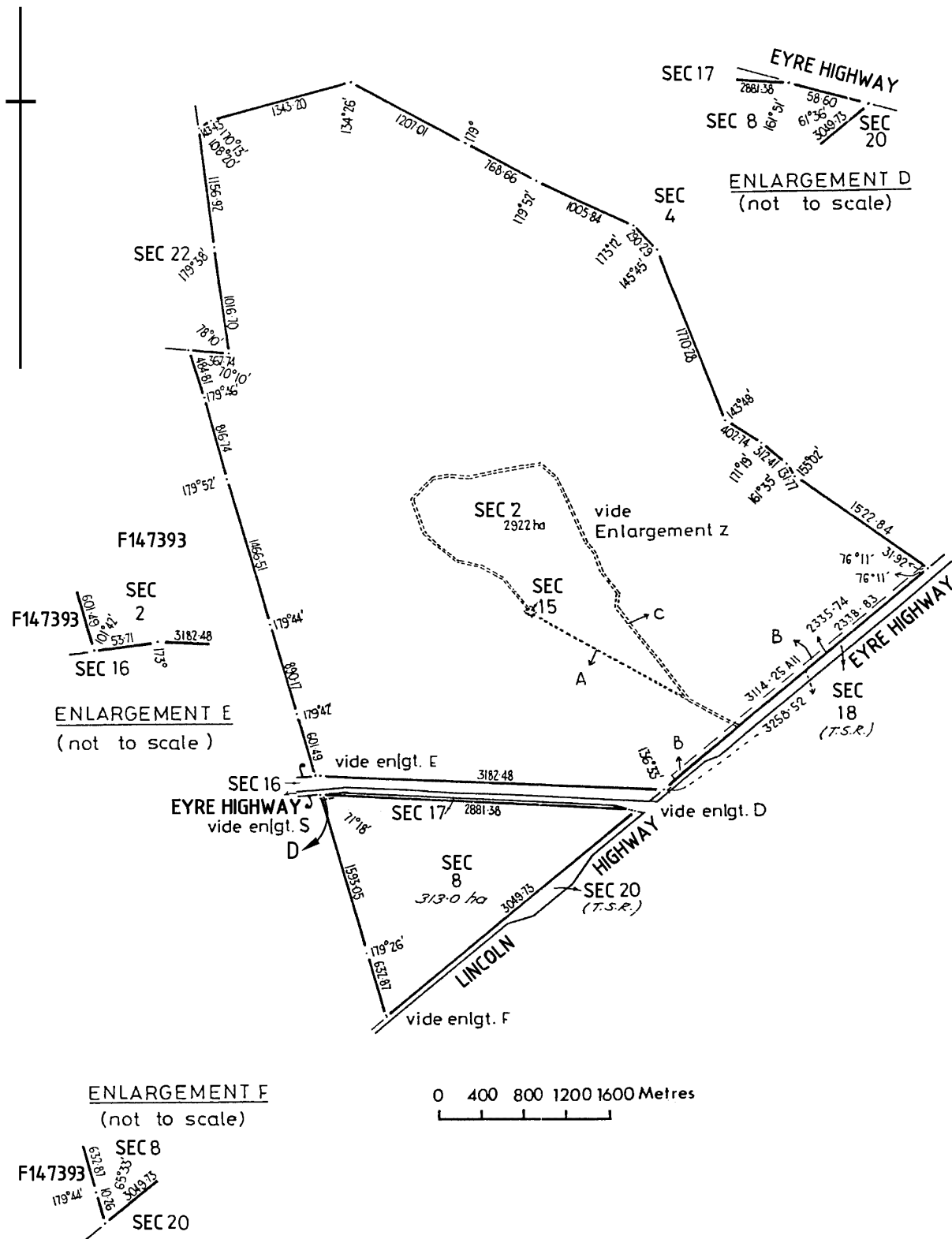
Registrar-General's Notes



Product	Register Search Plus (CT 6138/388)
Date/Time	02/11/2018 03:21PM
Customer Reference	PS111460
Order ID	20181102008866
Cost	\$34.50

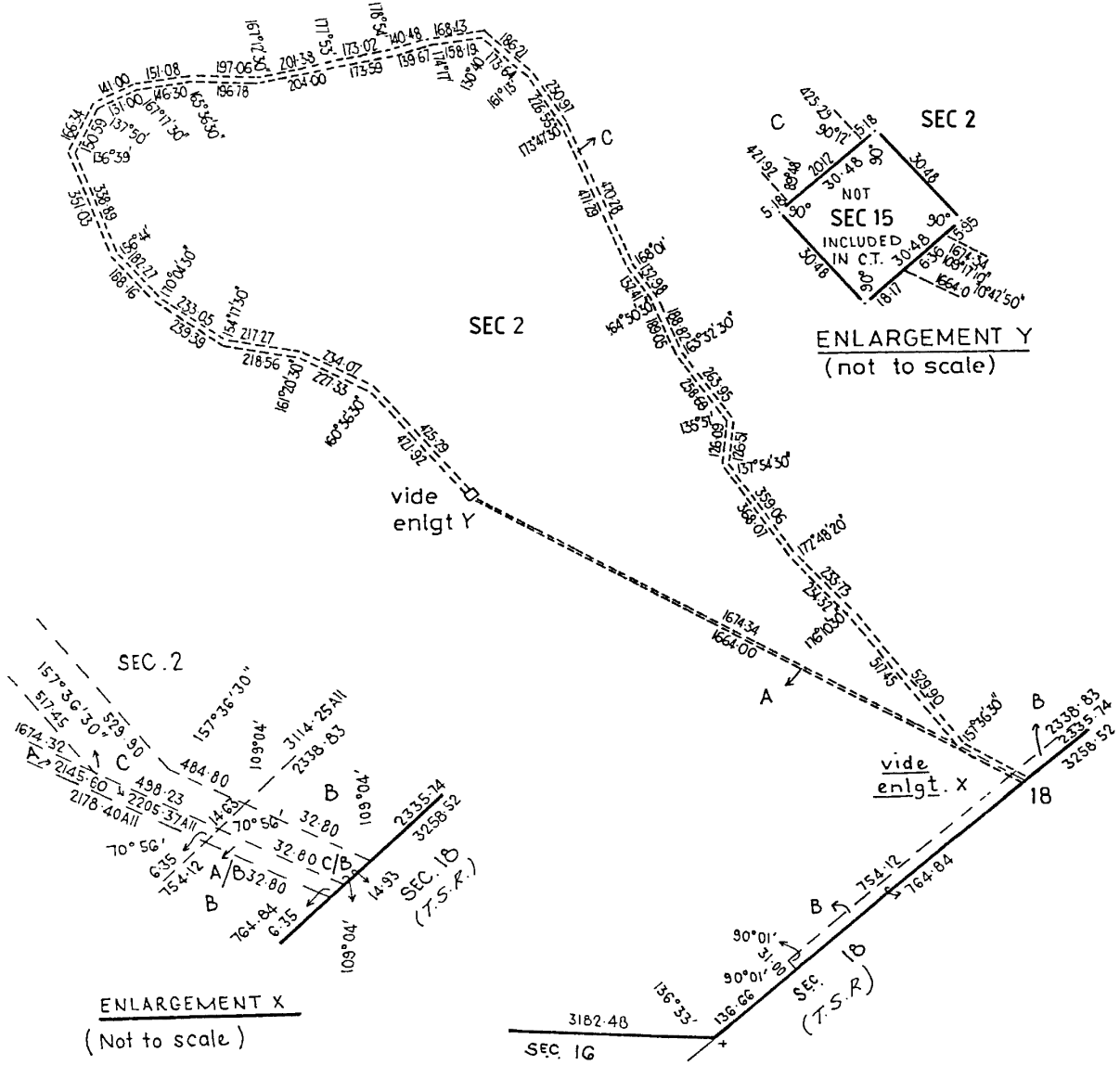
APPROVED FILED PLAN FOR LEASE PURPOSES FX48516

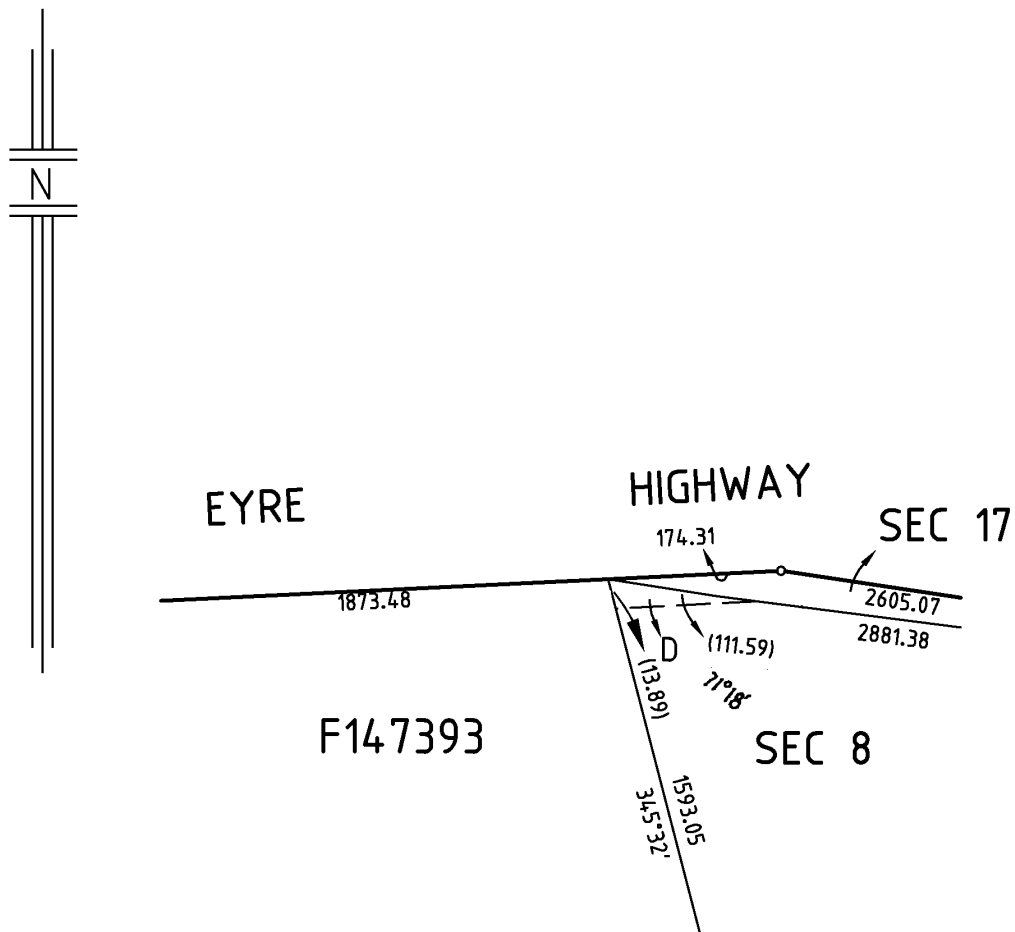
Administrative Interests NIL





ENLARGEMENT Z
 (not to scale)





ENLARGEMENT S
 NOT TO SCALE

APPENDIX E

PLANNING AND LAND USE ASSESSMENT



**Design
for a better
*future /***

LINCOLN GAP WIND FARM PTY LTD

**LINCOLN GAP
WIND FARM STAGE 3**

PLANNING AND
LAND USE
ASSESSMENT

wsp

NOVEMBER 2019

Question today *Imagine tomorrow* Create for the future

Lincoln Gap Wind Farm Stage 3 Planning and Land Use Assessment

Lincoln Gap Wind Farm Pty Ltd

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REV	DATE	DETAILS
00	25/10/2019	Draft issue
01	18/11/2019	Final

	NAME	DATE	SIGNATURE
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Reviewed by:	Bronte Nixon	18/11/2019	
Approved by:	Bronte Nixon	18/11/2019	

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ABBREVIATIONS

CEMP	Construction Environmental Management Plan
CFS	Country Fire Service
DEM	Department for Energy and Mining
DPTI	Department of Planning, Transport and Infrastructure
LGWF	Lincoln Gap Wind Farm
LGWF P/L	Lincoln Gap Wind Farm Pty Ltd
LNWCA	Land not within a council area
MW	Megawatt
Nexif Energy	Nexif Energy Australia Pty Ltd
NWFD	National Wind Farm Development Guidelines
OTR	Office of the Technical Regulator
PD Code	The Planning and Design Code (as applying to Land Not Within a Council Area)
PDI Act	<i>Planning, Development and Infrastructure Act 2016</i>
PDI Regulations	Planning, Development and Infrastructure (General) Regulations 2017
PO	Performance Outcome
SA	South Australia
SCAP	State Commission Assessment Panel
SPP	State Planning Policy
The Project	Lincoln Gap Wind Farm Stage 3
TIS	Traffic Impact Statement
WSP	WSP Australia Pty Ltd
WTG	Wind turbine generators

1 INTRODUCTION

WSP Australia Pty Ltd (WSP) has been engaged by Lincoln Gap Wind Farm Pty Ltd (LGWF P/L), a subsidiary of Nexif Energy Australia Pty Ltd (Nexif Energy), to prepare this planning and land use assessment to support a Section 131 (Crown Development) Development Application to the State Commission Assessment Panel (SCAP).

1.1 THE LINCOLN GAP WIND FARM STAGE 3

The Lincoln Gap Wind Farm (LGWF) received Development Approval for Stage 1 and 2 from SCAP in December 2018 and commenced construction in January 2019. Development Approval was granted for:

- 59 wind turbine generators (WTG) with a maximum tip height of 180 m and a total generating capacity of 212 megawatts (MW)
- internal ancillary infrastructure, including meteorological masts, operation/maintenance building, switchyard, transmission lines and temporary construction compound and concrete batching plant
- off-site substation.

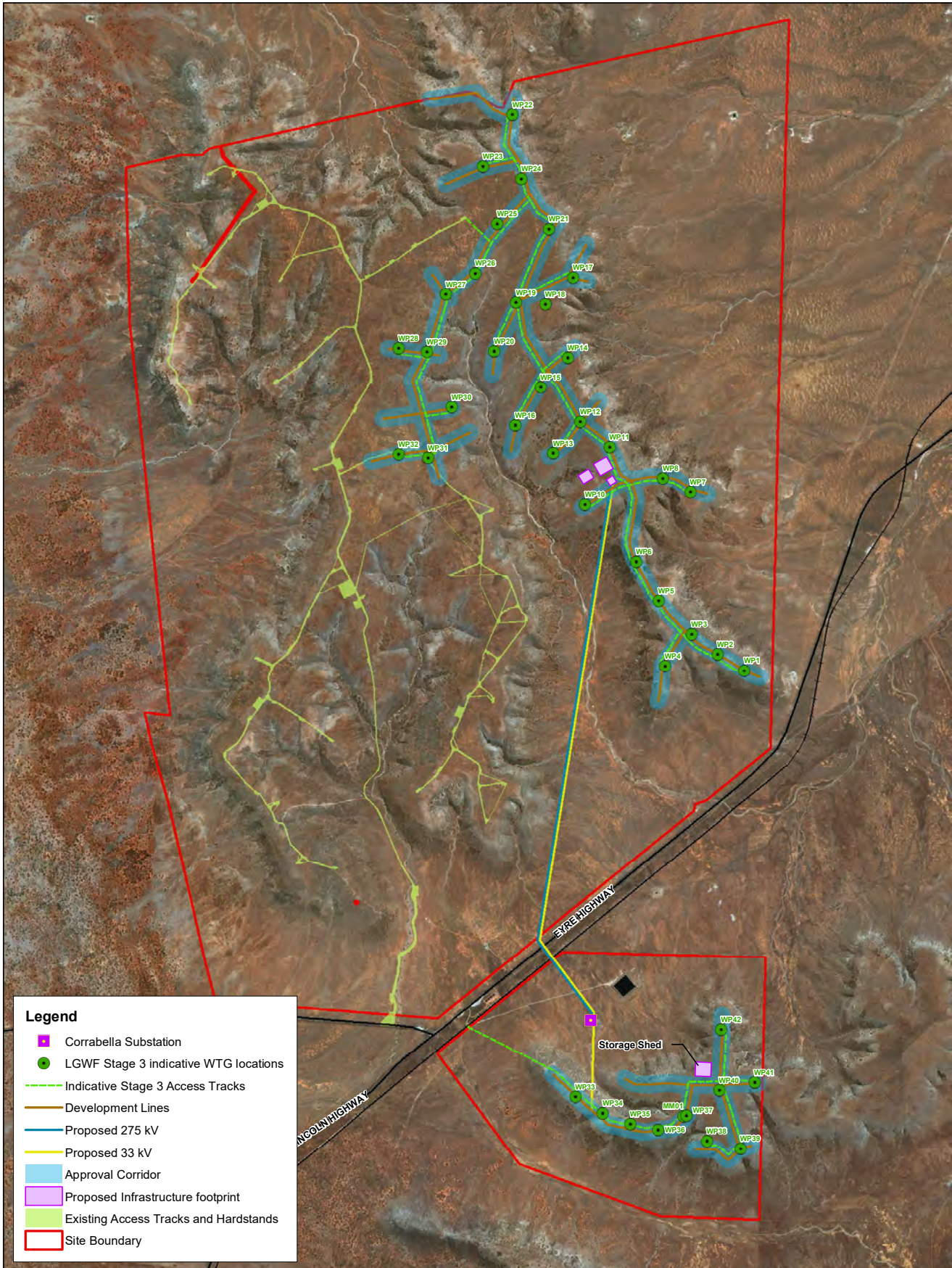
An application to construct a 10 MW battery energy storage system on site, to support Stage 1 and 2 of the LGWF, was also lodged with the SCAP in November 2018.

The proposed LGWF Stage 3 (the Project) incorporates an additional 42 WTGs and ancillary infrastructure, located across two areas within and south of the LGWF Stage 1 and 2 site. A separate Development Application is being submitted to SCAP as the relevant authority. To support the planning approval process for the Project, a number of specialist or technical studies are being undertaken.

1.2 PROJECT AREA

The Project area is located at Lincoln Gap, approximately 15 km west of Port Augusta, South Australia. The Project would be located across two areas, intersected by the Eyre Highway and an ARTC railway (refer to Figure 1.1 below):

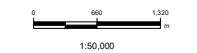
- Area 1: located within the LGWF Stage 1 and 2 site, on undeveloped pastoral land to the east of existing infrastructure.
- Area 2: located south of the LGWF Stage 1 and 2 site, within the site of the approved off-site substation.



Legend

- Corrabella Substation
- LGWF Stage 3 indicative WTG locations
- Indicative Stage 3 Access Tracks
- Development Lines
- Proposed 275 kV
- Proposed 33 kV
- Approval Corridor
- Proposed Infrastructure footprint
- Existing Access Tracks and Hardstands
- Site Boundary

Map: PS113707_GIS_009_A6	Author: MO
Date: 11/11/2019	Approved by:



Coordinate system: GDA 1994 MGA Zone 53
 Scale ratio correct when printed at A3



Lincoln Gap Wind Farm Stage 3

Figure 1.1
Site plan

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1.3 LEGISLATIVE AND POLICY REQUIREMENTS

LGWF P/L is seeking Development Approval from SCAP, under Section 131 of the *Planning, Development and Infrastructure Act 2016* (PDI Act). As such, the following legislation and policy will be relevant to the planning and land use assessment of the proposed Project:

- PDI Act
- *Planning, Development and Infrastructure (General) Regulations 2017* (PDI Regulations)
- The Planning and Design Code (PD Code) (as applying to Land Not Within a Council Area).

1.4 ASSESSMENT METHODOLOGY

This planning and land use assessment has been informed by the following:

- ongoing consultation with the LGWF P/L
- review of project documentation and plans, as supplied by LGWF P/L
- review of specialist or technical assessments undertaken to support the Development Application Report for the Project, including:
 - Acoustic Assessment
 - Aviation Advisory Report
 - Electromagnetic Interference Study
 - Flora and Fauna Baseline Assessment
 - Geotechnical Desktop Study
 - Hydrology and Drainage Desktop Study
 - Landscape Character and Visual Impact Assessment
 - Preliminary Site Investigation
 - Shadow Flicker Assessment
 - Socio-economic Impact Assessment
 - Traffic Impact Statement
- assessment of the Project against the relevant assessment provisions of the PD Code as Applying to Land Not Within a Council Area: Version 1 – Published 1 July 2019.

2 EXISTING CONDITIONS

2.1 BROAD LANDSCAPE DESCRIPTION

The Project site is located within an area of the South Australia comprising land not within a council area (LNWCA). Within this area, the SCAP is the Relevant Authority for decision making.

On 1 July 2019, assessment pathways under the new PDI Act came into operation across South Australia's LNWCA, and established the PD Code as the relevant planning policy with which to assess Development Applications lodged for projects located within LNWCA (Department of Planning, Transport and Infrastructure, 2019).

In the process of establishing the PDI Act and PD Code across the LNWCA, the *Development Act 1993* was repealed as the relevant piece of planning legislation for the region, and subsequently, three Land Not Within a Council Area development plans that provide the guiding planning policy (at the time) across the LNWCA region were revoked and replaced with the PD Code (Department of Planning, Transport and Infrastructure, 2019).

2.2 ISSUE SPECIFIC SITE DESCRIPTION

The Project is located within the Remote Areas Zone of the PD Code.

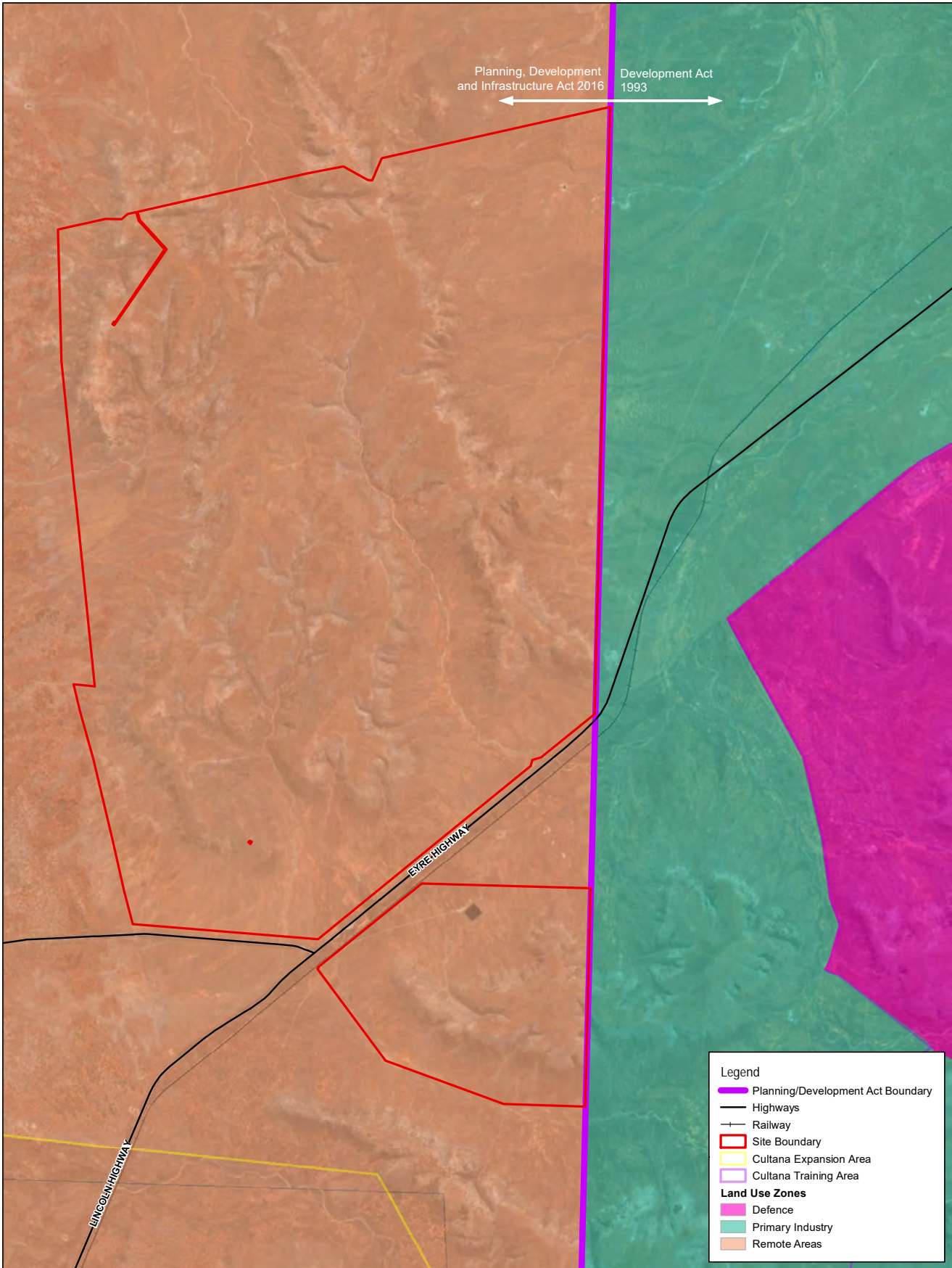
The Remote Areas Zone desires a range of activities, including pastoral, agricultural, mining, energy generation, infrastructure, aerospace and defence, tourism, remote settlements, Aboriginal lands and related rural land activities. Refer to Section 4.2 for an assessment of the Project against the relevant assessment provisions of the PD Code.

Land adjacent to the Project site to the north, south and west, is also covered by the Remote Areas Zone of the PD Code. Land adjacent to the Project site to the east is covered by the Primary Industry Zone of the Port Augusta (City) Development Plan, under the *Development Act 1993*.

The Cultana Training Area (including the Cultana Expansion Area) sits approximately 1.8 km from the nearest boundary; to the south of the site.

The Eyre Highway, a State maintained road, intersects the Site; between Area 1 and Area 2. An ARTC railway is located adjacent and parallel to the Eyre Highway.

Refer to Figure 2.1 below, showing land use zoning for the Project site and adjacent land.



Planning, Development and Infrastructure Act 2016 Development Act 1993

Legend

- Planning/Development Act Boundary
- Highways
- Railway
- Site Boundary
- Cultana Expansion Area
- Cultana Training Area

Land Use Zones

- Defence
- Primary Industry
- Remote Areas

Map: PS113707_GIS_015_A1 Author: MO

Date: 6/08/2019 Approved by:



0 750 1,500
m

1:60,000

Coordinate system: GDA 1994 MGA Zone 53
Scale ratio correct when printed at A3

Lincoln Gap Wind Farm Project - Stage 3

Figure 2.1
Land Use Zoning

Data sources: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community
Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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3 STRATEGIC CONTEXT

3.1 STATE PLANNING POLICIES

South Australia's State Planning Policies (SPPs) are established under the PDI Act, and have been developed to provide a comprehensive and efficient set of policies, objectives and principles that address land use planning and development across the State, that aim to enhance liveability, sustainability and prosperity. Planning instruments established under the PDI Act (including Regional Plans, Design Standards, and the PD Code) should be compliant with the policies, objectives and principles under the SPPs.

The following SPPs are relevant to this Project:

- *State Planning Policy 5: Climate Change*
- *State Planning Policy 8: Primary Industry*
- *State Planning Policy 12: Energy*
- *State Planning Policy 15: Natural Hazards*

(State Planning Commission, 2019)

3.2 THE PLANNING STRATEGY FOR SOUTH AUSTRALIA

The Planning Strategy for South Australia (the Planning Strategy) guides land use and development across the State. The Planning Strategy is presented across eight volumes, each covering a distinct geographical region. The Planning Strategy has been developed to guide the formulation of Development Plans for local areas (now revoked across a Project area), and can provide an indication of the envisaged land use and development for a region. The relevant volume of the Planning Strategy for this project area is the Far North Region Plan. The following principle from the Far North Region Plan is relevant to this project:

- *Principle 14: Foster sustainable alternative energy and water supply industries.*

This Principle seeks to encourage the development of sustainable, cost-effective energy generation and water supply methods. Policy 14.1, under this Principle, seeks to provide '*provide for the development of alternative and innovative energy generation ... and water supply facilities, and include guidance on environmental assessment requirements*' (Department of Planning and Local Government, 2010).

The Project, proposing infrastructure to generate energy from wind, constitutes a sustainable and cost-effective form of energy, as an alternative to non-renewable forms.

3.3 SOUTH AUSTRALIA'S CLIMATE CHANGE STRATEGY 2015-2050

South Australia's Climate Change Strategy 2015 – 2050 (the Climate Change Strategy) sets out South Australia's framework and initiatives to meet the targets established under the *Climate Change and Greenhouse Emissions Reduction Act 2007 (SA)* (Government of South Australia, 2015). This project contributes to two of the five targets set out in the document:

- *Achieve net zero emissions by 2050*
- *Generate 50% of our electricity from renewable sources by 2025.*

The project will increase South Australia's renewable energy capacity by up to 252 MW (note that the final turbine model is still under consideration), and assist in meeting the State's goal for the balance of energy generated from renewable energy, whilst also helping to reduce the emissions from non-renewable sources.

4 PLANNING ASSESSMENT

4.1 DEVELOPMENT APPROVAL PATHWAY

4.1.1 DEFINITION OF DEVELOPMENT

The PDI Act and PDI Regulations are the new, primary pieces of legislation that will facilitate planning and development approval across South Australia. The PDI Act is being implemented across South Australia in a staged approach. In July 2019, the PDI Act repealed the *Development Act 1993* as the relevant development legislation in LNWCA across South Australia. The PDI Act will be implemented across the remaining areas of South Australia, including regional Council Areas and Metropolitan Council Areas, by July 2020. The PDI Act requires that Development Approval must be sought and obtained prior to undertaking any form of development as defined under the Act.

The project, consisting of building work and a change in land use, constitutes development, as per Section 3 of the PDI Act, and as such, requires Development Approval under the Act.

4.1.2 APPROVAL PATHWAY

The Project is seeking Development Approval under Section 131 (Crown Development) of the PDI Act.

4.1.2.1 CROWN SPONSORSHIP

Under Section 131(2)(c) of the PDI Act, a person who proposes to undertake a project for the provision of essential infrastructure can utilise the Section 131 approval pathway where a State agency provides sponsorship (endorsement) of the project.

The Project has secured Section 131 (Crown Development) status under the PDI Act, with the Department for Energy and Mining (DEM) providing sponsorship/endorsement on 11 July 2019. Correspondence from DEM outlining sponsorship of the application is provided in Appendix A.

4.1.2.2 CERTIFICATE FROM THE OFFICE OF THE TECHNICAL REGULATOR

In accordance with Regulation 107(2)(c) of the PDI Regulations, if a Development Application seeks approval under Section 131 of the PDI Act, proposing the development of an electricity generating plant with a capacity of greater than 5 MW and to be connected to the State's power system, the Proponent must submit a statement to the Office of the Technical Regulator (OTR) seeking a certificate to confirm that the project will contribute to the security and reliability of the State's power system, prior to lodgement of the Development Application with SCAP.

A statement was submitted to the OTR on 10 May 2019, outlining how the Project intends to meet the technical requirements of the OTR and contribute to the security and reliability of the State's power system. A certificate from the OTR was issued for the Project on 26 June 2019, and is provided in Appendix B.

4.1.2.3 PUBLIC NOTIFICATION

As per Section 131(13) of the PDI Act, the Project, comprising development with the total value of construction work exceeding \$10,000,000, will be publicly notified by SCAP in accordance with the provisions below:

- a) *by public notice, invite interested persons to make written submissions to it on the proposal within a period of at least 15 business days; and*
- b) *allow a person who has made a written submission to it within that period and who, as part of that submission, has indicated an interest in appearing before it, a reasonable opportunity to appear personally or by representative before the Commission to be heard in support of his or her submission; and*

- c) *give due consideration in its assessment of the application to any submissions made by interested persons as referred to in paragraph (a) or (b).*

It can also be noted that under the Procedural Matters of the Remote Areas Zone, wind farms and ancillary infrastructure (including electricity substations, maintenance sheds, access roads, and connecting power-lines) are excluded from requiring public notification, except where the base of any turbine is 2000 m or less from an existing dwelling or tourist accommodation not associated with the wind farm; a proposed dwelling or tourist accommodation for which an operable planning consent exists; or the boundary of any airfield, airport, Local Infrastructure (Airfield) Zone, Settlement Zone, Township Zone or State Heritage Area Overlay.

4.1.2.4 REFERRALS

Table 4.1 below outlines the anticipated referrals that will be required for Project, under Schedule 9 of the PDI Regulations.

Table 4.1 Anticipated referrals under Schedule 9 of the PDI Regulations

BODY	DEVELOPMENT TRIGGER	REASON
Commissioner of Highways	<p>Development that is:</p> <ul style="list-style-type: none"> a in the Key Outback and Rural Routes Overlay under the Planning and Design Code; and b specified by the Planning and Design Code as development of a class to which this item applies. 	<p>The Project site is partially located within the Key Outback and Rural Routes Overlay under the Planning and Design Code.</p> <p>Furthermore, it is specified under the ‘Remote Areas Zone Table 3 –Applicable Policies for Performance Assessed Development’ that the Key Outback and Rural Routes Overlay is applicable to wind farm developments.</p>

4.2 PLANNING AND DESIGN CODE ASSESSMENT

The Project, consisting of a Wind Farm and ancillary development, is listed as Performance Assessed Development under the Remote Areas Zone of the PD Code. As per Section 107 of the PDI Act, Performance Assessed Development is to be assessed on its merits against the relevant provisions of the PD Code.

4.2.1 POLICY ASSESSMENT

The Desired Outcome of the Remote Areas Zone of the PD Code seeks a diverse range of activities including pastoral, grazing and farming activities, agricultural processing and transportation, mining and petroleum (and associated settlement activities), the generation and storage of energy, pipelines or infrastructure, aerospace and defence related facilities (and associated settlement activities), tourism, remote settlements, Aboriginal lands and related rural land activities (State Planning Commission, 2019). The Project, constituting energy generation, is consistent with the forms of development envisaged under the Desired Outcome of the Zone.

The Performance Outcomes of the Remote Areas Zone, all of which apply to wind farm developments, provide guidance on the built form and character requirements, as well as hazard risk minimization requirements for the Zone. An assessment of the Project against the relevant Performance Outcomes of the Remote Areas Zone is provided in Table 4.2 below.

Under the PD Code, policies are assigned to classes of performance assessed development under each Zone, with which the proposed development should be assessed against. Table 4.3 below provides an assessment of the proposed Project against the policies assigned to wind farms under the Remote Areas Zone.

Table 4.2 Assessment of the Project against the relevant Performance Outcomes of the Remote Areas Zone

PERFORMANCE OUTCOME (PO)	COMMENT
<p><i>Built Form and Character</i> PO 1.1 and PO 1.2</p>	<p>The Project will be will be located adjacent to the existing, approved, earlier stages of the LGWF (partially constructed as of the time of writing this report). Land use in the area prior to the Approval of the earlier stages of the LGWF, consisted predominantly of pastoral grazing.</p> <p>The Project site has been selected due the availability of suitable wind resources and connecting electrical infrastructure. Based on preliminary designs, it is anticipated that all proposed WTGs will be setback at least 600 m from public roads (at a minimum) and at least 100 m from site boundaries (at a minimum). Given the nature of wind farms and their need for adequate access to wind resources, it is not practical or efficient to conceal WTGs below ridgelines. As such, proposed WTGs will be prominently located on ridgelines across the site.</p> <p>A Landscape Character and Visual Impact Assessment has been undertaken by Hemisphere Design, to assess the likely cumulative visual impacts of the proposed Project, in conjunction with the earlier stages of the LGWF. An evaluation of the existing landscape character of the Project site and locality, undertaken as part of the assessment, recommended that the in relation to the visual amenity of the landscape, human adaption was secondary to natural features; including the plateaus and hills surrounding the site. In assessing the visual impacts of the proposed development from sensitive receptors (including a nearby dwelling and the Port Augusta foreshore), it was recommended that the proposed sighting and arrangement of WTGs appears sympathetic to the locality and broader contextual landscape, and will be visually complementary towards the LGWF Stage 1 and 2 (Hemisphere Design (Aust) Pty Ltd, 2019).</p>

PERFORMANCE OUTCOME (PO)	COMMENT
<p><i>Hazard Risk Minimisation</i></p> <p>PO 2.1</p>	<p>The Project site is situated within a ‘Hazards (Bushfire Outback) Overlay’. Measures should be taken to manage the risk of bushfire, both originating within and outside of the site, during construction and operation of the Project. This will need to be implemented through the Construction Environmental Management Plan and/or an Emergency Management Plan. Measures could include the following:</p> <ul style="list-style-type: none"> — emergency preparedness information and response actions — maintaining an Asset Protection Zone from the site boundary — requirements for water supply on site — fuel load reduction measures (e.g. mechanical slashing) — a schedule for regular maintenance of on-site fire-fighting equipment and staff training — prohibiting smoking on site, other than in designated smoking areas. <p>The Project site is located within the ‘Sloping Land Overlay’, with the sides of the ridgelines across the site mapped as sloping land. While WTG’s will be largely positions on the top of ridgelines, all cut and fill undertaken for the Project, for the purpose of WTGs and ancillary infrastructure, should be suitably informed to also ensure a geotechnically stable development to minimise risk on personal safety and property.</p> <p>In addition to bushfire and sloping land risks, as identified in the PD Code overlays the following items have all been assessed under technical studies undertaken for the Project:</p> <ul style="list-style-type: none"> — flooding — site contamination — acid sulfate soils — aviation risks. <p>Key risks have been outlined in the reports, with management and mitigation measures recommended where required.</p>

Table 4.3 Assessment of the Project against the relevant General Development Policies of the PD Code

PERFORMANCE OUTCOME	COMMENT
<p><i>Clearance from Overhead Powerlines</i> PO 1.1</p>	<p>The project Site is intersected by a number of overhead powerlines of varying voltage, both associated with the LGWF and non-associated activities.</p> <p>To minimise the hazard of overhead powerlines on people and property, the construction of new powerlines should be placed underground where practical, such as the use of underground cables between WTGs. This will also function as a safety measure to protect the powerlines themselves from bushfire risk.</p> <p>Buildings and structures established as part of the project, should comply with the setbacks prescribed under the Electricity (General) Regulations 2012, unless otherwise approved by the Technical Regulator.</p>
<p><i>Design and Siting</i> PO 1.1</p>	<p>Wind farms are generally considered a land use compatible with pastoral grazing in South Australia due to a number of factors including:</p> <ul style="list-style-type: none"> — large areas of pastoral lease land across the state, in areas with low population density — the ability for grazing activities to continue on site, with minimal disruption throughout the operation of the wind farm. <p>The Project will be sited within an existing pastoral station, with a long history of sheep grazing. It is anticipated that the pastoral activities will continue on the site throughout operation of the Project.</p> <p>A vegetation survey and Aboriginal cultural survey will each be undertaken for the Project site, and used to inform the detailed design of the Project to avoid potential damage to Aboriginal cultural heritage, as well as native vegetation where practical, to protect the environmental and cultural values of the site and locality.</p>

PERFORMANCE OUTCOME	COMMENT
<p><i>Infrastructure and Renewable Energy Facilities</i></p> <p>PO 1.1</p> <p>PO 2.1, PO 2.2 and PO 2.3</p> <p>PO 3.1</p> <p>PO 4.1 and PO 4.3</p> <p>PO 5.1</p> <p>PO 7.1</p> <p>PO 8.1, PO 8.2, PO 8.3, PO 8.4 and PO 8.5</p> <p>PO 12.1 and PO 12.2</p>	<p>The detailed design of the Project will be informed by a series of technical specialist studies, that has been undertaken to assist in the identification and mitigation of potential project impacts, such as hazards or environmental nuisance.</p> <p>Proposed WTGs will be setback at least 500 m from the Eyre Highway, and will be greater than 15 km from the nearest township (Port Augusta). Given the need for the WTGs to have access to wind resources, they will be located on the top of ridges across the site, and will be predominantly visible from the Eyre Highway.</p> <p>A Landscape Character and Visual Impact Assessment was undertaken for the Project, and recommended that when viewed from the Eyre Highway, the cumulative impacts of the Project along with prior stages of the LGWF, would lead to only a slight adverse change to the visual amenity. Furthermore, it was recommended that the Project would be barely visible when viewed from Port Augusta.</p> <p>It has been recommended that disturbed areas be revegetated upon the completion of construction, as well as after the decommissioning of the Project.</p> <p>An aviation impact assessment was undertaken, and recommended that the Project would not interfere with nearby aerodromes and airstrips. Management and mitigation measures have been recommended. Safety marking on turbines was not recommended, however aviation safety marking was recommended for associated meteorological masts (which have been approved under a separate Development Application).</p> <p>It has been recommended that a Bushfire Management Plan be developed in consultation with the Country Fire Service (CFS) and surrounding landowners, to manage bushfire risks on the site. The plan should include measures inclined operating and maintaining the site in a manner that no bushfire originates from the site and/or any approaching bushfire does not intensify because of excessive fuel loads within the site; requirements for water supply, and the regular maintenance of on-site fire-fighting equipment and staff training.</p> <p>The Project will utilise the existing Corraberra Hill Substation which is situated within Area 2, which will help to minimise environmental impact resulting from transmission infrastructure, and also make efficient use of the existing infrastructure.</p> <p>Recommendations from a flora and fauna assessment undertaken for the Project recommended that an ongoing fauna monitoring program should be developed (commencing prior to construction), with a focus on migratory and at risk bird species and bats. The purpose of this monitoring program would enable the collection of data on bird movements and nesting locations, that would allow for site specific management measures to be implemented in order to minimise impact to birds and bats.</p>

PERFORMANCE OUTCOME	COMMENT
<p><i>Interface Between Land Uses</i></p> <p>PO 1.2</p> <p>PO 3.4</p> <p>PO 4.1</p> <p>PO 6.1</p> <p>PO 7.1</p> <p>PO 8.1</p>	<p>Land use surrounding the Project site is primarily use for pastoral grazing. It is anticipated that grazing activities on, and surrounding, the Project site will continue throughout the operation of the Project with minimal conflict.</p> <p>The Cultana Training Area (including the Cultana Expansion Area) is located to the south of the Project site, and is approximately 1.8 km from the nearest site boundary. Aviation activities at the Cultana Training Area were considered under the Aviation Impact Assessment, and it was recommended that whilst operations should not be affected by the Project, both the Department of Defence and the Royal Australian Air Force should be advised of the Project, in order to be able to undertake an independent assessment and to be able to record the presence of obstacles.</p> <p>The impacts of shadow flicker and operational noise on nearby sensitive receptors were assessed under relevant technical assessments. For both assessments, the sensitive receptors were identified as a dwelling as well as a shearing shed located within Area 1; both belonging the owner of the Project site. The shadow flicker assessment identified that neither receptors is within the 1.14 km maximum distance of influence. Therefore, it is expected that neither receptor will experience effective shadow flicker as per the Environment Protection and Heritage Council's National Wind Farm Development (NWFD) Guidelines (2010).</p> <p>In relation to operational noise, the cumulative impacts of the Project alongside of the earlier stages of the LGWF, was assessed using SoundPLAN Version 8.0 noise modelling software. The outcome of the assessment recommended that the cumulative noise emissions of the Project would be relatively low, resulting in an increase of less than 1 dBA at sensitive receptors. Furthermore, it was recommended that the Project would achieve the nominated criterion of 45 dBA LAeq, as prescribed under the <i>South Australian Environment Protection Authority Wind Farms Environmental Noise Guidelines (2009)</i></p>
<p><i>Transport, Access and Parking</i></p> <p>PO 1.1 and PO 1.4</p> <p>PO 2.1 and PO 2.2</p> <p>PO 3.1 and PO 3.3</p>	<p>Access to the Site is gained off the Eyre Highway. The Eyre Highway is a State maintained road and is part of the Australian National Land Transport Network. A Traffic Impact Statement (TIS) has been prepared for the Project, and has recommended that the road system has sufficient capacity to accommodate the anticipated traffic volumes during construction. Traffic generated during operation of the Project is likely to be negligible.</p> <p>The Site has sufficient space to allow loading, unloading and turning of vehicles onsite; to avoid disruption to the road network.</p> <p>Access to Area 1, north of the Eyre Highway, can be safely gained from an existing access point, approved under the earlier stages of the LGWF. The TIS has recommended that an assessment of a rail crossing at the entrance to Area 2, south of Eyre Highway, be undertaken to determine any upgrades required.</p> <p>The nearest access point belongs to the landowner, and is located approximately 800 m east of the proposed access to Area 2 and approximately 1800 m east of the proposed access to Area 1. The nearest access point to a neighbouring property, not associated with the Project, is greater than 9 km away. As such, it is unlikely that the location of access points will impact on neighbouring properties.</p>

Table 4.4 Assessment of the Project against the relevant Overlays and corresponding Performance Outcomes of the PD Code

PERFORMANCE OUTCOME (PO)	COMMENT
<i>Hazards (Bushfire Outback) Overlay</i>	Not applicable
<p><i>Key Outback and Rural Routes Overlay</i></p> <p>PO 1.1, PO 1.2, PO 1.3 and PO 1.4</p> <p>PO 2.1 and PO 2.2</p>	<p>The Site is partially located under the Key Outback and Rural Routes Overlay.</p> <p>Access to the site will be gained from existing access points.</p> <p>Access to Area 1 is via a sealed access, which has recently been upgraded to Department of Planning, Transport and Infrastructure (DPTI) standards to support the construction of LGWF Stage 1 and 2. Access to Area 2 is via an unsealed access, and will require crossing a rail line.</p> <p>The TIS undertaken for the Project has made the recommendation that an assessment of the access to Area 2 should be undertaken to determine if any upgrades are required.</p>
<p><i>Sloping Land Overlay</i></p> <p>PO 1.1, PO 1.2 and PO 1.3</p> <p>PO 2.1 and PO 2.2</p> <p>PO 3.1</p> <p>PO 4.1, PO 4.2 and PO 4.3</p>	<p>The Site is partially located under the Sloping Land Overlay.</p> <p>Given the need for the WTG to have access to wind resources, the WTGs will be positioned on top of ridges. Access tracks will need to be constructed on sloping land in order to provide access to the WTGs. It is understood that access tracks are to be frequently utilised by heavily loaded specialised construction traffic and will be used as access tracks for maintenance vehicles following construction. A Geotechnical Desktop Study undertaken for the Project recommended slope stability and rockfall risk should be considered as part of the design, and that a slope risk assessment should be undertaken by a suitably experienced geotechnical practitioner as part of the investigation and/or construction phase to manage subsequent risk.</p>
<p><i>Water Resources Overlay</i></p> <p>PO 1.1, PO 1.2, PO 1.3, PO 1.4, PO 1.5, PO 1.6, PO 1.7, PO 1.8, PO 1.9 and PO 1.10</p>	<p>Drainage lines exist along the slopes of the ridges across the Site. These drainage lines are mapped under the Water Resources Overlay.</p> <p>A Hydrology and Drainage Desktop Study was undertaken for the Project, and recommended that drainage crossings should be installed where access tracks cross depressions in the topography.</p> <p>It was recommended that the slight increase in paved areas resulting from the development should be reviewed, but that the impact on downstream catchments from increased runoff was likely to be negligible. It was recommended that downstream scour protection should be designed into the downstream edge of hardstands.</p>

5 SUMMARY AND RECOMMENDATIONS

The PD Code recognises the importance of energy generation facilities within the Remote Area Zone, with recognition of these types of projects under the Desired Outcome statement for the Zone.

With regards to the assessment against the relevant provisions of the PD Code, as undertaken in this report, it is concluded that the proposed project is consistent with the relevant policy provisions under the PD Code, and the Project warrants the granting of Approval.

To comply with the relevant statutory requirements, it is recommended that a Construction Environmental Management Plan (CEMP) should be prepared for the Project prior to the commencement of construction, and that the Project should operate in accordance with that plans and supporting documents submitted/approved under the Development Application Report.

6 LIMITATIONS

This Report is provided by WSP Australia Pty Limited (*WSP*) for Nexif Energy Australia Pty Ltd (*Client*) in response to specific instructions from the Client and in accordance with WSP's proposal dated 15 February 2019 and agreement with the Client dated 14 March 2019 (*Agreement*).

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This Report can only be relied upon for the Permitted Purpose and may not be relied upon for any other purpose. The Report does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise. It is the responsibility of the Client to accept (if the Client so chooses) any Conclusions contained within the Report and implement them in an appropriate, suitable and timely manner.

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APPENDIX A

CROWN SPONSORSHIP





**Government
of South Australia**

Department for
Energy and Mining

D19076876

Ms Bronte Nixon
Principal Environmental Scientist/Planner
WSP Australia Pty Ltd
Level 1, 1 King William Street
ADELAIDE SA 5000

Dear Ms Nixon

Thank you for your letter of 27 May 2019 on behalf of Nexif Energy Australia Pty Ltd (Nexif) requesting Crown Sponsorship under Section 131 of the *Planning, Development and Infrastructure Act 2016* to assist with Nexif's proposed Lincoln Gap Stage 3 Wind Farm Project (Project).

The Project has been considered within the South Australian Department for Energy and Mining (DEM) with input from the Department of Planning, Transport and Infrastructure, the Department for Environment and Water, and the Environment Protection Authority. In principle, the Project is supported, recognising the possible environmental and community issues that will need to be addressed through the development assessment process.

On balance, the development of the Project has the potential to benefit South Australia and can be considered essential infrastructure. Accordingly I, as Chief Executive of DEM, will support the development and specifically endorse a Development Application to construct the Project comprising up to 243.6 MW of wind generation and 10MW/12MWh of battery storage for the provision of 'essential infrastructure' pursuant to Section 131(2)(c) of the *Planning, Development and Infrastructure Act 2016* (the Act).

It is the responsibility of Nexif to prepare all documentation as required by Section 131 of the Act. This includes all costs in the preparation, lodgement and assessment of the Development Application and satisfying any prescribed particulars outlined in Regulation 107(2) of the *Planning, Development and Infrastructure (General) Regulations 2017*.

A certificate from the Office of the Technical Regulator must also accompany your Development application to ensure that your project meets either Real Inertia or Fast Frequency Response criteria to safeguard the stability and reliability of the state's electricity network.

Chief Executive

Address Level 12, 11 Waymouth Street, Adelaide 5000 | GPO Box 320 Adelaide SA 5001 | DX452
Tel (+61) 08 8429 3216 | Email DEM.OCE@sa.gov.au | www.energymining.sa.gov.au | ABN 83 768 683 934



A development application must then be lodged with the State Commission Assessment Panel (SCAP). These lodgement documents can be provided in electronic form or made available via download link. Any development fee levied by SCAP is the responsibility of Nexif.

It is also a requirement that you contact Mr Mark Jackson, Senior Industry Development Officer, on (08) 8429 2722 or via email: mark.jackson@sa.gov.au prior to the lodgement of your Development Application to ensure all relevant statutory requirements are met.

DEM makes no representations and gives no warranties in relation to the outcome of the Development Application or the time that it takes to secure a planning outcome. It is the responsibility of Nexif to obtain all other statutory approvals, licences, connection agreements and permits from relevant authorities, manage community expectations and to fund the Project. The South Australian Government makes no commitment to purchase any product or service related to the Project.

If the Development Application has not been received electronically, by mail or in person by the SCAP within 12 months from the date of this letter, my support for this Crown Sponsorship under Section 131(2)(c) of the *Planning, Development and Infrastructure Act 2016* for the Project will lapse.

Yours sincerely



Paul Heithersay
CHIEF EXECUTIVE

11/7/2019

Chief Executive

Address Level 12, 11 Waymouth Street, Adelaide 5000 | GPO Box 320 Adelaide SA 5001 | DX452

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APPENDIX B

CERTIFICATE FROM THE OFFICE OF THE
TECHNICAL REGULATOR





Ref: D19071588

26th June 2019

Bronte Nixon
Principal Environmental Scientist/Planner
WSP Australia Pty Ltd
Level 1, 1 King William street
Adelaide SA 5000
bronte/nixon@wsp.com

Energy and Technical
Regulation

Office of the
Technical Regulator

Level 8, 11 Waymouth Street
Adelaide SA 5000

GPO Box 320
Adelaide SA 5001

Telephone: 08 8226 5500
Facsimile: 08 8226 5866

www.sa.gov.au/otr

Dear Bronte,

RE: Lincoln Gap 3, 42 turbine wind farm project.

The development of the Lincoln Gap 3 Project has been assessed by the Office of the Technical Regulator (OTR) under Section 37 of the Development Act 1993.

The *Development Regulations 2008* prescribe if the proposed development is for the purposes of the provision of electricity generating plant with a generating capacity of more than 5 MW that is to be connected to the State's power system – a certificate from the Technical Regulator is required, certifying that the proposed development complies with the requirements of the Technical Regulator in relation to the security and stability of the State's power system.

In making a decision on your application, our office has taken the following information into account:

- Your letter dated 10th May 2019.
- Presentation delivered to the OTR 24th May 2019.
- Your letter dated 27th May 2019.

After assessing the information provided, I advise that approval is granted for the proposed generator on the understanding that the shortfall in inertia of the turbines will be compensated for via a FFR solution. It is noted that should a synthetic inertia solution be provided via the wind turbines, the synthetic inertia is not considered as real inertia but is supplying a special form of FFR, so shall be measured and evaluated in MW as opposed to MW.s.

Energy and Technical Regulations

Level 8, 11 Waymouth Street Adelaide SA 5000 | GPO Box 320 Adelaide SA 5001 | DX541
Tel (+61) 8 8226 5500 | Fax (+61) 8 8226 5866 | www.dpc.sa.gov.au | ABN 83 524 915 929



It should be noted that should the shortfall in inertia not be addressed this will have impact on the ESCOSA license for the proposed generator.

Should you have any questions regarding this matter, please do not hesitate to call Mark Burns on (08) 8429 2707.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Rob Faunt'.

Rob Faunt
TECHNICAL REGULATOR

ABOUT US

WSP is one of the world's leading engineering professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors, environmental specialists, as well as other design, program and construction management professionals. We design lasting Property & Buildings, Transportation & Infrastructure, Resources (including Mining and Industry), Water, Power and Environmental solutions, as well as provide project delivery and strategic consulting services. With approximately 48,000 talented people globally, we engineer projects that will help societies grow for lifetimes to come.

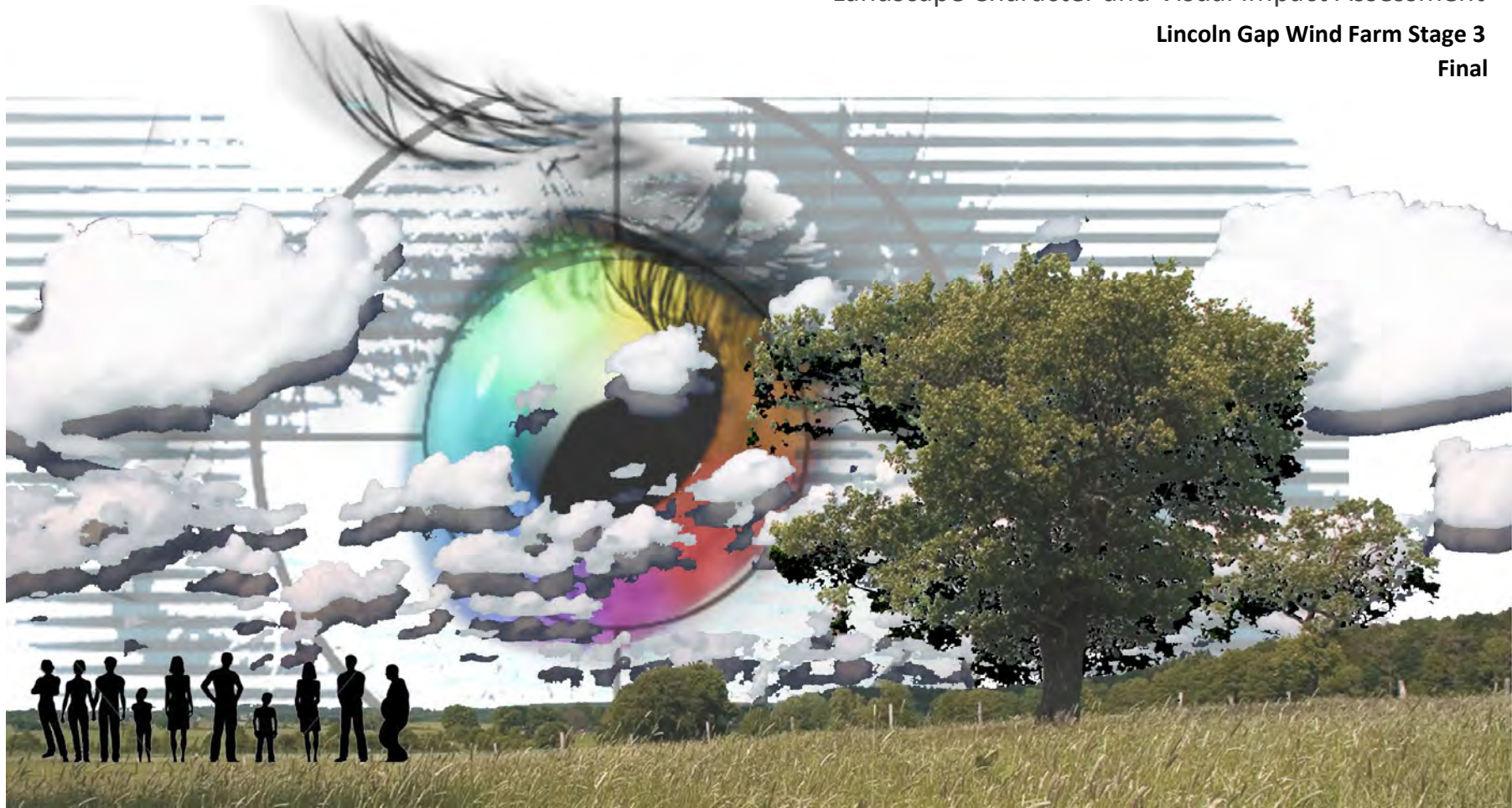


APPENDIX F

VISUAL AND LANDSCAPE ASSESSMENT



Landscape Character and Visual Impact Assessment
Lincoln Gap Wind Farm Stage 3
Final



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1. Introduction

The Lincoln Gap Wind Farm (LGWF) received Development Approval for Stage 1 and 2 from the State Commission Assessment Panel (SCAP) in December 2018 and commenced construction in January 2019. Development Approval was granted for:

- 59 wind turbine generators (WTG) with a maximum tip height of 180 m and a total generating capacity of 212 MW
- internal ancillary infrastructure, including meteorological masts, operation/maintenance building, switchyard, transmission lines and temporary construction compound and concrete batching plant
- an off-site substation

An application to construct a 10 MW battery energy storage system on site, to support LGWF Stages 1 and 2, was also lodged with the SCAP in November 2018.

LGWF Stages 1 and 2 is currently under construction and supporting infrastructure, including the on-site substation and power poles and transmission lines connecting to the off – site substation have been constructed.

The proposed LGWF Stage 3 will comprise of an additional 42 WTGs, a number of suitable WTGs are currently under consideration including both the GE - 5.3 MW WTG which utilises a 158 m diameter rotor with a tip height of 200 m and the Vestas 5.6 MW WTG which utilises a 162 m diameter rotor with a tip height 206 m. Both WTGs are some 20 -26 meters taller than the LGWF Stages 1 and 2 currently under construction. The WTGs will be located across two areas within and south of the LGWF Stages 1 and 2 site. A separate Development Application is being submitted to SCAP as the relevant authority. To support the planning approval process for LGWF Stage 3, a number of specialist or technical studies are being undertaken.

This assessment determines the likely cumulative visual impact of the proposed LGWF Stage 3 and associated infrastructure when considered in conjunction with the constructed Stage 1 and 2.

1.1 Project area

The LGWF project area is located at Lincoln Gap, approximately 15 km west of Port Augusta, South Australia.

The partially constructed LGWF Stages 1 and 2 is located on and along the western slopes of two of three ‘arms’ of a large relatively flat plateau identified locally as Lincoln Gap, Goat Hill, Bald Hill and Old Man Hill. The three ‘arms’ of the flat plateau are dissected by steeply sloped valleys which fall away to the south towards the Eyre Highway and the expansive plains beyond.

LGWF Stage 3 would be located across two areas;

Area one: located on the remaining third ‘arm’ of the flat plateau and slopes on undeveloped pastoral land within the LGWF Stages 1 and 2 site and to the east of existing infrastructure. The WTGs will be sited with a 250 m wide corridor.

Area two: located south of the LGWF Stages 1 and 2 site and the Eyre Highway on and along a less prominent plateau with shallower sloped sides. The foreground of the proposed WTGs location comprises of flatter land which includes the site of the approved off-site substation

1.2 This assessment has considered;

- Location drawings, construction plans identifying the proposed layout of the WTGs within a 250 m corridor and KMZ files prepared in Google Earth Map by others
- The Landscape and Visual Impact Study (the '2006 Report') prepared to support the LGWF Stages 1 and 2 Development Application¹ and the 'Probable Increase in Visual Effect Discussion' Lincoln Gap Wind Farm, 2017²
- Aerial photography of the site and wider locality

1.3 This assessment has assumed;

- That either the GE - 5.3 MW WTG or the slightly taller Vestas – 5.6 MW WTG will be the preferred turbine
- New transmission towers which will be erected to facilitate the distribution of generated power via the transmission network will be in close proximity to and follow the alignment of the existing power poles and transmission lines

1.4 Summary of activities

The degree of likely cumulative visual impact that will arise from the proposed development was determined based on an exercise which;

- Revaluated and where relevant referenced the character of the contextual landscape assessed in the '2006 Report'
- Visited four pre-determined publically accessible viewpoints within the immediate and wider contextual landscape, two of which were previously identified as viewpoints in the '2006 Report'
- Identified two 'sensitive receptors' and two viewpoints to assess likely visual impact
- Qualitatively assessed the likely visual impact of the LGWF Stage 3 and the likely cumulative visual impact of the proposed LGWF Stage 1 and 2 and LGWF Stage 3 development within the contextual landscape from these 'sensitive receptors' and the two viewpoints

The degree of likely visual impact is for the two 'sensitive receptors' is presented in a tabulated form and supported by photomontage imagery.



Image 1: Eyre Highway (A1), view south west

¹ Landscape and Visual Impact, Development Assessment Report Feb. 2006 - Wind Energy Solutions

² Probable Increase in Visual Effect Discussion Lincoln Gap Wind Farm, July 2017 - WAX Design

2. Landscape Character Assessment

2.1 Review and summary of work to date

2.1.1 Landscape and Visual Assessment Study 2006³

The Landscape and Visual Impact assessment undertaken and presented in the '2006 Report' concluded that whilst, by their very design wind turbines will always a visual impact on the landscape, the proposal to erect 59 WTGs in the LGWF Stages 1 and 2 development would *'result in acceptable levels of visual impact'*.

The assessment defined the contextual landscape and the more immediate locality through describing prevailing land use activities, for example by identifying the presence of the Morgan – Whyalla No.1 Pipeline and associated storage tanks which are within the immediate locality and a general description of vegetative cover, for example the extensive coverage of salt bush and blue grass. The assessment did not attempt to qualitatively evaluate and describe the inherent character of the contextual landscape.

However the conclusion that *'the landscape could be described as man altered and rural'* would suggest that the author of the report did not consider the prevailing landscape character to be a notable nor distinguished landscape of high scenic value. Based on my site visit and appraisal it is my opinion that, with the exception of the LGWF Stages 1 and 2 commencing construction, the landscape has not been significantly altered since this assessment was undertaken. Therefore I concur with the author's conclusion.

A Zone of Visual Influence Map was presented which adopted a 10 kms radius to define the field of study i.e. the extent within which all likely visual impact would occur. The study suggested that *'generally there would be a very low level of human activity, if any, within this area'*. I concur with this statement and with the suitability and adoption of a 10 kms radius ZVI. I have subsequently adopted the 10 kms radius as the extent of the 'Zone of Theoretical Visual Influence (ZTVI)' for the assessment of the LGWF Stage 3.

The assessment identified ten viewpoints, notionally assessed the likely visual impact at each viewpoint and based on these findings delivered a conclusion that

³ Landscape and Visual Impact, Development Assessment Report Feb. 2006, Wind Energy Solutions

overall the likely visual impact of the LGWF Stages 1 and 2 would be acceptable. Whilst each assessment lacked brevity, based on my site visit and appraisal I concur with this conclusion. The relevance of each individual assessment has been considered in my own assessment of the LGWF Stage 3.

The '2006' report did not establish whether any of the ten assessed viewpoints were 'sensitive receptors'.

However, within an area of *'a very low level human activity'* where views of the site and locality will be mainly received whilst travelling along a major highway with a 100 Kph speed limit, it is my opinion that only two of the ten selected viewpoints could be regarded as certain 'sensitive receptors'. Consequently a 'sensitive receptor' assessment has been conducted for the LGWF Stage 3 at these two locations, namely;

- No. 2252 Eyre Highway, Lincoln - a residential property occupied by the participating land owner and adjacent to the LGWF Stages 1 and 2 and Area one of the proposed LGWF Stage 3
- The water side at Port Augusta – a popular recreational and congregational spot for locals and visitors which, whilst some 15 kms to the east does orientate the view of the observer in the general direction of the expansive Lincoln Gap hills where the LGWF Stages 1 and 2 and proposed LGWF Stage 3 are located

These two locations have been assessed as 'sensitive receptors' to further corroborate the findings of the relevant viewpoint analysis presented in the '2006 Report' and give consideration to the likely cumulative visual impact of the proposed LGWF stage 3 when considered alongside the currently under construction LGWF Stages 1 and 2.

Two further viewpoints along Eyre Highway have been assessed albeit I do not consider either to be a 'sensitive receptor' more locations where Area one and Area two of the LGWF Stage 3 will, to varying degrees, be a prominent feature of the traveller's visual landscape.

The '2006 Report' surmised that the likely visual impact of LGWF Stages 1 and 2 would be 'moderate to minor' and that *'the Lincoln Gap site is immediate well*

suited to the proposed development'. Based on my own assessment I concur with these statements.

The '2006 Report' concluded that in selecting an appropriated site and then *'planning the precise location of each turbine so to as arrive at a final turbine array that appears neat and ordered'* the proponent had fully exercised the only mitigation steps available to him. I concur with this statement and based on my on-site appraisal I am of the opinion that this is an appropriate approach to visual mitigation within this contextual landscape.

2.1.2 Probable Increase in Visual Effect Discussion⁴, Lincoln Gap Wind Farm

This report the '2017 WAX study' was prepared to consider the likely visual impact of a potential increase in height of the WTGS at the LGWF Stages 1 and 2 from the approve 150 m height to a new height of 180 m. A comprehensive on site and desk top assessment was undertaken which appears to have considered the overall impact of the prosed LGWF Stages 1 and 2 and not merely the proposed increase in height of approximately 30 m. The conclusion drawn in this report that the potential visual impact of the prosed (LGWF Stages 1 and 2) *'can be described as moderate increasing to substantial'* is at a significant variance with the conclusion drawn in the '2006 report'. Further the report states, somewhat ambiguously, that with reference to the proposed increase in height that *'ultimately the approved development is likely to result in a moderate increasing to substantial visual effect'*.

I strongly disagree with the conclusions drawn in the '2017 WAX study' and prefer the conclusions drawn in the '2006 Report'.

2.2 Site Visit and Photography

A site visit was undertaken on the 6th June 2019.

The weather was fine with clear skies. Photographs were taken at selected viewpoints to underpin the landscape character and visual impact assessment. Photographs have been taken using a Nikon 35mm Single Lens Reflex (SLR) camera with an approximate lens setting of 43mm.

2.3 Evaluation of the Existing Landscape Character

A qualitative landscape character assessment has been undertaken in a rigorous manner consistent with best practice, as prescribed by *the Guidelines for Landscape and Visual Impact Assessment* (Third Edition).

A desktop review was undertaken to assess the suitability of the likely 'Zone of Visual Influence' (ZVI) presented in the '2006 Report'. The ZVI is the defined area or 'locality' within which modification to the contextual landscape as a result of the proposed upgrade could be potentially discernible to the naked eye.

The extent and coverage of this ZVI was considered appropriate for the assessment of the LGWF Stage 3. Consequently, the area defined within a 10 km radius from the site presented in the '2006 Report' was adopted as the likely furthest extent of the Zone of Theoretical Visual Influence (ZTVI). Notwithstanding consideration was given to the likely visual impact of the proposal on the Eastside Foreshore Recreational Reserve in Port Augusta, a 'sensitive receptor' some 18 kms to the east.

⁴ Probable Increase in Visual Effect Discussion, Lincoln Gap Wind farm- July 2017' WAX Design for Nexif Energy

2.4 Landscape Assessment

Landscape assessment, in contrast to visual assessment, deals with the fabric, character and quality of the countryside. The landscape fabric consists of the elements that make up the landscape, such as landform, land-use and cultural influences. The way these elements fit together in terms of proportion, pattern, scale, etc., gives rise to a particular landscape character. Changes to the fabric and character of a particular landscape may affect the perceived value of that landscape, giving rise to changes in its quality.

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

This characterisation process establishes a 'baseline' upon which judgments about the potential effects of the proposed development can be made. I apply the following guiding definitions to determine my assessments:

High scenic quality: Areas and localities which exhibit an exceptionally strong positive character with valued features which combine to give an experience of unity, richness and harmony. Within this definition 'exceptional' could apply where an area is also deemed to be worthy of a legislative designation, e.g. a National Park.

Moderate scenic quality: Areas which exhibit a strong positive character with valued features with evidence of a visually acceptable level of alteration/degradation/erosion resulting in a location of more mixed character.

Low scenic quality: Areas with a generally positive character with fewer valued features with evidence of a visually acceptable level of alteration/degradation/erosion resulting in a location of more mixed character.

No scenic quality: Areas with a little or no positive character with few or no valued features with evidence of a visually unacceptable level of alteration/degradation/erosion resulting in a highly modified location of little character

Further, the characterisation process defines the landscape 'sensitivity to change' of both the wider contextual landscape and the locality. This is categorised as either high, medium, low or negligible, where for example, a landscape that

displays a high 'sensitivity to change' would not be able to absorb a development of this nature without irreparable consequences and impacts on the inherent character and visual amenity.

2.5 Landscape Character of the Locality

From the Eyre Highway travelling west a sweeping vista is afforded across the modified planar landscape comprising of open arid scrubland and intermittent grazing land. The vista draws the eye of the observer to the troughs and peaks of the faceted slopes of the plateau to the north which command the horizon view and envelope Lincoln Gap. Orientating the view south the eye of the observer meanders over a much flatter foreground before pausing at the mid-ground of the gentler slopes of the lower plateau to the south of Lincoln Gap. Within this vista the vertical forms of powerlines, transmission and telecommunication towers 'trace' over the landform in a linear progression east - west.

The quintessential gateway and starting point of the 'outback journey' for many travellers, the contextual landscape offers an invite to enter and be immersed in the overwhelming expansive panorama where the eye traces the horizon in search of 'incident' and 'expression'.

In a planar landscape devoid of large trees, man made vertical structures which includes the under construction LGWF Stages 1 and 2, associated power poles and transmission lines and other power poles and telecommunication towers provide visual cues which narrate the travellers journey. Notwithstanding it is a landscape where the visual impact of human 'adaption' is secondary to the visually engaging form of the enveloping gentle and steep sloped plateaus and hills surrounding Lincoln Gap.

The partially constructed LGWF Stages 1 and 2 is located on and along the western and central slopes of the large relatively flat plateau to the north of Lincoln Gap and comprises of three 'arms' which are dissected by steeply sloped valleys which fall away south to the expansive plains. The dramatic and abrupt scale and form of the sharply falling slopes juxtaposed against the expansive plains is visually breathtaking.

From within the wider ZTVI and whilst travelling along the Eyre Highway the dominating scale and form of the steep slopes subtly alters the observers perception of the actual height of the under construction Stage 1 and Stage 2

LGWF. The LGWF Stages 1 and 2 WTGs appear smaller than the constructed (tip of blade) height of 180 m and are somewhat anonymous against this impressive backdrop. However the WTGs are more conspicuous when in motion, piercing the visual horizon and silhouetting the skyline.

From the Port Augusta waterside recreational park, some 18 Km to the east, the collective massing of the LGWF Stage 1 and 2 are barely discernible to the naked eye, the expansive vista of local hills dominate the view.

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

3.0 Likely Visual Impact Assessment

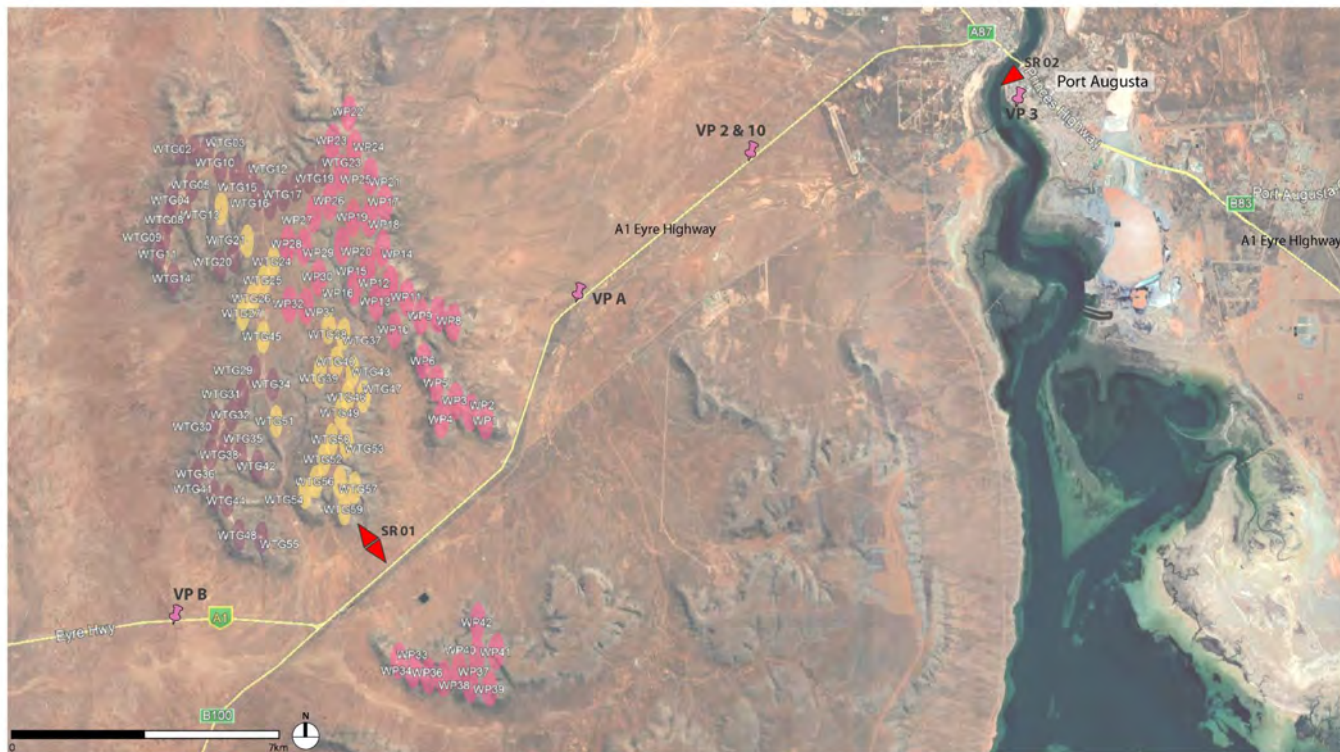
Of the four waypoints visited the evaluation has identified:

- (i) Two locations considered to be 'sensitive receptors',
- (ii) Two locations typical of the journey travelling north east – south west along Eyre Highway from which views of varying magnitude of Area one and Area two of the LGWF Stage 3 juxtaposed against the LGWF Stages 1 and 2 are likely.
One location was identified as VP s 2/10 in the '2006 Report'.

The likely visual impact of the proposed development is described considering factors which may include:

- The visual qualities of the view and the duration and angle of the view in relation to the main activity of the viewer;
- The distance of the viewpoint from the proposed development;
- The extent of the area over which the changes would be visible and the scale of the change in the view (loss or addition of features, changes in composition, proportion of view affected);
- The degree of contrast in form, scale, mass, line, height, colour and texture introduced into the view by the proposed development;

- The duration and nature of the effect (temporary, permanent, intermittent); which is particularly relevant in this appraisal where the majority of viewers are travellers moving through the landscape
- The numbers and types of viewers affected.



LEGEND

- The Lincoln Gap Wind Farm Stage 1
- The Lincoln Gap Wind Farm Stage 2
- The Lincoln Gap Wind Farm Stage 3
- VP 2, 3 & 10 Viewpoints (2006 Report)
- VP A & B Viewpoints (New)
- SR 01 & 02 Sensitive Receptors

TITLE LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

PROJECT The Lincoln Gap Wind Farm Stage 3
 DWG NO HD_V013_ADD1
 DRAWN SW

SCALE
 CHECKED SRH

SHEET NO 1
 REVISION
 DATE 06/19



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3.1 Construction Phase

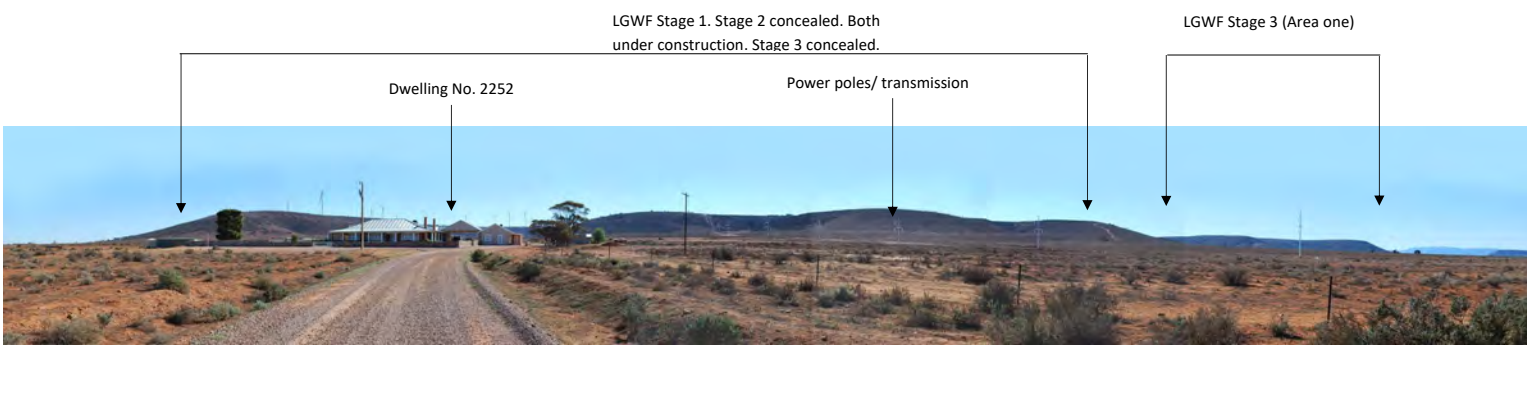
During the construction phase temporary changes to visual amenity will occur. These changes will be due mainly, but not limited to the presence of construction equipment, earthworks activities and an overall increase in the number of people and large vehicles at each site and at roadside locations.

The changing visual environment and activity during construction will be temporary, therefore is not considered in detail in the visual impact assessment.

3.2 Likely Visual Impact at the Identified 'sensitive receptors'

The following criteria were applied to describe the likely visual impact of the proposed development at the 'sensitive receptors':

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

Sensitive receptor 01	
	
Location	No. 2252 Eyre Highway, Lincoln – the occupier of this property is a participating landowner for the LGWF Stages 1 and 2 and LGWF Stage 3 Area one and two.
View directions	North – north east, north west, south.
Landscape and setting	<p>A landscape of moderate scenic quality.</p> <p>The sole occupied dwelling within the immediate 2 km locality.</p> <p>Access to the property is afforded via a single lane unmetalled track off the Eyre Highway which runs north to the single storey dwelling and collection of outdoor dwellings, hardstand areas and outdoor amenity spaces. It appears the private outdoor entertaining areas are located to the north of the dwelling with views orientated towards the backdrop of the imposing sharply rising steep slopes with a sparse vegetative cover. The colour contrast of the darker brown and ochre coloured tones of the slopes with occasional patches of olive – grey green vegetation juxtaposed against the cloudless sky blue horizon backdrop is visually stimulating.</p> <p>Within close proximity to Goat Hill Bald Hill and Old Man Hill, the dwelling is enveloped by the imposing steep sided slopes of the western and central plateau ‘arms’ which are the approved location for the LGWF Stages 1 and 2. At the time of this assessment a large number of the Stage 1 and 2 WTGs, power poles and transmission lines had been erected along the westernmost ‘arm’ of the plateau and along the plateau; the on-site substation which is sited beyond the immediate crest of the slopes is not visible. Whilst the WTGs will be an obvious and notable feature of the skyline and horizon the scale of the erected WTGs are proportional to and appropriate within the expansive contextual landscape, the silhouetted forms of the WTGs appear graceful against the backdrop of the sky-blue horizon. It is my opinion that the WTGs only slightly diminish the inherent visual qualities of the locality and the contextual landscape.</p>

	<p>Whilst only 1700 meters approx. from the curtilage of the dwelling the emerging collection of LGWF Stages 1 and 2 WTGs appear less imposing than one would consider for a generously spaced, co-located arrangement, of vertical elements that are 180 m tall. Whilst the blades were static at the time of assessing the impact on this receptor (having been active earlier in the day) it would be reasonable to assume that the rotational access of the blades would not cause a significant visual distraction to either the occupants of the dwelling nor travellers passing by along the Eyre Highway.</p> <p>Notwithstanding the generally positive contribution the WTGs make to the immediate locality the scenic amenity is somewhat diminished by the obvious more imposing presence of the large grey steel poles that carry the generated power along a catenary of wires to the substation to the south and the proposed location for Area two. Fortunately most of the steel poles sit below the horizon and from a greater distance are visually absorbed into the immediate steeply sloped background.</p>
Distance from Project Site(s)	Approximately 4 km to Area one and 2 km to Area two to the south
Visual exposure at receptor	<p>Of the 32 no. WTGs being erected in Area one it is anticipated that no more than 6 – 8 no. WTGS erected on the south western facing slopes of the third eastern 'arm' of the plateau will be visible from this receptor. The placing of the remaining WTGs follows a linear arrangement travelling north along the plateau and along the eastern slopes of the eastern 'arm', it is anticipated that these WTGs will be partially or mostly obscured from the receptor. When viewed from the rear of the dwelling and within the outdoor entertaining areas the small number of visible WTGs will appear as a sympathetically placed cluster at the periphery of the observer's right sided field of vision.</p> <p>The collection of 10 no. WTGs to be erected in Area Two to the immediate south are clustered around the north facing gentler slopes of a minor plateau where a number of existing power poles and telecommunication towers are notable infrastructure features of the contextual landscape. Where the expansive flat land dominates the immediate foreground, the more visually benign sloped rising ground on which the WTGs will be erected offers less visual enclosure and a less effective complementary 'backdrop' than where the WTGs in Area one will be sited. Consequently the proposed grouped arrangement of the WTGs will, in comparison to Area one appear more conspicuous as a 'stand-alone' and prominent new visual feature in the wider contextual landscape. However the proposed layout and visually sympathetic co-location will contain the impact to a more defined visual 'reference point' within the observer's wider field of vision across the expansive plains.</p> <p>The visual exposure to both the northern Area one and southern Area two of the LGWF Stage 3 will be no more significant than the exposure to LGWF Stage 1 and Stage 2 at this sensitive receptor. The necessary erection of further power poles and transmission lines will closely follow the alignment of the existing infrastructure and as new visual elements within the contextual landscape will therefore will be less apparent and less obtrusive.</p>
Predicted cumulative visual impact	When considered as a separate addition to the modified contextual landscape the likely visual impact if the LGWF Stage 3 will be slight adverse due mainly to the small collection of WTGs in Area two appearing visually 'detached' from the main LGWF and their more prominent appearance behind the expansive planar foreground.

	The likely cumulative visual impact when considered in conjunction with the LGWF Stages 1 and 2 will be no change to slight adverse.
Mitigation	The proposed sighting and arrangement of WTGs appears sympathetic to the locality and broader contextual landscape and visually complementary towards the Stage 1 and 2.

Sensitive receptor O2



Location	The Eastside Foreshore Reserve, Port Augusta.
View Direction	West – south west.
Landscape and setting	<p>A designated recreational reserve offering walking paths, children’s play space, BBQ areas and water’s edge ‘beach’ within an attractive shaded and lawned environment which runs along the ‘foreshore’ in a north east – south east direction for approximately 600 m. The popularity of the location for locals and tourists alike was apparent on the day of visiting the area through the patronage of the BBQ facilities and occupancy of the children’s play space which was notable for a mid-week day during late autumn.</p> <p>A highly modified ‘destination’ where the degree of ‘urbanisation’ is illustrated through adjacent land use activities which include a hotel and restaurant, a high proportion of irrigated lawn and exotic plantings and a jetty area for the landing of motorised tenders to give access to moored yachts. It is a ‘manicured’ environment, in sharp contrast to arid ‘outback’ landscape beyond the township.</p>
Distance from Project Site	Approximately 20 km.
Visual exposure at receptor	Views from the eastern ‘shore’ are orientated west and south west across an expansive vista to the steep sloped plateaus enveloping Lincoln Gap where LGWF Stages 1 and 2 are under construction and LGWF Stage 3 will be located. The foreground view is defined by views across the river and the resident yachts to a mid-ground on the raised western embankment where the ‘roofscape’ of the mainly single storey residential dwellings mars the pleasing

	<p>aspect of the distant views of the folds and blistered appearance of the contiguous steep sloped plateau which define the horizon.</p> <p>The masts of the collection of resident yachts are the prominent vertical features within the immediate contextual landscape and at a distance of approx. 18 kms to the west, the LGWF Stage1 and Stage 2 WTGs are anonymous and barely discernible to the naked eye. Whilst Areas one and two of the LGWF Stage 3 will be constructed to the immediate east and south east of the under construction LGWF Stage 1, the WTGs of the proposed LGWF Stage 3 will also remain inconspicuous and from this distance likely appear as one consolidated grouping of WTGs.</p>
Predicted cumulative visual impact	When considered as a separate addition to the modified contextual landscape the likely visual impact of the LGWF Stage 3 will be no change . The likely cumulative visual impact when considered in conjunction with the LGWF Stages 1 and 2 will be no change .
Mitigation	The proposed sighting and arrangement of the Stage 3 WTGs appears sympathetic to the locality and broader contextual landscape, when viewed from this sensitive receptor the LGWF Stage 3 design layout complements the disposition and arrangement of the LGWF Stages 1 and 2 to create a visually acceptable homogenous mass of WTGs.

3.3 Consideration of Likely visual impact on '2006 Report' Viewpoints

The following publically accessible viewpoints were assessed in the '2006 Report' to consider the likely visual impact of the LGWF Stages 1 and 2. These locations have been considered in this assessment to draw comparisons with the findings of the '2006 Report' and determine the cumulative likely visual impact of Stage and 2 and LGWF Stage 3.

As randomly selected 'transitory' viewpoints these locations are considered of low or no sensitivity due to the higher speed at which observers will be travelling through a locality of moderate scenic value whilst on a journey to an end destination beyond and outside the contextual landscape. The sense of 'immediacy' and the visual prominence of the completed LGWF Stages 1 and 2 within the immediate locality will be obvious but short lived.

Given the subject nature of visual impact many observers may consider the slender form and silhouetted appearance of grouped WTGs against the expansive horizon a positive visual contribution to the modified contextual landscape.

Viewpoints which were considered in the '2006 Report' that are remote or not publicly accessible have not been considered in this assessment.

3.3.1 VP 2 and VP 10 from the '2006 Report' and Viewpoint A.

Arbitrarily chosen points along the Eyre Highway north east of the proposed LGWF Stage 3 location travelling west.

A view west- north west which is typical of any number of similar views obtained travelling along this 14 kilometre stretch of the Eyre Highway towards the proposed LGWF Stage 3 location. Views of the under construction LGWF Stages 1 and 2 along the western and central 'arms' of the plateau and the flatter land to the north of the plateau are partially concealed by the foreground slopes of the eastern plateau 'arm', the chosen location for Area one of the LGWF Stage 3. The recently erected LGWF Stages 1 and 2 WTGs are faintly discernible and recognisable only where the tower tops and rotors of the WTGS on the higher aspects of the slopes on the western and central 'arms' protrude above the slopes of the eastern 'arm'.

There is a lack of extensive vegetative screening travelling west along the Eyre Highway at this and other similar locations and no elevated land mass between the eye of the observer and the chosen LGWF Stage 3 site. The absence of a screening

feature will result in approximately 18 WTGs, which run north along the facing eastern slopes of the eastern 'arm' and north along the plateau in Area one being more conspicuous than the WTGs on the western slopes of the eastern 'arm' in Area one. These new WTGs will be more prominent than the currently under construction LGWF Stages 1 and 2 which, on completion will be partially or wholly concealed due to undulating form of the plateau 'arms'. It is anticipated that the extent of visual exposure to the LGWF Stage 3 WTGs at these arbitrary locations will comprise of less than half the total number of 42 WTGs proposed in the LGWF Stage 3.

Sited within the more open and expansive 'outback' landscape and juxtaposed against a backdrop of more gentler slopes rising to a lower plateau the Area two WTGs will appear more prominent than the Area one WTGs. However within a wider field of view the likely visual impact of Area 2 will be focused on a more singular 'reference point' and contained by the compact sympathetic arranged of the WTGs.

As randomly selected 'transitory' viewpoints these locations are considered of low or no sensitivity due to the higher speed at which observers will be travelling through a locality of moderate scenic value whilst on a journey to an end destination beyond and outside the contextual landscape. The sense of 'immediacy' and the visual prominence of the completed LGWF Stages 1 and 2 and the proposed LGWF Stage 3 within the immediate locality will be obvious but short lived. Given the subject nature of visual impact many travellers may consider the slender form and silhouetted appearance of grouped WTGs against the expansive horizon a positive visual contribution to the modified contextual landscape.

The likely visual impact of the LGWF Stage 3 on the locality and contextual landscape at this and other similar viewpoints travelling west along the Eyre Highway will be **no change to slight adverse**.

Given the varying distances and widening field of vision from which views along the Eyre Highway will be obtained the cumulative visual impact of Stages 1 and 2 and LGWF Stage 3 will be **slight adverse**.

3.3.2 Location VP B

To the immediate west of LGWF Stages 1 and 2, a viewpoint similar to others within the vicinity where the proposed LGWF Stage 3 Area one lies further east and at a

distance of approximately 10 km and the proposed LGWF Stage 3 Area two lies south east and at a distance of approximately 5km.

Travelling south east along the Eyre Highway approaching the LGWF Stages 1 and 2 the presence of denser roadside scrub and small and medium sized trees afford glimpsed views only the recently constructed Stage 1 and 2 WTGs. These glimpsed views evoke the traveller's curiosity which is satisfied when the vegetation clears and the recently constructed Stage 1 and 2 WTGs are prominent. The Stage 1 and 2 WTGs are the dominant visual feature of the locality 'punching' up and above the crests of the steep sided plateau slopes on which they are sited, piercing the skyline. The WTGs could be regarded as 'focal statements' signifying a further and in this instance positive adaptation of the landscape.

The Stage 3 Area one WTGs will be sited further east on the eastern 'arm' of the plateau and as such will be only partially visible where the higher aspects of the proposed taller towers and rotors will protrude above and beyond the more immediate foreground slopes of both the western and central plateau 'arms'. Supplementary power poles and transmission lines will be largely concealed by the steep sloped foreground.

At this viewpoint the Stage 3 Area two WTGS will be more conspicuous than the Area one WTGs due to their visually 'detached' location and siting within the expansive foreground of 'outback' plains and against the backdrop of the more benign slopes of the lower plateau on which they are sited. However the close clustered arrangement and disposition of these 8 no. WTGs will restrict the visual impact to a singular 'reference point'.

The likely visual impact of the LGWF Stage 3 on the locality and contextual landscape at this location will be **slight adverse**.

Given the varying distances and widening field of vision from which views along the Eyre Highway will be obtained the cumulative visual impact of Stages 1 and 2 and LGWF Stage 3 will be **slight adverse**.

3.4 Photomontage Illustrations

VIEW POINT A (VP A)
Location: Eyre Highway (A1), north west - south west

ARTIST IMPRESSION
DRAFT

Lincoln Gap Wind Farm Stage 3 (Area two) Lincoln Gap Wind Farm Stage 3 (Area one)

LGWF Stage 1 and Stage 2 concealed by eastern 'arm'.
Eyre Highway (A1)

Lincoln Gap Wind Farm Stage 3 (Area one)
LGWF Stage 1 and Stage 2 concealed by eastern 'arm'.

Note:
Illustrative only. Based on either GE - 5.3 MW WTG (200m) or Vestas 5.6 MW WTG (206 m)
Subject to detail design.

LINCOLN GAP WIND FARM STAGE 3
Photomontage

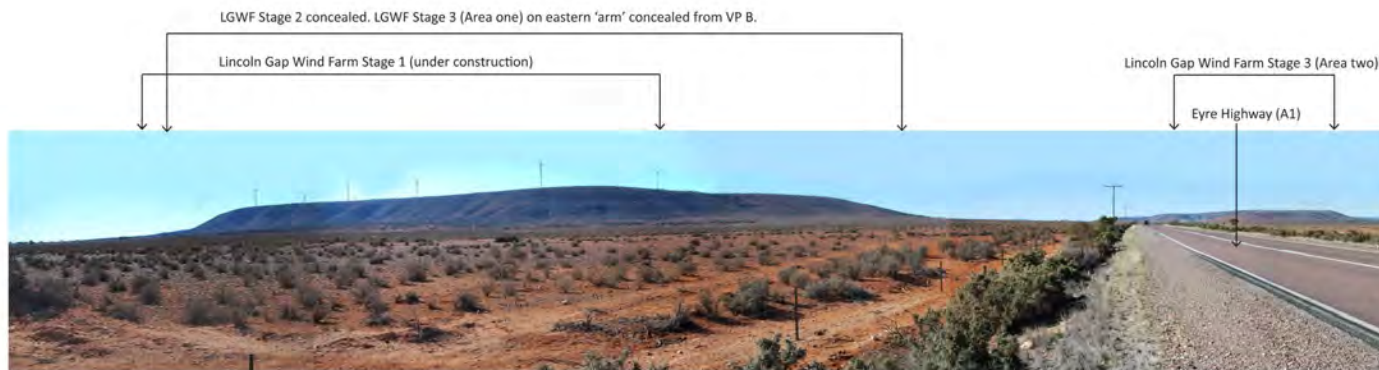
Drawing no: HD_V013_Photomontage_sheet 1 Revision: - Date: June 2019

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VIEW POINT B (VP B)

Location: Eyre Highway (A1), view north east - south east

ARTIST IMPRESSION
DRAFT



Note:

Illustrative only. Based on either GE - 5.3 MW WTG (200m) or Vestas 5.6 MW WTG (206 m)
Subject to detail design.

LINCOLN GAP WIND FARM STAGE 3

Photomontage

Drawing no: HD_V013_Photomontage_sheet 2 Revision: - Date: June 2019



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SENSITIVE RECEPTOR 01 (SR 01)

Location: No. 2252 Eyre Highway, view north west - south west

ARTIST IMPRESSION
DRAFT



Note:
Illustrative only. Based on either GE - 5.3 MW WTG (200m) or Vestas 5.6 MW WTG (206 m)
Subject to detail design.

LINCOLN GAP WIND FARM STAGE 3

Photomontage

Drawing no: HD_V013_Photomontage_sheet 3 Revision: - Date: June 2019



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4. Summary and recommendations

It is my opinion that within a locality and landscape of **Moderate scenic quality** the visual impact that is likely to be experienced by the LGWF Stage 3 will range from between:

- **No change** at one 'sensitive receptor'
- **No change** to slight adverse at one 'sensitive receptor'
- **No change to slight adverse** and **slight adverse** at viewpoints which are typical of numerous viewpoint afforded whilst travelling along the Eyre Highway

The cumulative visual impact of Stages one and two and Stage 3 will range from between:

- **No change** at one 'sensitive receptor'
- **No change to slight adverse** at one 'sensitive receptor'
- **Slight adverse** at viewpoints which are typical of numerous viewpoint afforded whilst travelling along the Eyre Highway

It is my opinion that the construction of LGWF Stage 3 will not have irreparable consequences for the visual amenity of the locality and wider contextual landscape.

About the author

Stuart Heseltine, Registered Landscape Architect, Principal Hemisphere Design.

Stuart is acknowledged as one of South Australia's leading practitioners in the area of landscape character and visual impact assessment. In considering each visual impact assessment exercise Stuart undertakes a qualitative landscape character assessment consistent with best practice as prescribed by the Guidelines for Landscape and Visual Impact Assessment (third edition), the Landscape Institute (UK) and Institute of Environmental Management and Assessment (NSW) 2013.

Stuart has successfully applied this methodology to major projects across South Australia and Victoria which includes main road, high street and highway projects, the Adelaide Desalination Plant EIA, the Roseworthy Development Feasibility Study, the Palmer, Allendale and Barn Hill Windfarm Developments, numerous infrastructure developments undertaken by Electranet SA and visual assessment exercises pertaining to Development Applications lodged in a numerous Adelaide metropolitan and regional council areas.

Stuart's particular expertise in undertaking visual assessments is highly sought after for the provision of expert evidence for the Environment, Resources and Development Court (SA).

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APPENDIX G

FLORA AND FAUNA ASSESSMENT





Lincoln Gap Stage 3
Flora and Fauna Baseline Assessment

Lincoln Gap Stage 3 Flora and Fauna Baseline Assessment

12 November 2019

Version 2 Final

Prepared by EBS Ecology for Nexif Energy Australia Pty Ltd

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Cover photograph: Spinifex grassland on tableland landform.

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GLOSSARY AND ABBREVIATION OF TERMS

ALA	Atlas of Living Australia
BDBSA	Biological Databases of South Australia
COEMP	Construction and Operation Environmental Management Plan
DEW	Department for Environment and Water
DotEE	Department of the Environment and Energy
DotE	Department of the Environment
EBS	EBS Ecology
EIA	Environmental Impact Assessment
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
IBRA	Interim Biogeographical Regionalisation of Australia
IUCN	International Union for Conservation of Nature
NatureMaps	An initiative of the DEW that provides a common access point to maps and geographic information about South Australia's natural resources in an online mapping format.
NPW Act	<i>National Parks and Wildlife Act 1972</i>
NRM Act	<i>Natural Resources Management Act 2004</i>
NRM	Natural Resources Management
NV Act	<i>Native Vegetation Act 1991</i>
NVC	Native Vegetation Council
PMST	Protected Matters Search Tool
PUA	Pastoral Unincorporated Area
RAM	Rangelands Assessment Method
SA	South Australia/South Australian
SEB	Significant Environmental Benefit
sp.	Species
spp.	Species (plural)
ssp.	Subspecies
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee
UBS	Unit Biodiversity score
VA	Vegetation Association
WTG	Wind Turbine Generator

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1 INTRODUCTION

1.1 The Lincoln Gap Stage 3 Wind Farm

Lincoln Gap Wind Farm Pty Ltd is undertaking feasibility studies for a wind farm development situated near Port Augusta, approximately 320 km north-west of Adelaide ('the Project'). Following the approval of Lincoln Gap Wind Farm Stages 1 and 2 (59 turbines), Nexif Energy Pty Ltd are now considering the potential development of Lincoln Gap Stage 3. The Lincoln Gap Stage 3 proposal is for up to 29 wind turbine generators (herein referred to as WTGs or turbines) and associated infrastructure (Figure 1). EBS Ecology (EBS) were contracted by Nexif Energy Pty Ltd specifically to undertake the following:

- A desktop assessment for threatened flora, fauna and ecological communities which may be present within the Project area.
- Avifauna surveys within the Project area.
- Vegetation surveys for the proposed footprint area of the Project.

The ecological assessment is intended to support Project approval documents such as the Development Application and Native Vegetation Clearance Application.

1.2 Project area

The existing Lincoln Gap Wind Farm Stage 1 and 2 Project area is located approximately 15 km to the west of Port Augusta, within a section of hills and escarpments. These were a single continuous mesa landform consisting of an escarpment leading up to a gently undulating plateau (Figure 1). The proposed Lincoln Gap Wind Farm Stage 3 ('the Project area') will be located along the ridgeline on the north-eastern side of the existing wind farm. The Project area is located on freehold land which has had a long history of pastoral use. The Project area falls within the Pastoral Unincorporated Area (PUA).

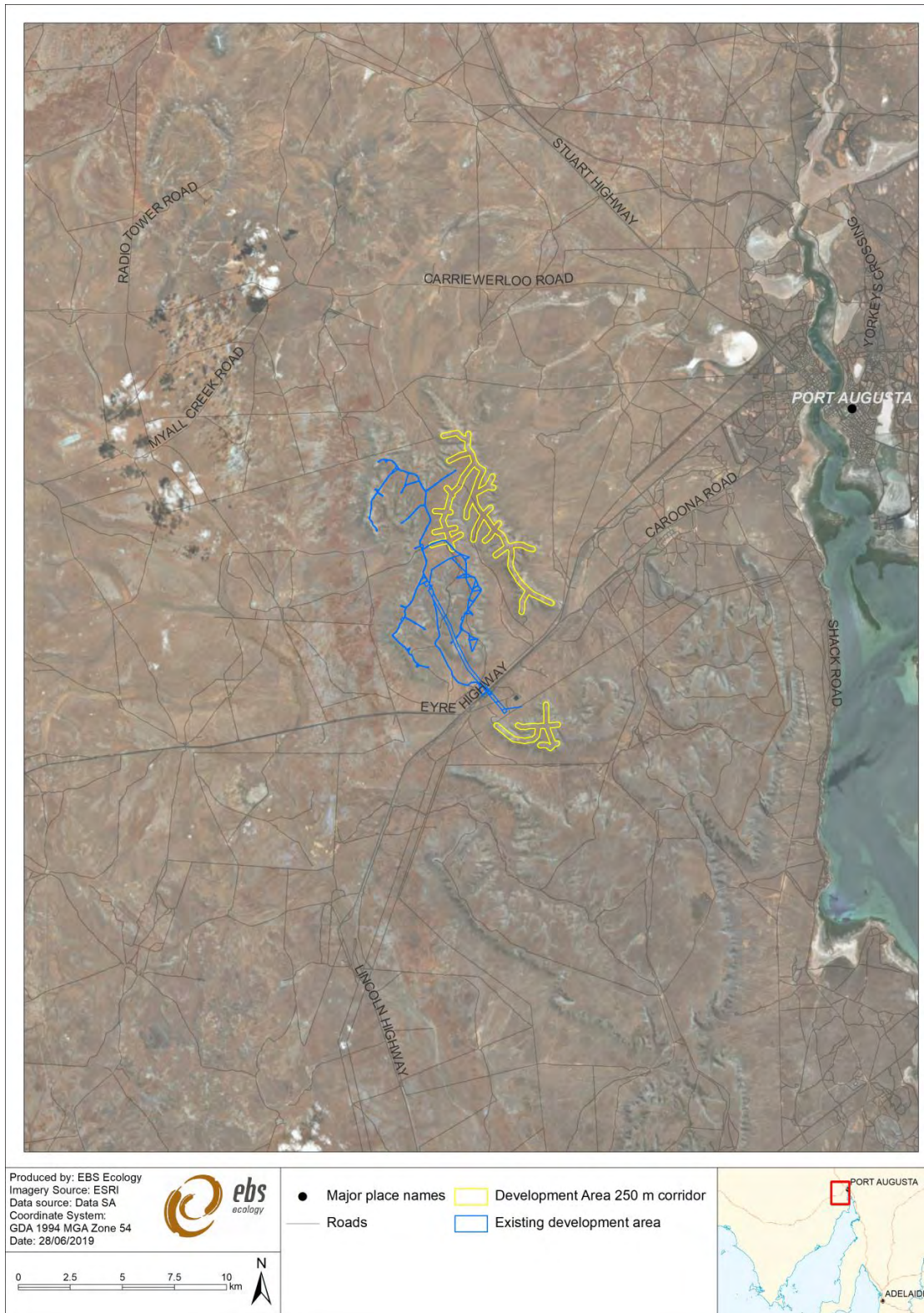


Figure 1. The location of the existing development envelope (Stage 1 & 2), and Stage 3 Project area, including a provisional 250m corridor layout and location within regional context.

1.3 Legislative and policy requirements

1.3.1 *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the Act as ‘matters of national environmental significance’. The nine matters of national environmental significance protected under the Act are:

- World Heritage properties.
- National Heritage places.
- wetlands of international importance (listed under the Ramsar Convention).
- listed threatened species and ecological communities.
- migratory species protected under international agreements.
- Commonwealth marine areas.
- the Great Barrier Reef Marine Park.
- nuclear actions (including uranium mines).
- a water resource, in relation to coal seam gas development and large coal mining development.

Any action that has, will have, or is likely to have a significant impact on matters of national environmental significance requires referral under the EPBC Act.

This report is focused on listed threatened species and ecological communities which are recognised as a matter of national environmental significance. Consequently, any action that is likely to have a significant impact on listed threatened species and ecological communities under the EPBC Act must be referred to the Minister and undergo an environmental assessment and approval process.

The EPBC Act Significant Impact Guidelines (DotE 2013) provide overarching guidance on determining whether an action is likely to have a significant impact on a matter of national environmental significance. In terms of nationally threatened species, the guidelines define an action as likely to have a significant impact if there is a real chance or possibility that it will:

- Lead to a long term decrease in the population.
- Reduce the area of occupancy of the species.
- Fragment an existing population.
- Adversely affect critical habitat.
- Disrupt breeding cycles.
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
- Result in the establishment of invasive species that are harmful to the species.
- Introduce disease that may cause the species to decline.
- Interfere with the recovery of the species.

1.3.2 Native Vegetation Act 1991

In South Australia, under the *Native Vegetation Act 1991* (NV Act), all clearance of native vegetation requires the approval of the Native Vegetation Council (NVC). Native vegetation refers to any naturally occurring local plant species that are indigenous to South Australia, from small ground covers and native grasses to large trees and water plants.

The Project area is situated within the pastoral zone which is subject to the *Native Vegetation Act 1991* and *Regulations 2017*. Specific clearance activities may be considered under exemption contained within the *Native Vegetation Regulations 2017*. The Lincoln Gap Project is considered compliant with the exemption outlined under Regulation 12(27) – Major Projects, to facilitate the interactions between the *Native Vegetation Act 1991* and the *Development Act 1993* in relation to the approvals for Projects of major social, economic or environmental significance.

The NVC will comment on the proposal as part of the assessment for major Projects as to whether it avoids and minimises clearance as far as practicable, and at the same time determine the Significant Environmental Benefit (SEB) required to offset the impact of the clearance.

All approved vegetation clearance must also be conditional on achieving a SEB to offset the clearance. The requirement for a SEB applies to several of the exemptions. Potential SEB offsets include:

- the establishment and management of a set-aside area to encourage the natural regeneration of native vegetation.
- the protection and management of an established area of native vegetation.
- entering into a Heritage Agreement on land where native vegetation is already established to further preserve or enhance the area in perpetuity.
- a payment to the Native Vegetation Fund (only where the above options are not possible).

1.3.3 National Parks and Wildlife Act 1972

Vascular plants and vertebrate animals (e.g. mammals, birds, reptiles and amphibians) are protected in South Australia under the threatened species schedules of the *National Parks and Wildlife Act 1972* (NPW Act): Schedule 7 (endangered species), Schedule 8 (vulnerable species) and Schedule 9 (rare species). The criteria used to define threatened species in South Australia are generally based on categories and definitions from the International Union for Conservation of Nature (IUCN) Red List Categories and Criteria.

The current schedules do not include non-vascular plants, fish, insects, butterflies, spiders, scorpions and other invertebrates, fungi and other life forms which do not have a current legal conservation status in South Australia.

Under the NPW Act, persons must not:

- take a native plant on a reserve, wilderness protection area, wilderness protection zone, land reserved for public purposes, a forest reserve or any other Crown land.
- take a native plant of a prescribed species on private land.

- take a native plant on private land without the consent of the owner (such plants may also be covered by the *Native Vegetation Act 1991*).
- take a protected animal or the eggs of a protected animal without approval.
- keep protected animals unless authorised to do so.
- kill a protected animal without approval.

1.3.4 *Natural Resources Management Act 2004*

Under the *Natural Resources Management Act 2004* (NRM Act), landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation.

Key components under the Act include the establishment of regional Natural Resource Management (NRM) Boards and development of regional NRM Plans; the ability to control water use through prescription, allocations and restrictions; requirement to control pest plants and animals, and activities that might result in land degradation.

A 'duty of care' is a fundamental component of this Act, i.e. ensuring one's environmental and civil obligation by taking reasonable steps to prevent land and water degradation. Persons can be prosecuted if they are considered negligent in meeting their obligations.

The Project area is located within the South Australian Arid Lands Natural Resources Management Board Region.

1.4 Assessment methodology

1.4.1 *Database searches*

A Protected Matters Report was generated on 21 June 2019 to identify matters of national environmental significance under the EPBC Act that may occur or may have suitable habitat occurring within the Project area. A buffer of 50 km was applied for this search (DotEE 2019).

A Biological Database of South Australia (BDBSA) search was obtained from the Department for Environment and Water and Natural Resources (DEW) on 21 June 2019, to identify flora and fauna species previously recorded within and around the Project area (10 km buffer) (DEW 2019, *Recordset number DEWNRBDBSA171211-1*). The BDBSA is comprised of an integrated collection of corporate databases which meet DEW standards for data quality, integrity and maintenance. In addition to the DEW biological data, the BDBSA also includes data from partner organisations (Birds Australia, Birds SA, Australasian Wader Study Group, SA Museum, and other State Government Agencies). This data is included under agreement with the partner organisation for ease of distribution but they remain owners of the data and should be contacted directly for further information.

Existing spatial datasets, relevant literature, aerial imagery and previous survey information where relevant was reviewed.

This information was used to build a picture of:

- native vegetation cover within the Project area and immediate surrounds;

- previous survey effort in the area;
- vegetation associations present (including associations of significance) and their condition; and
- flora and fauna species (including species of national or state conservation significance known or likely to occur in the area).

Any threatened species previously recorded within the area, or highlighted as potentially occurring in the area, were researched (if necessary) to determine whether suitable habitat for these species exists within the Project area.

1.4.2 Field survey

The field survey was conducted by EBS from 15-19 June 2019.

Vegetation

The vegetation survey was performed in accordance with the Rangelands Assessment Method (RAM) devised by the NVC (NVC 2017). The RAM is suitable for assessing vegetation systems within the South Australian Arid Lands and Alinytjara Wilurara NRM Board regions. The new method aligns the assessment of vegetation (and land) condition with the RAM developed by Natural Resources South Australian Arid Lands for the rapid assessment of pastoral properties in sheep and cattle country, but is adapted for native vegetation assessments in arid rangelands throughout South Australia (NVC 2017). The outcomes from these assessments are reflective of condition and the offset values associated with any clearance. The three components of the biodiversity value of the individual sites are;

- Landscape context;
- Vegetation condition (including a measure of land condition); and
- Conservation value.

These are scored based on the criteria outlined below in Table 1.

Table 1. Factors that influence the value of the three parameters used to calculate the total SEB area and biodiversity value in the Rangelands Assessment Method.

Parameter	Factors
Landscape context	<ul style="list-style-type: none"> • Number of land form features present • Size of the area being affected • Presence of wetland features • Level of protection of native vegetation in the geographic area
Vegetation condition	<ul style="list-style-type: none"> • Utilisation of perennial species (Intact, Modified, Over-utilised) • Biotic and physical disturbance (e.g. presence of litter mats (+), bare scalds (-)) • Vegetation strata present and notably absent (i.e. removed) • Introduce plant species cover

Parameter	Factors
Conservation value	<ul style="list-style-type: none"> • Presence of Commonwealth or State listed threatened ecological communities, and their conservation rating • Number of threatened plant species recorded (directly and historically), and their conservation rating • Number of threatened fauna species recorded (directly and historically), and their conservation rating, and potential habitat within the site

Each area to be assessed (i.e. each application area) within the methodology framework are assigned specific naming protocols. Individual areas are termed 'Blocks', which are further divided into stratified 'Sites'. Each Site relates to a vegetation association found within the Block.

The three component scores are combined to provide 'Unit Biodiversity Score' (per hectare) and then multiplied by the size (hectares) of the Site to provide a 'Total Biodiversity Score' for each Site, and then the overall Block.

The conservation significance scores were calculated from direct and historical observations of flora and fauna species of conservation significance. Historical observations were obtained from the PMST and BDBSA using a defined 50 km point buffer. For the PMST, only species or species habitat known to occur within the 50 km buffer were included (as per the RAM manual sections 5.3.2 and 5.3.3) (NVC 2017).

The number of sites assessed is generally determined by dividing blocks into predetermined areas usually based on one or all of;

- Rainfall Gradient
- Grazing Gradient; and
- Pastoral Paddocks.

The assessment design and sampling protocol used for this assessment was modified to deal with the long linear but narrow transmission line corridor. The number of 'Sites' were pre-determined in this instance to reflect the range of vegetation communities from a number of landforms without the need for exceedingly high and restrictive sample size requirements.

Birds

Birds were opportunely recorded over the Project area. For each bird observed, the following information was recorded:

- Species;
- Number of individuals;
- GPS location;
- Method, i.e. sight or sound; and
- Habitat.

2 EXISTING CONDITIONS

2.1 Broad landscape description

2.1.1 IBRA

The Project area is located at the northern extent of the Eyre Peninsula region. To classify landforms, the Interim Biogeographical Regionalisation of Australia (IBRA) is used. This is a landscape-based approach to classifying the land surface across a range of environmental attributes, which is used to assess and plan for the protection of biodiversity (DotE 2013). The Project area falls within the Gawler IBRA bioregion, and the Arcoona Plateau subregion. Landscape and remnancy descriptions are summarised in Table 2.

Table 2. IBRA bioregion, subregion, and environmental association environmental landscape summary.

Gawler IBRA bioregion	
Semi-arid to arid, flat topped to broadly rounded hills of the Gawler Range Volcanic and Proterozoic sediments, low plateaux on sandstone and quartzite with an undulating surface of Aeolian sand or gibbers and rocky quartzite hills with colluvium foot slopes, erosional and depositional plains and salt encrusted lake beds, with Belah (Belah) and Myall low open woodlands, open Mallee scrub, Bluebush/Saltbush open chenopod shrublands and tall Mulga shrublands on shallow loams, calcareous earths and hard red duplex soils.	
Arcoona Plateau IBRA subregion	
A series of low plateaux on sandstone and quartzite with an undulating surface of Aeolian sand or gibbers over red duplex soils, and rocky quartzite hills with colluvium foot slopes. There is a cover of low chenopod shrublands, <i>Acacia victoriae</i> tall shrublands with a chenopod shrub understorey and fringing <i>Acacia papyrocarpa</i> woodland.	
Remnant vegetation	Approximately 99% (1,077,028 ha) of the subregion is mapped as remnant native vegetation, of which >1% (710 ha) is formally conserved.
Landform	Dissected sandstone plateau with bold eastern escarpment. Surface undulating to hilly and often gibber-covered, particularly in east.
Geology	Sands, clays, silts; pallid zones & ferruginised breakaway scarps. Silcrete & silcrete skins; stony plains & plateau remnants. Colluvium fans, alluvial sands, silts, clays & gravels. Stony tablelands, gibber plains & stone circles (Gilgai effects).
Soil	Crusty red duplex soils, Red calcareous loams.
Vegetation	Chenopod shrublands.
Conservation significance	34 species of threatened fauna, 14 species of threatened flora. 2 wetlands of national significance.

2.1.2 Previous surveys conducted

Seven ecological assessments for the Project have been carried out from 2005 to 2019. Changes to Project ownership and modifications of the Project footprint have occurred during this period. Each of the ecological assessments is listed below. Please refer to individual reports for further details on each assessment.

Lincoln Gap Stage 3 Flora and Fauna Baseline Assessment

- Preliminary Route Assessment: Port Augusta Wind Farm Development (Ecological Associates 2005).
- Risks to Birds from the Port Augusta Wind Farm Development: Impact Assessment Proposal (Ecological Associates 2006).
- Port Augusta Wind Farm Development: Identification of Ecological Issues (Ecological Associates 2008).
- Lincoln Gap Wind Farm Avifauna Report (EBS Ecology 2016a).
- Lincoln Gap Vegetation Survey and Wedge-tailed Eagle Nest Inspection (EBS Ecology 2016b).
- Lincoln Gap Wind Farm Native Vegetation Clearance Assessment (EBS Ecology 2017a).
- Lincoln Gap Wind Farm Ecological Assessment (EBS Ecology 2017b).

3 BASELINE ENVIRONMENTAL DATA

3.1 Desktop Assessment

The Protected Matters Search Tool (PMST) identified 51 threatened fauna species and 45 listed migratory species, protected under the EPBC Act that occurred within 50 km of the Project area and may be relevant to the Lincoln Gap Stage 3 Project (DotEE 2019). Any action that has, will have or is likely to have a significant impact on matters of National environmental significance requires referral under the EPBC Act.

Table 3 summarises the results of the EPBC Protected Matters Report and the relevant matters of National environmental significance discussed further below. Marine listed species under the EPBC Act, which are not also listed as threatened or migratory, have been excluded for this desktop assessment as they only trigger the need for an EPBC Referral if they have been significantly impacted within a Commonwealth Marine Area. As Commonwealth Marine Areas commence three nautical miles from shore, marine species are not relevant to the Project.

Furthermore, fauna that complete their life cycle in marine habitats, such as sharks and whales, have not been discussed due to their irrelevance to the Project, which is located on terrestrial land.

Table 3. Summary of the results of the EPBC Act Protected Matters Search.

Search area (50 km buffer)	Matters of National Environment Significance under the EPBC Act 1999	Identified within the search area
	World Heritage Properties	None
	National Heritage Properties	None
	Wetlands of International Significance	None
	Great Barrier Reef Marine Park	None
	Commonwealth Marine Areas	None
	Threatened Ecological Communities	3
	Threatened Species	51
	Migratory Species	45
	Commonwealth Lands	8
	Commonwealth Heritage Places	None
	Listed Marine Species	79
	Whales and other Cetaceans	8
	Critical Habitats	None
	Commonwealth Reserves Terrestrial	None
	Australian Marine Parks	None
	State and Territory Reserves	5
	Regional Forest Agreements	None
	Invasive Species	32
	Nationally Important Wetlands	1
	Key Ecological Features (Marine)	None

3.1.1 Threatened ecological communities

Three threatened ecological communities (TECs) were identified in the PMST search within 50 km of the Project area (Table 4). All three TECs are unlikely to occur in the Project area and were not recorded during the field assessment.

Table 4. Threatened ecological communities identified by the PMST search within 50 km of the Project area (DotEE 2019).

Community	Conservation Status Aus	Likelihood of occurrence
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	EN	Unlikely
Peppermint Box (<i>Eucalyptus odorata</i>) Grassy Woodland of South Australia	CE	Unlikely
Subtropical and Temperate Coastal Saltmarsh	VU	Unlikely

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

3.1.2 Threatened flora species

A total of twelve nationally threatened fauna species were identified by the PMST and BDBSA data extraction as potentially occurring in the search area (50 km buffer from the Project area) (Table 5). None of the nationally threatened species were considered as likely to occur within the Project area. The full list of flora species recorded in the BDBSA within 50 km of the Project area is provided in Appendix 1. Threatened fauna species

A total of 35 nationally threatened fauna species were identified by the PMST and BDBSA data extraction as potentially occurring in the search area (50 km buffer from the Project area) (Table 6). The Western Grasswren (*Amytornis textilis myall*) was the only nationally threatened species considered to potentially occur within the Project area. The full list of fauna species recorded in the BDBSA within 50 km of the Project area is provided in Appendix 2.

3.1.3 Migratory species

A total of 38 migratory species were identified by the PMST and BDBSA data extraction as potentially occurring in the search area (50 km buffer from the Project area) (Table 6). The Fork-tailed Swift (*Apus pacificus*) was the only migratory species considered to potentially occur within the Project area.

3.1.4 Nationally important wetlands

The PMST report identified one nationally important wetland as potentially occurring within a 50 km radius of the Project area. The Upper Spencer Gulf area is listed as a Nationally Important Wetland under the EPBC Act. The Project area is approximately 15 km inland from the Spencer Gulf estuary. The proposed development will have no impact on the Upper Spencer Gulf estuary.

3.1.5 Commonwealth lands

The PMST report identified eight Commonwealth land areas:

- Commonwealth Land – unidentified
- Commonwealth Land – Aboriginal and Torres Strait Islander Commission
- Commonwealth Land – Australian National Railways Commission
- Commonwealth Land – Defence Housing Authority
- Commonwealth Land – Minister of Aboriginal Affairs
- Defence – AIRTC WHYALLA
- Defence – CULTANA TRAINING AREA
- Defence – EL ALAMEIN – PORT AUGUSTA.

None of these Commonwealth Lands are present within the Project area.

3.1.6 State threatened flora

A total of 68 State threatened flora species had records within the search area (50 km buffer from the Project area) (Table 5). Overall, eleven State threatened species were considered as possibly occurring within the Project area.

Table 5. National and State threatened flora species identified as potentially occurring within 50 km of the Project area (DEW 2019; DotEE 2019).

Scientific name	Common name	Conservation Status		Source	Last Record (Year)	Likelihood of occurrence
		Aus	SA			
<i>Acacia iteaphylla</i>	Flinders Ranges Wattle		R	2	1975	Unlikely
<i>Acacia quornensis</i>	Quorn Wattle		R	2	2006	Unlikely
<i>Anogramma leptophylla</i>	Annual Fern		R	2	1999	Unlikely
<i>Asperula syrticola</i>	Southern Flinders Woodruff		R	2	1999	Unlikely
<i>Austrostipa breviglumis</i>	Cane Spear-grass		R	2	2003	Possible
<i>Austrostipa echinata</i>	Spiny Spear-grass		R	2	1990	Unlikely
<i>Austrostipa gibbosa</i>	Swollen Spear-grass		R	2	1992	Possible
<i>Austrostipa petraea</i>	Flinders Range Spear-grass		R	2	2005	Unlikely
<i>Austrostipa pilata</i>	Prickly Spear-grass		V	2	1996	Unlikely
<i>Austrostipa tenuifolia</i>			R	2	1994	Unlikely
<i>Brachyscome ciliaris</i> var. <i>subintegrifolia</i>			R	2	2005	Unlikely
<i>Caladenia gladiolata</i>	Bayonet Spider-orchid	EN	E	1, 2	1994	Unlikely
<i>Caladenia tensa</i>	Greencomb Spider-orchid	EN		1		Unlikely
<i>Caladenia woolcockiorum</i>	Woolcock's Spider-orchid	VU	E	1		Unlikely
<i>Caladenia xantholeuca</i>	White Rabbits	EN	E	1		Unlikely
<i>Calandrinia sphaerophylla</i>	Bead Purslane		R	2	1990	Possible
<i>Calotis lappulacea</i>	Yellow Burr-daisy		R	2	1999	Unlikely
<i>Ceratogyne obionoides</i>	Wingwort		R	2	1990	Unlikely
<i>Citrus glauca</i>	Desert Lime		V	2	1993	Unlikely
<i>Cryptandra campanulata</i>	Long-flower Cryptandra		R	2	1999	Possible

Lincoln Gap Stage 3 Flora and Fauna Baseline Assessment

Scientific name	Common name	Conservation Status		Source	Last Record (Year)	Likelihood of occurrence
		Aus	SA			
<i>Daviesia pectinata</i>	Zig-zag Bitter-pea		R	2	1941	Unlikely
<i>Deyeuxia densa</i>	Heath Bent-grass		R	2	1994	Unlikely
<i>Dianella longifolia</i> var. <i>grandis</i>	Pale Flax-lily		R	2	1999	Unlikely
<i>Drosera stricticaulis</i>	Erect Sundew		V	2	1999	Unlikely
<i>Echinopogon ovatus</i>	Rough-beard Grass		R	2	1994	Unlikely
<i>Elachanthus glaber</i>	Shiny Elachanth		R	2	1995	Unlikely
<i>Elatine gratioloides</i>	Waterwort		R	2	1999	Unlikely
<i>Eryngium ovinum</i>	Blue Devil		V	2	1994	Unlikely
<i>Eucalyptus albens</i>	White Box		R	2	1986	Unlikely
<i>Eucalyptus behriana</i>	Broad-leaf Box		R	2	1941	Possible
<i>Eucalyptus cajuputea</i>	Green Mallee		R*	2	1999	Unlikely
<i>Eucalyptus percostata</i>	Ribbed White Mallee		R	2	2006	Unlikely
<i>Eucalyptus polybractea</i>	Flinders Ranges Box		R	2	1999	Unlikely
<i>Eucalyptus viridis</i> ssp. <i>viridis</i> (NC)	Green Mallee		R	2	2009	Possible
<i>Festuca benthamiana</i>	Bentham's Fescue		R	2	2000	Unlikely
<i>Frankenia plicata</i>	Frankenia	EN	V	1		Possible
<i>Gratwickia monochaeta</i>			R	2	2007	Unlikely
<i>Haeckeria cassiniiformis</i>	Dogwood Haeckeria		R	2	2006	Possible
<i>Hibbertia crispula</i>	Ooldea Guinea-flower	VU	V	1		Unlikely
<i>Hovea purpurea</i>	Tall Hovea		R	2	2001	Unlikely
<i>Lepidium pseudotasmanicum</i>	Shade Peppercross		V	2	1994	Unlikely
<i>Leptorhynchus elongatus</i>	Lanky Buttons		R	2	1994	Unlikely
<i>Leptorhynchus scaber</i>	Annual Buttons		R	2	1992	Unlikely
<i>Logania saxatilis</i>	Rock Logania		R	2	1996	Possible
<i>Maireana excavata</i>	Bottle Fissure-plant		V	2	1996	Possible
<i>Maireana rohrlachii</i>	Rohrlach's Bluebush		R	2	1967	Unlikely
<i>Malacocera gracilis</i>	Slender Soft-horns		V	2	2010	Unlikely
<i>Myoporum parvifolium</i>	Creeping Boobialla		R	2	2009	Unlikely
<i>Olearia pannosa</i> ssp. <i>cardiophylla</i>	Velvet Daisy-bush		R	2	1999	Unlikely
<i>Olearia pannosa</i> ssp. <i>pannosa</i>	Silver Daisy-bush	VU	V	2	1996	Unlikely
<i>Olearia picridifolia</i>	Rasp Daisy-bush		R	2	1992	Unlikely
<i>Orobanche cernua</i> var. <i>australiana</i>	Australian Broomrape		R	2	1975	Unlikely
<i>Osteocarpum acropterum</i> var. <i>deminutum</i>	Wingless Bonefruit		R	2	1920	Unlikely
<i>Osteocarpum pentapterum</i>	Five-wing Bonefruit		E	2	1974	Unlikely
<i>Ozothamnus scaber</i>	Rough Bush-everlasting		V	2	1999	Unlikely
<i>Phyllangium sulcatum</i>			V	2	1992	Unlikely
<i>Poa drummondiana</i>	Knotted Poa		R	2	2000	Unlikely
<i>Podolepis jaceoides</i>	Showy Copper-wire Daisy		R	2	1924	Unlikely
<i>Prasophyllum pallidum</i>	Pale Leek-orchid	VU	R	1, 2	2009	Unlikely
<i>Prasophyllum validum</i>	Sturdy Leek-orchid	VU	V	1, 2	1994	Unlikely
<i>Pterostylis xerophila</i>	Desert Greenhood	VU	V	1		Unlikely
<i>Pycnosorus globosus</i>	Drumsticks		V	2	2001	Unlikely

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Scientific name	Common name	Conservation Status		Source	Last Record (Year)	Likelihood of occurrence
		Aus	SA			
<i>Rumex dumosus</i>	Wiry Dock		R	2	1996	Unlikely
<i>Rytidosperma laeve</i>	Smooth Wallaby-grass		R	2	1992	Unlikely
<i>Rytidosperma tenuius</i>	Short-awn Wallaby-grass		R	2	1993	Unlikely
<i>Santalum spicatum</i>	Sandalwood		V	2	2010	Possible
<i>Sarcozona bicarinata</i>	Ridged Noon-flower		V	2	2008	Unlikely
<i>Senecio megaglossus</i>	Large-flower Groundsel	VU	E	1, 2	2009	Unlikely
<i>Tecticornia lepidosperma</i>	Samphire		R	2	1998	Unlikely
<i>Thelymitra grandiflora</i>	Great Sun-orchid		R	2	1999	Unlikely
<i>Thysanotus tenellus</i>	Grassy Fringe-lily		R	2	1995	Unlikely
<i>Veronica decorosa</i>	Showy Speedwell		R	2	1999	Unlikely
<i>Veronica parkalliana</i>	Port Lincoln Speedwell	EN	E	1		Unlikely
<i>Wurmbea stellata</i>	Star Nancy		R	2	1991	Unlikely
<i>Zostera muelleri ssp. mucronata</i>	Garweed		R	2	1974	Unlikely

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare. Source: 1 EPBC, 2: DBBSA

3.1.7 State threatened fauna

A total of 45 State threatened fauna species had records within the search area (50 km buffer from the Project area) (Table 6). Overall, eight State threatened species considered to potentially occur within the Project area.

Table 6. National and State threatened fauna species identified as potentially occurring within 50 km of the Project area (DEW 2019; DotEE 2019).

Scientific name	Common name	Conservation Status		Source	Last Record (Year)	Likelihood of occurrence
		Aus	SA			
AMPHIBIA		AMPHIBIANS				
<i>Pseudophryne bibronii</i>	Brown Toadlet		R	2	1981	Unlikely
AVES		BIRDS				
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western)		R	2	2006	Known
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi	R	1,2	2004	Unlikely
<i>Amytornis merrotsyi merrotsyi</i>	Short-tailed Grasswren (Flinders Ranges)	VU		1,2	2001	Unlikely
<i>Amytornis textilis myall</i>	Western Grasswren (Gawler Ranges)	VU		1, 2	2002	Possible
<i>Apus pacificus</i>	Fork-tailed Swift	Mi		1, 2	2000	Possible
<i>Ardea ibis</i>	Cattle Egret		R	2	1994	Unlikely
<i>Ardena carneipes</i>	Flesh-footed Shearwater	Mi	R	1		Unlikely
<i>Ardeotis australis</i>	Australian Bustard		V	2	2006	Possible
<i>Arenaria interpres</i>	Ruddy Turnstone	Mi	R	1, 2	1998	Unlikely
<i>Biziura lobata</i>	Musk Duck		R	2	2006	Unlikely
<i>Calamanthus (Hylacola) pyrrhopygius pedleri</i>	Chestnut-rumped Heathwren		V	2	1997	Unlikely
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi		1, 2	2006	Unlikely
<i>Calidris alba</i>	Sanderling	Mi	R	1		Unlikely

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Scientific name	Common name	Conservation Status		Source	Last Record (Year)	Likelihood of occurrence
		Aus	SA			
<i>Calidris canutus</i>	Red Knot	EN, Mi		1, 2	2000	Unlikely
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE, Mi		1, 2	2000	Unlikely
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi	R	1		Unlikely
<i>Calidris ruficollis</i>	Red-necked Stint	Mi		1, 2	2006	Unlikely
<i>Calidris tenuirostris</i>	Great Knot	CE, Mi		1		Unlikely
<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU, Mi	R	1		Unlikely
<i>Charadrius veredus</i>	Oriental Plover	Mi		1, 2	1996	Unlikely
<i>Cinclosoma castanotum</i>	Chestnut-backed Quailthrush (Chestnut Quailthrush)		R	2	1988	Unlikely
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V	2	2006	Unlikely
<i>Climacteris affinis</i>	White-browed Treecreeper		R	2	1965	Unlikely
<i>Diomedea antipodensis</i>	Antipodean Albatross	VU, Mi		1		Unlikely
<i>Diomedea epomophora</i>	Southern Royal Albatross	VU, Mi	V	1		Unlikely
<i>Diomedea exulans</i>	Wandering Albatross	VU, Mi	V	1		Unlikely
<i>Diomedea sanfordi</i>	Northern Royal Albatross	EN, Mi	E	1		Unlikely
<i>Egretta garzetta</i>	Little Egret		R	2	2005	Unlikely
<i>Emblema pictum</i>	Painted Finch		R	2	1994	Unlikely
<i>Falco hypoleucos</i>	Grey Falcon		R	2	2006	Possible
<i>Falco peregrinus</i>	Peregrine Falcon		R	2	2005	Possible
<i>Falcunculus frontatus frontatus</i>	Eastern Shrike-tit		R	2	1997	Unlikely
<i>Gallinago hardwickii</i>	Latham's Snipe	Mi	R	1		Unlikely
<i>Gallinago stenura</i>	Pin-tailed Snipe	Mi		1		Unlikely
<i>Grantiella picta</i>	Painted Honeyeater	VU	V	1		Unlikely
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R	2	2006	Unlikely
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R	2	2004	Unlikely
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E	2	1900	Unlikely
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard		R	2	1991	Possible
<i>Hydroprogne caspia</i>	Caspian Tern	Mi		2	2005	Unlikely
<i>Larus dominicanus</i>	Kelp Gull		R	2	1982	Unlikely
<i>Leipoa ocellata</i>	Malleefowl	VU	V	1		Unlikely
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit (baueri)	VU, Mi	R	1		Unlikely
<i>Limosa lapponica menzberi</i>	Bar-tailed Godwit (menzberi)	CE, Mi		1		Unlikely
<i>Limosa limosa</i>	Black-tailed Godwit	Mi	R	1, 2	1984	Unlikely
<i>Lophochroa leadbeateri mollis</i>	Major Mitchell's Cockatoo		R	2	2013	Possible
<i>Macronectes giganteus</i>	Southern Giant Petrel	EN, Mi	V	1, 2	2000	Unlikely
<i>Macronectes halli</i>	Northern Giant Petrel	VU, Mi		1		Unlikely
<i>Motacilla cinerea</i>	Grey Wagtail	Mi		1		Unlikely
<i>Myiagra inquieta</i>	Restless Flycatcher		R	2	2002	Unlikely
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CE	E	1, 2	1992	Unlikely
<i>Neophema chrysostoma</i>	Blue-winged Parrot		V	2	2006	Possible
<i>Neophema elegans</i>	Elegant Parrot		R	2	2015	Possible
<i>Neophema petrophila</i>	Rock Parrot		R	2	1998	Unlikely
<i>Neophema splendida</i>	Scarlet-chested Parrot		R	2	1996	Unlikely

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Scientific name	Common name	Conservation Status		Source	Last Record (Year)	Likelihood of occurrence
		Aus	SA			
<i>Ninox connivens</i>	Barking Owl		R	2	1933	Unlikely
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CE, Mi	V	1, 2	2004	Unlikely
<i>Oxyura australis</i>	Blue-billed Duck		R	2	2001	Unlikely
<i>Pachycephala inornata</i>	Gilbert's Whistler		R	2	2001	Unlikely
<i>Pachyptila turtur subantarctica</i>	Fairy Prion (Southern)	VU		1		Unlikely
<i>Pandion haliaetus</i>	Osprey	Mi	E	1		Unlikely
<i>Pedionomus torquatus</i>	Plains-wanderer	CE	E	1		Unlikely
<i>Petroica boodang boodang</i>	Scarlet Robin		R	2	2000	Unlikely
<i>Pezoporus occidentalis</i>	Night Parrot	EN	E	1		Unlikely
<i>Phaps histrionica</i>	Flock Bronzewing		R	2	2013	Unlikely
<i>Philomachus pugnax</i>	Ruff (Reeve)	Mi	R	1		Unlikely
<i>Phoebastria fusca</i>	Sooty Albatross	VU, Mi	E	1		Unlikely
<i>Pluvialis squatarola</i>	Grey Plover	Mi		2	1999	Unlikely
<i>Podiceps cristatus</i>	Great Crested Grebe		R	2	2002	Unlikely
<i>Rostratula australis</i>	Australian Painted Snipe	EN	V	1		Unlikely
<i>Stagonopleura guttata</i>	Diamond Firetail		V	2	2005	Unlikely
<i>Sternula nereis</i>	Fairy Tern	VU	E	1, 2	2002	Unlikely
<i>Sternula nereis nereis</i>	Australian Fairy Tern	VU	E	1, 2	2002	Unlikely
<i>Stictonetta naevosa</i>	Freckled Duck		V	2	2001	Unlikely
<i>Thalassarche cauta cauta</i>	Shy Albatross	VU, Mi	V	1		Unlikely
<i>Thalassarche cauta steadi</i>	White-capped Albatross	VU, Mi		1		Unlikely
<i>Thalassarche impavida</i>	Campbell Albatross	VU, Mi	V	1		Unlikely
<i>Thalassarche melanophris</i>	Black-browed Albatross	VU, Mi		1		Unlikely
<i>Thalasseus bergii</i>	Greater Crested Tern	Mi		2	2006	Unlikely
<i>Tringa nebularia</i>	Common Greenshank	Mi		1, 2	2006	Unlikely
<i>Tringa stagnatilis</i>	Marsh Sandpiper	Mi		1, 2	2006	Unlikely
<i>Turnix varius</i>	Painted Buttonquail		R	2	1999	Unlikely
<i>Zoothera lunulata halmaturina</i>	Bassian Thrush (South Australian)	VU	R	1		Unlikely
MAMMALIA	MAMMALS					
<i>Petrogale xanthopus xanthopus</i>	Yellow-footed Rock Wallaby (SA and NSW)	VU		1, 2	2015	Unlikely
<i>Bettongia lesueur</i>	Burrowing Bettong	EX		2	1900	Unlikely
<i>Dasyurus viverrinus</i>	Eastern Quoll	EN	E	2	1909	Unlikely
REPTILIA	REPTILES					
<i>Aprasia pseudopulchella</i>	Flinders Range Worm-lizard	VU		1, 2	2017	Unlikely
<i>Notechis scutatus ater</i>	Kreff's Tiger Snake (Flinders Ranges)	VU		1		Unlikely
<i>Morelia spilota</i>	Carpet Python		R	2	1988	Unlikely
<i>Varanus varius</i>	Lace Monitor		R	2	2017	Unlikely

Aus: Australia (Environment Protection and Biodiversity Conservation Act 1999). **SA:** South Australia (National Parks and Wildlife Act 1972). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare. Source 1: EPBC, 2: BBBSA

3.2 Field survey

3.2.1 Site Flora

Seven vegetation associations were assessed within the Project area (Table 7) which covered a total of 913.04 ha. Many of these associations overlapped somewhat with many changes based purely on co-dominant species presence/absence. The seven associations described below provide an accurate representation of the vegetation communities present within the Project areas 250m corridor. No vegetation associations listed as threatened at a regional, state or national level were observed.

Table 7. Description of the Vegetation Associations (VA) present in the Project area.

VA ID	Description	Area (ha)
1	<i>Atriplex vesicaria</i> (Bladder Saltbush) +/- <i>Tecticornia medullosa</i> (Samphire) Low Shrubland.	313.29
2	<i>Maireana sedifolia</i> (Pearl Bluebush), <i>Rhagodia ulicina</i> (Intricate Saltbush) Low Shrubland.	440.13
3	<i>Casuarina pauper</i> (Belah) Low Open Woodland.	19.15
4	<i>Casuarina pauper</i> (Belah) +/- <i>Myoporum platycarpum</i> ssp. (False Sandalwood), <i>Alectryon oleifolius</i> (Bullock Bush) <i>Senna</i> sp. (Senna) Mixed Open Woodland.	84.79
5	<i>Eucalyptus socialis</i> ssp. <i>socialis</i> (Red Mallee) Open Mallee	39.04
6	<i>Triodia irritans</i> (Spinifex) Hummock Grassland.	13.41
7	<i>Dodonaea lobulata</i> (Lobe-leaved Hop-bush) +/- <i>Maireana sedifolia</i> (Pearl Bluebush) Low Shrubland	3.23
Total		913.04

At least one rangeland assessment was conducted for each vegetation association. The Project area was broken into 3 sections: ('North 1 and North 2') and ('South 1') for nomenclature purposes. Scores with multiple sheets were averaged for the respective associations based on the largely homogenous nature of the tableland associations. Scores for the rangeland assessment are intended to contribute to the vegetation clearance requirements for the Project. At the current point in time the exact clearance requirement is uncertain. All calculations for the Native Vegetation Clearance will be addressed in a subsequent report once the Project layout and refinements have been finalised.

Figure 2 below shows the overall Project layout and Vegetation Association mapping for sections north and south while Figure 3 to Figure 5 show the mapping at a higher resolution for the northern sections North 1 and North 2) southern section (South 1).

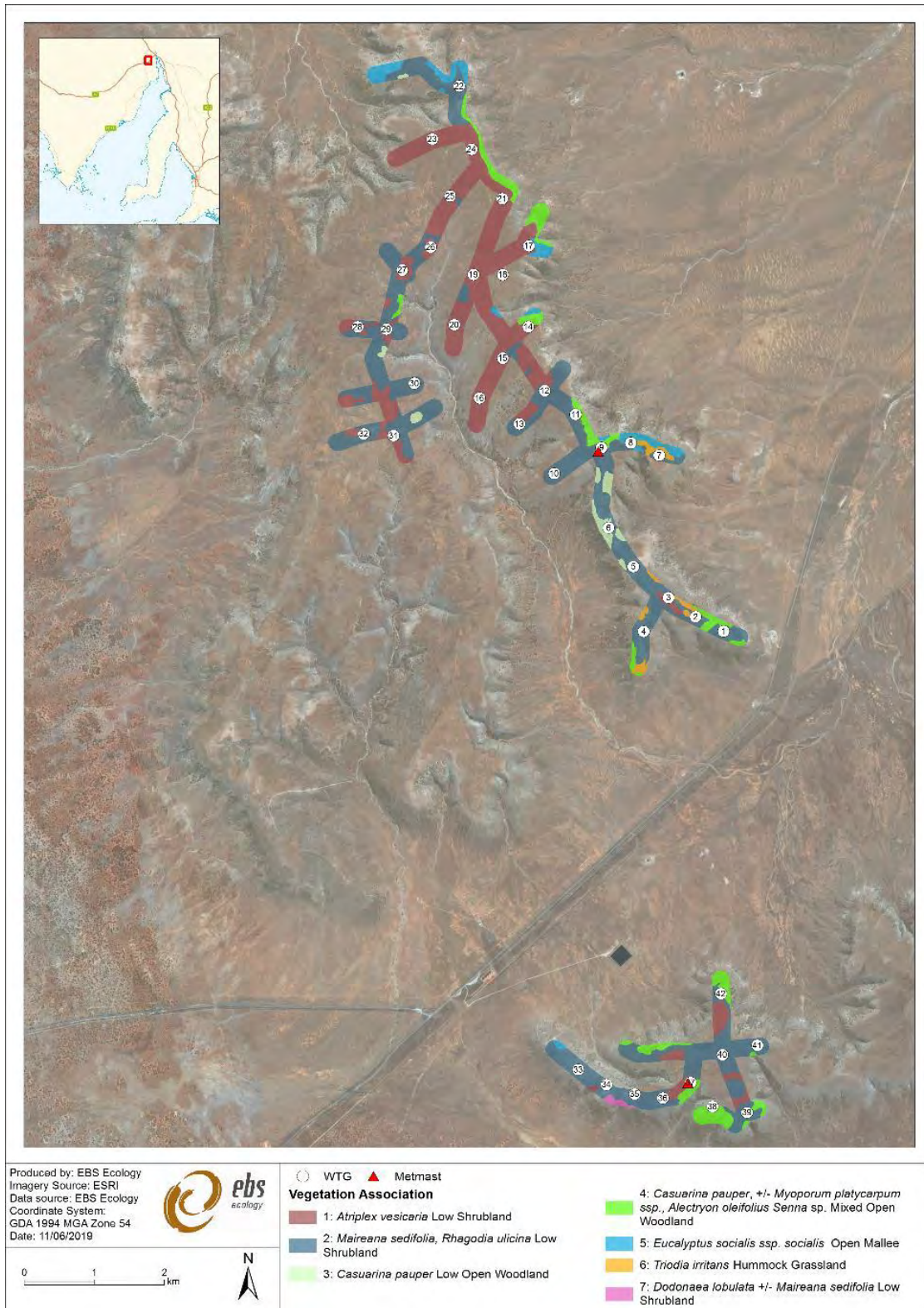


Figure 2. Overview of 250m Project layout corridor and Vegetation Association mapping for the Project.

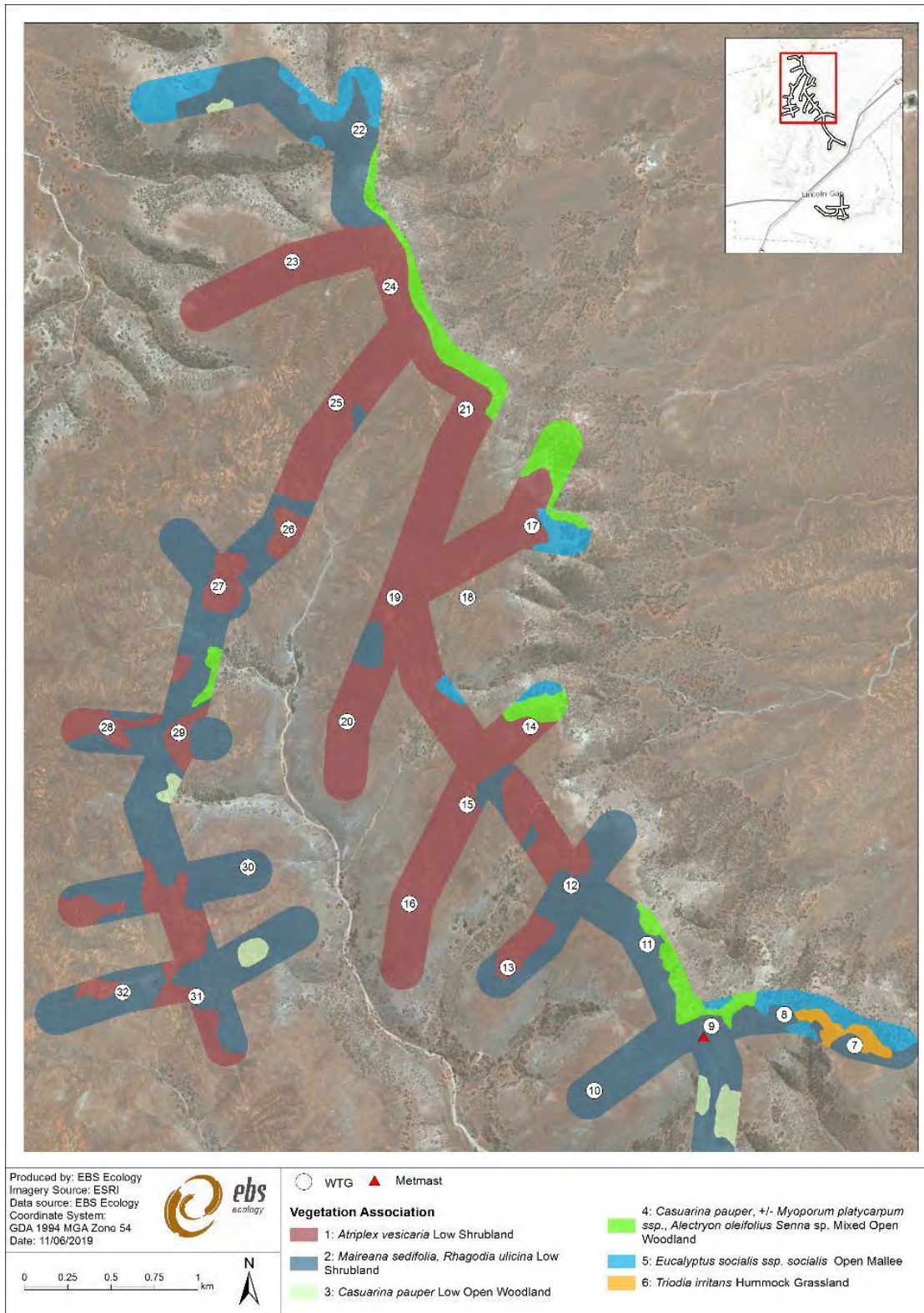


Figure 3. Section North 1 Vegetation Association mapping within 250m Project corridor.

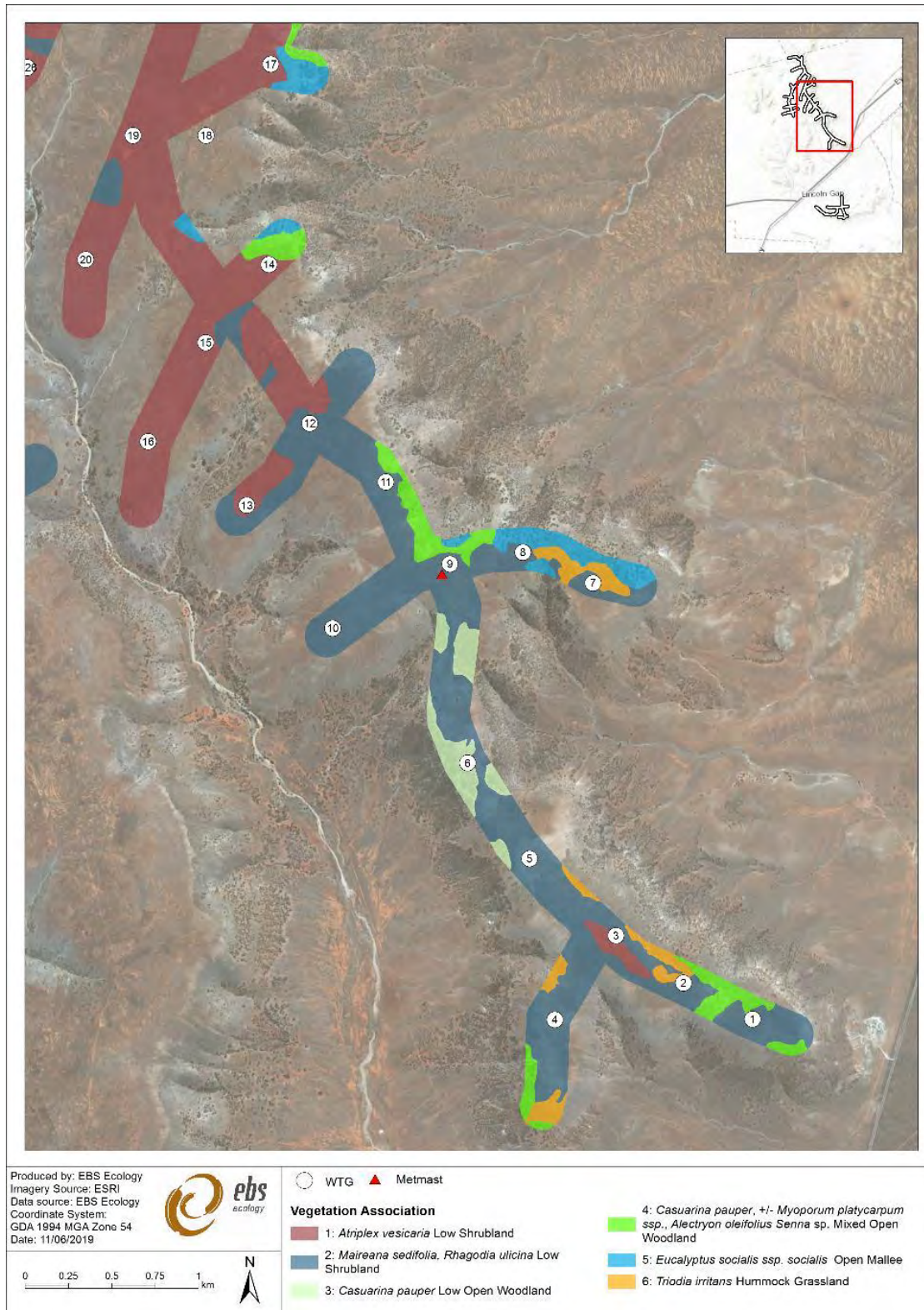


Figure 4. Section North 2 Vegetation Association mapping within 250m Project corridor.



Figure 5. Section South 1 Vegetation association mapping within 250m Project corridor.

Vegetation Association 1: *Atriplex vesicaria* (Bladder Saltbush) / *Tecticornia medullosa* (Samphire) Shrubland

Atriplex vesicaria (Bladder Saltbush) is a relatively long-lived perennial that is dominant or co-dominant over large areas of arid and semi-arid southern Australia. This association occurs on clay or clay-loam soils. The Project area has this association present on the tableland landform where the soil has no outcropping and instead was comprised of self-mulching clay soils. It commonly formed pure stands which was an indicator of good condition. The loss or degradation of Bladder Saltbush is detrimental to the rangeland environment since it leads to a reduction in the forage availability during drought for both native species and stock, and increases the risk of soil erosion (Eldridge, Westoby and Stanley 1990). Figure 6 shows a representative photo of the community within the Project area. Table 8 shows the species commonly recorded within this community during the assessment.



Figure 6. Bladder saltbush dominant community within Project area footprint.

Table 8. *Atriplex vesicaria* / *Tecticornia medullosa* Shrubland community summary.

Overstorey species	<i>Atriplex vesicaria</i> (Bladder Saltbush) <i>Tecticornia medullosa</i> (Samphire)
Midstorey species	<i>Abutilon halophilum</i> (Plains Lantern), <i>Maireana eriantha</i> (Woolly Bluebush)
Understorey species	<i>Sclerolaena ventricosa</i> (Salt Bindyi) <i>Sclerolaena brachyptera</i> (Short Wing Bindyi)
Threatened species	None
Declared or significant weeds	Sparsely scattered <i>Carrichtera annua</i> (Wards Weed)
Vegetation condition	Medium
Unit biodiversity scores	44.7

Vegetation Association 2: *Maireana sedifolia* (Pearl Bluebush), *Rhagodia ulicina* (Intricate Saltbush) Low Shrubland.

Maireana sedifolia (Pearl Bluebush) is characteristic of limestone/calcrete and alkaline soil conditions. The calcareous earths commonly have surface textures ranging from clay loams to loams. Apart from the vascular plant community, the calcareous earths support a rich suite of soil surface organisms which together make up a biological or microphytic crust (Eldridge 1996). During unfavourable times such as droughts, microphytic crusts may provide the only biological protective cover on the soil surface. Figure 7 shows a representative photo of the community within the Project area while Table 9 shows the species commonly recorded within this community during the assessment.



Figure 7. *Maireana sedifolia* shrubland on shallow clay soil overlying Calcrete outcropping.

Table 9. *Maireana sedifolia* (Pearl Bluebush), *Rhagodia ulicina* (Intricate Saltbush) Low Open Shrubland community summary.

Overstorey species	<i>Maireana sedifolia</i> (Pearl Bluebush) <i>Senna cardiosperma</i> ssp. <i>gawlerensis</i> (Gawler Ranges Senna) <i>Atriplex vesicaria</i> (Bladder Saltbush) <i>Maireana pyramidata</i> (Black Bluebush) <i>Maireana georgei</i> (Satiny Bluebush)
Midstorey species	<i>Ptilotus obovatus</i> (Silver Mulla Mulla)
Understorey species	<i>Sclerolaena cuneata</i> (Yellow-stemmed Bindyi) <i>Maireana trichoptera</i> (Hairy Fruit Bluebush) <i>Sclerolaena uniflora</i> (Bassia)
Threatened species	None observed
Declared or significant weeds	Very few scattered <i>Lycium ferocissimum</i> (African Boxthorn) amongst <i>Lycium australe</i> (Native Boxthorn)
Vegetation condition	Medium - low
Unit biodiversity scores	40.27

Vegetation Association 3: *Casuarina pauper* (Belah) Open Woodland

Casuarina pauper (Belah) is often observed as patches or clumps of trees on the edges of the primary escarpments. These groves are also commonly prominent occupying areas of outcropping stone or rises where other species are unable to compete and have low overstorey diversity (Figure 8). *Casuarina pauper* (Belah) occurs across much of South Australia, typically growing in groves in red-brown soils with light-textured topsoil and calcareous subsoil. Understories are often dominated by chenopod shrubs and forbs including species of *Maireana* spp. (Bluebushes), *Chenopodium* spp. (Goosefoots), *Enchylaena tomentosa* (Ruby Saltbush), *Rhagodia spinescens* (Spiny Saltbush) and *Sclerolaena* spp. (Bindyis). Figure 8 shows a representative photo of the community within the Project area while Table 10 shows the species commonly recorded within this community during the assessment.



Figure 8. *Casuarina pauper* (Belah) Shrubland.

Table 10. *Casuarina pauper* (Belah) Open Woodland community summary.

Overstorey species	<i>Casuarina pauper</i> (Belah) <i>Alectryon oleifolius</i> (Bullock Bush)
Midstorey species	<i>Acacia oswaldii</i> (Wattle)
Understorey species	<i>Maireana</i> spp. (Bluebushes) <i>Enchylaena tomentosa</i> (Ruby Saltbush) <i>Ptilotus obovatus</i> (Silver Mulla Mulla) <i>Sida</i> spp. (Sidas) <i>Sclerolaena obliquicuspis</i> (Oblique spined Bindyi)
Threatened species	None observed
Declared or significant weeds	<i>Carrichtera annua</i> (Wards Weed)
Vegetation condition	37.27, Medium
Unit biodiversity scores	44.28

Vegetation Association 4: *Casuarina pauper* (Belah) / *Myoporum platycarpum* ssp. (False Sandalwood), *Alectryon oleifolius* (Bullock Bush) *Senna* sp. (Senna) Mixed Open Woodland.

Mixed Woodlands made up a significant component of the fringe escarpment areas and were often dominated by one of three species, being *Myoporum platycarpum*, *Casuarina pauper* or *Eucalyptus oleosa*. The understorey was almost always consistent with that of other woodland associations being dominated by *Maireana sedifolia* and other long lived perennial shrubs (Figure 9). Table 11 below summarise the typical community composition.



Figure 9. *Myoporum platycarpum* (False Sandalwood) Mixed Woodland.

Table 11. *Casuarina pauper* (Belah) / *Myoporum platycarpum* ssp. (False Sandalwood), *Alectryon oleifolius* (Bullock Bush) *Senna* sp. (Senna) Mixed Open Woodland community summary.

Overstorey species	<i>Casuarina pauper</i> (Belah) <i>Myoporum platycarpum</i> (False Sandalwood)
Midstorey species	<i>Alectryon oleifolius</i> (Bullock Bush) <i>Senna</i> spp. (Sennas)
Understorey species	<i>Maireana</i> spp. (Bluebushes) <i>Enchylaena tomentosa</i> (Ruby Saltbush) <i>Ptilotus obovatus</i> (Silver Mulla Mulla) <i>Sida</i> spp. (Sidas) <i>Sclerolaena obliquicuspis</i> (Oblique spined Bindyi)
Threatened species	None observed
Declared or significant weeds	<i>Carrichtera annua</i> , <i>Medicago polymorpha</i>
Vegetation condition	36.48 Medium
Unit biodiversity scores	43.33

Vegetation Association 5: *Eucalyptus oleosa* ssp. (Red Mallee) Open Mallee over *Triodia irritans* (Spinifex) Grassland

Eucalyptus oleosa Open Mallee was co-dominant with an understorey of *Triodia* grassland which is generally indicative of very shallow soils and significant rock outcropping (Figure 10). These areas are typically structurally diverse and provide significant habitat value due the refuge resources this species provides to small mammals and reptiles. Table 12 below summarise the typical community composition.



Figure 10. *Eucalyptus oleosa* ssp. (Red Mallee) Open Mallee over *Triodia irritans* (Spinifex) Grassland.

Table 12. *Eucalyptus oleosa* ssp. (Red Mallee) Open Mallee over *Triodia irritans* (Spinifex) Grassland community summary.

Overstorey species	<i>Acacia aneura</i> (Mulga) <i>Casuarina pauper</i> (Belah)
Midstorey species	<i>Dodonaea viscosa</i> ssp. <i>angustissimus</i> (Sticky Hop-bush) <i>Senna</i> spp. (Sennas) <i>Myoporum montanum</i> (Western Boobiella)
Understorey species	<i>Maireana</i> spp. (Bluebushes) <i>Enchylaena tomentosa</i> (Ruby Saltbush) <i>Ptilotus obovatus</i> (Silver Mulla Mulla) <i>Sida</i> spp. (Sidas) <i>Sclerolaena obliquicuspis</i> (Oblique spined Bindyi)
Threatened species	None observed
Declared or significant weeds	<i>Carrichtera annua</i> (Wards Weed)
Vegetation condition	36.75, Medium
Unit biodiversity scores	43.66

Vegetation Association 6: *Triodia irritans* (Spinifex) Hummock Grassland.

Triodia irritans (Spinifex) Grassland formed large tracts of dominant community on the escarpments and sides of hills where shallow soils dominated the landform (Figure 11). The community was interrupted by areas where *Eucalyptus oleosa* dominated patches however this community was defined by no areas of over storey above the hummock grass cover. Table 13 below summarise the typical community composition.



Figure 11. *Triodia irritans* (Spinifex) Grassland.

Table 13. *Triodia irritans* (Spinifex) Hummock Grassland community summary.

Overstorey species	<i>Triodia irritans</i> (Spinifex)
Midstorey species	<i>Lawrencia squamata</i> (Thorny Lawrencia)
Understorey species	<i>Maireana</i> spp. (Bluebushes) <i>Enchylaena tomentosa</i> (Ruby Saltbush) <i>Ptilotus obovatus</i> (Silver Mulla Mulla) <i>Sida</i> spp. (Sidas) <i>Sclerolaena obliquicuspis</i> (Oblique spined Bindyi)
Threatened species	None observed
Declared or significant weeds	<i>Medicago polymorpha</i> , <i>Carrichtera annua</i> , <i>Asphodelus fistulosus</i>
Vegetation condition	36.69, Medium
Unit biodiversity scores	43.58

Vegetation Association 7: *Dodonaea lobulata* (Lobe-leaved Hop-bush) +/- *Maireana sedifolia* (Pearl Bluebush) Low Shrubland

This community occupied a small section of the 250 m corridor and was largely on the southern facing escarpments of the south section (Figure 12). There was high levels of rock outcropping typical of areas where *Dodonaea lobulata* commonly dominates. Tussocks of *Cymbopogon ambiguus* (Lemon-scented Grass) were prevalent throughout these areas. Table 14 summarises the species observed within the general community.



Figure 12. *Dodonaea lobulata* (Lobe-leaved Hop-bush) +/- *Maireana sedifolia* (Pearl Bluebush) Low Shrubland reference.

Table 14. *Dodonaea lobulata* (Lobe-leaved Hop-bush) +/- *Maireana sedifolia* (Pearl Bluebush) Low Shrubland community summary.

Overstorey species	<i>Dodonaea lobulata</i> (Lobe leaved Hop Bush)
Midstorey species	<i>Sida petrophila</i> (Rock Sida) <i>Maireana sedifolia</i> (Pearl Bluebush)
Understorey species	<i>Maireana</i> spp. (Bluebushes) <i>Enchylaena tomentosa</i> (Ruby Saltbush) <i>Ptilotus</i> (Silver Mulla Mulla) <i>Sida</i> spp. (Sidas) <i>Sclerolaena obliquicuspis</i> (Oblique spined Bindyi)
Threatened species	None observed
Declared or significant weeds	<i>Carrichtera annua</i> (Wards Weed)
Vegetation condition	43.04, Medium
Unit biodiversity scores	51.13

3.2.2 Site Fauna

General bird observations

A total of 148 individuals from 20 bird species were recorded over the field assessment period (Table 15). The most abundant bird species recorded over the Project area were the White-fronted Chat (*Epthianura albifrons*) (43 individuals), Black-faced Woodswallow (*Artamus cinereus*) (21 individuals), White-winged Fairywren (*Malurus leucopterus*) (21 individuals) and White-browed Babbler (*Pomatostomus superciliosus*) (15 individuals). One introduced species, the Common Starling (*Sturnus vulgaris*) (10 individuals) was recorded in the Project area. The State Rare (Western) Slender-billed Thornbill (*Acanthiza iredalei iredalei*) was the only species with a conservation status to be recorded in the Project area.

Table 15. The number of individuals of each fauna species observed in the Project area.

Family Name	Scientific Name	Common Name	Conservation Status		Number of individuals
			Aus	SA	
ACANTHIZIDAE	<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western)		R	11
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill			3
ACCIPITRIDAE	<i>Aquila audax</i>	Wedge-tailed Eagle			5
ARTAMIDAE	<i>Artamus cinereus</i>	Black-faced Woodswallow			21
	<i>Cracticus torquatus</i>	Grey Butcherbird			1
	<i>Gymnorhina tibicen</i>	Australian Magpie			1
CAMPEPHAGIDAE	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike			1
COLUMBIDAE		Common Bronzewing			1
CORVIDAE	<i>Corvus mellori</i>	Little Raven			2
HIRUNDINIDAE	<i>Hirundo neoxena</i>	Welcome Swallow			3
MALURIDAE	<i>Malurus leucopterus</i>	White-winged Fairywren			21
MELIPHAGIDAE	<i>Epthianura albifrons</i>	White-fronted Chat			43
MOTACILLIDAE	<i>Anthus australis</i>	Australian Pipit			4
PACHYCEPHALIDAE	<i>Pachycephala rufiventris</i>	Rufous Whistler			2
PETROICIDAE	<i>Microeca fascinans</i>	Jacky Winter			1
PHASIANIDAE	<i>Coturnix pectoralis</i>	Stubble Quail			1
POMATOSTOMIDAE	<i>Pomatostomus superciliosus</i>	White-browed Babbler			15
PSITTACULIDAE	<i>Psephotellus varius</i>	Mulga Parrot			1
RHIPIDURIDAE	<i>Rhipidura leucophrys</i>	Willie Wagtail			1
STURNIDAE	<i>Sturnus vulgaris</i>	Common Starling			10
Grand Total					148

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

Western Grasswren

The Nationally Vulnerable Western Grasswren (*Amytornis textilis myall*) was not recorded within the Project area during the targeted bird surveys. The Western Grasswren is discussed further in Section 4.2.

Slender-billed Thornbill (western)

The State Rare Slender-billed Thornbill (*Acanthiza iredalei iredalei*) was recorded within the Project area during the targeted bird surveys. The Slender-billed Thornbill is discussed further in Section 4.2.3.

Reptiles

One reptile species; the Gidgee Skink (*Egernia stokesii*) was observed in the Project area. This species was recorded at a rocky outcrop, which comprises the preferred habitat for the Gidgee Skink.

4 POTENTIAL IMPACTS

4.1 Impact on vegetation

The vegetation condition was typical for areas managed under normal pastoral conditions. Most shrubs were grazed to some extent however there was little to no evidence of overgrazing in any areas on the tablelands that the Project areas occupied. Intact microphytic crust cover was observed across the Project area and this is an indicator of appropriate historical grazing regimes.

The primary driver of low vegetation condition scores was due to the presence of exotic species and lack of perennial grass tussocks. This was likely to be a direct result of dry seasonal conditions, during which higher palatable species such as perennial grasses are generally grazed out. Increased effects of grazing was probably caused by high numbers of Western Grey (*Macropus fuliginosus*) and Red Kangaroos (*Macropus rufus*) observed within the Project area, on top of normal stocking rates. It would be expected that with a return of average seasonal conditions perennial grasses will recover. Goats (*Capra hircus*) were also prevalent throughout the Project area at moderate densities. The construction and operation of the wind farm is not expected to impact on vegetation communities other than the loss from clearance.

Declared weeds species such as *Lycium ferocissimum* (African Boxthorn) was sparsely present, only occupying shallow ephemeral depressions, often in association with the indigenous *Lycium australe*. Other weed cover were annual species commonly occurring in grazing country at these rainfall gradients such as *Carrichtera annua* (Wards Weed) and *Asphodelus fistulosus* (Onion Weed). No increase in weed species would be expected as part of construction and operation if standard weed management measures are implemented.

The potential decline in vegetation community composition over longer time spans of >100 years could be caused the lack of regeneration, whereby over storey shrubs and trees have been unable to re-establish after germination due to grazing from rabbits particularly, which were present in the Project area. The slow retreat of these communities as older individuals are lost is not highly noticeable in a short timeframe, however contributes significantly to reduced condition and species richness over time. The Project possibly plays a significant role in managing the above mentioned pest species through offsets provided as part of vegetation clearance, which has the potential to result in improved outcomes for these types of areas.

The low species richness (20 species) of birds within the Project area may have been in response to the prevailing drought conditions, as well as the cold temperatures and windy conditions experienced over the survey period. As transient and nomadic bird species comprise a significant proportion of the bird community in arid areas (Reid and Gillen 2013), the lack of rainfall and subsequent low availability of food resources, may have resulted in an exodus of numerous bird species from the Project area in search of more productive arid areas. Furthermore, the cold temperatures and wind may have reduced bird activity and therefore lowered the likelihood of their detection (Robbins 1981).

4.2 Nationally threatened fauna species

4.2.1 *Western Grasswren (Amytornis textilis myall)*

The likelihood of Western Grasswrens occurring in the Project area was downgraded from possible to unlikely following the field assessment, due to the absence of suitable habitat. Suitable habitat for the Western Grasswren was described by Black *et al.* (2009) as “*low-lying areas of Blackbush and spiny shrubs, particularly Australian Boxthorn, either as a shrubland or as an understorey of Western Myall low open woodland. Furthermore, the “presence of (western) grasswrens could largely be predicted by the total cover of Blackbush, Australian Boxthorn, spiny shrubs, Ruby Saltbush and taller shrubs (over 0.75 m)”*. There were no Vegetation Associations mapped over the Project area where Blackbush, Australian Boxthorn or other spiny shrub species were dominant species. As such, habitat within the Project area is deemed unsuitable for the Western Grasswren.

4.2.2 *Fork-tailed Swift (Apus pacificus)*

The Fork-tailed Swift is a non-breeding visitor to Australia, arriving in Australia between September and October and departing from its breeding grounds in April. The breeding grounds of the Fork-tailed Swift extend from northern India to western Russia. The distribution of the Fork-tailed Swift in Australia extends the entire continent, with records most common around the coastal and sub-coastal regions, however, the species also frequents inland areas. Fork-tailed Swifts are highly mobile in Australia, and their movements are influenced by weather patterns, with large flocks observed to precede and follow low pressure systems (DotE 2019). Although Fork-tailed Swifts are nearly exclusively aerial in Australia, the species has been observed to roost in cliffs and large trees, however, may spend nights flying (Pizzey and Knight 2014).

4.2.3 *Western Slender-billed Thornbill (Acanthiza iredalei iredalei)*

Three groups of (Western) Slender-billed Thornbills, consisting of five, four and two individuals were observed within the Project area (Figure 13). These groups were observed in two Vegetation Associations; *Atriplex vesicaria* (Bladder Saltbush) / *Tecticornia medullosa* (Samphire) Shrubland (VA 1) and *Casuarina pauper* (Belah) Open Woodland (VA 3). Where a group was recorded in *Casuarina pauper* (Belah) Open Woodland, overstorey species were very sparse and *Maireana spp.* (Bluebushes) were more abundant. The chenopod shrubland habitat within VA 1 is their usual habitat, however, it is uncommon for the species to inhabit *Casuarina* dominated communities (VA 3) (Threatened Species Scientific Committee 2013). Western Slender-billed Thornbills were also recorded in *Casuarina pauper* (Belah) Sparse Open Woodland adjacent to the Project area in 2017 (G. Oerman. Pers. Comm. 2019).

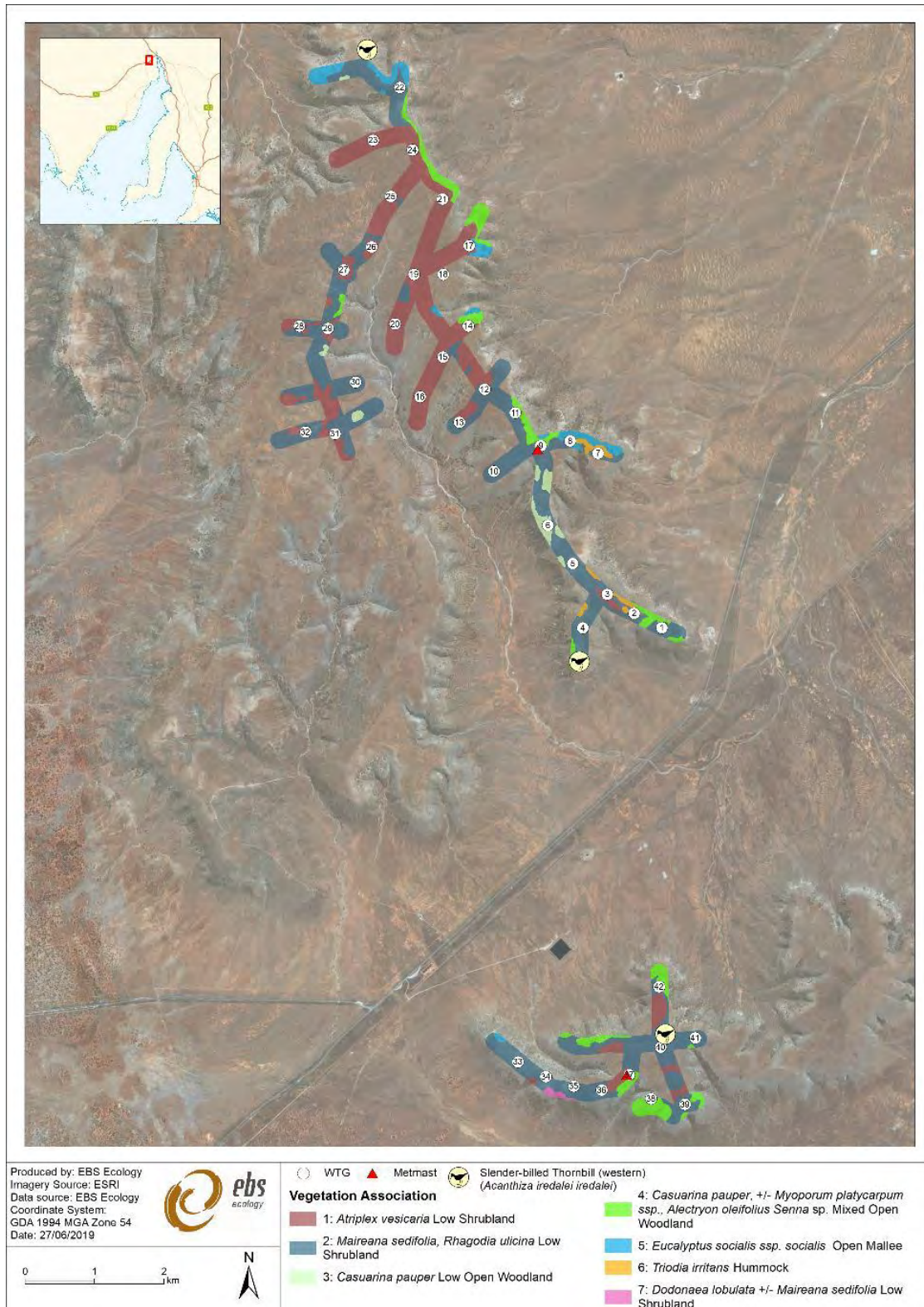


Figure 13. Locations of Western Slender-bill Thornbill observations during of the June 2019 field survey.

The vegetation associations mapped over the Project area have been divided in to three categories based upon their suitability for (Western) Slender-billed Thornbills presence: unsuitable, potential and preferred habitat. The suitability of each vegetation association over the Project area for (Western) Slender-billed Thornbills is detailed in Table 16.

Overall, the Project area covers 753.42 ha of preferred habitat and 107.17 ha of potential habitat for the (Western) Slender-billed Thornbill. The Project will have a negligible impact on the (Western) Slender-billed Thornbill as the species has a stable population, is widespread, and has extensive areas of suitable habitat within the region (TSSC 2013).

Table 16. Suitability of each Vegetation Association as habitat for (Western) Slender-billed Thornbills.

VA ID	Association	Area (Ha)	Suitability for Western Slender-billed Thornbills
1	<i>Atriplex vesicaria</i> (Bladder Saltbush) +/- <i>Tecticornia medullosa</i> (Samphire) Low Shrubland.	313.29	Preferred
2	<i>Maireana sedifolia</i> (Pearl Bluebush), <i>Rhagodia ulicina</i> (Intricate Saltbush) Low Shrubland.	440.13	Preferred
3	<i>Casuarina pauper</i> (Black Oak) Low Open Woodland.	19.15	Potential
4	<i>Casuarina pauper</i> (Black Oak) +/- <i>Myoporum platycarpum</i> ssp. (False Sandalwood), <i>Alectryon oleifolius</i> (Bullock Bush) <i>Senna</i> sp. (Senna) Mixed Open Woodland.	84.79	Potential
5	<i>Eucalyptus socialis</i> ssp. <i>socialis</i> (Red Mallee) Open Mallee	39.04	Unsuitable
6	<i>Triodia irritans</i> (Spinifex) Hummock Grassland.	13.41	Unsuitable
7	<i>Dodonaea lobulata</i> (Lobe-leaved Hop-bush) +/- <i>Maireana sedifolia</i> (Pearl Bluebush) Low Shrubland	3.23	Potential

4.3 State threatened fauna species

Seven other State listed species were considered to potentially occur within the Project area (Table 17). The impact of the Project on the species will be negligible due to their uncommon to rare frequency of occurrence, widespread distribution and the availability of extensive areas of comparable habitat elsewhere in the region.

Table 17. Fauna species which have potential to occur within the Project area.

Scientific name	Common name	Reasoning
<i>Ardeotis australis</i>	Australian Bustard	Possible. The Australian Bustard may be an irregular visitor to the Project area. Suitable habitat in <i>Atriplex vesicaria</i> (Bladder saltbush), <i>Tecticornia medullosa</i> (Samphire), <i>Sclerolaena</i> sp. Shrubland, is widespread over the Project area (G. Oerman. Pers. Obs. 2019, Pizzey and Knight 2014). The species has been observed within 2 km of the Project area as recently as 2006 (ALA 2019).
<i>Falco hypoleucos</i>	Grey Falcon	Possible. The Grey Falcon may be a rare visitor to the Project area. The species inhabits lightly treed inland plains and has been observed within 40 km from the Project area in 2011 (ALA 2019).
<i>Falco peregrinus</i>	Peregrine Falcon	Possible. The Peregrine Falcon may be an uncommon visitor to the Project area. The species inhabits plains and open woodlands (Pizzey and Knight 2014). The species has been recorded within 50 km of the Project area in 2005 (DEWNR 2019).
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	Possible. The Black-breasted Buzzard may be a rare visitor to the Project area. The Project area is at the

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Scientific name	Common name	Reasoning
		southern limit of the range of the Black-breasted Buzzard; however, the species has been observed within 2 km of the Project area in 2006.
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	Possible. The Major Mitchell's Cockatoo may be a rare visitor to the Project area. The species inhabits chenopod plains and casuarina woodland, and therefore suitable habitat is present within the Project area (Pizzey and Knight 2014). Major Mitchell's Cockatoo were recorded within 7 km of the Project area in 2013 (ALA 2019).
<i>Neophema chrysostoma</i>	Blue-winged Parrot	Possible. The Blue-winged Parrot may be an uncommon visitor to the Project area. The species inhabits chenopod shrublands and has been observed within 20 km of the Project area in 2017 (G. Oerman. Pers, Obs. 2019; Pizzey and Knight 2014).
<i>Neophema elegans</i>	Elegant Parrot	Possible. The Elegant Parrot may be an uncommon visitor to the Project area, as the species inhabits chenopod shrublands (Pizzey and Knight 2014). The species has been observed within 10 km of the Project area as recently as 2006 (ALA 2019). Elegant Parrots were observed approximately 10 km from the Project area in 2017 (G. Oerman. Pers, Obs. 2019).

5 MANAGEMENT AND MITIGATION MEASURES

5.1 Planning and Design

The impact on native vegetation is unavoidable within the footprint which is entirely comprised of indigenous vegetation communities. No communities were observed to contain threatened flora species at the time of the June 2019 survey. Despite this, some species with records regionally were deemed as possibly occurring within the Project area. The likelihood of these species occurring is greatest in areas of high species richness and niche availability which is largely associated with areas on the edges of escarpments, steep slopes and areas which contain and retain resources such as water, litter, food and shelter. These areas are the least represented within the Project area. Hence, it is recommended to design the lay-out of the Project in communities without multi-layer structures and overstorey canopy and exclude infrastructure from all areas of woodland. Infrastructure should also avoid the *Triodia* grasslands, which while not primarily being diverse in structure, provide significant refuge habitat for fauna species due to the inherent spiny nature of the flora species present in this vegetation community.

No Wedge-tailed Eagle (*Aquila audax*) nests were identified during the 2019 survey. However, nesting may occur within the Project area, if new nests are established or previously inactive areas are occupied by Wedge-tailed Eagles. For any new nest locations, it is recommended that each nest have a 500 m buffer placed around it, to reduce the risk of bird collision and nest disturbance. Raptors had completed their breeding at the time the 2019 bird surveys were undertaken. It is thus recommended that an additional survey is undertaken for at risk raptors during their breeding season (i.e. spring) to gain a better picture of activity levels across the Project area, and potential breeding locations.

Approval is required from the Native Vegetation Council regarding any vegetation clearance that may be required for the Project. Once the infrastructure design is finalised, the extent of vegetation removal required will need to be determined to calculate the required SEB offset. The provision of an SEB can be undertaken in several forms including managing and conserving areas of native vegetation, undertaking native vegetation restoration activities or making a payment into the Native Vegetation Fund.

If the Project is to proceed, a detailed Environmental Impact Assessment (EIA) report and subsequent environmental management plan should be developed and implemented. These plans should include flora and fauna management, which identifies, but is not limited to, best practice principles for the management of vegetation, fauna, threatened species and weeds.

5.2 Construction

Where impact on native vegetation cannot be avoided (e.g. cable routes across roads), infrastructure should be sited to avoid intact native vegetation and areas of potential fauna habitat. Micro-siting prior to construction should be undertaken to ensure any impact is minimised.

The main concerns in relation to flora is the impact during construction of the turbines and associated infrastructure such as access tracks (e.g. direct damage by vehicles and machinery) and the ongoing indirect impacts associated with increased activity and maintenance activities (e.g. dust issues from use of vehicle access tracks). For these reasons, areas of intact native vegetation, areas of vegetation in good

condition and areas containing threatened flora should be buffered by a suitable distance (ideally 100 m) to ensure these areas will not be subject to ongoing impact. Micro-siting of infrastructure will be required for areas where native vegetation will be impacted upon or infrastructure is to be located within the buffer areas. Any infrastructure within the buffer area will need to be assessed at a site level to ensure potential impacts are minimised.

Staff training and awareness of ecological issues, flora and fauna species, their values and threats is important to successfully minimise impacts during construction and operation. Staff working in the Project area should be aware of the significance of the native vegetation and fauna species present and potentially present, and the potential and actual impacts of construction, operation and maintenance of the proposed wind farm on flora and fauna species and habitats. Training and inductions for on-site personnel should reinforce staff expectations to minimise potential impacts related to on-site works, and encourage staff to report significant flora and fauna sightings. If the Project is to proceed, a detailed Construction and Operation Environmental Management Plan (COEMP) should be developed and implemented.

5.3 Operation

A review of the proposed final layout should be undertaken to quantify the actual impact of the proposed wind farm after the design has been finalised. This includes the actual vegetation clearance and the condition of the impacted vegetation.

Weed management strategies should be implemented to ensure that weed species are not introduced to or spread throughout the construction site. Targeted control of isolated priority weed occurrences should be undertaken.

An ongoing fauna monitoring program should be developed (commencing prior to construction) with a focus on migratory and at risk bird species, bats, and threatened flora species, as mentioned in this report. If the wind farm is designed so that there are no impacts on native vegetation or threatened flora species, a monitoring program will not be required for threatened flora, but bird and bat monitoring will be required.

The bird monitoring program will enable site management to be informed by collated data on bird movements, including potential flight and migration paths, and nesting locations of raptors at risk of collision. Such a program will allow site specific management to be implemented (e.g. buffers, radar monitoring, turning off turbines at higher risk times), if issues or significant impacts are identified.

If the Project is to proceed, a detailed COEMP should be developed and implemented.

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7 APPENDICES

Appendix 1. Flora species records within 10km buffer of Project area (BDBSA 2019).

Exotic	Species	Common	Aus	SA	Most recent sighting
	<i>Abutilon fraseri</i> ssp.				1/10/1994
	<i>Abutilon fraseri</i> ssp. <i>diplotrichum</i>	Dwarf Lantern-bush			1/04/2007
	<i>Abutilon fraseri</i> ssp. <i>fraseri</i>	Dwarf Lantern-bush			26/03/2007
	<i>Abutilon halophilum</i>	Plains Lantern-bush			31/03/2007
	<i>Abutilon leucopetalum</i>	Desert Lantern-bush			1/12/1991
	<i>Abutilon otocarpum</i>	Desert Lantern-bush			26/03/2007
	<i>Abutilon</i> sp.	Lantern-bush			26/03/2007
	<i>Acacia acinacea</i>	Wreath Wattle			20/10/1994
	<i>Acacia anceps</i>				1/07/1941
	<i>Acacia aneura</i> complex	Mulga			1/04/2007
	<i>Acacia aneura</i> var. <i>aneura</i>	Mulga			23/09/1990
	<i>Acacia aneura</i> var. <i>intermedia</i>	Broad-leaf Mulga			31/03/2007
	<i>Acacia argyrophylla</i>	Silver Mulga-bush			4/09/1994
	<i>Acacia ayersiana</i>	Blue Mulga			9/11/1928
	<i>Acacia beckleri</i> (NC)	Beckler's Rock Wattle			27/10/1992
	<i>Acacia brachystachya</i>	Turpentine Mulga			31/03/2007
	<i>Acacia burkittii</i>	Pin-bush Wattle			1/04/2007
	<i>Acacia calamifolia</i>	Wallowa			7/10/2015
	<i>Acacia calamifolia</i> (NC)	Wallowa			26/11/2002
	<i>Acacia clelandii</i>	Turpentine Mulga			19/04/1955
	<i>Acacia continua</i>	Thorn Wattle			15/09/2009
	<i>Acacia cupularis</i>	Cup Wattle			3/10/1994
	<i>Acacia euthycarpa</i>	Wallowa			1/04/2007
	<i>Acacia hakeoides</i>	Hakea Wattle			17/11/2009
	<i>Acacia havilandiorum</i>	Needle Wattle			10/06/1990
	<i>Acacia iteaphylla</i>	Flinders Ranges Wattle		R	20/05/1975
	<i>Acacia kempeana</i>	Witchetty Bush			13/05/1992
	<i>Acacia ligulata</i>	Umbrella Bush			19/10/2008
	<i>Acacia ligulata</i> (NC)	Umbrella Bush			27/08/1990
	<i>Acacia notabilis</i>	Notable Wattle			17/11/2009
	<i>Acacia oswaldii</i>	Umbrella Wattle			17/11/2009
	<i>Acacia papyrocarpa</i>	Western Myall			21/09/2009
	<i>Acacia paradoxa</i>	Kangaroo Thorn			27/08/1975
	<i>Acacia praviifolia</i>	Coil-pod Wattle			23/11/1999
	<i>Acacia pycnantha</i>	Golden Wattle			7/10/2015
	<i>Acacia quornensis</i>	Quorn Wattle		R	17/01/2006
	<i>Acacia ramulosa</i> var. <i>ramulosa</i>	Horse Mulga			1/01/1941
	<i>Acacia rigens</i>	Nealie			1/08/1999
	<i>Acacia rivalis</i>	Silver Wattle			10/10/1964
	<i>Acacia rupicola</i>	Rock Wattle			24/11/1999
	<i>Acacia salicina</i>	Willow Wattle			1/09/2001
	<i>Acacia sclerophylla</i> var. <i>sclerophylla</i>	Hard-leaf Wattle			1/01/1995
	<i>Acacia sibirica</i>	Bastard Mulga			19/11/1992
	<i>Acacia</i> sp.	Wattle			17/01/1996
	<i>Acacia tarculensis</i>	Steel Bush			22/04/1954
	<i>Acacia tetragonophylla</i>	Dead Finish			31/03/2007
	<i>Acacia victoriae</i> ssp.	Elegant Wattle			7/10/2015

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	<i>Acacia victoriae</i> ssp. <i>victoriae</i>	Elegant Wattle			7/12/2009
	<i>Acacia wilhelmiana</i>	Dwarf Nealie			18/10/1996
	<i>Acaena echinata</i>	Sheep's Burr			27/12/1997
	<i>Acaena novae-zelandiae</i>	Biddy-biddy			16/11/2009
	<i>Acaena</i> sp.	Sheep's Burr			1/10/1994
	<i>Acarospora smaragdula</i>				10/08/1969
✓	<i>Acetosa vesicaria</i>	Rosy Dock			26/03/2007
✓	<i>Achillea millefolium</i>	Yarrow			1/01/1989
	<i>Acrosorium ciliolatum</i>				4/11/1973
	<i>Actinobole uliginosum</i>	Flannel Cudweed			17/10/1996
✓	<i>Adonis microcarpa</i>	Pheasant's Eye			7/09/1969
✓	<i>Agave americana</i>	Century Plant			17/11/2009
	<i>Agrostis avenacea</i> var. <i>perennis</i> (NC)	Perennial Blown-grass			1/10/1994
✓	<i>Aira caryophyllea</i>	Silvery Hair-grass			23/11/1999
✓	<i>Aira cupaniana</i>	Small Hair-grass			22/10/1994
✓	<i>Aira elegantissima</i>	Delicate Hair-grass			16/11/2009
✓	<i>Aira</i> sp.	Hair-grass			16/11/2009
	<i>Ajuga australis</i>	Australian Bugle			7/10/2015
	<i>Ajuga australis</i> f. <i>A</i> (A.G. Spooner 9058)	Australian Bugle			14/09/2009
	<i>Alectryon oleifolius</i> ssp. <i>canescens</i>	Bullock Bush			7/10/2015
	<i>Allocasuarina helmsii</i>	Helm's Oak-bush			1/12/1950
	<i>Allocasuarina muelleriana</i> ssp.	Common Oak-bush			3/10/1994
	<i>Allocasuarina muelleriana</i> ssp. <i>alticola</i>	Flinders Ranges Oak-bush			13/07/1999
	<i>Allocasuarina muelleriana</i> ssp. <i>muelleriana</i>	Common Oak-bush			5/05/1987
	<i>Allocasuarina verticillata</i>	Drooping Sheoak			17/07/2003
	<i>Alternanthera angustifolia</i>	Narrow-leaf Joyweed			10/02/1997
	<i>Alternanthera denticulata</i>	Lesser Joyweed			1/04/2003
	<i>Alternanthera nana</i>	Hairy Joyweed			1/10/1994
	<i>Alternanthera nodiflora</i>	Common Joyweed			
✓	<i>Alternanthera pungens</i>	Khaki Weed			1/04/1986
	<i>Alternanthera</i> sp. <i>A</i> (<i>prostrate</i>)				1/10/1994
	<i>Alyogyne hakeifolia</i>	Hakea-leaf Hibiscus			22/10/1990
	<i>Alyogyne huegelii</i>	Native Hibiscus			15/10/1996
	<i>Alyogyne huegelii</i> (NC)	Native Hibiscus			17/10/1996
	<i>Alyogyne</i> sp. <i>Great Victoria Desert</i> (D.J. Edinger 6212)				16/09/1992
✓	<i>Alyssum linifolium</i>	Flax-leaf Alyssum			18/10/1996
	<i>Alyxia buxifolia</i>	Sea Box			1/04/1994
✓	<i>Amaranthus caudatus</i>	Love-lies-bleeding			19/01/1989
✓	<i>Amaranthus deflexus</i>	Spreading Amaranth			16/02/1997
	<i>Amaranthus grandiflorus</i>	Large-flower Amaranth			26/03/2007
	<i>Amaranthus mitchellii</i>	Boggabri Weed			23/09/1990
	<i>Amaranthus</i> sp.	Amaranth			1/10/1994
✓	<i>Amaranthus viridis</i>	Green Amaranth			1/08/2003
	<i>Amoenothamnion planktonicum</i>				26/11/1975
	<i>Amphibolis antarctica</i>	Sea Nymph			1/01/1975
	<i>Amphipogon caricinus</i> var. <i>caricinus</i>	Long Grey-beard Grass			1/10/1994
✓	<i>Amsinckia lycopsooides</i>	Bugloss Fiddle-neck			4/10/1997
	<i>Amyema linophylla</i> ssp. <i>orientalis</i>	Casuarina Mistletoe			16/03/1987
	<i>Amyema melaleucae</i>	Tea-tree Mistletoe			29/07/1982
	<i>Amyema miquelii</i>	Box Mistletoe			18/09/2001

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	<i>Amyema miraculosa ssp. boormanii</i>	Fleshy Mistletoe			22/10/1996
	<i>Amyema preissii</i>	Wire-leaf Mistletoe			23/11/1999
	<i>Amyema quandang var. quandang</i>	Grey Mistletoe			1/04/2007
	<i>Amyema sp.</i>	Mistletoe			15/09/1997
	<i>Anacampseros australiana</i>	Australian Anacampseros			22/11/1999
✓	<i>Anagallis arvensis</i>	Pimpernel			7/10/2015
✓	<i>Anchusa capensis</i>	Cape Forget-me-not			1/10/1994
	<i>Angianthus glabratus</i>	Smooth Angianthus			1/01/1998
	<i>Anogramma leptophylla</i>	Annual Fern		R	29/08/1999
	<i>Anotrichium elongatum</i>				27/06/1978
	<i>Anthocercis anisantha ssp. collina</i>	Gawler Ranges Ray-flower			22/09/1990
	<i>Anthosachne scabra</i>	Native Wheat-grass			18/10/1996
	<i>Antithamnion delicatulum</i>				27/06/1978
	<i>Antrocentrum nigrescens</i>				17/11/1980
	<i>Aphanes australiana</i>	Australian Piert			28/08/1999
	<i>Aphanes australiana (NC)</i>	Australian Piert			3/10/1994
	<i>Aphanes pumila</i>	Australian Piert			29/08/1999
	<i>Arabidella filifolia</i>	Thread-leaf Cress			9/09/2010
	<i>Arabidella nasturtium</i>	Yellow Cress			16/09/2008
	<i>Arabidella procumbens</i>	Creeping Cress			11/08/2008
	<i>Arabidella trisecta</i>	Shrubby Cress			10/09/2010
✓	<i>Arctotheca calendula</i>	Cape Weed			7/10/2015
✓	<i>Arctotheca sp.</i>				2/10/1994
✓	<i>Argemone ochroleuca ssp. ochroleuca</i>	Mexican Poppy			14/12/1946
	<i>Argentipallium obtusifolium</i>	Blunt Everlasting			1/09/1927
	<i>Aristida anthoxanthoides</i>	Yellow Three-awn			1/05/1921
	<i>Aristida behriana</i>	Brush Wire-grass			16/11/2009
	<i>Aristida contorta</i>	Curly Wire-grass			31/03/2007
	<i>Aristida holathera var. holathera</i>	Tall Kerosene Grass			31/03/2007
	<i>Aristida nitidula</i>	Brush Three-awn			18/10/1996
	<i>Aristida personata</i>	Purple Wire-grass			24/03/2000
	<i>Aristida sp.</i>	Three-awn/Wire-grass			2/10/1994
	<i>Arthropodium minus</i>	Small Vanilla-lily			9/09/2010
	<i>Arthropodium sp.</i>	Vanilla-lily			22/10/1994
	<i>Arthropodium strictum</i>	Common Vanilla-lily			7/10/2015
✓	<i>Arundo donax</i>	Giant Reed			13/01/1987
✓	<i>Asclepias curassavica</i>	Red-head Cotton-bush			16/02/1997
	<i>Asparagopsis armata</i>				10/09/1987
	<i>Asparagopsis taxiformis</i>				3/08/2007
	<i>Asperococcus bullosus</i>				4/08/2007
	<i>Asperula conferta</i>	Common Woodruff			10/09/2010
	<i>Asperula syrticola</i>	Southern Flinders Woodruff		R	28/08/1999
✓	<i>Asphodelus fistulosus</i>	Onion Weed			7/10/2015
	<i>Asplenium flabellifolium</i>	Necklace Fern			1/10/1994
	<i>Asterella drummondii</i>				5/09/1980
	<i>Asteridea athrxioides</i>	Wirewort			11/06/1973
	<i>Asteridea athrxioides f. athrxioides (NC)</i>	Wirewort			1/10/1994
✓	<i>Asteriscus spinosus</i>	Golden Pallensis			12/01/1993
	<i>Astroloma humifusum</i>	Cranberry Heath			19/09/2001
	<i>Atriplex acutibractea ssp.</i>	Pointed Saltbush			1/01/1975
	<i>Atriplex acutibractea ssp. acutibractea</i>	Pointed Saltbush			22/10/1990

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	<i>Atriplex angulata</i>	Fan Saltbush			20/10/2008
	<i>Atriplex cinerea</i>	Coast Saltbush			1/07/1995
	<i>Atriplex eardleyae</i>	Eardley's Saltbush			25/02/1997
	<i>Atriplex fissivalvis</i>	Gibber Saltbush			20/09/1990
	<i>Atriplex holocarpa</i>	Pop Saltbush			20/10/2008
	<i>Atriplex limbata</i>	Spreading Saltbush			8/03/1997
	<i>Atriplex lindleyi</i> ssp.	Baldoo			20/10/2008
	<i>Atriplex lindleyi</i> ssp. <i>conduplicata</i>	Baldoo			19/04/1997
	<i>Atriplex lindleyi</i> ssp. <i>inflata</i>	Corky Saltbush			18/10/1996
	<i>Atriplex lindleyi</i> ssp. <i>lindleyi</i>	Baldoo			7/03/1998
	<i>Atriplex lindleyi</i> ssp. <i>quadripartita</i>	Baldoo			13/06/1992
	<i>Atriplex paludosa</i> ssp. <i>cordata</i>	Marsh Saltbush			1/01/1998
	<i>Atriplex paludosa</i> ssp. <i>paludosa</i>	Marsh Saltbush			16/10/1996
	<i>Atriplex pumilio</i>	Mat Saltbush			8/03/1997
	<i>Atriplex semibaccata</i>	Berry Saltbush			17/11/2009
	<i>Atriplex</i> sp.	Saltbush			7/12/2009
	<i>Atriplex spongiosa</i>	Pop Saltbush			19/04/1997
	<i>Atriplex stipitata</i>	Bitter Saltbush			18/11/2009
	<i>Atriplex suberecta</i>	Lagoon Saltbush			25/02/1997
	<i>Atriplex velutinella</i>	Sandhill Saltbush			28/09/1920
	<i>Atriplex vesicaria</i>	Bladder Saltbush			5/11/2008
	<i>Atriplex vesicaria</i> ssp. (NC)	Bladder Saltbush			16/11/2009
	<i>Audouinella daviesii</i>				17/04/1975
	<i>Austrobryonia micrantha</i>	Desert Cucumber			26/12/1990
✓	<i>Austrocylindropuntia cylindrica</i>	Cane Cactus			7/11/2006
✓	<i>Austrocylindropuntia subulata</i>	Eve's-pin Cactus			27/08/1985
	<i>Austrodanthonia</i> sp. (NC)				7/12/2009
	<i>Austronereia australis</i>				5/08/2007
	<i>Austrostipa acrociliata</i>	Graceful Spear-grass			17/11/2009
	<i>Austrostipa blackii</i>	Crested Spear-grass			22/11/1999
	<i>Austrostipa breviglumis</i>	Cane Spear-grass		R	15/07/2003
	<i>Austrostipa curticoma</i>	Short-crest Spear-grass			18/10/1996
	<i>Austrostipa drummondii</i>	Cottony Spear-grass			7/10/2015
	<i>Austrostipa echinata</i>	Spiny Spear-grass		R	23/09/1990
	<i>Austrostipa elegantissima</i>	Feather Spear-grass			17/11/2009
	<i>Austrostipa eremophila</i>	Rusty Spear-grass			23/11/1999
	<i>Austrostipa exilis</i>	Heath Spear-grass			29/09/1992
	<i>Austrostipa flavescens</i>	Coast Spear-grass			27/10/1992
	<i>Austrostipa gibbosa</i>	Swollen Spear-grass		R	27/10/1992
	<i>Austrostipa nitida</i>	Balcarra Spear-grass			18/11/2009
	<i>Austrostipa nodosa</i>	Tall Spear-grass			7/10/2015
	<i>Austrostipa petraea</i>	Flinders Range Spear-grass		R	5/12/2005
	<i>Austrostipa pilata</i>	Prickly Spear-grass		V	18/10/1996
	<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass			19/10/2008
	<i>Austrostipa puberula</i>	Fine-hairy Spear-grass			12/10/1998
	<i>Austrostipa scabra</i> ssp.	Rough Spear-grass			15/09/1986
	<i>Austrostipa scabra</i> ssp. <i>falcata</i>	Slender Spear-grass			23/08/2001
	<i>Austrostipa scabra</i> ssp. <i>scabra</i>	Rough Spear-grass			1/01/2000
	<i>Austrostipa setacea</i>	Corkscrew Spear-grass			15/10/1996
	<i>Austrostipa</i> sp.	Spear-grass			7/12/2009
	<i>Austrostipa stipoides</i>	Coast Spear-grass			16/11/2009
	<i>Austrostipa tenuifolia</i>			R	22/10/1994
	<i>Austrostipa trichophylla</i>				16/11/2009
✓	<i>Avellinia michelii</i>	Avellinia			18/10/1996

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✓	<i>Avena barbata</i>	Bearded Oat			7/10/2015
✓	<i>Avena fatua</i>	Wild Oat			16/11/2009
✓	<i>Avena sativa</i>	Cultivated Oat			24/09/1990
✓	<i>Avena sp.</i>	Oat			7/12/2009
	<i>Avicennia marina ssp. marina</i>	Grey Mangrove			18/09/2001
	<i>Bellotia eriophorum</i>				17/11/1980
	<i>Bergia trimera</i>	Three-part Water-fire			22/05/2008
	<i>Beyeria lechenaultii</i>	Pale Turpentine Bush			15/10/1996
	<i>Billardiera sp.</i>	Apple-berry			21/10/1994
	<i>Billardiera versicolor</i>	Yellow-flower Apple-berry			18/10/1996
	<i>Boerhavia coccinea</i>	Tar-vine			31/03/2007
	<i>Boerhavia dominii</i>	Tar-vine			22/10/1996
	<i>Boerhavia dominii (NC)</i>	Tar-vine			27/03/2007
	<i>Boerhavia schomburgkiana</i>	Schomburgk's Tar-vine			24/05/1992
	<i>Boerhavia schomburgkiana (NC)</i>	Schomburgk's Tar-vine			22/11/1999
	<i>Bonnemaisonia australis</i>				10/09/1987
	<i>Boraginaceae sp.</i>	Borage Family			1/10/1994
	<i>Bothriochloa ewartiana</i>	Desert Blue-grass			9/03/1973
	<i>Botryocladia sonderi</i>				13/09/1973
	<i>Bovista cunninghamii</i>				13/06/1999
	<i>Brachycome leptocarpa (NC)</i>	Small Hairy Daisy			1/10/1994
✓	<i>Brachypodium distachyon</i>	False Brome			7/10/2015
	<i>Brachyscome ciliaris var.</i>	Variable Daisy			22/10/1994
	<i>Brachyscome ciliaris var. ciliaris</i>	Variable Daisy			18/09/2001
	<i>Brachyscome ciliaris var. lanuginosa</i>	Woolly Variable Daisy			21/09/2009
	<i>Brachyscome ciliaris var. lyrifolia</i>	Lyrate-leaf Daisy			5/12/2005
	<i>Brachyscome ciliaris var. subintegrifolia</i>			R	5/12/2005
	<i>Brachyscome debilis</i>	Weak Daisy			15/10/1996
	<i>Brachyscome dichromosomatica var. dichromosomatica</i>	Large Hard-head Daisy			17/10/1996
	<i>Brachyscome exilis</i>	Slender Daisy			11/10/1955
	<i>Brachyscome gilesii</i>	Giles Daisy			1/10/1994
	<i>Brachyscome lineariloba</i>	Hard-head Daisy			30/09/2008
	<i>Brachyscome perpusilla</i>	Tiny Daisy			2/10/1994
	<i>Brachyscome sp.</i>	Native Daisy			23/10/1994
	<i>Brachyscome trachycarpa</i>	Smooth Daisy			22/11/1999
✓	<i>Brassica rapa ssp. rapa</i>	Turnip Rape			27/09/1985
✓	<i>Brassica tournefortii</i>	Wild Turnip			17/11/2009
✓	<i>Briza maxima</i>	Large Quaking-grass			26/10/1992
	<i>Bromus arenarius</i>	Sand Brome			1/11/1999
✓	<i>Bromus catharticus</i>	Prairie Grass			16/11/2009
✓	<i>Bromus diandrus</i>	Great Brome			16/11/1997
✓	<i>Bromus diandrus (NC)</i>	Great Brome			18/11/2009
✓	<i>Bromus hordeaceus ssp. hordeaceus</i>	Soft Brome			1/10/1994
✓	<i>Bromus madritensis</i>	Compact Brome			16/11/2009
✓	<i>Bromus rubens</i>	Red Brome			7/10/2015
	<i>Bromus sp.</i>	Brome			7/10/2015
	<i>Brongniartella australis</i>				26/11/1975
✓	<i>Buglossoides arvensis</i>	Sheepweed			14/10/1996
	<i>Bulbine alata</i>	Winged Bulbine-lily			21/09/2009
	<i>Bulbine bulbosa</i>	Bulbine-lily			26/09/1999
	<i>Bulbine semibarbata</i>	Small Leek-lily			1/10/1999
	<i>Bulbine sp.</i>	Bulbine-lily			26/10/1992

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✓	<i>Bupleurum semicompositum</i>	Hare's Ear			16/02/1997
	<i>Bursaria spinosa</i> ssp.	Bursaria			7/10/2015
	<i>Bursaria spinosa</i> ssp. <i>spinosa</i>	Sweet Bursaria			17/11/2009
✓	<i>Cactaceae</i> sp.				16/11/2009
	<i>Caesia calliantha</i>	Blue Grass-lily			3/10/1994
✓	<i>Cakile maritima</i> ssp. <i>maritima</i>	Two-horned Sea Rocket			1/01/1998
	<i>Caladenia capillata</i>	Wispy Spider-orchid			3/09/2001
	<i>Caladenia carnea</i> complex	Pink Fingers Caladenia			1/01/1990
	<i>Caladenia coactilis</i>	Flinders Ranges Caladenia			7/09/1999
	<i>Caladenia filamentosa</i> complex	Daddy-long-legs Spider-orchid			1/10/1994
	<i>Caladenia gladiolata</i>	Bayonet Spider-orchid	EN	E	1/01/1994
	<i>Caladenia stricta</i>	Upright Caladenia			14/09/2009
	<i>Caladenia tensa</i>	Inland Green-comb Spider-orchid	EN		28/08/1999
	<i>Caladenia tentaculata</i>	King Spider-orchid			15/10/1996
	<i>Caladenia toxochila</i>	Bow-lip Spider-orchid			3/09/2001
	<i>Calandrinia calyptrata</i>	Pink Purslane			15/10/1996
	<i>Calandrinia disperma</i>	Two-seed Purslane			1/10/1939
	<i>Calandrinia eremaea</i>	Dryland Purslane			21/09/2009
	<i>Calandrinia remota</i>	Round-leaf Parakeelya			1/09/1939
	<i>Calandrinia</i> sp.	Purslane/Parakeelya			17/01/1996
	<i>Calandrinia sphaerophylla</i>	Bead Purslane		R	18/08/1990
	<i>Calandrinia volubilis</i>	Twining Purslane			20/10/2008
✓	<i>Calendula arvensis</i>	Field Marigold			16/07/2003
	<i>Callistemon teretifolius</i>	Needle Bottlebrush			24/11/1999
✓	<i>Callitriche stagnalis</i>	Common Water Starwort			21/10/1928
	<i>Callitris glaucophylla</i>	White Cypress-pine			7/10/2015
	<i>Callitris gracilis</i>	Southern Cypress Pine			16/11/2009
	<i>Callitris verrucosa</i>	Scrub Cypress Pine			22/10/1994
	<i>Calocephalus citreus</i>	Lemon Beauty-heads			31/12/1995
	<i>Calostemma purpureum</i>	Pink Garland-lily			16/02/1997
	<i>Calotis cymbacantha</i>	Showy Burr-daisy			25/08/1995
	<i>Calotis erinacea</i>	Tangled Burr-daisy			26/03/2007
	<i>Calotis hispidula</i>	Hairy Burr-daisy			20/10/2008
	<i>Calotis lappulacea</i>	Yellow Burr-daisy		R	22/11/1999
	<i>Calotis latiuscula</i>	Leafy Burr-daisy			14/10/1992
	<i>Calotis multicaulis</i>	Woolly-headed Burr-daisy			6/08/2004
	<i>Calotis scabiosifolia</i> var. <i>scabiosifolia</i>	Rough Burr-daisy			16/10/2013
	<i>Calotis</i> sp.	Burr-daisy			1/10/1994
	<i>Calytrix tetragona</i>	Common Fringe-myrtle			24/11/1999
✓	<i>Capsella bursa-pastoris</i>	Shepherd's Purse			1/10/1994
✓	<i>Carduus</i> sp.	Thistle			23/10/1994
✓	<i>Carduus tenuiflorus</i>	Slender Thistle			7/10/2015
	<i>Carex appressa</i>	Tall Sedge			1/10/1994
	<i>Carex bichenoviana</i>	Notched Sedge			27/12/1997
	<i>Carex breviculmis</i>	Short-stem Sedge			1/10/1994
	<i>Carex inversa</i> var. <i>major</i>	Knob Sedge			1/10/1999
	<i>Carex</i> sp.	Sedge			23/10/1994
	<i>Carex tereticaulis</i>	Rush Sedge			14/10/1996
✓	<i>Carpobrotus chilensis</i>	Angled Pigface			1/01/1975
	<i>Carpobrotus rossii</i>	Native Pigface			3/10/1974
	<i>Carpobrotus rossii</i> (NC)	Native Pigface			1/01/1998
	<i>Carpobrotus</i> sp.	Pigface			17/01/1996
✓	<i>Carrichtera annua</i>	Ward's Weed			7/10/2015
✓	<i>Carthamus lanatus</i>	Saffron Thistle			7/10/2015
✓	<i>Carthamus</i> sp.				23/10/1994

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	<i>Cassinia complanata</i>	Sticky Cassinia			28/01/1991
	<i>Cassinia laevis</i>	Curry Bush			7/10/2015
	<i>Cassinia uncata</i>				14/07/1999
	<i>Cassinia uncata</i> (NC)	Sticky Cassinia			3/10/1994
	<i>Cassytha flindersii</i>	Flinders Ranges Dodder-laurel			1/10/1994
	<i>Cassytha peninsularis</i>	Peninsula Dodder-laurel			29/10/1992
	<i>Cassytha peninsularis</i> var. (NC)	Peninsula Dodder-laurel			3/10/1994
✓	<i>Casuarina glauca</i>	Grey Bul oak			1/04/1994
	<i>Casuarina pauper</i>	Black Oak			17/11/2009
	<i>Casuarinaceae</i> sp.	Sheoak Family			16/11/2009
✓	<i>Catapodium rigidum</i>	Rigid Fescue			15/10/1996
	<i>Caulerpa cactoides</i>				4/09/1973
	<i>Caulerpa flexilis</i> var. <i>muelleri</i>				25/11/1978
	<i>Caulocystis cephalornithos</i>				4/09/1973
✓	<i>Cenchrus ciliaris</i>	Buffel Grass			23/04/2014
✓	<i>Cenchrus ciliaris/pennisetiformis</i>	Buffel Grass			1/01/2010
✓	<i>Cenchrus clandestinus</i>	Kikuyu			26/11/2002
✓	<i>Cenchrus echinatus</i>				23/04/2014
✓	<i>Cenchrus longispinus</i>	Spiny Burr-grass			12/03/2015
✓	<i>Cenchrus setaceus</i>	Fountain Grass			1/01/2010
✓	<i>Centaurea calcitrapa</i>	Star Thistle			18/11/2009
✓	<i>Centaurea melitensis</i>	Malta Thistle			23/11/1999
✓	<i>Centaurea</i> sp.	Centauray			21/10/1994
✓	<i>Centaureum erythraea</i>	Common Centauray			1/10/1994
✓	<i>Centaureum tenuiflorum</i>	Branched Centauray			27/12/1997
	<i>Centella cordifolia</i>	Native Centella			19/09/1993
	<i>Centipeda crateriformis</i> ssp. <i>compacta</i>	Desert Sneezeweed			17/09/1912
	<i>Centipeda crateriformis</i> ssp. <i>crateriformis</i>	Common Sneezeweed			22/11/1999
	<i>Centipeda cunninghamii</i>	Common Sneezeweed			26/03/2007
	<i>Centipeda cunninghamii</i> (NC)	Common Sneezeweed			22/11/1999
	<i>Centipeda thespidioides</i>	Desert Sneezeweed			13/10/1983
	<i>Centroceras clavulatum</i>				27/06/1978
	<i>Centrolepis eremica</i>	Dryland Centrolepis			20/08/1989
	<i>Centrolepis strigosa</i> ssp. <i>strigosa</i>	Hairy Centrolepis			1/10/1994
	<i>Ceramium cliftonianum</i>				27/06/1978
	<i>Ceramium macilentum</i>				17/04/1975
	<i>Ceramium puberulum</i>				17/04/1975
	<i>Ceramium shepherdii</i>				27/06/1978
✓	<i>Cerastium glomeratum</i>	Common Mouse-ear Chickweed			15/10/1996
✓	<i>Cerastium</i> sp.	Chickweed			3/10/1994
	<i>Ceratogyne obionoides</i>	Wingwort		R	22/09/1990
	<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>	Blue Squill			1/04/1994
	<i>Chamaesyce drummondii</i> (NC)	Caustic Weed			23/11/1999
	<i>Champia zostericola</i>				17/11/1980
	<i>Cheilanthes austrotenuifolia</i>	Annual Rock-fern			19/09/2001
	<i>Cheilanthes distans</i>	Bristly Cloak-fern			19/09/2001
	<i>Cheilanthes lasiophylla</i>	Woolly Cloak-fern			7/10/2015
	<i>Cheilanthes sieberi</i> ssp.	Narrow Rock-fern			3/10/1994
	<i>Cheilanthes sieberi</i> ssp. <i>sieberi</i>	Narrow Rock-fern			19/09/2001
	<i>Cheilanthes</i> sp.	Rock-fern			2/10/1994
	<i>Chenopodiaceae</i> sp.	Goosefoot Family			16/10/1996
✓	<i>Chenopodium album</i>	Fat Hen			16/11/2009

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Exotic	Species	Common	Aus	SA	Most recent sighting
	<i>Chenopodium curvispicatum</i>	Cottony Goosefoot			1/04/2007
	<i>Chenopodium desertorum</i> ssp.	Desert Goosefoot			20/10/2008
	<i>Chenopodium desertorum</i> ssp. <i>anidiophyllum</i>	Mallee Goosefoot			31/03/2007
	<i>Chenopodium desertorum</i> ssp. <i>desertorum</i>	Frosted Goosefoot			1/04/2007
	<i>Chenopodium desertorum</i> ssp. <i>microphyllum</i>	Small-leaf Goosefoot			1/04/2007
	<i>Chenopodium gaudichaudianum</i>	Scrambling Goosefoot			1/01/1975
✓	<i>Chenopodium murale</i>	Nettle-leaf Goosefoot			1/10/1994
	<i>Chenopodium nitrariaceum</i>	Nitre Goosefoot			28/01/1993
	<i>Chenopodium</i> sp.	Goosefoot			16/11/2009
✓	<i>Chloris gayana</i>	Rhodes Grass			1/01/2010
	<i>Chloris pectinata</i>	Comb Windmill Grass			1/10/1994
	<i>Chloris</i> sp.	Windmill Grass/Chloris			21/10/1994
	<i>Chloris truncata</i>	Windmill Grass			22/10/1995
✓	<i>Chloris virgata</i>	Feather-top Rhodes Grass			23/04/2014
	<i>Chlorodesmis baculifera</i>				17/11/1980
	<i>Chondria harveyana</i>				17/11/1980
	<i>Chondria succulenta</i>				5/08/2007
✓	<i>Chondrilla juncea</i>	Skeleton Weed			20/01/1989
	<i>Chondrophyucus brandenii</i>				13/09/1973
	<i>Chondropsis semiviridis</i>				10/08/1969
✓	<i>Chrozophora tinctoria</i>	Dyer's Litmus Plant			27/12/1997
	<i>Chrysocephalum apiculatum</i>	Common Everlasting			15/09/2009
	<i>Chrysocephalum apiculatum</i> (NC)	Common Everlasting			17/11/2009
	<i>Chrysocephalum pterochaetum</i>	Shrub Everlasting			31/03/2007
	<i>Chrysocephalum semipapposum</i>	Clustered Everlasting			17/11/2009
	<i>Chthonocephalus pseudevax</i>	Ground-heads			22/09/1990
✓	<i>Cicendia quadrangularis</i>	Square Cicendia			4/10/1994
✓	<i>Cirsium vulgare</i>	Spear Thistle			1/10/1994
✓	<i>Citrullus colocynthis</i>	Colocynth			31/03/2007
✓	<i>Citrullus lanatus</i>	Bitter Melon			27/03/2007
✓	<i>Citrullus</i> sp.	Wild Melon			31/03/2007
	<i>Citrus glauca</i>	Desert Lime		V	14/02/1993
	<i>Citrus limon</i> (NC)				13/01/1987
	<i>Cladophora bainesii</i>				6/11/1981
	<i>Cladophora laetevirens</i>				25/11/1978
	<i>Cladophora lehmanniana</i>				25/11/1978
	<i>Cladophora vagabunda</i>				17/04/1975
	<i>Cladosiphon filum</i>				17/04/1975
	<i>Cladostephus spongiosus</i>				25/11/1978
	<i>Clematis decipiens</i>	Old Man's Beard			10/10/1981
	<i>Clematis leptophylla</i>				19/09/2001
	<i>Clematis microphylla</i>	Old Man's Beard			7/10/2015
	<i>Clematis microphylla</i> var. <i>microphylla</i> (NC)	Old Man's Beard			15/10/1996
	<i>Cliftonaea pectinata</i>				13/09/1973
	<i>Codium harveyi</i>				6/09/1973
	<i>Codonocarpus cotinifolius</i>	Desert Poplar			22/09/1990
	<i>Coelarthrum opuntia</i>				5/08/2007
	<i>Commicarpus australis</i>	Pink Gum-fruit			2/10/1980
	<i>Compositae</i> sp.	Daisy Family			2/10/1994
	<i>Convolvulus angustissimus</i> ssp. <i>peninsularum</i>	Narrow-leaf Bindweed			22/10/1996

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	<i>Convolvulus clementii</i>				29/09/1992
	<i>Convolvulus crispifolius</i>	Silver Bindweed			10/10/1992
	<i>Convolvulus erubescens (NC)</i>	Australian Bindweed			23/10/1994
	<i>Convolvulus erubescens complex</i>				7/10/2015
	<i>Convolvulus erubescens/remotus (NC)</i>	Native Bindweed			28/10/1992
	<i>Convolvulus microsepalus</i>	Small-flower Bindweed			5/05/1998
	<i>Convolvulus remotus</i>	Grassy Bindweed			7/10/2015
	<i>Convolvulus sp.</i>	Bindweed			9/09/1992
✓	<i>Conyza bonariensis</i>	Flax-leaf Fleabane			3/10/1994
	<i>Correa glabra (NC)</i>	Rock Correa			1/10/1994
	<i>Correa glabra var. turnbullii</i>	Smooth Correa			27/08/1961
	<i>Cotula australis</i>	Common Cotula			23/11/1999
	<i>Craspedia glauca (NC)</i>	Billy-buttons			15/10/1996
	<i>Craspedia haplorrhiza</i>	Billy-buttons			3/09/2001
	<i>Craspedia variabilis</i>	Billy-buttons			1/09/1999
	<i>Craspedocarpus ramentaceus</i>				17/11/1980
	<i>Craspedocarpus tenuifolius</i>				6/09/1973
	<i>Crassula closiana</i>	Stalked Crassula			1/10/1994
	<i>Crassula colligata ssp. colligata</i>				26/10/1992
	<i>Crassula colligata ssp. lamprosperma</i>				21/09/2009
	<i>Crassula colorata var.</i>	Dense Crassula			20/10/2008
	<i>Crassula colorata var. acuminata</i>	Dense Crassula			21/09/2009
	<i>Crassula colorata var. colorata</i>	Dense Crassula			17/10/1996
	<i>Crassula decumbens var. decumbens</i>	Spreading Crassula			1/10/1994
	<i>Crassula sieberiana complex</i>	Australian Stonecrop			23/10/1994
	<i>Crassula sieberiana ssp. tetramera (NC)</i>	Australian Stonecrop			1/01/1998
	<i>Crassula sp.</i>	Crassula/Stonecrop			3/10/1994
	<i>Crassula tetramera</i>	Australian Stonecrop			29/09/1992
	<i>Cratystylis conocephala</i>	Bluebush Daisy			15/09/1997
✓	<i>Crepis foetida ssp. foetida</i>	Stinking Hawksbeard			1/10/1994
	<i>Crinum flaccidum</i>	Murray Lily			31/03/2007
✓	<i>Critesion murinum ssp. (NC)</i>	Barley-grass			28/10/1992
	<i>Cruciferae sp.</i>	Cress Family			2/10/1994
	<i>Cryptandra amara var. (NC)</i>	Cryptandra			22/11/1999
	<i>Cryptandra campanulata</i>	Long-flower Cryptandra		R	22/11/1999
	<i>Cryptandra propinqua</i>	Silky Cryptandra			1/10/1993
	<i>Cryptandra sp. Floriferous (W.R. Barker 4131)</i>	Pretty Cryptandra			9/08/1991
	<i>Cryptandra tomentosa</i>	Heath Cryptandra			25/09/1913
✓	<i>Cucumis myriocarpus</i>	Paddy Melon			26/03/2007
	<i>Cullen australasicum</i>	Tall Scurf-pea			21/10/1994
	<i>Cullen graveolens</i>	Native Lucerne			31/03/2007
	<i>Cullen tenax</i>				1/11/1998
✓	<i>Cylindropuntia fulgida var. mamillata</i>				27/11/2009
	<i>Cymbonotus preissianus</i>	Austral Bear's-ear			1/10/1994
	<i>Cymbopogon ambiguus</i>	Lemon-grass			7/10/2015
	<i>Cymbopogon obtectus</i>	Silky-head Lemon-grass			14/10/1996
	<i>Cymbopogon sp.</i>	Lemon Grass			23/10/1994
	<i>Cynanchum floribundum</i>	Desert Cynanchum			15/07/2003
	<i>Cynanchum viminalis ssp. australe</i>	Caustic Bush			15/09/1997

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✓	<i>Cynara cardunculus</i> ssp. <i>flavescens</i>	Artichoke Thistle			16/11/2009
✓	<i>Cynodon dactylon</i> (NC)	Couch			26/11/2002
✓	<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch			16/11/2009
	<i>Cynoglossum australe</i>	Australian Hound's-tongue			1/01/1990
	<i>Cynoglossum suaveolens</i>	Sweet Hound's-tongue			1/10/1994
✓	<i>Cynosurus echinatus</i>	Rough Dog's-tail Grass			16/11/2009
	<i>Cyperus alterniflorus</i>	Umbrella Flat-sedge			22/11/1999
✓	<i>Cyperus arenarius</i>	Sand Sedge			14/03/1962
	<i>Cyperus bulbosus</i>	Bulbous Flat-sedge			16/02/1997
	<i>Cyperus difformis</i>	Variable Flat-sedge			1/05/1918
	<i>Cyperus gilesii</i>	Giles' Flat-sedge			16/03/1939
	<i>Cyperus gymnocaulos</i>	Spiny Flat-sedge			3/10/1994
	<i>Cyperus rigidellus</i>	Dwarf Flat-sedge			1/05/1921
	<i>Cyperus vaginatus</i>	Stiff Flat-sedge			19/09/2001
	<i>Cystophora expansa</i>				10/04/1950
	<i>Cystoseira trinodis</i>				31/12/1950
	<i>Dactyloctenium radulans</i>	Button-grass			31/03/2016
	<i>Dampiera dysantha</i>	Shrubby Dampiera			2/10/1994
	<i>Dampiera rosmarinifolia</i>	Rosemary Dampiera			1/10/1993
	<i>Dampiera</i> sp.	Dampiera			2/10/1994
	<i>Dasya crescens</i>				5/08/2007
	<i>Dasya extensa</i>				6/11/1981
	<i>Dasya hookeri</i>				3/08/2007
	<i>Dasya quadrispora</i>				27/06/1978
	<i>Dasya villosa</i>				5/08/2007
	<i>Dasythamniella latissima</i>				23/09/1986
✓	<i>Datura ferox</i>	Long-spine Thorn-apple			22/04/2014
✓	<i>Datura innoxia</i>	Downy Thorn-apple			16/04/1998
✓	<i>Datura leichhardtii</i>	Leichhardt's Thorn-apple			22/04/2014
✓	<i>Datura stramonium</i>	Common Thorn-apple			9/09/1975
	<i>Daucus glochidiatus</i>	Native Carrot			7/10/2015
	<i>Daviesia arenaria</i>	Sand Bitter-pea			1/04/1994
	<i>Daviesia genistifolia</i>	Broom Bitter-pea			4/10/1994
	<i>Daviesia leptophylla</i>	Narrow-leaf Bitter-pea			21/10/1994
	<i>Daviesia pectinata</i>	Zig-zag Bitter-pea		R	1/09/1941
	<i>Daviesia ulicifolia</i> (NC)	Gorse Bitter-pea			26/11/1993
	<i>Deyeuxia densa</i>	Heath Bent-grass		R	3/10/1994
	<i>Deyeuxia quadriseta</i>	Reed Bent-grass			1/11/1994
	<i>Dianella brevicaulis/revoluta</i> var.	Black-anther Flax-lily			17/01/1996
	<i>Dianella longifolia</i> var. <i>grandis</i>	Pale Flax-lily		R	26/09/1999
	<i>Dianella revoluta</i> (NC)				27/08/1990
	<i>Dianella revoluta</i> var.				31/03/2007
	<i>Dianella revoluta</i> var. <i>divaricata</i>	Broad-leaf Flax-lily			1/04/2007
	<i>Dianella revoluta</i> var. <i>revoluta</i>	Black-anther Flax-lily			16/11/2009
	<i>Dichanthium sericeum</i> ssp. <i>sericeum</i>	Silky Blue-grass			0/01/1900
	<i>Dichelachne crinita</i>	Long-hair Plume-grass			1/01/2000
	<i>Dichondra repens</i>	Kidney Weed			21/10/1994
	<i>Dictyomenia harveyana</i>				5/01/1976
	<i>Dictyopteris australis</i>				17/11/1980
	<i>Dictyopteris muelleri</i>				6/09/1973
	<i>Dictyota dichotoma</i>				10/09/1987
	<i>Dictyota furcellata</i>				31/12/1950
	<i>Didymodon australasiae</i>				21/07/1986
	<i>Didymodon torquatus</i>				21/07/1986

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Exotic	Species	Common	Aus	SA	Most recent sighting
	<i>Digitaria ammophila</i>	Spider Grass			1/10/1994
	<i>Digitaria brownii</i>	Cotton Panic-grass			1/10/1994
✓	<i>Digitaria sanguinalis</i>	Crab Grass			26/12/1920
	<i>Diploschistes scruposus</i>				8/08/1969
✓	<i>Diplotaxis muralis</i>	Wall Rocket			1/10/1994
✓	<i>Diplotaxis tenuifolia</i>	Lincoln Weed			26/11/2002
	<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface			28/06/2010
	<i>Dissocarpus biflorus</i> var.	Two-horn Saltbush			20/10/2008
	<i>Dissocarpus biflorus</i> var. <i>biflorus</i>	Two-horn Saltbush			8/07/1999
	<i>Dissocarpus fontinalis</i>				31/03/2007
	<i>Dissocarpus paradoxus</i>	Ball Bindyi			7/12/2009
	<i>Distichlis distichophylla</i>	Emu-grass			1/01/1975
	<i>Distromium flabellatum</i>				25/11/1978
✓	<i>Dittrichia graveolens</i>	Stinkweed			16/11/2009
	<i>Diuris palustris</i>	Little Donkey-orchid			2/10/1994
	<i>Dodonaea baueri</i>	Crinkled Hop-bush			15/10/1996
	<i>Dodonaea bursariifolia</i>	Small Hop-bush			16/09/1960
	<i>Dodonaea intricata</i>	Gawler Ranges Hop-bush			7/06/1981
	<i>Dodonaea lobulata</i>	Lobed-leaf Hop-bush			17/11/2009
	<i>Dodonaea microzyga</i> var. <i>microzyga</i>	Brilliant Hop-bush			28/07/1990
	<i>Dodonaea</i> sp.	Hop-bush			1/04/2007
	<i>Dodonaea stenozyga</i>	Desert Hop-bush			24/09/1990
	<i>Dodonaea viscosa</i> ssp.	Sticky Hop-bush			7/10/2015
	<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	Narrow-leaf Hop-bush			30/07/2009
	<i>Dodonaea viscosa</i> ssp. <i>spatulata</i>	Sticky Hop-bush			1/01/1990
	<i>Drewiana nitella</i>				23/09/1986
	<i>Drosera auriculata</i>	Tall Sundew			1/10/1996
	<i>Drosera glanduligera</i>	Scarlet Sundew			1/10/1994
	<i>Drosera macrantha</i> ssp. <i>planchonii</i>	Climbing Sundew			3/10/1994
	<i>Drosera peltata</i> (NC)	Pale Sundew			1/10/1994
	<i>Drosera stricticaulis</i>	Erect Sundew		V	1/08/1999
	<i>Duboisia hopwoodii</i>	Pituri			28/05/1903
	<i>Dudresnaya australis</i>				5/09/1973
	<i>Duma florulenta</i>	Lignum			26/03/2007
	<i>Dysphania cristata</i>	Crested Crumbweed			31/03/2007
	<i>Dysphania plantaginella</i>	Plantain Crumbweed			13/05/1992
	<i>Dysphania pumilio</i>	Small Crumbweed			1/04/2007
	<i>Dysphania rhadinostachya</i> ssp. <i>rhadinostachya</i>	Green Crumbweed			10/04/1993
	<i>Echinopogon ovatus</i>	Rough-beard Grass		R	1/10/1994
✓	<i>Echinopsis oxygona</i>				18/11/2005
✓	<i>Echinopsis spachiana</i>				18/11/2005
✓	<i>Echium plantagineum</i>	Salvation Jane			7/10/2015
✓	<i>Echium</i> sp.	Bugloss			22/10/1994
✓	<i>Ehrharta longiflora</i>	Annual Veldt Grass			22/10/1996
	<i>Einadia nutans</i> ssp.	Climbing Saltbush			7/10/2015
	<i>Einadia nutans</i> ssp. <i>eremaea</i>	Dryland Climbing Saltbush			26/03/2007
	<i>Einadia nutans</i> ssp. <i>nutans</i>	Climbing Saltbush			19/10/2008
	<i>Einadia nutans</i> ssp. <i>oxycarpa</i>	Pointed-fruit Climbing Saltbush			24/07/1974
	<i>Elachanthus glaber</i>	Shiny Elachanth		R	1/01/1995
	<i>Elachanthus pusillus</i>	Elachanth			26/09/1999
	<i>Elatine gratioloides</i>	Waterwort		R	26/09/1999

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Exotic	Species	Common	Aus	SA	Most recent sighting
	<i>Eleocharis acuta</i>	Common Spike-rush			28/01/1993
	<i>Elymus scaber</i> var. <i>scaber</i> (NC)	Native Wheat-grass			23/10/1994
✓	<i>Emex australis</i>	Three-corner Jack			18/10/1996
✓	<i>Emex spinosa</i>	Lesser Jack			18/11/2005
	<i>Enchylaena tomentosa</i> var.	Ruby Saltbush			22/11/1999
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush			17/11/2009
	<i>Enneapogon avenaceus</i>	Common Bottle-washers			31/03/2016
	<i>Enneapogon caeruleus</i>	Blue Bottle-washers			24/05/1992
	<i>Enneapogon cylindricus</i>	Jointed Bottle-washers			1/10/1994
	<i>Enneapogon nigricans</i>	Black-head Grass			20/04/2014
	<i>Enneapogon polyphyllus</i>	Leafy Bottle-washers			16/11/2009
	<i>Enneapogon</i> sp.	Bottle-washers/Nineawn			16/11/2009
	<i>Enteropogon acicularis</i>	Umbrella Grass			16/11/2009
	<i>Enteropogon ramosus</i>	Umbrella Grass			22/10/1995
	<i>Enteropogon</i> sp.	Umbrella Grass			7/12/2009
	<i>Epilobium billardierianum</i> ssp. <i>cinereum</i>	Variable Willow-herb			27/12/1997
	<i>Epilobium hirtigerum</i>	Hairy Willow-herb			16/03/1969
	<i>Eragrostis australasica</i>	Cane-grass			1/04/2007
✓	<i>Eragrostis barrelieri</i>	Pitted Love-grass			23/04/2014
✓	<i>Eragrostis cilianensis</i>	Stink Grass			1/05/2004
✓	<i>Eragrostis curvula</i>	African Love-grass			19/04/1997
	<i>Eragrostis dielsii</i>	Mulka			31/03/2007
	<i>Eragrostis exigua</i>	Delicate Love-grass			16/02/1997
	<i>Eragrostis falcata</i>	Sickle Love-grass			4/04/2003
	<i>Eragrostis leptocarpa</i>	Drooping Love-grass			1/05/1921
	<i>Eragrostis setifolia</i>	Bristly Love-grass			24/08/1992
✓	<i>Eragrostis trichophora</i>	Hairyflower Lovegrass			31/03/2016
	<i>Eremophila alternifolia</i>	Narrow-leaf Emubush			15/09/2009
	<i>Eremophila crassifolia</i>	Thick-leaf Emubush			26/08/1964
	<i>Eremophila deserti</i>	Turkey-bush			5/11/1998
	<i>Eremophila duttonii</i>	Harlequin Emubush			24/09/1990
	<i>Eremophila glabra</i> (NC)	Tar Bush			29/10/1992
	<i>Eremophila glabra</i> ssp.	Tar Bush			19/10/2008
	<i>Eremophila glabra</i> ssp. <i>glabra</i>	Tar Bush			1/04/2007
	<i>Eremophila latrobei</i> ssp. <i>glabra</i>	Crimson Emubush			31/03/2007
	<i>Eremophila longifolia</i>	Weeping Emubush			18/11/2009
	<i>Eremophila oppositifolia</i> ssp.	Opposite-leaved Emubush			17/01/1996
	<i>Eremophila oppositifolia</i> ssp. <i>oppositifolia</i>	Opposite-leaved Emubush			18/09/2001
	<i>Eremophila santalina</i>	Sandalwood Emubush			15/10/1996
	<i>Eremophila scoparia</i>	Broom Emubush			1/04/2007
	<i>Eremophila serrulata</i>	Green Emubush			22/09/1990
	<i>Eriochiton sclerolaenoides</i>	Woolly-fruit Bluebush			31/03/2007
	<i>Eriochlamys behrii</i>	Woolly Mantle			17/10/1996
	<i>Eriochlamys behrii</i> (NC)	Woolly Mantle			17/10/1996
	<i>Eriochloa australiensis</i>	Australian Cupgrass			15/03/1937
	<i>Eriochloa pseudoacrotricha</i>	Perennial Cupgrass			27/12/1992
	<i>Erodiochloa elderi</i>	Koonamore Daisy			12/09/1990
✓	<i>Erodium aureum</i>				1/10/1994
✓	<i>Erodium botrys</i>	Long Heron's-bill			16/10/1996
	<i>Erodium carolinianum</i>	Clammy Heron's-bill			3/09/1974
✓	<i>Erodium cicutarium</i>	Cut-leaf Heron's-bill			31/03/2007
	<i>Erodium crinitum</i>	Blue Heron's-bill			3/10/1994
	<i>Erodium cygnorum</i>	Blue Heron's-bill			23/09/1969

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	<i>Erodium cygnorum</i> ssp. (NC)	Blue Heron's-bill			1/01/1975
	<i>Erodium cygnorum</i> ssp. glandulosum (NC)	Clammy Heron's-bill			1/10/1994
✓	<i>Erodium moschatum</i>	Musky Herons-bill			3/10/1994
	<i>Erodium</i> sp.	Heron's-bill/Crowfoot			1/04/2007
✓	<i>Eruca sativa</i>	Purple-vein Rocket			12/08/1986
	<i>Eryngium ovinum</i>	Blue Devil		V	1/08/1994
	<i>Erythroclonium muelleri</i>				5/09/1973
	<i>Erythrotrichia carnea</i>				29/04/1987
	<i>Eucalyptus albens</i>	White Box		R	3/06/1986
	<i>Eucalyptus behriana</i>	Broad-leaf Box		R	1/10/1941
	<i>Eucalyptus brachycalyx</i>	Gilja			31/03/2007
	<i>Eucalyptus cajuputea</i>	Green Mallee		R*	22/11/1999
	<i>Eucalyptus calcareana</i>	Nundroo Mallee			6/10/1943
	<i>Eucalyptus camaldulensis</i> ssp.	River Red Gum			17/11/2009
	<i>Eucalyptus camaldulensis</i> ssp. camaldulensis	River Red Gum			22/10/1996
	<i>Eucalyptus camaldulensis</i> ssp. minima	River Red Gum			29/06/2001
	<i>Eucalyptus camaldulensis</i> var. camaldulensis (NC)	River Red Gum			14/10/1996
	<i>Eucalyptus cladocalyx</i> ssp. petila	Sugar Gum			16/07/2003
	<i>Eucalyptus concinna</i>	Victoria Desert Mallee			14/10/1991
	<i>Eucalyptus dumosa</i>	White Mallee			17/11/2009
	<i>Eucalyptus flindersii</i>	Flinders Grey Mallee			15/12/1995
	<i>Eucalyptus goniocalyx</i> (NC)	Long-leaf Box			21/10/1994
	<i>Eucalyptus goniocalyx</i> ssp. goniocalyx	Long-leaf Box			12/12/1984
	<i>Eucalyptus gracilis</i>	Yorrell			17/11/2009
	<i>Eucalyptus intertexta</i>	Gum-barked Coolibah			1/04/2007
	<i>Eucalyptus leptophylla</i> (NC)	Narrow-leaf Red Mallee			1/01/1995
	<i>Eucalyptus leucoxydon</i> ssp.	South Australian Blue Gum			23/10/1994
	<i>Eucalyptus leucoxydon</i> ssp. leucoxydon	South Australian Blue Gum			3/10/1994
	<i>Eucalyptus leucoxydon</i> ssp. pruinosa	Inland South Australian Blue Gum			1/09/2001
	<i>Eucalyptus microcarpa</i>	Grey Box			7/10/2015
	<i>Eucalyptus odorata</i>	Peppermint Box			14/10/1996
	<i>Eucalyptus odorata</i> (NC)	Peppermint Box			17/11/2009
	<i>Eucalyptus oleosa</i> (NC)	Red Mallee			20/11/1998
	<i>Eucalyptus oleosa</i> ssp.				1/04/2007
	<i>Eucalyptus oleosa</i> ssp. ampliata	Red Mallee			5/03/1968
	<i>Eucalyptus oleosa</i> ssp. oleosa	Red Mallee			11/10/1954
	<i>Eucalyptus percostata</i>	Ribbed White Mallee		R	5/07/2006
	<i>Eucalyptus pileata</i>	Capped Mallee			5/08/1991
	<i>Eucalyptus polybractea</i>	Flinders Ranges Box		R	22/11/1999
	<i>Eucalyptus porosa</i>	Mallee Box			17/11/2009
	<i>Eucalyptus socialis</i> (NC)	Beaked Red Mallee			1/01/1998
	<i>Eucalyptus socialis</i> ssp.	Beaked Red Mallee			17/11/2009
	<i>Eucalyptus socialis</i> ssp. socialis	Beaked Red Mallee			31/03/2007
	<i>Eucalyptus socialis</i> ssp. viridans	Beaked Red Mallee			25/07/1974
	<i>Eucalyptus</i> sp.				16/11/2009
	<i>Eucalyptus viridis</i> ssp. viridis (NC)	Green Mallee		R	17/11/2009
	<i>Euchiton involucreatus</i> (NC)	Star Cudweed			1/10/1994
	<i>Euchiton sphaericus</i>	Annual Cudweed			18/10/1996
✓	<i>Euphorbia cyathophora</i>				25/04/1986

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	<i>Euphorbia dallachyana</i>	Caustic Weed			22/11/1999
	<i>Euphorbia drummondii</i> (NC)				1/04/2007
	<i>Euphorbia flindersica</i>				30/09/1916
	<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>				
	<i>Euphorbia multifaria</i>				22/12/1992
✓	<i>Euphorbia paralias</i>	Sea Spurge			1/01/1975
✓	<i>Euphorbia peplus</i>	Petty Spurge			24/09/1990
	<i>Euphorbia stevenii</i>	Bottletree Spurge			31/03/2007
	<i>Euphorbia tannensis</i> ssp. <i>eremophila</i>	Desert Spurge			10/09/2010
✓	<i>Euphorbia terracina</i>	False Caper			1/04/2007
	<i>Euphorbia thelephora</i> var. <i>australis</i>				29/03/1993
	<i>Euphorbia wheeleri</i>	Wheeler's Spurge			1/01/1998
	<i>Euphorbiaceae</i> sp.	Spurge Family			26/03/2007
	<i>Eutaxia diffusa</i>	Large-leaf Eutaxia			28/10/1992
	<i>Eutaxia microphylla</i>	Common Eutaxia			15/09/2009
	<i>Eutaxia microphylla</i> var. <i>microphylla</i> (erect) (NC)	Common Eutaxia			15/10/1996
	<i>Eutaxia</i> sp.	Eutaxia			22/10/1994
	<i>Exocarpos aphyllus</i>	Leafless Cherry			7/10/2015
	<i>Exocarpos cupressiformis</i>	Native Cherry			19/09/2001
	<i>Exocarpos sparteus</i>	Slender Cherry			5/07/1991
	<i>Feldmannia globifera</i>				8/10/1975
	<i>Festuca benthamiana</i>	Bentham's Fescue		R	1/01/2000
✓	<i>Ficus carica</i>	Edible Fig			7/04/2001
	<i>Fissidens megalotis</i>				21/07/1986
	<i>Frankenia crista</i>	Hoary Sea-heath			22/11/1968
	<i>Frankenia pauciflora</i> var.	Southern Sea-heath			19/10/2008
	<i>Frankenia pauciflora</i> var. <i>fruticulosa</i>	Southern Sea-heath			1/01/1998
	<i>Frankenia serpyllifolia</i>	Thyme Sea-heath			20/09/1990
	<i>Frankenia sessilis</i>	Small-leaf Sea-heath			1/01/1998
	<i>Frankenia</i> sp.	Sea-heath			1/01/1987
	<i>Fulgensia bracteata</i>				10/08/1969
✓	<i>Fumaria capreolata</i>	White-flower Fumitory			22/10/1996
✓	<i>Fumaria muralis</i> ssp.	Wall Fumitory			1/10/1994
✓	<i>Fungus</i> sp.				1/04/2007
✓	<i>Galenia pubescens</i> var. <i>pubescens</i>	Coastal Galenia			26/03/2007
✓	<i>Galenia secunda</i>	Galenia			1/01/1998
	<i>Galium binifolium</i> (NC)	Reflexed Bedstraw			23/10/1994
	<i>Galium gaudichaudii</i> (NC)	Rough Bedstraw			15/10/1996
	<i>Galium microlobum</i>	Rough Bedstraw			11/10/1993
	<i>Galium migrans</i> (NC)	Loose Bedstraw			18/10/1996
	<i>Galium migrans</i> ssp. <i>inversum</i>	Loose Bedstraw			28/10/1992
✓	<i>Galium murale</i>	Small Bedstraw			18/10/1996
	<i>Galium</i> sp.	Bedstraw			23/10/1994
✓	<i>Galium spurium</i>	Bedstraw			23/11/1999
✓	<i>Gastridium phleoides</i>	Nit-grass			16/02/1997
	<i>Gattya pinnella</i>				13/09/1973
✓	<i>Gazania</i> sp.	Gazania			1/01/2010
	<i>Geastrum triplex</i>				18/06/2000
	<i>Geijera linearifolia</i>	Sheep Bush			19/10/2008
	<i>Gelinaria ulvoidea</i>				10/04/1980
	<i>Geococcus pusillus</i>	Earth Cress			1/10/1994

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✓	<i>Geranium dissectum</i>	Cut-leaf Geranium			13/01/1987
✓	<i>Geranium molle</i> var. <i>molle</i>	Soft Geranium			22/07/1986
	<i>Geranium potentilloides</i> var. <i>potentilloides</i>	Downy Geranium			3/10/1994
	<i>Geranium retrorsum</i>	Grassland Geranium			23/11/1999
	<i>Geranium solanderi</i>	Austral Geranium			23/11/1999
	<i>Geranium</i> sp.	Geranium			3/10/1994
✓	<i>Glaucium corniculatum</i>	Bristly Horned-poppy			7/10/2015
	<i>Glinus lotoides</i>	Hairy Carpet-weed			20/03/1993
	<i>Glischrocaryon behrii</i>	Golden Pennants			26/10/1992
	<i>Glischrocaryon flavescens</i>	Yellow Pennants			6/12/1992
	<i>Gloiosaccion brownii</i>				17/11/1980
	<i>Glossocardia bidens</i>	Native Cobbler's-pegs			16/02/1997
	<i>Glycine canescens</i>	Silky Glycine			6/08/1991
	<i>Glycine clandestina</i> var. (NC)	Twining Glycine			23/11/1999
	<i>Glycine rubiginosa</i>	Twining Glycine			1/04/2007
	<i>Gnaphalium indutum</i> ssp. <i>indutum</i>	Tiny Cudweed			1/10/1994
	<i>Gnephosis arachnoidea</i>	Spidery Button-flower			5/06/1990
	<i>Gnephosis tenuissima</i>	Dwarf Golden-tip			17/10/1996
	<i>Gonocarpus elatus</i>	Hill Raspwort			7/10/2015
	<i>Gonocarpus mezianus</i>	Broad-leaf Raspwort			1/01/1990
	<i>Gonocarpus</i> sp.	Raspwort			2/10/1994
	<i>Gonocarpus tetragynus</i>	Small-leaf Raspwort			3/10/1994
	<i>Goodenia albiflora</i>	White Goodenia			7/10/2015
	<i>Goodenia amplexans</i>	Clasping Goodenia			1/09/1996
	<i>Goodenia berardiana</i>	Split-end Goodenia			1/10/1994
	<i>Goodenia calcarata</i>	Streaked Goodenia			22/08/1992
	<i>Goodenia cycloptera</i>	Serrated Goodenia			17/10/1996
	<i>Goodenia fascicularis</i>	Silky Goodenia			14/10/1996
	<i>Goodenia fascicularis</i> (NC)	Silky Goodenia			1/04/2007
	<i>Goodenia glabra</i>	Smooth Goodenia			22/08/1992
	<i>Goodenia glauca</i>	Pale Goodenia			27/08/1990
	<i>Goodenia havilandii</i>	Hill Goodenia			22/09/1990
	<i>Goodenia lunata</i>	Stiff Goodenia			31/03/2007
	<i>Goodenia ovata</i>	Hop Goodenia			26/09/1999
	<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia			7/10/2015
	<i>Goodenia pusilliflora</i>	Small-flower Goodenia			9/09/2010
	<i>Goodenia robusta</i>	Woolly Goodenia			22/10/1994
	<i>Goodenia</i> sp.	Goodenia			31/12/1995
	<i>Gossypium sturtianum</i> var. <i>sturtianum</i>	Sturt's Desert Rose			22/10/1990
	<i>Gracilaria cliftonii</i>				17/11/1980
	<i>Gramineae</i> sp.	Grass Family			15/09/1997
	<i>Gratwickia monochaeta</i>			R	31/03/2007
	<i>Grevillea huegelii</i>	Comb Grevillea			1/04/2007
	<i>Grevillea lavandulacea</i> ssp. <i>lavandulacea</i>	Spider-flower			22/10/1994
	<i>Grevillea lavandulacea</i> var. <i>sericea</i> (NC)	Spider-flower			1/08/1994
	<i>Grevillea nematophylla</i> ssp. <i>nematophylla</i>	Water Bush			1/12/1991
	<i>Griffithsia monilis</i> var. <i>monilis</i>				17/04/1975
	<i>Gunniopsis calva</i>				17/10/1996
	<i>Gunniopsis quadrifida</i>	Sturt's Pigface			19/11/1992
✓	<i>Gypsophila tubulosa</i>	Annual Chalkwort			22/11/1999
	<i>Gyrostemon thesioides</i>	Broom Wheel-fruit			3/10/1998

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Exotic	Species	Common	Aus	SA	Most recent sighting
	<i>Haeckeria cassiniiformis</i>	Dogwood Haeckeria		R	6/07/2006
	<i>Haeckeria punctulata</i>	Sticky Haeckeria			3/09/2001
✓	<i>Hainardia cylindrica</i>	Common Barb-grass			9/11/1997
	<i>Hakea ednieana</i>	Flinders Ranges Corkwood			26/09/1999
	<i>Hakea francisiana</i>	Bottlebrush Hakea			7/09/1912
	<i>Hakea leucoptera</i> ssp. <i>leucoptera</i>	Silver Needlewood			17/11/2009
	<i>Hakea rostrata</i>	Beaked Hakea			1/12/1914
	<i>Halgania cyanea</i>	Rough Blue-flower			15/10/1996
	<i>Haloplegma duperreyi</i>				9/04/1980
	<i>Halopteris platycena</i>				25/11/1978
	<i>Halopteris pseudospicata</i>				25/11/1978
	<i>Haloragis aspera</i>	Rough Raspwort			23/11/1999
	<i>Haloragis gossei</i>	Gosse's Raspwort			26/10/1992
	<i>Haloragis</i> sp.	Raspwort			2/10/1994
	<i>Halosarcia</i> sp. (NC)	Samphire			26/11/2002
	<i>Halydictyon arachnoideum</i>				4/08/2007
	<i>Hardenbergia violacea</i>	Native Lilac			1/10/1994
	<i>Harmsiodoxa brevipes</i> var. <i>brevipes</i>	Short Cress			2/09/1941
✓	<i>Helianthus annuus</i>	Sunflower			27/04/2002
	<i>Helichrysum leucopsideum</i>	Satin Everlasting			1/07/1915
✓	<i>Heliotropium amplexicaule</i>	Blue Heliotrope			25/04/1996
	<i>Heliotropium asperrimum</i>	Rough Heliotrope			23/09/1990
✓	<i>Heliotropium curassavicum</i>	Smooth Heliotrope			1/01/1998
✓	<i>Heliotropium europaeum</i>	Common Heliotrope			23/04/2014
✓	<i>Heliotropium supinum</i>	Creeping Heliotrope			1/01/1998
	<i>Hemichroa diandra</i>	Mallee Hemichroa			28/06/2010
	<i>Herb</i> sp.				28/10/1992
✓	<i>Herniaria cinerea</i>	Rupturewort			3/10/1998
	<i>Herposiphonia versicolor</i>				10/09/1987
	<i>Heterosiphonia gunniana</i>				6/09/1973
	<i>Heterosiphonia lawrenciana</i>				13/09/1973
	<i>Hibbertia exutiacies</i>	Prickly Guinea-flower			24/11/1999
	<i>Hibbertia riparia</i> (NC)	Guinea-flower			1/01/1990
	<i>Hibiscus krichauffianus</i>	Velvet-leaf Hibiscus			7/03/1995
	<i>Hibiscus sturtii</i> var. <i>grandiflorus</i>	Sturt's Hibiscus			20/03/1993
	<i>Hincksia sordida</i>				5/08/2007
✓	<i>Hirschfeldia incana</i>	Hoary Mustard			26/09/1999
	<i>Hirsutithallia angustata</i>				3/08/2007
✓	<i>Hordeum glaucum</i>	Blue Barley-grass			7/12/1999
✓	<i>Hordeum hystrix</i>	Mediterranean Barley-grass			21/07/1986
✓	<i>Hordeum leporinum</i>	Wall Barley-grass			7/12/2009
✓	<i>Hordeum marinum</i>	Sea Barley-grass			21/10/1994
✓	<i>Hordeum</i> sp.	Barley-grass			31/03/2007
	<i>Hormophysa cuneiformis</i>				31/12/1950
	<i>Hormosira banksii</i> f. <i>billardieri</i>				15/08/1978
✓	<i>Hornungia procumbens</i>	Oval Purse			16/10/1996
	<i>Hovea purpurea</i>	Tall Hovea		R	19/09/2001
	<i>Hyalosperma demissum</i>	Dwarf Sunray			22/10/1994
	<i>Hyalosperma glutinosum</i> ssp. <i>glutinosum</i>	Golden Sunray			15/10/1996
	<i>Hyalosperma semisterile</i>	Orange Sunray			14/10/1996
	<i>Hyalosperma</i> sp.	Sunray			3/10/1994
	<i>Hybanthus floribundus</i> ssp. <i>floribundus</i>	Shrub Violet			7/10/2015

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	<i>Hybanthus monopetalus</i>	Slender Violet			3/10/1994
	<i>Hydrocotyle callicarpa</i>	Tiny Pennywort			1/10/1994
	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort			23/10/1994
	<i>Hydrocotyle trachycarpa</i>	Wild Parsley			1/10/1994
✓	<i>Hypochaeris glabra</i>	Smooth Cat's Ear			7/10/2015
✓	<i>Hypochaeris radicata</i>	Rough Cat's Ear			22/10/1995
	<i>Hypoxis sp.</i>	Yellow Star-lily			2/10/1994
	<i>Imperata cylindrica</i>	Blady Grass			1/02/1997
	<i>Indigofera australis ssp. australis</i>	Austral Indigo			7/10/2015
	<i>Indigofera australis ssp. hesperia</i>	Austral Indigo			3/10/1994
	<i>Indigofera australis var. australis (NC)</i>	Austral Indigo			23/10/1994
	<i>Indigofera helmsii</i>	Helm's Indigo			15/10/1996
	<i>Indigofera leucotricha (NC)</i>	Silver Indigo			2/10/1994
	<i>Inocybe emergens</i>				18/06/2000
✓	<i>Ipomoea cairica</i>	Mile-a-minute			1/01/1975
	<i>Isoetopsis graminifolia</i>	Grass Cushion			14/10/1996
	<i>Isolepis australiensis</i>	Southern Club-rush			26/09/1999
	<i>Isolepis cernua</i>	Nodding Club-rush			1/10/1994
	<i>Isolepis congrua</i>	Slender Club-rush			2/10/1994
	<i>Isolepis hookeriana</i>	Grassy Club-rush			3/10/1994
✓	<i>Isolepis marginata</i>	Little Club-rush			1/11/1997
	<i>Isotoma petraea</i>	Rock Isotome			2/10/1994
	<i>Ixiochlamys cuneifolia</i>	Silverton Daisy			6/06/1992
	<i>Ixiochlamys nana</i>	Small Fuzzweed			24/05/1992
	<i>Ixodia achillaeoides ssp. alata</i>	Hills Daisy			1/08/1913
	<i>Jasminum didymum ssp. lineare</i>	Native Jasmine			3/10/1994
✓	<i>Juncus acutus</i>	Sharp Rush			8/03/1997
	<i>Juncus aridicola</i>	Inland Rush			1/09/1999
	<i>Juncus bufonius</i>	Toad Rush			22/11/1999
	<i>Juncus caespiticius</i>	Grassy Rush			1/10/1994
	<i>Juncus flavidus</i>	Yellow Rush			3/10/1994
	<i>Juncus subsecundus</i>	Finger Rush			22/11/1999
✓	<i>Kickxia elatine ssp. crinita</i>	Twining Toadflax			1/10/1994
	<i>Kuckuckia spinosa</i>				29/05/1975
	<i>Lachnagrostis aemula (NC)</i>	Blown-grass			1/10/1994
	<i>Lachnagrostis filiformis</i>	Common Blown-grass			22/11/1999
✓	<i>Lactuca serriola (NC)</i>	Prickly Lettuce			1/10/1994
✓	<i>Lactuca serriola f. serriola</i>	Prickly Lettuce			22/12/1992
✓	<i>Lactuca sp.</i>	Lettuce			1/01/1975
	<i>Lagenophora huegelii</i>	Coarse Bottle-daisy			26/09/1999
✓	<i>Lagunaria patersonii</i>	Pyramid Tree			19/01/1989
✓	<i>Lamarckia aurea</i>	Toothbrush Grass			7/10/2015
✓	<i>Lamium amplexicaule var. amplexicaule</i>	Deadnettle			1/10/1994
	<i>Lasiopetalum discolor</i>	Coast Velvet-bush			30/07/1992
	<i>Laurencia forsteri</i>				29/05/1976
	<i>Laurencia majuscula</i>				31/12/1950
	<i>Lawrencella davenportii</i>	Davenport Daisy			1/07/1915
	<i>Lawrencia glomerata</i>	Clustered Lawrenceia			27/10/2016
	<i>Lawrencia sp.</i>	Lawrenceia			17/10/1996
	<i>Lawrencia squamata</i>	Thorny Lawrenceia			31/03/2007
	<i>Leiocarpa leptolepis</i>	Pale Plover-daisy			25/09/2006
	<i>Leiocarpa semicalva ssp.</i>	Hill Button-bush			23/11/1999

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	<i>Leiocarpa semicalva</i> ssp. <i>semicalva</i>	Scented Button-bush			15/09/2009
	<i>Leiocarpa</i> sp.	Plover-daisy			3/10/1994
	<i>Leiocarpa tomentosa</i>	Woolly Plover-daisy			21/09/2009
	<i>Leiocarpa websteri</i>	Narrow Plover-daisy			7/12/2009
	<i>Lemooria burkittii</i>	Wires-and-wool			23/09/1990
✓	<i>Leontodon rhagadioloides</i>	Cretan Weed			7/10/2015
✓	<i>Lepidium africanum</i>	Common Peppercross			23/10/2012
	<i>Lepidium fasciculatum</i>	Bundled Peppercross			25/08/1992
	<i>Lepidium oxytrichum</i>	Green Peppercross			23/09/1990
	<i>Lepidium papillosum</i>	Warty Peppercross			29/08/1999
	<i>Lepidium phlebopetalum</i>	Veined Peppercross			11/08/2008
	<i>Lepidium pseudotasmanicum</i>	Shade Peppercross		V	3/10/1994
	<i>Lepidium rotundum</i>	Veined Peppercross			1/01/1975
	<i>Lepidosperma viscidum</i>	Sticky Sword-sedge			17/07/2003
	<i>Lepiota subcristata</i>				18/06/2000
	<i>Leptorhynchos elongatus</i>	Lanky Buttons		R	1/08/1994
	<i>Leptorhynchos scaber</i>	Annual Buttons		R	9/09/1992
	<i>Leptorhynchos</i> sp.	Buttons			28/10/1992
	<i>Leptorhynchos squamatus</i> ssp. <i>squamatus</i>	Scaly Buttons			7/10/2015
	<i>Leptorhynchos tetrachaetus</i>	Little Buttons			16/10/2013
	<i>Leptorhynchos waitzia</i>	Button Immortelle			18/11/2009
	<i>Leucochrysum molle</i>	Hoary Sunray			16/11/2009
✓	<i>Leucojum aestivum</i>	Snowflake			1/08/2004
	<i>Levenhookia dubia</i>	Hairy Stylewort			26/09/1999
	<i>Lichen</i> sp.				15/09/1997
	<i>Liliaceae</i> sp.	Lily Family			3/10/1994
✓	<i>Limonium binervosum</i>	Dwarf Sea-lavender			20/11/1998
✓	<i>Limonium companyonis</i>	Sea-lavender			18/11/2009
✓	<i>Limonium diffusum</i>				24/01/1989
✓	<i>Limonium lobatum</i>	Winged Sea-lavender			7/10/2015
✓	<i>Limonium sinuatum</i>	Notch-leaf Sea-lavender			15/03/1987
✓	<i>Limonium</i> sp.	Sea-lavender			21/10/1994
	<i>Limosella australis</i>	Australian Mudwort			23/09/1990
✓	<i>Linaria incarnata</i>				1/09/1993
	<i>Linum marginale</i>	Native Flax			22/11/1999
✓	<i>Linum trigynum</i>	French Flax			1/10/1994
	<i>Lobelia anceps</i>	Angled Lobelia			12/02/1988
	<i>Lobelia gibbosa</i>	Tall Lobelia			11/04/1999
	<i>Lobelia gibbosa</i> (NC)	Tall Lobelia			26/10/1992
	<i>Lobophora variegata</i>				25/11/1978
	<i>Logania saxatilis</i>	Rock Logania		R	18/10/1996
✓	<i>Lolium loliaceum</i>	Stiff Ryegrass			14/10/1996
✓	<i>Lolium perenne</i>	Perennial Ryegrass			1/01/1975
✓	<i>Lolium rigidum</i>	Wimmera Ryegrass			22/10/2012
✓	<i>Lolium</i> sp.	Ryegrass			21/10/1994
	<i>Lomandra collina</i>	Sand Mat-rush			28/08/1999
	<i>Lomandra densiflora</i>	Soft Tussock Mat-rush			23/11/1999
	<i>Lomandra effusa</i>	Scented Mat-rush			31/03/2007
	<i>Lomandra leucocephala</i> ssp. <i>robusta</i>	Woolly Mat-rush			10/04/1992
	<i>Lomandra micrantha</i> ssp.	Small-flower Mat-rush			2/10/1994
	<i>Lomandra multiflora</i> ssp. <i>dura</i>	Hard Mat-rush			16/11/2009
	<i>Lomandra</i> sp.	Mat-rush			20/10/1994
	<i>Lotus australis</i>	Austral Trefoil			26/10/1997

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	<i>Lotus cruentus</i>	Red-flower Lotus			31/03/2007
	<i>Luzula meridionalis</i>	Common Wood-rush			19/09/2001
	<i>Lycium australe</i>	Australian Boxthorn			17/11/2009
✓	<i>Lycium ferocissimum</i>	African Boxthorn			7/10/2015
	<i>Lysiana exocarpi ssp. exocarpi</i>	Harlequin Mistletoe			1/07/1999
	<i>Lysiana murrayi</i>	Mulga Mistletoe			26/03/2007
	<i>Lythrum hyssopifolia</i>	Lesser Loosestrife			22/10/1990
	<i>Lythrum wilsonii</i>	Wilson's Loosestrife			29/03/1993
	<i>Macrothamnion secundum</i>				17/11/1980
	<i>Maireana aphylla</i>	Cotton-bush			16/11/2009
	<i>Maireana appressa</i>	Pale-fruit Bluebush			21/09/2009
	<i>Maireana astrotricha</i>	Low Bluebush			1/04/2007
	<i>Maireana brevifolia</i>	Short-leaf Bluebush			17/11/2009
	<i>Maireana cannonii</i>	Cannon's Bluebush			8/07/1999
	<i>Maireana carnososa</i>	Cottony Bluebush			16/09/1960
	<i>Maireana ciliata</i>	Hairy Fissure-plant			25/08/1992
	<i>Maireana enchylaenoides</i>	Wingless Fissure-plant			23/11/1999
	<i>Maireana eriantha</i>	Woolly Bluebush			28/07/1990
	<i>Maireana erioclada</i>	Rosy Bluebush			18/11/2009
	<i>Maireana excavata</i>	Bottle Fissure-plant		V	1/10/1996
	<i>Maireana georgei</i>	Satiny Bluebush			18/09/2001
	<i>Maireana integra</i>	Entire-wing Bluebush			1/10/1994
	<i>Maireana lobiflora</i>	Lobed Bluebush			8/06/1992
	<i>Maireana microcarpa</i>	Swamp Bluebush			30/05/1992
	<i>Maireana oppositifolia</i>	Salt Bluebush			1/01/1998
	<i>Maireana pentatropis</i>	Erect Mallee Bluebush			31/03/2007
	<i>Maireana planifolia</i>	Flat-leaf Bluebush			22/10/1994
	<i>Maireana pyramidata</i>	Black Bluebush			25/11/2009
	<i>Maireana radiata</i>	Radiate Bluebush			13/10/1983
	<i>Maireana rohrlachii</i>	Rohrlach's Bluebush		R	18/05/1967
	<i>Maireana schistocarpa</i>	Split-fruit Bluebush			26/07/2001
	<i>Maireana sedifolia</i>	Bluebush			18/11/2009
	<i>Maireana sp.</i>	Bluebush/Fissure-plant			18/11/2009
	<i>Maireana spongiocarpa</i>	Spongy-fruit Bluebush			13/06/1992
	<i>Maireana tomentosa ssp. urceolata (NC)</i>				1/04/2007
	<i>Maireana trichoptera</i>	Hairy-fruit Bluebush			17/11/2009
	<i>Maireana triptera</i>	Three-wing Bluebush			1/04/2007
	<i>Maireana turbinata</i>	Top-fruit Bluebush			18/10/1996
	<i>Malacocera gracilis</i>	Slender Soft-horns		V	28/06/2010
	<i>Malacocera tricornis</i>	Goat-head Soft-horns			17/10/1996
✓	<i>Malcolmia flexuosa</i>				26/09/1999
✓	<i>Malva parviflora</i>	Small-flower Marshmallow			18/10/1996
	<i>Malva preissiana</i>	Australian Hollyhock			16/09/1992
✓	<i>Malvastrum americanum var. americanum</i>	Malvastrum			26/03/2007
✓	<i>Marrubium vulgare</i>	Horehound			7/10/2015
	<i>Marsdenia australis</i>	Native Pear			31/03/2007
	<i>Marsilea drummondii</i>	Common Nardoo			13/10/1983
	<i>Marsilea hirsuta</i>	Short-fruit Nardoo			24/05/1992
✓	<i>Medicago minima var. minima</i>	Little Medic			7/10/2015
✓	<i>Medicago polymorpha var. polymorpha</i>	Burr-medic			18/09/2001
✓	<i>Medicago praecox</i>	Small-leaf Burr-medic			22/11/1999
✓	<i>Medicago scutellata</i>	Snail Medic			21/10/1994
✓	<i>Medicago sp.</i>	Medic			18/11/2009

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✓	<i>Medicago truncatula</i>	Barrel Medic			25/10/1996
	<i>Melaleuca interioris</i>	Broombush			31/03/2007
	<i>Melaleuca lanceolata</i>	Dryland Tea-tree			31/03/2007
	<i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i> (NC)	Dryland Tea-tree			1/10/1994
	<i>Melaleuca uncinata</i>	Broombush			1/04/2007
✓	<i>Melia azedarach</i>	White Cedar			7/04/2001
	<i>Meliccytus angustifolius</i> ssp. <i>divaricatus</i>	Tree Violet			7/10/2015
✓	<i>Melilotus indicus</i>	King Island Melilot			1/01/1998
✓	<i>Melinis repens</i>	Red Natal Grass			12/12/1991
	<i>Menkea australis</i>	Fairy Spectacles			1/08/2001
	<i>Menkea crassa</i>	Fat Spectacles			8/08/1991
✓	<i>Mesembryanthemum aitonis</i>	Angled Iceplant			18/09/2001
✓	<i>Mesembryanthemum crystallinum</i>	Common Iceplant			19/10/2008
✓	<i>Mesembryanthemum nodiflorum</i>	Slender Iceplant			20/10/2008
✓	<i>Mesembryanthemum</i> sp.	Iceplant			21/11/1998
	<i>Microbryum starckeanum</i>				27/08/1953
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Rice-grass			1/11/1994
	<i>Micropeuce feredayae</i>				17/11/1980
	<i>Microseris lanceolata</i>	Yam Daisy			7/10/2015
	<i>Microtis arenaria</i>	Notched Onion-orchid			26/09/1999
	<i>Microtis frutetorum</i>				1/10/1999
	<i>Microtis parviflora</i>	Slender Onion-orchid			1/10/1996
	<i>Microtis</i> sp.	Onion-orchid			23/10/1994
	<i>Microtis unifolia</i>				28/10/1992
	<i>Microtis unifolia</i> complex	Onion-orchid			28/10/1992
	<i>Millotia muelleri</i>	Common Bow-flower			1/10/1994
	<i>Millotia myosotidifolia</i>	Broad-leaf Millotia			26/09/1999
	<i>Millotia perpusilla</i>	Tiny Bow-flower			29/08/1999
	<i>Millotia</i> sp.	Millotia/Bow-flower			3/10/1994
	<i>Millotia tenuifolia</i> var.	Soft Millotia			1/10/1994
	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	Soft Millotia			15/10/1996
	<i>Minuria annua</i>	Annual Minuria			23/10/1994
	<i>Minuria cunninghamii</i>	Bush Minuria			31/03/2016
	<i>Minuria denticulata</i>	Woolly Minuria			13/06/1992
	<i>Minuria integerrima</i>	Smooth Minuria			20/10/2008
	<i>Minuria leptophylla</i>	Minnie Daisy			17/01/1996
	<i>Mitrasacme paradoxa</i> (NC)	Wiry Mitrewort			2/10/1994
✓	<i>Moenchia erecta</i>	Erect Chickweed			1/10/1994
	<i>Mollugo cerviana</i>	Wire-stem Chickweed			31/03/2007
	<i>Monachather paradoxus</i>	Bandicoot Grass			10/04/1992
✓	<i>Monoculus monstrosus</i>	Tripteris			16/10/1996
✓	<i>Moraea setifolia</i>	Thread Iris			22/10/2012
	<i>Moss</i> sp.				25/10/1996
	<i>Mychodea carnosa</i>				6/09/1973
	<i>Myoporum brevipes</i>	Warty Boobiella			
	<i>Myoporum insulare</i>	Common Boobiella			18/09/2001
	<i>Myoporum montanum</i>	Native Myrtle			21/09/2009
	<i>Myoporum parvifolium</i>	Creeping Boobiella		R	21/09/2009
	<i>Myoporum petiolatum</i>	Sticky Boobiella			2/10/1994
	<i>Myoporum platycarpum</i> ssp.	False Sandalwood			17/11/2009
	<i>Myoporum platycarpum</i> ssp. <i>perbellum</i>	Mallee Sandalwood			27/10/1992

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	<i>Myoporum platycarpum</i> ssp. <i>platycarpum</i>	False Sandalwood			21/09/2009
	<i>Myoporum viscosum</i> (NC)	Sticky Boobialla			22/10/1994
	<i>Myriophyllum verrucosum</i>	Red Milfoil			20/03/1993
✓	<i>Narcissus jonquilla</i>	Jonquill			1/08/2004
	<i>Nemacystus novae-zelandiae</i>				4/09/1973
✓	<i>Nicotiana glauca</i>	Tree Tobacco			26/11/2002
	<i>Nicotiana goodspeedii</i>	Small-flower Tobacco			18/09/2001
	<i>Nicotiana maritima</i>	Coast Tobacco			1/10/1994
	<i>Nicotiana occidentalis</i> ssp. <i>obliqua</i>	Western Tobacco			3/07/1992
	<i>Nicotiana simulans</i>	Native Tobacco			10/10/1992
	<i>Nicotiana</i> sp.	Tobacco			31/03/2007
	<i>Nicotiana</i> sp. <i>Corunna</i> (D.E. Symon 17088)				9/09/2010
	<i>Nicotiana velutina</i>	Velvet Tobacco			21/09/2009
	<i>Nitraria billardiarei</i>	Nitre-bush			7/12/2009
✓	<i>Oenothera stricta</i> ssp. <i>stricta</i>	Common Evening Primrose			26/11/2002
✓	<i>Olea europaea</i> ssp.	Olive			7/10/2015
✓	<i>Olea europaea</i> ssp. <i>europaea</i>	Olive			1/10/1994
	<i>Olearia axillaris</i>	Coast Daisy-bush			1/01/1975
	<i>Olearia calcarea</i>	Crinkle-leaf Daisy-bush			18/09/2001
	<i>Olearia decurrens</i>	Winged Daisy-bush			3/05/2006
	<i>Olearia exiguifolia</i>	Lobed-leaf Daisy-bush			1/04/2007
	<i>Olearia floribunda</i>	Heath Daisy-bush			26/09/1999
	<i>Olearia muelleri</i>	Mueller's Daisy-bush			18/10/1996
	<i>Olearia pannosa</i> ssp.	Silver Daisy-bush			3/10/1994
	<i>Olearia pannosa</i> ssp. <i>cardiophylla</i>	Velvet Daisy-bush		R	1/08/1999
	<i>Olearia pannosa</i> ssp. <i>pannosa</i>	Silver Daisy-bush	VU	V	10/08/1996
	<i>Olearia picridifolia</i>	Rasp Daisy-bush		R	27/10/1992
	<i>Olearia pimeleoides</i>	Pimelea Daisy-bush			7/10/2015
	<i>Olearia pimeleoides</i> ssp. (NC)	Pimelea Daisy-bush			17/01/1996
	<i>Olearia ramulosa</i>	Twiggy Daisy-bush			30/07/2009
	<i>Olearia</i> sp.	Daisy-bush			28/10/1992
	<i>Olearia tubuliflora</i>	Rayless Daisy-bush			2/10/1994
✓	<i>Oligocarpus calendulaceus</i>				22/11/1999
	<i>Omphalolappula concava</i>	Burr Stickseed			18/09/2001
✓	<i>Onopordum acanthium</i>	Scotch Thistle			21/07/1986
✓	<i>Onopordum acaulon</i>	Horse Thistle			13/01/1987
✓	<i>Onopordum</i> sp.	Thistle			23/10/1994
	<i>Opercularia turpis</i>	Twiggy Stinkweed			3/10/1994
	<i>Ophioglossum lusitanicum</i>	Austral Adder's-tongue			3/10/1994
✓	<i>Opuntia elata</i>	Riverina Pear			18/11/2005
✓	<i>Opuntia elatior</i>				27/08/1985
✓	<i>Opuntia engelmannii</i>				29/11/1983
✓	<i>Opuntia ficus-indica</i>	Indian Fig			15/07/2005
✓	<i>Opuntia linguiformis</i>				6/09/2006
✓	<i>Opuntia microdasys</i>	Bunny-ears			6/11/2006
✓	<i>Opuntia microdasys</i> (NC)	Bunny-ears			28/10/1992
✓	<i>Opuntia monacantha</i>	Drooping Prickly Pear			27/08/1985
✓	<i>Opuntia puberula</i>				18/11/2005
✓	<i>Opuntia robusta</i>	Wheel Pear			18/11/2009
✓	<i>Opuntia</i> sp. (NC)	Prickly Pear			17/01/1996
✓	<i>Opuntia stricta</i>	Erect Prickly Pear			1/12/2005
✓	<i>Opuntia tomentosa</i>	Velvet Pear			27/08/1985

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✓	<i>Orbea variegata</i>	Carrion-flower			9/08/1995
	<i>Orchidaceae sp.</i>	Orchid Family			1/01/1987
	<i>Orobanche cernua var. australiana</i>	Australian Broomrape		R	1/01/1975
	<i>Osteocarpum acropterum var. acropterum</i>	Tuberculate Bonefruit			17/10/1996
	<i>Osteocarpum acropterum var. deminutum</i>	Wingless Bonefruit		R	29/09/1920
	<i>Osteocarpum dipterocarpum</i>	Two-wing Bonefruit			21/09/2009
	<i>Osteocarpum pentapterum</i>	Five-wing Bonefruit		E	30/09/1974
	<i>Osteocarpum salsuginosum</i>	Inland Bonefruit			5/11/2008
	<i>Owenia acidula</i>	Sour Plum			6/08/1991
✓	<i>Oxalis bowiei</i>	Bowie Wood-sorrel			1/06/1992
	<i>Oxalis perennans</i>	Native Sorrel			7/10/2015
	<i>Oxalis perennans (NC)</i>	Native Sorrel			23/11/1999
✓	<i>Oxalis pes-caprae</i>	Soursob			19/09/2001
	<i>Oxalis radicata</i>	Downy Native Sorrel			22/10/1994
	<i>Oxalis sp.</i>	Sorrel			22/10/1994
	<i>Ozothamnus retusus</i>	Notched Bush-everlasting			28/10/1992
	<i>Ozothamnus scaber</i>	Rough Bush-everlasting		V	24/11/1999
	<i>Pachydictyon polycladum</i>				27/06/1978
	<i>Pachymitus cardaminoides</i>	Sand Cress			7/08/1991
✓	<i>Panicum capillare var. brevifolium</i>	Witch-grass			1/02/1993
	<i>Panicum effusum var. effusum</i>	Hairy Panic			31/03/2007
✓	<i>Papaver aculeatum</i>	Bristle Poppy			0/01/1900
✓	<i>Papaver hybridum</i>	Rough Poppy			26/10/1997
✓	<i>Papaver sp.</i>	Poppy			23/10/1994
	<i>Paractaenum novae-hollandiae ssp. reversum</i>	Barbed-wire Grass			26/03/2007
	<i>Paractaenum refractum</i>	Bristle-brush Grass			28/04/1945
✓	<i>Parapholis incurva</i>	Curly Ryegrass			17/10/1996
✓	<i>Parentucellia latifolia</i>	Red Bartsia			1/10/1994
	<i>Parietaria cardiostegia</i>	Mallee Smooth-nettle			23/09/1990
	<i>Parietaria debilis</i>	Smooth-nettle			21/10/1994
	<i>Parietaria debilis (NC)</i>	Smooth-nettle			23/10/1994
✓	<i>Parkinsonia aculeata</i>	Jerusalem Thorn			1/11/1985
✓	<i>Pascalina glauca</i>	Pascalina Weed			10/04/1949
✓	<i>Paspalum vaginatum</i>	Salt-water Couch			19/01/1988
	<i>Pauridia glabella var. glabella</i>	Tiny Star			22/10/1994
	<i>Pauridia vaginata var. vaginata</i>	Yellow Star			1/01/1990
✓	<i>Peganum harmala</i>	African Rue			16/10/2009
	<i>Pelargonium sp.</i>	Storks-bill			2/10/1994
✓	<i>Pentameris airoides ssp. airoides</i>	False Hair-grass			25/10/1996
✓	<i>Periballia minuta</i>	Small Hair-grass			26/10/1992
	<i>Persicaria decipiens (NC)</i>	Slender Knotweed			1/10/1994
	<i>Persicaria prostrata</i>	Creeping Knotweed			22/11/1999
	<i>Petalostylis labicheoides</i>	Butterfly Bush			1/10/1963
✓	<i>Petrorhagia dubia</i>	Velvet Pink			1/10/1994
✓	<i>Phalaris minor</i>	Lesser Canary-grass			18/11/2009
✓	<i>Phalaris paradoxa</i>	Paradox Canary-grass			20/10/1992
✓	<i>Phalaris sp.</i>	Canary Grass			21/10/1994
	<i>Pheladenia deformis</i>	Bluebeard Orchid			3/10/1994
	<i>Philothea linearis</i>	Narrow-leaf Wax-flower			31/03/2007
	<i>Phlegmatospermum cochlearinum</i>	Downy Cress			23/08/2001

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Exotic	Species	Common	Aus	SA	Most recent sighting
	<i>Phragmites australis</i>	Common Reed			8/03/1997
	<i>Phyllangium sulcatum</i>			V	27/10/1992
	<i>Phyllanthus fuernrohrii</i>	Sand Spurge			31/03/2007
	<i>Phyllanthus lacunarius</i>	Lagoon Spurge			26/03/2007
	<i>Phyllanthus oblanceolatus</i>	Sandhill Spurge			7/06/1992
	<i>Phyllanthus saxosus</i>	Rock Spurge			26/10/1997
✓	<i>Picnomon acarna</i>	Soldier Thistle			17/11/2009
	<i>Picris angustifolia</i> ssp. <i>angustifolia</i>	Coast Picris			26/09/1999
	<i>Picris angustifolia</i> ssp. <i>angustifolia</i> (NC)	Coast Picris			1/10/1994
	<i>Pimelea curviflora</i> var.	Curved Riceflower			22/10/1994
	<i>Pimelea glauca</i>	Smooth Riceflower			20/10/1994
	<i>Pimelea imbricata</i> var. <i>petraea</i>	Rock Woolly Riceflower			12/10/1993
	<i>Pimelea micrantha</i>	Silky Riceflower			23/11/1999
	<i>Pimelea microcephala</i> ssp.	Shrubby Riceflower			19/10/2008
	<i>Pimelea microcephala</i> ssp. <i>microcephala</i>	Shrubby Riceflower			21/09/2009
	<i>Pimelea simplex</i> ssp.	Desert Riceflower			1/01/1975
	<i>Pimelea simplex</i> ssp. <i>continua</i>	Desert Riceflower			19/11/1992
	<i>Pimelea simplex</i> ssp. <i>simplex</i>	Desert Riceflower			17/10/1996
	<i>Pimelea stricta</i>	Erect Riceflower			19/09/2001
	<i>Pimelea trichostachya</i>	Spiked Riceflower			22/10/1991
✓	<i>Piptatherum miliaceum</i>	Rice Millet			1/01/2010
	<i>Pittosporum angustifolium</i>	Native Apricot			7/10/2015
	<i>Pittosporum</i> sp.	Pittosporum			22/10/1994
	<i>Plagiobothrys elachanthus</i>	Hairy Forget-me-not			1/10/1994
	<i>Plagiobothrys plurisepaleus</i>	White Rochelia			1/01/1995
	<i>Plantago cunninghamii</i>	Clay Plantain			9/09/1992
	<i>Plantago debilis</i>	Shade Plantain			23/11/1999
	<i>Plantago drummondii</i>	Dark Plantain			11/08/2008
	<i>Plantago gaudichaudii</i>	Narrow-leaf Plantain			1/10/1994
	<i>Plantago hispida</i>	Hairy Plantain			17/01/1996
✓	<i>Plantago lanceolata</i> var.	Ribwort			16/11/2009
	<i>Plantago</i> sp.	Plantain			31/03/2007
	<i>Plantago</i> sp. (B.R. Bates 44765)	Little Plantain			31/12/1995
	<i>Plantago turrifera</i>	Crowned Plantain			1/10/1994
	<i>Plantago varia</i> complex	Native Plantain			23/10/1994
	<i>Platysiphonia delicata</i>				26/05/1976
	<i>Pleurosorus rufifolius</i>	Blanket Fern			19/09/2001
✓	<i>Poa annua</i> (NC)	Winter Grass			3/10/1994
✓	<i>Poa bulbosa</i>	Bulbous Meadow-grass			25/09/1999
	<i>Poa crassicaudex</i>	Thick-stem Tussock-grass			1/01/2000
	<i>Poa drummondiana</i>	Knotted Poa		R	1/01/2000
✓	<i>Poa infirma</i>	Winter Grass			28/08/1999
	<i>Poa labillardieri</i> var. <i>labillardieri</i>	Common Tussock-grass			3/10/1998
✓	<i>Poa pratensis</i>	Kentucky Blue-grass			21/10/1994
	<i>Poa</i> sp.	Meadow-grass/Tussock-grass			23/10/1994
	<i>Podolepis aristata</i> ssp. <i>affinis</i>	Grey Copper-wire Daisy			20/08/1960
	<i>Podolepis capillaris</i>	Wiry Podolepis			1/04/2007
	<i>Podolepis jaceoides</i>	Showy Copper-wire Daisy		R	1/10/1924
	<i>Podolepis tepperi</i>	Delicate Copper-wire Daisy			2/10/1994
	<i>Podotheca angustifolia</i>	Sticky Long-heads			22/09/1990
	<i>Pogonolepis muelleriana</i>	Stiff Cup-flower			18/09/2001
	<i>Pollexfenia pedicellata</i>				10/09/1987
	<i>Polycalymma stuartii</i>	Poached-egg Daisy			17/10/1996

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Exotic	Species	Common	Aus	SA	Most recent sighting
✓	<i>Polycarpon tetraphyllum</i>	Four-leaf Allseed			23/11/1999
✓	<i>Polygonum aviculare</i>	Wireweed			20/10/1980
✓	<i>Polygonum aviculare (NC)</i>	Wireweed			1/10/1994
	<i>Polygonum plebeium</i>	Small Knotweed			3/10/1994
✓	<i>Polypogon monspeliensis</i>	Annual Beard-grass			9/11/1997
✓	<i>Polypogon viridis</i>	Water Bent			1/10/1994
	<i>Polysiphonia amphibolis</i>				27/06/1978
	<i>Polysiphonia crassiuscula</i>				10/09/1987
	<i>Polysiphonia decipiens</i>				5/10/1978
	<i>Polysiphonia infestans</i>				27/06/1978
	<i>Polysiphonia tegees</i>				12/03/1982
	<i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i>	Mallee Pomaderris			26/09/1999
	<i>Pomaderris</i> sp.	Pomaderris			3/10/1994
	<i>Pomax umbellata</i>	Pomax			2/10/1994
	<i>Poranthera microphylla</i>	Small Poranthera			22/09/1990
	<i>Portulaca intraterranea</i>	Buttercup Purslane			16/02/1997
	<i>Portulaca oleracea</i>	Common Purslane			1/04/2007
✓	<i>Portulacaria afra</i>	Dwarf Jade Plant			16/11/2012
	<i>Posidonia angustifolia</i>	Narrow-leaf Tapeweed			13/09/1973
	<i>Posidonia australis</i>	Southern Tapeweed			3/03/1976
	<i>Posidonia sinuosa</i>	Narrow-leaf Tapeweed			27/06/1978
	<i>Prasophyllum occidentale</i>	Plains Leek-orchid			6/09/1999
	<i>Prasophyllum odoratum</i>	Scented Leek-orchid			18/10/1996
	<i>Prasophyllum odoratum (NC)</i>	Scented Leek-orchid			1/10/1994
	<i>Prasophyllum pallidum</i>	Pale Leek-orchid	VU	R	14/09/2009
	<i>Prasophyllum validum</i>	Mount Remarkable Leek-orchid	VU	V	23/10/1994
✓	<i>Proboscidea louisianica</i>	Purple-flower Devil's Claw			1/10/1994
✓	<i>Prosopis juliflora</i>	Mesquite			5/09/1989
	<i>Prostanthera althoferi</i> ssp. <i>longifolia</i>				18/11/1990
	<i>Prostanthera behriana</i>	Downy Mintbush			4/10/1994
	<i>Prostanthera spinosa</i>	Spiny Mintbush			1/10/1963
	<i>Prostanthera striatiflora</i>	Striated Mintbush			15/09/2009
	<i>Protokuetzingia australasica</i>				27/06/1978
✓	<i>Prunus domestica</i> ssp. <i>domestica</i>	Plum			13/01/1987
✓	<i>Prunus</i> sp.	Plum			1/10/1994
✓	<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed			1/10/1994
✓	<i>Psilocalon granulicaule</i>	Match-head Plant			7/06/1997
	<i>Psoralea patens (NC)</i>	Spreading Scurf-pea			15/09/1986
	<i>Pterocaulon sphacelatum</i>	Apple-bush			15/10/1990
	<i>Pterostylis aff. excelsa (NC)</i>	Dryland Greenhood			3/10/1994
	<i>Pterostylis biseta</i>	Two-bristle Greenhood			7/10/2015
	<i>Pterostylis biseta (NC)</i>	Two-bristle Greenhood			15/10/1996
	<i>Pterostylis excelsa</i>	Dryland Greenhood			14/10/1996
	<i>Pterostylis excelsa (NC)</i>	Dryland Greenhood			15/10/1996
	<i>Pterostylis mutica</i>	Midget Greenhood			10/09/2000
	<i>Pterostylis nana</i>	Dwarf Greenhood			1/10/1994
	<i>Pterostylis nutans</i>	Nodding Greenhood			1/10/1994
	<i>Pterostylis ovata</i>	Gawler Ranges Greenhood			22/09/1990
	<i>Pterostylis plumosa</i>	Bearded Greenhood			28/08/1999
	<i>Pterostylis pusilla</i>	Small Rusty-hood			22/10/1994
	<i>Pterostylis robusta</i>	Large Shell-orchid			16/07/2003
	<i>Pterostylis</i> sp.	Greenhood			24/10/1994
	<i>Pterothamnion francisianum</i>				23/09/1986

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Exotic	Species	Common	Aus	SA	Most recent sighting
	<i>Ptilocladia australis</i>				10/09/1975
	<i>Ptilotus decipiens</i>				22/09/1990
	<i>Ptilotus incanus/obovatus</i>	Silver Mulla Mulla			23/11/1999
	<i>Ptilotus nobilis ssp. angustifolius</i>	Yellow-tails			15/10/1996
	<i>Ptilotus nobilis ssp. nobilis</i>	Yellow-tails			17/10/1996
	<i>Ptilotus nobilis var. (NC)</i>	Yellow-tails			21/10/1994
	<i>Ptilotus nobilis var. nobilis (NC)</i>	Yellow-tails			16/11/2009
	<i>Ptilotus obovatus</i>	Silver Mulla Mulla			21/09/2009
	<i>Ptilotus obovatus (NC)</i>	Silver Mulla Mulla			30/07/2009
	<i>Ptilotus polystachyus</i>	Long-tails			26/03/2007
	<i>Ptilotus sp.</i>	Mulla Mulla			2/10/1994
	<i>Ptilotus spathulatus</i>	Pussy-tails			7/10/2015
	<i>Pultenaea graveolens</i>	Scented Bush-pea			1/10/1932
	<i>Pultenaea largiflorens</i>	Twiggy Bush-pea			21/10/1994
	<i>Pycnosorus globosus</i>	Drumsticks		V	1/09/2001
	<i>Pycnosorus pleiocephalus</i>	Soft Billy-buttons			3/09/2001
✓	<i>Pyracantha coccinea</i>				27/12/1997
	<i>Pyrorchis nigricans</i>	Black Fire-orchid			1/10/1926
	<i>Radyera farragei</i>	Desert Rose Mallow			22/10/1990
	<i>Ramalina inflata ssp. australis</i>				3/08/1995
	<i>Ranunculus hamatosetosus</i>	Hill Buttercup			28/08/1999
✓	<i>Ranunculus muricatus</i>	Pricklefruit Buttercup			26/09/1999
	<i>Ranunculus pachycarpus</i>	Thick-fruit Buttercup			2/10/1994
	<i>Ranunculus pentandrus var. platycarpus</i>	Smooth Buttercup			1/01/1975
	<i>Ranunculus pumilio var. pumilio</i>	Ferny Buttercup			19/10/1992
	<i>Ranunculus sessiliflorus var. sessiliflorus</i>	Annual Buttercup			3/10/1994
	<i>Ranunculus sp.</i>	Buttercup			3/10/1994
✓	<i>Raphanus raphanistrum</i>	Wild Radish			20/08/1989
✓	<i>Rapistrum rugosum ssp. rugosum</i>	Turnip Weed			14/11/1998
✓	<i>Reichardia tingitana</i>	False Sowthistle			29/09/1999
✓	<i>Reseda luteola</i>	Wild Mignonette			16/11/2009
✓	<i>Reseda odorata</i>	Sweet Mignonette			25/09/1991
	<i>Rhabdonia coccinea</i>				5/08/2007
	<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush			29/07/1982
	<i>Rhagodia crassifolia</i>	Fleshy Saltbush			1/01/1998
	<i>Rhagodia parabolica</i>	Mealy Saltbush			7/10/2015
	<i>Rhagodia sp.</i>	Saltbush			1/01/1990
	<i>Rhagodia spinescens</i>	Spiny Saltbush			16/11/2009
	<i>Rhagodia ulicina</i>	Intricate Saltbush			25/07/2001
✓	<i>Rhaponticum repens</i>	Creeping Knapweed			10/01/1985
	<i>Rhodanthe corymbiflora</i>	Paper Everlasting			18/11/2009
	<i>Rhodanthe floribunda</i>	White Everlasting			17/01/1996
	<i>Rhodanthe laevis</i>	Smooth Daisy			1/10/1916
	<i>Rhodanthe microglossa</i>	Clustered Everlasting			17/10/1996
	<i>Rhodanthe moschata</i>	Musk Daisy			21/09/2009
	<i>Rhodanthe polygalifolia</i>	Milkwort Everlasting			9/09/2010
	<i>Rhodanthe pygmaea</i>	Pigmy Daisy			22/10/1996
	<i>Rhodanthe sp.</i>	Everlasting			22/10/1994
	<i>Rhodanthe stricta</i>	Slender Everlasting			20/10/2008
	<i>Rhodanthe stuartiana</i>	Clay Everlasting			16/10/1996
	<i>Rhodanthe troedelii</i>	Small Paper-everlasting			26/10/1992
	<i>Rhyncharrhena linearis</i>	Bush Bean			31/03/2007

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Exotic	Species	Common	Aus	SA	Most recent sighting
	<i>Riccia crinita</i>				22/08/1973
	<i>Riccia lamellosa</i>				19/08/1971
	<i>Riccia limbata</i>				20/04/1973
	<i>Riccia nigrella</i>				19/08/1971
	<i>Riccia sorocarpa</i>				22/08/1973
	<i>Riccia spongiosula</i>				19/08/1971
✓	<i>Ricinus communis</i>	Castor Oil Plant			22/04/2014
✓	<i>Romulea minutiflora</i>	Small-flower Onion-grass			1/10/1994
✓	<i>Rorippa nasturtium-aquaticum</i>	Watercress			22/10/2012
	<i>Rostellularia adscendens</i> var. <i>pogonantha</i>	Pink Tongues			15/03/1937
✓	<i>Rostraria cristata</i>	Annual Cat's-tail			18/10/1996
✓	<i>Rostraria pumila</i>	Tiny Bristle-grass			18/09/2001
✓	<i>Rubus anglocandicans</i>				27/12/1997
	<i>Rumex brownii</i>	Slender Dock			7/10/2015
	<i>Rumex brownii</i> (NC)	Slender Dock			23/10/1994
✓	<i>Rumex conglomeratus</i>	Clustered Dock			1/10/1994
✓	<i>Rumex crispus</i>	Curled Dock			23/11/1992
	<i>Rumex crystallinus</i>	Glistening Dock			24/09/1990
	<i>Rumex dumosus</i>	Wiry Dock		R	14/10/1996
	<i>Rumex dumosus</i> var. (NC)	Wiry Dock		R	1/10/1994
✓	<i>Rumex pulcher</i> ssp. <i>pulcher</i>	Fiddle Dock			9/09/2010
	<i>Rumex</i> sp.	Dock			31/03/2007
	<i>Rumex tenax</i>	Shiny Dock			22/03/2007
	<i>Ruppia maritima</i>	Sea Tassel			24/09/1990
	<i>Ruppia</i> sp.	Water-tassel			1/01/1975
	<i>Ruppia tuberosa</i>	Widgeon Grass			22/11/1982
	<i>Rytidosperma auriculatum</i>	Lobed Wallaby-grass			14/10/1996
	<i>Rytidosperma caespitosum</i>	Common Wallaby-grass			7/10/2015
	<i>Rytidosperma erianthum</i>	Hill Wallaby-grass			31/12/1995
	<i>Rytidosperma fulvum</i>	Leafy Wallaby-grass			31/12/1995
	<i>Rytidosperma geniculatum</i>	Kneed Wallaby-grass			1/10/1994
	<i>Rytidosperma laeve</i>	Smooth Wallaby-grass		R	9/09/1992
	<i>Rytidosperma pilosum</i>	Velvet Wallaby-grass			26/10/1992
	<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	Slender Wallaby-grass			3/10/1994
	<i>Rytidosperma setaceum</i>	Small-flower Wallaby-grass			16/11/2009
	<i>Rytidosperma</i> sp.	Wallaby-grass			31/03/2007
	<i>Rytidosperma tenuius</i>	Short-awn Wallaby-grass		R	26/11/1993
✓	<i>Sagina apetala</i>	Annual Pearlwort			18/10/1996
	<i>Salsola australis</i>	Buckbush			7/12/2009
✓	<i>Salvia</i> sp.	Sage			23/10/1994
✓	<i>Salvia verbenaca</i> var.	Wild Sage			7/10/2015
✓	<i>Salvia verbenaca</i> var. <i>verbenaca</i>	Wild Sage			16/02/1997
	<i>Santalum acuminatum</i>	Quandong			10/09/2010
	<i>Santalum lanceolatum</i>	Plumbush			1/06/1991
	<i>Santalum murrayanum</i>	Bitter Quandong			1/10/1994
	<i>Santalum spicatum</i>	Sandalwood		V	13/11/2010
	<i>Sarcocornia blackiana</i>	Thick-head Samphire			21/09/2009
	<i>Sarcocornia quinqueflora</i>	Beaded Samphire			1/01/1998
	<i>Sarcocozona bicarinata</i>	Ridged Noon-flower		V	5/11/2008
	<i>Sarcocozona praecox</i>	Sarcocozona			19/10/2008
	<i>Sargassum spinuligerum</i>				13/09/1973
	<i>Scaberia agardhii</i>				31/12/1950
✓	<i>Scabiosa atropurpurea</i>	Pincushion			25/02/1997

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	<i>Scaevola albida</i>	Pale Fanflower			1/01/1990
	<i>Scaevola collaris</i>				8/03/1997
	<i>Scaevola humilis</i>	Inland Fanflower			14/09/2009
	<i>Scaevola parvibarbata</i>	Small-beard Fanflower			16/11/2009
	<i>Scaevola sp.</i>	Fanflower			22/10/1994
	<i>Scaevola spinescens</i>	Spiny Fanflower			19/10/2008
	<i>Scambopus curvipes</i>				9/09/2009
	<i>Schenkia australis</i>	Spike Centaury			22/10/1990
✓	<i>Schinus molle</i>	Pepper-tree			17/11/2009
✓	<i>Schismus barbatus</i>	Arabian Grass			21/09/2009
	<i>Schoenia ramosissima</i>	Dainty Everlasting			9/08/1991
	<i>Schoenus apogon</i>	Common Bog-rush			10/11/1997
	<i>Schoenus nanus</i>	Little Bog-rush			1/10/1998
	<i>Scleranthus pungens</i>	Prickly Knawel			23/11/1999
	<i>Scleroblitum atriplicinum</i>	Starry Goosefoot			3/10/1945
	<i>Sclerolaena bicuspis</i>	Two-spine Bindyi			13/06/1992
	<i>Sclerolaena brachyptera</i>	Short-wing Bindyi			25/11/2009
	<i>Sclerolaena brevifolia</i>	Small-leaf Bindyi			10/06/1967
	<i>Sclerolaena constricta</i>				9/09/1992
	<i>Sclerolaena cuneata</i>	Tangled Bindyi			28/06/2010
	<i>Sclerolaena decurrens</i>	Green Bindyi			31/03/2007
	<i>Sclerolaena diacantha</i>	Grey Bindyi			1/04/2007
	<i>Sclerolaena divaricata</i>	Tangled Bindyi			22/09/2009
	<i>Sclerolaena eriacantha</i>	Silky Bindyi			18/11/2009
	<i>Sclerolaena holtiana</i>	Holt's Bindyi			27/03/2007
	<i>Sclerolaena intricata</i>	Tangled Bindyi			26/10/1992
	<i>Sclerolaena lanicuspis</i>	Spinach Bindyi			18/11/2009
	<i>Sclerolaena limbata</i>	Pearl Bindyi			1/10/2008
	<i>Sclerolaena longicuspis</i>	Long-spine Bindyi			1/01/1987
	<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi			18/11/2009
	<i>Sclerolaena parviflora</i>	Small-flower Bindyi			15/09/1991
	<i>Sclerolaena patenticuspis</i>	Spear-fruit Bindyi			18/11/2009
	<i>Sclerolaena sp.</i>	Bindyi			7/12/2009
	<i>Sclerolaena uniflora</i>	Small-spine Bindyi			8/03/1997
	<i>Sclerolaena ventricosa</i>	Salt Bindyi			18/09/2001
✓	<i>Scorzonera laciniata (NC)</i>	Scorzonera			1/10/1994
	<i>Senecio anethifolius (NC)</i>	Feathery Groundsel			1/10/1994
	<i>Senecio anethifolius ssp. anethifolius</i>	Feathery Groundsel			7/10/1992
	<i>Senecio anethifolius ssp. brevibracteolatus</i>	Feathery Groundsel			14/09/2009
	<i>Senecio cunninghamii var. (NC)</i>	Shrubby Groundsel			1/10/1994
	<i>Senecio cunninghamii var. cunninghamii</i>	Shrubby Groundsel			1/04/1909
	<i>Senecio cunninghamii var. flindersensis</i>	Shrubby Groundsel			4/06/1979
	<i>Senecio gawlerensis</i>	Gawler Ranges Groundsel			3/09/1994
	<i>Senecio glossanthus</i>	Annual Groundsel			20/10/2008
	<i>Senecio glossanthus (NC)</i>	Annual Groundsel			1/01/1998
	<i>Senecio gregorii</i>	Fleshy Groundsel			18/10/1996
	<i>Senecio laceratus</i>	Cut-leaf Groundsel			1/04/1994
	<i>Senecio magnificus</i>	Showy Groundsel			22/07/1986
	<i>Senecio megaglossus</i>	Large-flower Groundsel	VU	E	17/09/2009
	<i>Senecio odoratus</i>	Scented Groundsel			19/09/2001
	<i>Senecio odoratus var. (NC)</i>	Scented Groundsel			21/10/1994
	<i>Senecio odoratus var. odoratus (NC)</i>	Scented Groundsel			3/10/1994

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Exotic	Species	Common	Aus	SA	Most recent sighting
	<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel			1/01/1998
	<i>Senecio quadridentatus</i>	Cotton Groundsel			7/10/2015
	<i>Senecio runcinifolius</i>	Thistle-leaf Groundsel			1/04/2003
	<i>Senecio spanomerus</i>				4/12/1991
	<i>Senecio tenuiflorus</i> (NC)	Woodland Groundsel			15/10/1996
	<i>Senna artemisioides nothosp.</i> (NC)	Desert Senna			1/04/1980
	<i>Senna artemisioides ssp.</i>	Desert Senna			7/10/2015
	<i>Senna artemisioides ssp. filifolia</i>	Fine-leaf Desert Senna			19/09/2001
	<i>Senna artemisioides ssp. petiolaris</i>				16/11/2009
	<i>Senna artemisioides ssp. petiolaris</i> (NC)	Flat-stalk Senna			18/10/1996
	<i>Senna artemisioides ssp. quadrifolia</i>	Four-leaf Desert Senna			31/03/2007
	<i>Senna artemisioides ssp. X artemisioides</i>	Silver Senna			1/04/2007
	<i>Senna artemisioides ssp. X coriacea</i>	Broad-leaf Desert Senna			7/12/2009
	<i>Senna artemisioides ssp. X sturtii</i>	Grey Senna			16/11/2009
	<i>Senna artemisioides ssp. zygophylla</i>	Twin-leaf Desert Senna			1/04/1980
	<i>Senna cardiosperma ssp. cardiosperma</i>	Curved-leaf Senna			13/10/1983
	<i>Senna cardiosperma ssp. gawlerensis</i>	Gawler Ranges Senna			22/09/1990
	<i>Senna phyllodinea</i>				4/03/1968
	<i>Senna planitiicola</i>	Yellow Pea			14/04/1993
	<i>Senna pleurocarpa var. pleurocarpa</i>	Stripe-pod Senna			1/04/2007
	<i>Senna sp.</i>	Senna			7/12/2009
	<i>Setaria basiclada</i>				8/03/1997
	<i>Setaria clementii</i>	Clement's Paspalidium			12/03/1950
	<i>Setaria constricta</i>	Knotty-butt Paspalidium			1/04/2007
	<i>Setaria dielsii</i>	Diel's Pigeon-grass			0/01/1900
	<i>Setaria jubiflora</i>	Warrego Summer-grass			1/01/1998
✓	<i>Setaria verticillata</i>	Whorled Pigeon-grass			1/02/1993
✓	<i>Sherardia arvensis</i>	Field Madder			1/10/1994
	<i>Sida ammophila</i>	Sand Sida			31/03/2007
	<i>Sida calyxhymenia</i>	Tall Sida			25/09/1991
	<i>Sida corrugata var.</i>	Corrugated Sida			7/10/2015
	<i>Sida corrugata var. angustifolia</i>	Grassland Sida			18/10/1996
	<i>Sida corrugata var. corrugata</i>	Corrugated Sida			18/10/1996
	<i>Sida fibulifera</i>	Pin Sida			31/03/2007
	<i>Sida filiformis</i>	Fine Sida			1/10/1994
	<i>Sida intricata</i>	Twiggy Sida			31/03/2007
	<i>Sida petrophila</i>	Rock Sida			14/09/2009
	<i>Sida sp.</i>	Sida			21/10/1994
	<i>Sida spodochroma</i>				1/04/2007
	<i>Sida trichopoda</i>	High Sida			31/03/2016
	<i>Sigesbeckia orientalis</i>	Oriental Sigesbeckia			1/09/1915
✓	<i>Silene gallica var.</i>	French Catchfly			22/10/1995
✓	<i>Silene gallica var. gallica</i>	French Catchfly			17/10/1996
✓	<i>Silene nocturna</i>	Mediterranean Catchfly			19/09/2001
✓	<i>Silene sp.</i>	Catchfly			15/09/1997
✓	<i>Silene tridentata</i>				17/10/1996
	<i>Siloxerus multiflorus</i>	Small Wrinklewort			1/10/1994
✓	<i>Silybum marianum</i>	Variegated Thistle			22/10/1994

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✓	<i>Sisymbrium erysimoides</i>	Smooth Mustard			23/10/2012
✓	<i>Sisymbrium irio</i>	London Mustard			18/09/2001
✓	<i>Sisymbrium orientale</i>	Indian Hedge Mustard			18/10/1996
✓	<i>Sisymbrium sp.</i>	Wild Mustard			23/10/1994
	<i>Solanum chenopodium</i>	Goosefoot Potato-bush			13/07/1954
✓	<i>Solanum cinereum</i>	Narrawa Burr			27/12/1997
	<i>Solanum cleistogamum</i>	Shy Nightshade			19/05/1987
	<i>Solanum coactiliferum</i>	Tomato-bush			18/09/2001
✓	<i>Solanum elaeagnifolium</i>	Silver-leaf Nightshade			22/10/1952
	<i>Solanum ellipticum</i>	Velvet Potato-bush			7/10/2015
	<i>Solanum esuriale</i>	Quena			15/10/1996
	<i>Solanum lasiophyllum</i>	Flannel Bush			5/06/1990
✓	<i>Solanum nigrum</i>	Black Nightshade			1/10/1994
	<i>Solanum petrophilum</i>	Rock Nightshade			10/09/2010
	<i>Solanum petrophilum (NC)</i>	Rock Nightshade			1/04/2007
	<i>Solanum quadriloculatum</i>	Plains Nightshade			26/03/2007
	<i>Solanum simile</i>	Kangaroo Apple			7/11/1997
	<i>Solanum sp.</i>	Nightshade/Potato-bush			3/10/1994
✓	<i>Solidago canadensis</i>	Golden Rod			1/04/2003
	<i>Solieria robusta</i>				17/11/1980
✓	<i>Sonchus asper ssp. asper</i>	Rough Sow-thistle			8/11/1997
✓	<i>Sonchus oleraceus</i>	Common Sow-thistle			18/11/2009
	<i>Sonchus sp.</i>	Sow-thistle			22/10/1994
✓	<i>Sonchus tenerrimus (NC)</i>	Clammy Sow-thistle			27/10/1992
✓	<i>Spergularia bocconeii</i>	Red Sand-spurrey			23/09/1990
	<i>Spergularia brevifolia</i>	Salt Sand-spurrey			25/09/1969
✓	<i>Spergularia diandra</i>	Lesser Sand-spurrey			20/10/2008
✓	<i>Spergularia diandra (NC)</i>	Lesser Sand-spurrey			18/10/1996
	<i>Spergularia diandroides</i>	Lesser Sand-spurrey			28/09/1966
	<i>Spergularia marina</i>	Salt Sand-spurrey			25/04/1994
✓	<i>Spergularia media (NC)</i>	Coast Sand-spurrey			1/01/1975
✓	<i>Spergularia rubra</i>	Red Sand-spurrey			28/10/1992
✓	<i>Spergularia rubra (NC)</i>	Red Sand-spurrey			31/12/1995
✓	<i>Spergularia sp.</i>	Sand-spurrey			23/10/1994
	<i>Spermatochnus paradoxus</i>				23/09/1986
	<i>Sphacelaria biradiata</i>				27/06/1978
	<i>Sphacelaria cirrosa</i>				27/06/1978
	<i>Sphacelaria rigidula</i>				27/06/1978
	<i>Sphacelaria tribuloides</i>				17/04/1975
	<i>Spongoclonium australicum</i>				10/09/1987
	<i>Spongoclonium conspicuum</i>				10/09/1987
	<i>Sporobolus actinocladius</i>	Ray Grass			31/03/2007
	<i>Sporochnus comosus</i>				17/11/1980
	<i>Spyridia filamentosa</i>				27/06/1978
	<i>Spyridia tasmanica</i>				17/11/1980
	<i>Spyridium phlebophyllum</i>	Inland Spyridium			15/09/2009
	<i>Spyridium stenophyllum ssp. renovatum</i>	Forked Spyridium			30/10/1918
	<i>Spyridium subochreatum</i>	Velvet Spyridium			1/10/1926
	<i>Stackhousia aspericocca (NC)</i>				27/08/1990
	<i>Stackhousia monogyna</i>	Creamy Candles			23/11/1999
	<i>Stackhousia monogyna (NC)</i>	Creamy Candles			23/11/1999
	<i>Stackhousia sp.</i>	Candles			22/10/1995
	<i>Stackhousia spathulata</i>	Coast Candles			7/10/2015
	<i>Stackhousia subterranea</i>	Creamy Candles			14/10/1993
✓	<i>Stellaria media</i>	Chickweed			15/10/1996

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✓	<i>Stellaria pallida</i>	Lesser Starwort			1/10/1994
	<i>Stellaria palustris</i> var. (NC)	Swamp Starwort			3/10/1994
	<i>Stemodia florulenta</i>	Bluerod			24/09/1990
	<i>Stenogramme leptophylla</i>				9/04/1980
	<i>Stenopetalum lineare</i>	Narrow Thread-petal			17/10/1996
	<i>Stenopetalum lineare</i> (NC)	Narrow Thread-petal			17/10/1996
	<i>Stenopetalum sphaerocarpum</i>	Round-fruit Thread-petal			9/08/1991
	<i>Stilophora rhizodes</i>				4/09/1973
	<i>Stuartina hamata</i>	Prickly Cudweed			30/08/1974
	<i>Stuartina muelleri</i>	Spoon Cudweed			3/10/1994
	<i>Stylidium despectum</i>	Hundreds And Thousands			27/10/1996
✓	<i>Suaeda aegyptiaca</i>				27/05/2005
	<i>Suaeda australis</i>	Austral Seablite			19/10/2008
	<i>Swainsona adenophylla</i>	Violet Swainson-pea			31/03/2007
	<i>Swainsona canescens</i>	Grey Swainson-pea			22/09/1990
	<i>Swainsona eremaea</i>				
	<i>Swainsona fissimontana</i>	Broken Hill Pea			31/03/1987
	<i>Swainsona formosa</i>	Sturt Pea			16/09/1992
	<i>Swainsona oroboides complex</i>	Variable Swainson-pea			1/01/1987
	<i>Swainsona phacoides</i>	Dwarf Swainson-pea			16/09/2008
	<i>Swainsona</i> sp.	Swainson-pea			31/03/2007
	<i>Swainsona stipularis</i>	Orange Swainson-pea			22/10/1995
	<i>Swainsona stipularis</i> (NC)	Orange Darling Pea			9/09/1992
	<i>Swainsona tephrotricha</i>	Ashy-haired Swainson-pea			26/09/1999
	<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>				17/11/1992
✓	<i>Tagetes minuta</i>	Stinking Roger			5/04/1982
✓	<i>Tamarix ramosissima</i>				3/10/1994
✓	<i>Taraxacum khatoonae</i>	Dandelion			21/11/2008
	<i>Tecticornia arbuscula</i>	Shrubby Samphire			1/01/1998
	<i>Tecticornia disarticulata</i>				31/03/2007
	<i>Tecticornia halocnemoides</i> ssp.	Grey Samphire			17/10/1996
	<i>Tecticornia halocnemoides</i> ssp. <i>halocnemoides</i>	Grey Samphire			28/06/2010
	<i>Tecticornia halocnemoides</i> ssp. <i>longispicata</i>	Grey Samphire			11/04/1995
	<i>Tecticornia indica</i> ssp. <i>bidens</i>	Brown-head Samphire			21/09/2009
	<i>Tecticornia indica</i> ssp. <i>leiostachya</i>	Brown-head Samphire			28/06/2010
	<i>Tecticornia lepidosperma</i>			R	1/01/1998
	<i>Tecticornia medullosa</i>				22/09/1990
	<i>Tecticornia pergranulata</i> ssp. <i>divaricata</i>	Black-seed Samphire			24/09/1990
	<i>Tecticornia pergranulata</i> ssp. <i>pergranulata</i>	Black-seed Samphire			8/03/1997
	<i>Tecticornia pruinosa</i>	Bluish Samphire			18/09/2001
	<i>Tecticornia</i> sp.	Samphire			20/10/2008
	<i>Tecticornia tenuis</i>	Slender Samphire			23/08/2001
	<i>Templetonia aculeata</i>	Spiny Mallee-pea			30/07/2009
	<i>Templetonia egena</i>	Broombush Templetonia			18/09/2001
	<i>Templetonia egena</i> (NC)	Broombush Templetonia			18/11/2009
	<i>Templetonia retusa</i>	Cookies Tongue			1/10/1994
	<i>Tetragonia eremaea</i>	Desert Spinach			1/04/2007
	<i>Tetragonia implexicoma</i>	Bower Spinach			19/10/2008
	<i>Tetragonia moorei</i>	New Zealand Spinach			3/09/2001
	<i>Tetragonia</i> sp.	False Spinach			1/04/2007
	<i>Tetragonia tetragonioides</i> (NC)	New Zealand Spinach			9/09/1992

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	<i>Tetragonia tetragonoides</i>	New Zealand Spinach			12/10/1983
	<i>Tetrapterum cylindricum</i>				21/07/1986
	<i>Teucrium corymbosum</i>	Rock Germander			14/09/2009
	<i>Teucrium corymbosum (NC)</i>	Rock Germander			15/07/2003
	<i>Teucrium racemosum</i>	Grey Germander			17/11/2009
	<i>Teucrium sp.</i>	Germander			21/10/1994
	<i>Thelymitra alcockiae</i>	Scented Sun-orchid			3/10/1994
	<i>Thelymitra grandiflora</i>	Great Sun-orchid		R	26/09/1999
	<i>Thelymitra luteocilium</i>	Yellow-tuft Sun Orchid			1/08/1999
	<i>Thelymitra megalyptra</i>	Scented Sun-orchid			1/09/2004
	<i>Thelymitra nuda</i>				15/10/1996
	<i>Thelymitra nuda (NC)</i>	Scented Sun-orchid			15/10/1996
	<i>Thelymitra pauciflora</i>	Slender Sun-orchid			1/09/1999
	<i>Thelymitra pauciflora (NC)</i>	Slender Sun-orchid			1/10/1994
	<i>Thelymitra rubra</i>	Salmon Sun-orchid			1/08/1994
	<i>Thelymitra sp.</i>	Sun-orchid			3/10/1994
	<i>Themeda triandra</i>	Kangaroo Grass			31/03/2007
✓	<i>Thinopyrum elongatum</i>	Tall Wheat-grass			16/01/1987
	<i>Threlkeldia diffusa</i>	Coast Bonefruit			20/10/2008
	<i>Thryptomene elliottii</i>				30/03/1960
	<i>Thryptomene micrantha</i>	Ribbed Thryptomene			28/08/1968
	<i>Thyridolepis mitchelliana</i>	Window Mulga-grass			11/04/1999
	<i>Thysanotus baueri</i>	Mallee Fringe-lily			19/10/2008
	<i>Thysanotus exfimbriatus</i>				4/09/1991
	<i>Thysanotus patersonii</i>	Twining Fringe-lily			18/10/1996
	<i>Thysanotus tenellus</i>	Grassy Fringe-lily		R	31/12/1995
	<i>Tiparraria aurata</i>				27/06/1978
	<i>Tortula atrovirens</i>				21/07/1986
	<i>Trachymene cyanopetala</i>	Purple Trachymene			19/08/1990
	<i>Trachymene glaucifolia</i>	Blue Parsnip			16/10/1901
	<i>Trachymene ornata</i>	Cotton-ball Trachymene			22/09/1990
	<i>Tragus australianus</i>	Small Burr-grass			31/03/2007
	<i>Tremella mesenterica</i>				3/08/1995
	<i>Trianthema triquetra</i>	Red Spinach			26/03/2007
	<i>Tribulus eichlerianus</i>	Eichler's Caltrop			31/03/2007
	<i>Tribulus minutus</i>				31/03/2007
	<i>Tribulus sp.</i>	Caltrop			26/03/2007
✓	<i>Tribulus terrestris</i>	Caltrop			23/04/2014
	<i>Trichanthodium skirrophorum</i>	Woolly Yellow-heads			1/01/1991
✓	<i>Trifolium angustifolium</i>	Narrow-leaf Clover			7/10/2015
✓	<i>Trifolium arvense var. arvense</i>	Hare's-foot Clover			23/11/1999
✓	<i>Trifolium campestre</i>	Hop Clover			23/11/1999
✓	<i>Trifolium fragiferum var. fragiferum</i>	Strawberry Clover			25/11/1995
✓	<i>Trifolium glomeratum</i>	Cluster Clover			23/11/1999
✓	<i>Trifolium sp.</i>	Clover			7/10/2015
✓	<i>Trifolium subterraneum</i>	Subterranean Clover			26/10/1992
✓	<i>Trifolium tomentosum</i>	Woolly Clover			14/10/1996
	<i>Triglochin calcitrapum (NC)</i>	Spurred Arrowgrass			1/01/1975
	<i>Triglochin centrocarpum (NC)</i>	Dwarf Arrowgrass			1/01/1975
	<i>Triglochin isingiana</i>	Spurred Arrowgrass			2/09/1991
	<i>Trigonella suavissima</i>	Sweet Fenugreek			19/10/1992
	<i>Triodia bunicola (NC)</i>	Flinders Ranges Spinifex			17/11/2009
	<i>Triodia irritans</i>	Spinifex			1/04/2007
	<i>Triodia irritans complex</i>	Spinifex			1/01/1990
	<i>Triodia irritans var. (NC)</i>				27/08/1990

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	<i>Triodia scariosa</i>	Spinifex			7/10/2015
	<i>Triodia scariosa</i> ssp. (NC)	Spinifex			20/11/1998
	<i>Triodia</i> sp.	Spinifex			1/04/2007
	<i>Triodia</i> sp. (NC)	Spinifex			22/10/1994
	<i>Tripogon loliiformis</i>	Five-minute Grass			31/03/2007
	<i>Triptilodiscus pygmaeus</i>	Small Yellow-heads			1/09/1999
	<i>Triraphis mollis</i>	Purple Plume Grass			31/03/2007
✓	<i>Triticum aestivum</i>	Wheat			14/10/1996
	<i>Trymalium wayi</i>	Grey Trymalium			25/10/1970
	<i>Tulostoma berterianum</i>				14/07/2002
	<i>Typha domingensis</i>	Narrow-leaf Bulrush			19/09/2001
	Unidentified sp.				22/10/1995
✓	<i>Urochloa panicoides</i> var. <i>panicoides</i>				25/01/2012
✓	<i>Urospermum picroides</i>	False Hawkbit			23/11/1999
✓	<i>Vachellia farnesiana</i>	Sweet Acacia			29/03/2011
	<i>Velleia arguta</i>	Toothed Velleia			10/09/2010
	<i>Velleia paradoxa</i>	Spur Velleia			2/10/1994
✓	<i>Verbascum thapsus</i> ssp. <i>thapsus</i>	Great Mullein			27/12/1997
✓	<i>Verbena aristigera</i>	Mayne's Pest			7/06/1997
✓	<i>Verbena supina</i> (NC)	Trailing Verbena			22/11/1999
✓	<i>Verbena supina</i> var. <i>erecta</i>	Trailing Verbena			27/12/1997
✓	<i>Verbena supina</i> var. <i>supina</i>	Trailing Verbena			26/03/2007
	<i>Veronica decorosa</i>	Showy Speedwell		R	22/11/1999
	<i>Veronica plebeia</i>	Trailing Speedwell			21/10/1994
✓	<i>Vicia monantha</i>	Spurred Vetch			22/10/1996
✓	<i>Vicia monantha</i> ssp. <i>monantha</i>	One-flower Vetch			31/08/1983
✓	<i>Vicia monantha</i> ssp. <i>triflora</i>				2/10/1994
✓	<i>Vicia</i> sp.	Vetch			21/11/1998
	<i>Vittadinia australasica</i> var.	Sticky New Holland Daisy			17/01/1996
	<i>Vittadinia australasica</i> var. <i>australasica</i>	Sticky New Holland Daisy			26/09/1999
	<i>Vittadinia blackii</i>	Narrow-leaf New Holland Daisy			3/10/1994
	<i>Vittadinia cervicalis</i> var. <i>cervicalis</i>	Waisted New Holland Daisy			7/10/2015
	<i>Vittadinia condyloides</i>	Club-hair New Holland Daisy			26/09/1999
	<i>Vittadinia cuneata</i> var.	Fuzzy New Holland Daisy			16/11/2009
	<i>Vittadinia cuneata</i> var. <i>cuneata</i>	Fuzzy New Holland Daisy			19/09/2001
	<i>Vittadinia cuneata</i> var. <i>morrisii</i>	New Holland Daisy			25/10/1996
	<i>Vittadinia dissecta</i> var. <i>hirta</i>	Dissected New Holland Daisy			1/01/1990
	<i>Vittadinia eremaea</i>	Desert New Holland Daisy			1/10/1994
	<i>Vittadinia gracilis</i>	Woolly New Holland Daisy			23/11/1999
	<i>Vittadinia megacephala</i>	Giant New Holland Daisy			4/09/1994
	<i>Vittadinia nullarborensis</i>	Nullarbor New Holland Daisy			16/11/1997
	<i>Vittadinia pterochaeta</i>	Rough New Holland Daisy			25/09/1999
	<i>Vittadinia</i> sp.	New Holland Daisy			17/11/2009
	<i>Vittadinia sulcata</i>	Furrowed New Holland Daisy			26/09/1999
✓	<i>Vulpia bromoides</i>	Squirrel-tail Fescue			26/10/1992
	<i>Vulpia bromoides/myuros</i>				28/10/1992
✓	<i>Vulpia muralis</i>	Wall Fescue			15/09/1997
✓	<i>Vulpia myuros</i> f.	Fescue			16/11/2009
✓	<i>Vulpia myuros</i> f. <i>megalura</i>	Fox-tail Fescue			22/10/1996
✓	<i>Vulpia myuros</i> f. <i>myuros</i>	Rat's-tail Fescue			25/10/1996
✓	<i>Vulpia</i> sp.	Fescue			7/10/2015
	<i>Wahlenbergia communis</i>	Tufted Bluebell			1/04/2007

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	<i>Wahlenbergia gracilentia</i>	Annual Bluebell			9/09/2010
	<i>Wahlenbergia luteola</i>	Yellow-wash Bluebell			7/10/2015
	<i>Wahlenbergia sp.</i>	Native Bluebell			3/10/1994
	<i>Wahlenbergia stricta ssp. stricta</i>	Tall Bluebell			7/10/2015
	<i>Waitzia acuminata var. acuminata</i>	Orange Immortelle			23/09/1990
	<i>Walwhalleya proluta</i>	Rigid Panic			22/10/1958
	<i>Walwhalleya proluta (NC)</i>	Rigid Panic			17/11/2009
	<i>Warrenia comosa</i>				4/08/2007
✓	<i>Watsonia marginata</i>	Bordered Watsonia			1/10/1999
	<i>Webervanbossea tasmanensis</i>				27/06/1978
	<i>Westringia rigida</i>	Stiff Westringia			31/03/2007
	<i>Wilsonia humilis</i>	Silky Wilsonia			1/01/1998
	<i>Wurmbea australis</i>	Inland Nancy			7/10/2015
	<i>Wurmbea biglandulosa ssp. flindersica</i>	Flinders Ranges Nancy			10/09/2000
	<i>Wurmbea centralis (NC)</i>	Inland Nancy			21/10/1994
	<i>Wurmbea citrina</i>	Green-flower Nancy			29/07/1966
	<i>Wurmbea dioica ssp. brevifolia</i>	Early Nancy			1/09/2001
	<i>Wurmbea dioica ssp. dioica</i>	Early Nancy			7/10/2015
	<i>Wurmbea dioica ssp. dioica (NC)</i>	Early Nancy			1/01/1990
	<i>Wurmbea sp.</i>	Nancy			31/12/1995
	<i>Wurmbea stellata</i>	Star Nancy		R	25/06/1991
✓	<i>Xanthium spinosum</i>	Bathurst Burr			26/03/2007
	<i>Xanthoparmelia convoluta</i>				1/10/1966
	<i>Xanthoparmelia tasmanica</i>				23/09/1994
	<i>Xanthorrhoea quadrangulata</i>	Rock Grass-tree			30/07/2009
	<i>Xerochrysum bracteatum</i>	Golden Everlasting			3/10/1994
	<i>Zostera muelleri ssp. mucronata</i>	Garweed		R	6/09/1974
	<i>Zostera sp.</i>	Grass-wrack			1/01/1975
	<i>Zygochloa paradoxa</i>	Sandhill Cane-grass			21/09/2009
	<i>Zygophyllum ammophilum</i>	Sand Twinleaf			16/11/1997
	<i>Zygophyllum ammophilum (NC)</i>	Sand Twinleaf			9/09/1992
	<i>Zygophyllum angustifolium</i>	Scrambling Twinleaf			1/04/2007
	<i>Zygophyllum apiculatum</i>	Pointed Twinleaf			18/09/2001
	<i>Zygophyllum aurantiacum (NC)</i>	Shrubby Twinleaf			17/10/1996
	<i>Zygophyllum aurantiacum ssp. aurantiacum</i>	Shrubby Twinleaf			18/11/2009
	<i>Zygophyllum aurantiacum ssp. aurantiacum</i>	Shrubby Twinleaf			13/03/1997
	<i>Zygophyllum aurantiacum ssp. aurantiacum (NC)</i>	Shrubby Twinleaf			1/01/1998
	<i>Zygophyllum aurantiacum ssp. cuneatum</i>	Shrubby Twinleaf			27/03/2007
	<i>Zygophyllum aurantiacum ssp. verticillatum</i>	Shrubby Twinleaf			20/08/1966
	<i>Zygophyllum billardierei</i>	Coast Twinleaf			15/09/1997
	<i>Zygophyllum billardierei (NC)</i>	Coast Twinleaf			29/10/1992
	<i>Zygophyllum compressum</i>	Rabbit-ears Twinleaf			13/04/1993
	<i>Zygophyllum confluens</i>	Forked Twinleaf			19/09/2001
	<i>Zygophyllum crenatum</i>	Notched Twinleaf			19/09/2001
	<i>Zygophyllum eremaeum</i>				18/10/1996
	<i>Zygophyllum eremaeum (NC)</i>	Pale-flower Twinleaf			1/01/1998
	<i>Zygophyllum glaucum</i>	Pale Twinleaf			22/10/1990
	<i>Zygophyllum iodocarpum</i>	Violet Twinleaf			31/03/2007
	<i>Zygophyllum iodocarpum (NC)</i>	Violet Twinleaf			8/08/1996
	<i>Zygophyllum kochii</i>	Koch's Twinleaf			16/09/1997

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	<i>Zygophyllum ovatum</i>	Dwarf Twinleaf			1/04/2007
	<i>Zygophyllum prismatothecum</i>	Square-fruit Twinleaf			15/10/1990
	<i>Zygophyllum reticulatum</i>	Shrubby Twinleaf			22/09/2009
	<i>Zygophyllum simile</i>	White Twinleaf			18/10/1996
	<i>Zygophyllum sp.</i>	Twinleaf			1/04/2007

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

Appendix 2. Fauna species records from within 50km buffer of Project area (BSBSA 2019).

Class	Species	Common	Aus	SA	Most Recent Sighting
AVES	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater			2011
	<i>Acanthiza apicalis</i>	Inland Thornbill			2008
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			2011
	<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western)		R	2006
	<i>Acanthiza nana</i>	Yellow Thornbill			2006
	<i>Acanthiza sp.</i>	thornbills			1997
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill			2011
	<i>Acanthorhynchus tenuirostris halmaturinus</i>	Eastern Spinebill (Ki, MLR, southern FR)			2000
	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk			2007
	<i>Accipiter fasciatus</i>	Brown Goshawk			2006
	<i>Actitis hypoleucos</i>	Common Sandpiper		R	2004
	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar			2007
	<i>Alauda arvensis</i>	Eurasian Skylark			2007
	<i>Amytornis merrotsyi</i>	Short-tailed Grasswren			1981
	<i>Amytornis merrotsyi merrotsyi</i>	Flinders Ranges Short-tailed Grasswren	VU		2001
	<i>Amytornis textilis (NC)</i>	Thick-billed Grasswren	ssp.		2002
		Western Grasswren			2006
	<i>Anas castanea</i>	Chestnut Teal			2001
	<i>Anas gracilis</i>	Grey Teal			2007
	<i>Anas superciliosa</i>	Pacific Black Duck			2006
	<i>Anthochaera carunculata</i>	Red Wattlebird			2011
	<i>Anthus australis</i>	Australian Pipit			2008
	<i>Aphelocephala leucopsis</i>	Southern Whiteface			2015
	<i>Apus pacificus</i>	Pacific Swift (Fork-tailed Swift)			2000
	<i>Aquila audax</i>	Wedge-tailed Eagle			2015
	<i>Ardea alba</i>	Great Egret			2005
	<i>Ardea ibis</i>	Cattle Egret		R	1994
	<i>Ardea pacifica</i>	White-necked Heron			2007
	<i>Ardeotis australis</i>	Australian Bustard		V	2006
	<i>Arenaria interpres</i>	Ruddy Turnstone		R	1998
	<i>Artamus cinereus</i>	Black-faced Woodswallow			2007
	<i>Artamus cyanopterus</i>	Dusky Woodswallow			2007
	<i>Artamus leucorhynchus</i>	White-breasted Woodswallow			1999
	<i>Artamus minor</i>	Little Woodswallow			1998
	<i>Artamus personatus</i>	Masked Woodswallow			2007
	<i>Artamus superciliosus</i>	White-browed Woodswallow			2001
	<i>Aythya australis</i>	Hardhead			2006
	<i>Barnardius zonarius</i>	Australian Ringneck			2011
	<i>Biziura lobata</i>	Musk Duck		R	2006
	<i>Cacatua sanguinea</i>	Little Corella			2011
	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo			2006
	<i>Cacomantis pallidus</i>	Pallid Cuckoo			2006
	<i>Calamanthus (Calamanthus) campestris</i>	Rufous Fieldwren			2007
	<i>Calamanthus (Hylacola) pyrrhopygius</i>	Chestnut-rumped Heathwren	ssp.	ssp.	1997
	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper			2006
	<i>Calidris canutus</i>	Red Knot	EN		2000
	<i>Calidris ferruginea</i>	Curlew Sandpiper	CR		2000
	<i>Calidris ruficollis</i>	Red-necked Stint			2006

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Class	Species	Common	Aus	SA	Most Recent Sighting
	<i>Caligavis chrysops</i>	Yellow-faced Honeyeater			1980
	<i>Caligavis chrysops samueli</i>	Yellow-faced Honeyeater (MLR, southern FR)			2004
	<i>Carduelis carduelis</i>	European Goldfinch			1996
	<i>Certhionyx variegatus</i>	Pied Honeyeater			2007
	<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo			2007
	<i>Chalcites lucidus</i>	Shining Bronze Cuckoo			2005
	<i>Chalcites osculans</i>	Black-eared Cuckoo			2007
	<i>Charadrius ruficapillus</i>	Red-capped Plover			2006
	<i>Charadrius veredus</i>	Oriental Plover			1996
	<i>Chenonetta jubata</i>	Maned Duck			2007
	<i>Cheramoeca leucosterna</i>	White-backed Swallow			2007
	<i>Chlidonias hybrida</i>	Whiskered Tern			2004
	<i>Chroicocephalus novaehollandiae</i>	Silver Gull			2006
	<i>Cincloramphus cruralis</i>	Brown Songlark			2006
	<i>Cincloramphus mathewsi</i>	Rufous Songlark			2005
	<i>Cinclsoma castanotum</i>	Chestnut-backed Quailthrush (Chestnut Quailthrush)		ssp	1988
	<i>Cinclsoma cinnamomeum</i>	Cinnamon Quailthrush			2007
	<i>Circus assimilis</i>	Spotted Harrier			2004
	<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V	2006
	<i>Climacteris affinis</i>	White-browed Treecreeper		R	1965
	<i>Climacteris picumnus</i>	Brown Treecreeper			1997
	<i>Colluricincla harmonica</i>	Grey Shrikethrush			2008
	<i>Columba livia</i>	Feral Pigeon			2005
	<i>Coracina maxima</i>	Ground Cuckooshrike			2009
	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike			2008
	<i>Corvus bennetti</i>	Little Crow			2006
	<i>Corvus coronoides</i>	Australian Raven			2008
	<i>Corvus mellori</i>	Little Raven			2011
	<i>Corvus sp.</i>	crows			2008
	<i>Coturnix pectoralis</i>	Stubble Quail			2006
	<i>Cracticus torquatus</i>	Grey Butcherbird			2011
	<i>Cygnus atratus</i>	Black Swan			2007
	<i>Dacelo novaeguineae</i>	Laughing Kookaburra			2006
	<i>Daphoenositta chrysoptera</i>	Varied Sittella			2006
	<i>Dicaeum hirundinaceum</i>	Mistletoebird			2007
	<i>Dromaius novaehollandiae</i>	Emu			2015
	<i>Drymodes brunneopygia</i>	Southern Scrub Robin			1999
	<i>Egretta garzetta</i>	Little Egret		R	2005
	<i>Egretta novaehollandiae</i>	White-faced Heron			2006
	<i>Elanus axillaris</i>	Black-shouldered Kite			2002
	<i>Elsayornis melanops</i>	Black-fronted Dotterel			2006
	<i>Emblema pictum</i>	Painted Finch		R	1994
	<i>Eolophus roseicapilla</i>	Galah			2008
	<i>Epthianura albifrons</i>	White-fronted Chat			2007
	<i>Epthianura aurifrons</i>	Orange Chat			2007
	<i>Epthianura tricolor</i>	Crimson Chat			2007
	<i>Erythronyctes cinctus</i>	Red-kneed Dotterel			2004
	<i>Eurostopodus argus</i>	Spotted Nightjar			1996
	<i>Falco berigora</i>	Brown Falcon			2007
	<i>Falco cenchroides</i>	Nankeen Kestrel			2011
	<i>Falco hypoleucos</i>	Grey Falcon		R	2006
	<i>Falco longipennis</i>	Australian Hobby			2005

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	<i>Falco peregrinus</i>	Peregrine Falcon		R	2005
	<i>Falco subniger</i>	Black Falcon			2006
	<i>Falcunculus frontatus frontatus</i>	Eastern Shrikebird		R	1997
	<i>Fulica atra</i>	Eurasian Coot			2006
	<i>Gallirallus philippensis</i>	Buff-banded Rail			1940
	<i>Gavialis vireescens</i>	Singing Honeyeater			2008
	<i>Geopelia cuneata</i>	Diamond Dove			2000
	<i>Geopelia placida</i>	Peaceful Dove			2005
	<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater			2005
	<i>Grallina cyanoleuca</i>	Maggielark			2008
	<i>Gymnorhina tibicen</i>	Australian Magpie			2011
	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R	2006
	<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R	2004
	<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E	1900
	<i>Haliastur sphenurus</i>	Whistling Kite			2006
	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard		R	1991
	<i>Hieraaetus morphnoides</i>	Little Eagle			2004
	<i>Himantopus leucocephalus</i>	White-headed Stilt			2006
	<i>Hirundo neoxena</i>	Welcome Swallow			2008
	<i>Hydroprogne caspia</i>	Caspian Tern			2005
	<i>Lalage tricolor</i>	White-winged Triller			2007
	<i>Larus dominicanus</i>	Kelp Gull		R	1982
	<i>Larus pacificus</i>	Pacific Gull			2005
	<i>Limosa limosa</i>	Black-tailed Godwit		R	1984
	<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo		R	1956
	<i>Lophochroa leadbeateri mollis</i>	Major Mitchell's Cockatoo (EP, GR, NW)		SP	2013
	<i>Macronectes giganteus</i>	Southern Giant Petrel	EN	V	2000
	<i>Malacorhynchus membranaceus</i>	Pink-eared Duck			2006
	<i>Malurus lamberti</i>	Variagated Fairywren			2008
	<i>Malurus leucopterus</i>	White-winged Fairywren			2008
	<i>Malurus splendens</i>	Splendid Fairywren			1996
	<i>Malurus splendens callainus</i>	Turquoise Fairywren			2007
	<i>Manorina flavigula</i>	Yellow-throated Miner			2007
	<i>Megalurus gramineus</i>	Little Grassbird			2002
	<i>Melanodryas cucullata</i>	Hooded Robin		ssp	2004
	<i>Melanodryas cucullata westralensis</i>	Hooded Robin (EP, GR, NW)			2007
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater			2006
	<i>Melopsittacus undulatus</i>	Budgerigar			2005
	<i>Merops ornatus</i>	Rainbow Bee-eater			2006
	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant			2006
	<i>Microeca fascinans</i>	Jacky Winter		ssp	2007
	<i>Milvus migrans</i>	Black Kite			2006
	<i>Mirafra javanica</i>	Horsfield's Bush Lark			2005
	<i>Myiagra inquieta</i>	Restless Flycatcher		R	2002
	<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CR	E	1992
	<i>Neophema chrysostoma</i>	Blue-winged Parrot		V	2006
	<i>Neophema elegans</i>	Elegant Parrot		R	2015
	<i>Neophema petrophila</i>	Rock Parrot		R	1998
	<i>Neophema sp.</i>	Neophema parrots			2008
	<i>Neophema splendida</i>	Scarlet-chested Parrot		R	1996
	<i>Neopsephotus bourkii</i>	Bourke's Parrot			2007
	<i>Nesoptilotis leucotis</i>	White-eared Honeyeater			2000

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	<i>Nesoptilotis leucotis novaenoriae</i>	White-eared Honeyeater (EP, NW)			1993
	<i>Ninox boobook</i>	Southern Boobook			2006
	<i>Ninox connivens</i>	Barking Owl		R	1933
	<i>Northiella haematogaster (NC)</i>	Bluebonnet		ssp	2007
	<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V	2004
	<i>Nymphicus hollandicus</i>	Cockatiel			2004
	<i>Ocyphaps lophotes</i>	Crested Pigeon			2011
	<i>Oreoica gutturalis</i>	Crested Bellbird			2007
	<i>Oxyura australis</i>	Blue-billed Duck		R	2001
	<i>Pachycephala inornata</i>	Gilbert's Whistler		R	2001
	<i>Pachycephala pectoralis</i>	Golden Whistler			1998
	<i>Pachycephala rufiventris</i>	Rufous Whistler			1980
	<i>Pachycephala rufiventris rufiventris</i>	Rufous Whistler			2011
	<i>Pardalotus punctatus</i>	Spotted Pardalote			2006
	<i>Pardalotus striatus</i>	Striated Pardalote			2011
	<i>Parvipsitta porphyrocephala</i>	Purple-crowned Lorikeet			2005
	<i>Passer domesticus</i>	House Sparrow			2006
	<i>Pelecanus conspicillatus</i>	Australian Pelican			2005
	<i>Peltohyas australis</i>	Inland Dotterel			2000
	<i>Petrochelidon ariel</i>	Fairy Martin			2005
	<i>Petrochelidon nigricans</i>	Tree Martin			2006
	<i>Petroica boodang boodang</i>	Scarlet Robin		R	2000
	<i>Petroica goodenovii</i>	Red-capped Robin			2007
	<i>Phalacrocorax carbo</i>	Great Cormorant			2002
	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant			2006
	<i>Phalacrocorax varius</i>	Great Pied Cormorant			2006
	<i>Phaps chalcoptera</i>	Common Bronzewing			2011
	<i>Phaps histrionica</i>	Flock Bronzewing		R	2013
	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater			1999
	<i>Platalea flavipes</i>	Yellow-billed Spoonbill			2001
	<i>Platycercus elegans</i>	Crimson Rosella			2011
	<i>Platycercus elegans fleurieuensis & elegans subadelaidae (NC)</i>	Adelaide Rosellas			1993
	<i>Pluvialis squatarola</i>	Grey Plover			1999
	<i>Podargus strigoides</i>	Tawny Frogmouth			2007
	<i>Podiceps cristatus</i>	Great Crested Grebe		R	2002
	<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe			2007
	<i>Pomatostomus superciliosus</i>	White-browed Babbler			2011
	<i>Porphyrio porphyrio</i>	Purple Swamphen			1999
	<i>Porzana fluminea</i>	Australian Crake (Australian Spotted Crake)			2004
	<i>Psephotellus varius</i>	Mulga Parrot			2007
	<i>Psephotus haematonotus</i>	Red-rumped Parrot			2001
	<i>Psephotus haematonotus haematonotus</i>	Red-rumped Parrot (eastern SA except NE)			1999
	<i>Psophodes cristatus</i>	Chirruping Wedgebill			2006
	<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater			2007
	<i>Ptilotula penicillata</i>	White-plumed Honeyeater			2006
	<i>Ptilotula plumula</i>	Grey-fronted Honeyeater			2007
	<i>Ptilotula plumula graingeri</i>	Grey-fronted Honeyeater (FR, MN, LNE, MM)			2006
	<i>Purnella albifrons</i>	White-fronted Honeyeater			2007
	<i>Pyrrholaemus brunneus</i>	Redthroat			2008
	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet			2006

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	<i>Rhipidura albiscapa</i>	Grey Fantail			2006
	<i>Rhipidura leucophrys</i>	Willie Wagtail			2011
	<i>Smicrornis brevirostris</i>	Weebill			2011
	<i>Spilopelia chinensis</i>	Spotted Dove			2001
	<i>Stagonopleura guttata</i>	Diamond Firetail		V	2005
	<i>Sternula nereis</i>	Fairy Tern	VU	E	2002
	<i>Stictonetta naevosa</i>	Freckled Duck		V	2001
	<i>Stiltia isabella</i>	Australian Pratincole			2003
	<i>Strepera versicolor</i>	Grey Currawong		ssp	2011
	<i>Strepera versicolor intermedia</i>	Brown Currawong			2004
	<i>Struthidea cinerea</i>	Apostlebird			2011
	<i>Struthio camelus</i>	Common Ostrich			2000
	<i>Sturnus vulgaris</i>	Common Starling			2007
	<i>Sugomel niger</i>	Black Honeyeater			2001
	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe			2007
	<i>Tadorna tadornoides</i>	Australian Shelduck			2001
	<i>Taeniopygia guttata</i>	Zebra Finch			2007
	<i>Thalasseus bergii</i>	Greater Crested Tern			2006
	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher			2006
	<i>Todiramphus sanctus</i>	Sacred Kingfisher			2005
	<i>Tribonyx ventralis</i>	Black-tailed Nativehen			2004
	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet			2001
	<i>Tringa nebularia</i>	Common Greenshank			2006
	<i>Tringa stagnatilis</i>	Marsh Sandpiper			2006
	<i>Turdus merula</i>	Common Blackbird			2005
	<i>Turnix varius</i>	Painted Buttonquail		R	1999
	<i>Turnix velox</i>	Little Buttonquail			2007
	<i>Tyto delicatula</i>	Eastern Barn Owl			2007
	<i>Vanellus miles</i>	Masked Lapwing			2006
	<i>Vanellus tricolor</i>	Banded Lapwing			2007
	<i>Zosterops lateralis</i>	Silvereye			2006

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

Lincoln Gap Stage 3 Flora and Fauna Baseline Assessment



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APPENDIX H

ACOUSTIC ASSESSMENT



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**LINCOLN GAP STAGE 3
ACOUSTIC ASSESSMENT**

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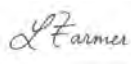


Lincoln Gap Stage 3 Acoustic Assessment

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1	19/11/2019	Issue

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Approved by:	S. Moore	19/11/2019	

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GLOSSARY

'A' FREQUENCY WEIGHTING

The 'A' frequency weighting reflects the human loudness perception at various frequencies and sound pressure levels, equated to the level of 40 dB at 1 kHz. The human ear is less sensitive to low frequency sound and very high frequency sound than midrange frequency sound (i.e. 500 Hz to 6 kHz). The 'A' weighting is the most commonly used frequency weighting for occupational and environmental noise assessments.

L_{Aeq} , EQUIVALENT CONTINUOUS SOUND LEVEL

The 'A' frequency weighting roughly approximates to the Fletcher-Munson 40 phon equal loudness contour. The human loudness perception at various frequencies and sound pressure levels is equated to the level of 40 dB at 1 kHz. The human ear is less sensitive to low frequency sound and very high frequency sound than midrange frequency sound (i.e. 500 Hz to 6 kHz). The 'A' weighting is the most commonly used frequency weighting for occupational and environmental noise assessments.

SOUND POWER LEVEL, L_w

The sound power level of a noise source is the inherent noise of the device. Therefore, sound power level does not vary with distance from the noise source or with a different acoustic environment.

BACKGROUND NOISE LEVEL

Total silence does not exist in the natural or built-environments, only varying degrees of noise. The Background Noise Level is the minimum repeatable level of noise measured in the absence of the noise under investigation and any other short-term noises such as those caused by all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc. It is quantified by the noise level that is exceeded for 90 % of the measurement period 'T' ($L_{A90, T}$).

TONALITY

A characteristic that can increase the adverse impact of a given noise source. It can be determined by breaking the noise signature down into discrete frequency bands.

HUMAN RESPONSE TO NOISE LEVEL CHANGES

- Less than 3 dBA = No perceivable difference
- 3 dBA = Barely perceptible difference
- 5 dBA = Readily perceptible difference
- 10 dBA = 'Doubling' (or 'halving') of performance.

[Reference; Cowan, J.P., 1994 "Handbook of Environmental Acoustics" and Bell, L.H. and D.H. Bell. 1994. "Industrial Noise Control Fundamentals and Applications"]

1 INTRODUCTION

1.1 THE LINCOLN GAP 3 WIND FARM

The Lincoln Gap wind farm is a proposed wind farm development located approximately 15 km west of Port Augusta, South Australia. Stages 1 and 2 of the project are approved for development (and are currently in construction) and consist of 59 Senvion 3.6 MW wind turbines and 10 MW of grid-scale battery storage.

Lincoln Gap Stage 3 proposes 42 additional wind turbines in the vicinity of Lincoln Gap Stages 1 and 2. A layout of the proposed wind turbine configuration and relevant noise sensitive receivers is included in Figure 1.1. At the current phase of planning, there is an allowance of 125m for re-positioning of the Stage 3 turbines from their currently proposed locations. The potential for re-positioning the Stage 3 turbines is referred to as “micro-siting” in this report.

An acoustic assessment of Lincoln Gap Stage 1 and 2 was completed by Marshall Day in September 2014 and an updated assessment was completed by Sonus in August 2018. The Sonus assessment found that noise levels due to Stage 1 and Stage 2 at the two nearest identified noise sensitive receivers achieve the nominated 45 dBA L_{Aeq} noise criterion.

This assessment predicts noise levels at the identified noise sensitive receivers due to:

- the proposed Stage 3 only,
- the cumulative effects of Lincoln Gap Stages 1, 2, and 3,
- the cumulative effects of Lincoln Gap Stages 1, 2, and 3 with allowance for 125m micro-siting of the Stage 3 turbines.

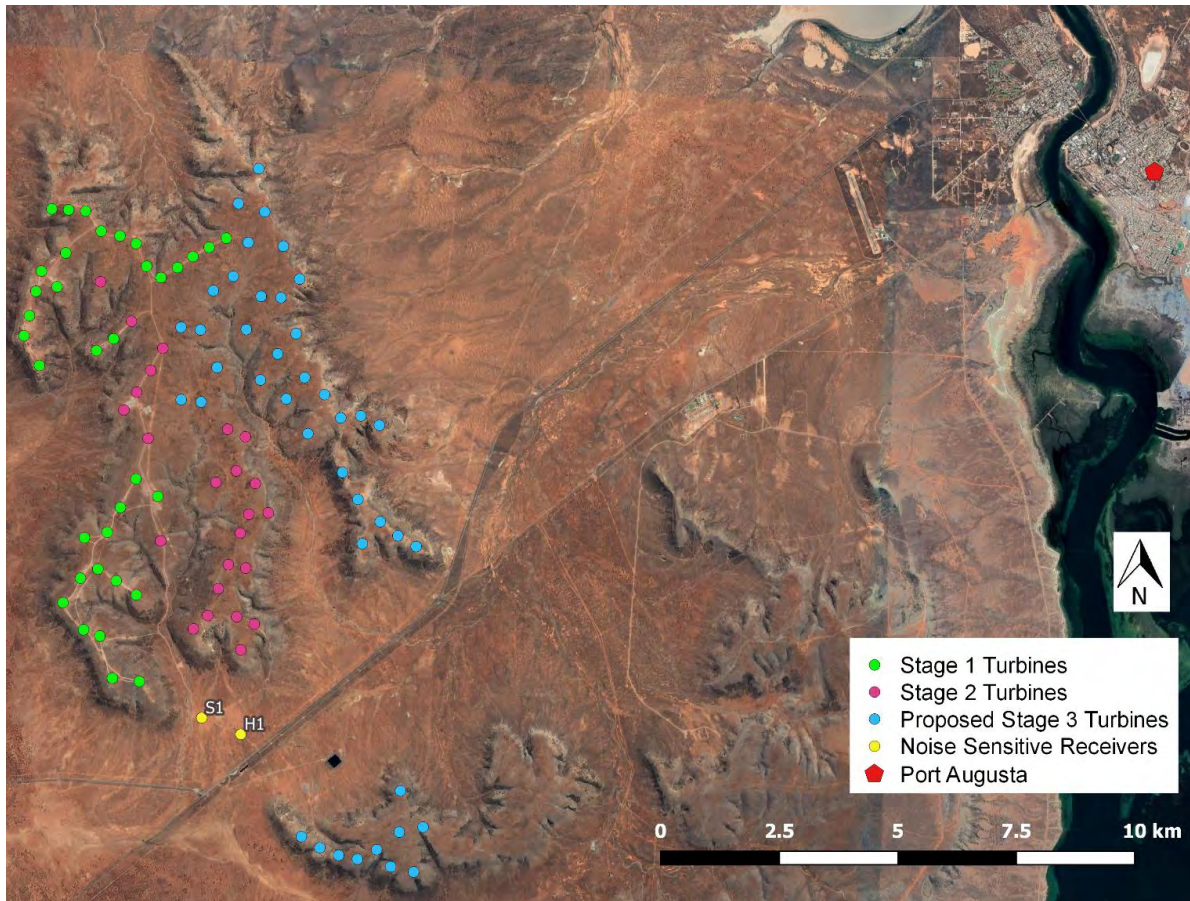
Four models of wind turbines are being considered for Lincoln Gap Stage 3:

- Vestas V162 5.6MW
- Senvion 4.5 MW
- Siemens Gamesa 6.0 MW-155
- GE 5.3 MW-158

1.2 PROJECT AREA

Lincoln Gap Wind Farm Stages 1, 2 (under construction), proposed Stage 3 wind turbine locations, and the relevant noise sensitive receivers are situated as shown in Figure 1.1 below. The identified noise sensitive receivers are a shearer's quarters (S1) and a house (H1).

Figure 1.1 Lincoln Gap Stages 1, 2 and proposed Stage 3 wind turbine locations



1.3 LEGISLATIVE AND POLICY REQUIREMENTS

The South Australian Environment Protection Authority (SA EPA) *Wind farms environmental noise guidelines* (2009) (the Guidelines) provide guidance for undertaking assessments of environmental noise impacts from wind farms in South Australia. The Guidelines state that the predicted equivalent noise level ($L_{Aeq,10min}$) should not exceed a level 5 dBA above the background noise level. It is understood that the landowner of the two noise sensitive receiver locations has a commercial interest in the Lincoln Gap development, and commercial relationships between wind farm developers and private land owners are considered in the Guidelines if there is no unreasonable interference with the landowner's enjoyment of the area. Adoption of a 45 dBA $L_{Aeq,10min}$ noise criterion outdoors at the localities belonging to the financial stakeholders is unlikely to result in unreasonable interference as defined in the Guidelines. This criterion is consistent with the 45 dBA L_{Aeq} criterion nominated in the 2014 Marshall Day assessment and again in the 2018 Sonus assessment of Lincoln Gap Stages 1 and 2.

The Guidelines state that if tonality is a characteristic of the wind turbine noise at the receiver, a 5 dBA penalty is added to the predicted or measured noise. Tonal audibility noise data is not available for all the models being considered for Lincoln Gap Stage 3. If the selected wind turbine model is determined to have a tonal characteristic in accordance with *Wind turbines – Part 11: Acoustic noise measurement techniques* (IEC 61400-11), and the tonal noise is detected at the receivers, the 5 dBA penalty will need to be applied to predicted levels.

2 ASSESSMENT METHODOLOGY

Lincoln Gap Stage 3 was assessed in accordance with the Institute of Acoustics (IOA) method incorporating the standard *Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation (2007)* (ISO 9613-2:2007). The IOA method was used as described in *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (2013)* (IOA guide). This assessment is implemented in SoundPLAN Version 8.0 noise modelling software which was used to undertake the noise level predictions.

The South Australian Environment Protection Authority (SA EPA) *Wind farms environmental noise guidelines (2009)* recommend noise prediction methods in accordance with either CONCAWE¹ or ISO9613-2 propagation models. WSP elected to model noise propagation using ISO9613-2 and incorporate the IOA modifications, as this has been shown to provide better agreement to measured values than CONCAWE at distances greater than 2000m (Cooper & Evans, 2012).

Prediction model modifications used as recommended by the IOA guide are displayed in Table 2.1.

Table 2.1 IOA method prediction model inputs

MODEL INPUT	DESCRIPTION
Acoustically moderate ground (0.5 ground factor)	The ground surface on-site is acoustically soft as defined by ISO-9613-2. A moderate ground factor of 0.5 makes a conservative allowance for 50% of the ground surface to be acoustically hard.
Atmospheric conditions at 10°C and 70% humidity	These conditions represent conservatively low levels of atmospheric sound absorption.
+2 dBA correction factor to manufacturer supplied data	Of the four turbine models considered for Stage 3, the Vestas V162 5.6MW is considered to have the highest noise level (refer Section 3). Vestas V162 5.6MW sound power data is valid for the downwind reference position as defined according to the standard <i>Wind turbines – Part 11: Acoustic noise measurement techniques</i> (IEC 61400-11 Ed.3), but this data is not provided as a guarantee by the manufacturer. The IOA guide describes measurement uncertainty as potentially up to 2 dBA and therefore a +2 dBA correction factor allows for this uncertainty.

No correction for background noise created by meteorological conditions has been applied in this implementation of ISO9613-2:2007. Predictions will therefore account for typical downwind propagation, consistent with the approach of Cooper and Evans (2012).

Before assessment with the IOA method, WSP confirmed consistency with the methodology of the previous assessment completed by Sonus by modeling Stages 1 and 2 with the CONCAWE propagation method. Table 2.2 contains a comparison between the results obtained by the Sonus implementation of the CONCAWE method, the WSP implementation of the CONCAWE method, and the WSP implementation of the IOA method of the ISO-9613-2 standard.

¹ CONCAWE, method described in The Oil Companies International Study Group for Conservation of Clean Air and Water in Europe *The propagation of noise from petrochemical complexes to neighbouring communities*

Table 2.2 Comparison of CONCAWE and ISO-9613-2 modelling results for Lincoln Gap Stages 1 and 2

	H1	S1
Sonus CONCAWE	41	44
WSP CONCAWE	41	44
WSP ISO-9613-2	41	43

The WSP model of Stages 1 and 2 exhibits consistency with the Sonus model as the differences between predicted values are less than 1 dBA when the CONCAWE propagation model was used. The WSP implementation of ISO-9613-2 and the IOA modifications was found to provide consistent results as the differences between the CONCAWE and ISO-9613-2 predicted values are less than 2 dBA.

3 WIND TURBINE NOISE DATA

Sound power data for the Stages 1 and 2 wind turbines (Senvion 3.6MW-140) is provided in the August 2018 Sonus report.

Manufacturer supplied sound power data for the four possible Stage 3 turbine models is displayed in Table 3.1. Detailed sound power data for the Senvion 4.5 MW wind turbine is not yet available and as such we considered the spectral sound power data for the Senvion 4.2 MW model and the expected maximum sound power level of 106 dBA as provided by the manufacturer. Detailed noise data as provided by the turbine manufacturers is included in Appendix A and Table A.4 contains spectral sound power data for the referenced Senvion 4.2 MW model.

Table 3.1 Maximum expected sound power levels at hub height for Stage 3 models being considered, as provided by turbine manufacturers

TURBINE MODEL	MAXIMUM SOUND POWER LEVEL, L_w (dBA)	LOWEST WIND SPEED AT WHICH MAXIMUM SOUND POWER LEVEL, L_w OCCURS (m/s)
Vestas V162 5.6MW	106.8	9
Senvion 4.5MW-140	106.0	9
Siemens Gamesa 6.0MW-155	105.0	8
GE 5.3MW-158	106.0	9

The Vestas V162 5.6MW model has the highest maximum sound power level at 106.8dBA and was therefore assessed as the worst case turbine from a noise perspective. Manufacturer supplied expected noise data for the Vestas V162 5.6MW model was assessed for each integer wind speed from cut-in speed (3m/s) to cut-out speed (20m/s) and at a hub height of 125m.

A +2dBA correction factor for uncertainty has been applied to the Vestas 5.6MW expected noise data in this assessment. Therefore, the maximum sound power level assessed was 108.8dBA at hub height.

4 ASSESSMENT RESULTS

Table 4.1 below displays the maximum predicted noise levels at the relevant noise receivers due to the proposed Stage 3 only, the cumulative effects of Lincoln Gap Stages 1, 2, and 3, and the cumulative effects of Lincoln Gap Stages 1, 2, and 3 with allowance of 125m micro-siting for Stage 3. The predicted noise levels have been rounded up to the nearest integer. Appendix B contains detailed results for hub height wind speed integers 3m/s through 20m/s.

Table 4.1 Maximum predicted noise level from assessment of wind speeds 3m/s– 20m/s

CONFIGURATION	RECEIVER LOCATION	MAXIMUM PREDICTED $L_{Aeq,10min}$ NOISE LEVEL (dBA)	NOISE CRITERION (dBA)
Stage 3 only	House, H1	33	45
	Shearer's Quarters, S1	32	
Stages 1, 2, and 3	House, H1	41	45
	Shearer's Quarters, S1	43	
Stages 1, 2, and 3 with micro-siting	House, H1	41	45
	Shearer's Quarters, S1	43	

Due to the relatively low noise contribution of the Stage 3 turbines, the cumulative result of Stages 1, 2, and 3 is predicted to increase noise levels by less than 1 dBA at the receiver locations as compared to Stages 1 and 2 only. Micro-siting Stage 3 turbines 125m closer to the receivers is predicted to increase noise levels at the receivers by less than 1 dBA. Sound levels predictions for all assessed configurations achieve the nominated criterion of 45 dBA L_{Aeq} at the house and shearer's quarters.

5 SUMMARY AND RECOMMENDATIONS

This assessment has predicted sound levels at residential receivers H1 and S1 due to the proposed Stage 3 only, the cumulative effects of Lincoln Gap Stages 1, 2, and 3, and the cumulative effects of Lincoln Gap Stages 1, 2, and 3 with allowance for 125m micro-siting. The Stage 3 proposed wind turbine locations have been assessed based on expected environmental noise from the Vestas V162 5.6MW model with a hub height of 125m. The noise contribution of the proposed Stage 3 turbines to the cumulative noise emission of the Lincoln Gap Wind Farm was determined to be relatively low, resulting in an increase of less than 1 dBA at the relevant noise sensitive receivers.

The sound levels are predicted to achieve the nominated criterion of 45dBA L_{Aeq} at the relevant noise receivers for all configurations assessed.

6 BIBLIOGRAPHY

- Cooper, J., & Evans, T. (2012). Comparison of Predicted and Measured Wind Farm Noise Levels and Implications of New Wind Farms. *Acoustics Australia*, 28-36.

APPENDIX A

MANUFACTURER NOISE DATA



A1 MANUFACTURER NOISE DATA

Table A.1 Vestas V162 5.6MW, Mode 0-0S (blades without serrated trailing edges) expected sound power one-third octave band performance provided by manufacturer (dBA)

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	14.2	14.2	15.2	18.2	21.1	23.9	25.1	25.1	24.6	24.6	24.7	24.9	25.1	25.5	25.7	25.9	26.0	26.9
8 Hz	21.5	21.4	22.4	25.5	28.4	31.2	32.5	32.4	32.0	31.9	32.0	32.2	32.5	32.8	33.0	33.2	33.3	34.1
10 Hz	27.9	27.9	28.9	32.0	34.9	37.7	39.0	38.9	38.5	38.4	38.5	38.7	39.0	39.3	39.5	39.7	39.8	40.6
12.5 Hz	34.0	34.0	35.0	38.1	41.1	43.9	45.1	45.1	44.7	44.6	44.7	44.9	45.1	45.5	45.6	45.8	45.9	46.7
16 Hz	40.4	40.4	41.3	44.5	47.5	50.3	51.6	51.5	51.1	51.1	51.2	51.3	51.6	51.9	52.0	52.2	52.3	53.1
20 Hz	45.8	45.8	46.7	49.9	52.9	55.7	57.0	57.0	56.6	56.5	56.6	56.8	57.0	57.3	57.5	57.7	57.7	58.4
25 Hz	50.8	50.8	51.8	55.0	58.0	60.8	62.1	62.1	61.7	61.6	61.7	61.9	62.1	62.4	62.5	62.7	62.8	63.5
31.5 Hz	55.7	55.8	56.7	59.9	62.9	65.7	67.0	67.0	66.6	66.6	66.7	66.8	67.0	67.3	67.4	67.6	67.7	68.3
40 Hz	60.4	60.5	61.4	64.6	67.6	70.5	71.7	71.7	71.4	71.3	71.4	71.5	71.7	72.0	72.1	72.3	72.3	72.9
50 Hz	64.5	64.5	65.4	68.6	71.6	74.5	75.7	75.7	75.4	75.4	75.4	75.6	75.7	76.0	76.1	76.3	76.3	76.9
63 Hz	68.3	68.3	69.2	72.4	75.5	78.3	79.6	79.5	79.2	79.2	79.3	79.4	79.6	79.8	79.9	80.0	80.1	80.6
80 Hz	71.9	71.9	72.8	76.0	79.0	81.9	83.1	83.1	82.8	82.8	82.8	83.0	83.1	83.3	83.4	83.6	83.6	84.1
100 Hz	74.9	74.9	75.8	79.0	82.0	84.8	86.1	86.1	85.8	85.8	85.8	85.9	86.1	86.3	86.4	86.5	86.5	86.9
125 Hz	77.5	77.6	78.4	81.6	84.6	87.5	88.7	88.7	88.5	88.4	88.5	88.6	88.7	88.9	89.0	89.1	89.1	89.5
160 Hz	80.1	80.2	81.0	84.1	87.2	90.0	91.2	91.2	91.0	91.0	91.0	91.1	91.2	91.3	91.4	91.5	91.5	91.9
200 Hz	82.0	82.2	82.9	86.1	89.1	91.9	93.1	93.1	92.9	92.9	92.9	93.0	93.1	93.2	93.3	93.4	93.4	93.6
250 Hz	83.7	83.8	84.5	87.7	90.7	93.5	94.7	94.6	94.5	94.5	94.5	94.6	94.7	94.8	94.8	94.9	94.9	95.1
315 Hz	85.0	85.2	85.9	89.0	92.0	94.7	95.9	95.9	95.8	95.8	95.8	95.8	95.9	96.0	96.0	96.1	96.1	96.2
400 Hz	86.0	86.2	86.9	89.9	92.9	95.7	96.8	96.8	96.7	96.7	96.7	96.8	96.8	96.9	96.9	96.9	96.9	97.0
500 Hz	86.6	86.8	87.4	90.5	93.4	96.2	97.3	97.3	97.2	97.2	97.2	97.3	97.3	97.3	97.3	97.4	97.4	97.4
630 Hz	86.9	87.1	87.7	90.7	93.6	96.3	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4
800 Hz	86.8	87.0	87.5	90.5	93.4	96.1	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.1	97.1	97.1
1 kHz	86.3	86.5	87.1	90.0	92.9	95.6	96.6	96.6	96.7	96.7	96.7	96.7	96.6	96.6	96.5	96.5	96.5	96.4
1.25 kHz	85.5	85.8	86.3	89.2	92.0	94.7	95.7	95.7	95.8	95.8	95.8	95.8	95.7	95.6	95.6	95.5	95.5	95.3
1.6 kHz	84.3	84.6	85.0	87.9	90.7	93.3	94.3	94.3	94.4	94.5	94.4	94.4	94.3	94.2	94.1	94.0	94.0	93.7
2 kHz	82.8	83.1	83.5	86.3	89.1	91.6	92.6	92.6	92.8	92.9	92.8	92.7	92.6	92.5	92.4	92.3	92.3	92.0
2.5 kHz	81.0	81.3	81.7	84.5	87.2	89.7	90.6	90.7	90.9	90.9	90.9	90.8	90.6	90.5	90.4	90.3	90.2	89.8
3.15 kHz	78.8	79.1	79.4	82.1	84.8	87.3	88.2	88.2	88.5	88.6	88.5	88.4	88.2	88.0	87.9	87.8	87.7	87.3
4 kHz	76.1	76.4	76.7	79.4	82.0	84.4	85.3	85.4	85.7	85.7	85.6	85.5	85.3	85.1	85.0	84.8	84.7	84.2
5 kHz	73.2	73.6	73.8	76.4	79.0	81.4	82.3	82.3	82.7	82.7	82.6	82.5	82.3	82.0	81.9	81.7	81.6	81.0
6.3 kHz	69.9	70.3	70.5	73.1	75.6	77.9	78.8	78.8	79.2	79.3	79.2	79.0	78.8	78.4	78.3	78.1	78.0	77.3
8 kHz	66.1	66.6	66.7	69.2	71.6	73.9	74.7	74.8	75.2	75.3	75.2	75.0	74.7	74.4	74.2	73.9	73.9	73.1
10 kHz	62.3	62.7	62.8	65.2	67.6	69.8	70.6	70.6	71.1	71.2	71.1	70.9	70.6	70.2	70.0	69.7	69.7	68.9
A-wgt	96.3	96.5	97.1	100.1	103.0	105.7	106.8	106.8	106.8	106.8	106.8	106.8	106.8	106.8	106.8	106.8	106.8	106.8

Table A.2 GE 5.3MW-158 expected sound power octave band performance provided by manufacturer (dBA)

Normal Operation - A-weighted Octave Spectra [dB]												
Hub Height Wind Speed [m/s]	4	5	6	7	8	9	10	11	12	13	14	15
Wind speed at 10 m height for a hub height of 101 m [m/s]	2.8	3.5	4.2	4.9	5.6	6.3	7.0	7.7	8.4	9.0	9.7	10.4
Wind speed at 10 m height for a hub height of 120.9 m [m/s]	2.7	3.4	4.1	4.8	5.4	6.1	6.8	7.5	8.2	8.8	9.5	10.2
Wind speed at 10 m height for a hub height of 150 m [m/s]	2.6	3.3	4.0	4.6	5.3	6.0	6.6	7.3	7.9	8.6	9.3	9.9
Wind speed at 10 m height for a hub height of 161 m [m/s]	2.6	3.3	3.9	4.6	5.2	5.9	6.6	7.2	7.9	8.5	9.2	9.8
Frequency [Hz]	16	53.9	54.0	56.3	59.4	62.0	64.5	64.5	64.5	64.5	64.5	64.5
	32	67.4	67.3	69.6	72.8	75.5	78.0	78.0	78.0	78.0	78.0	78.0
	63	76.3	77.1	79.2	82.0	84.6	87.2	87.2	87.2	87.2	87.2	87.2
	125	83.0	85.0	87.1	89.0	91.0	92.6	92.6	92.6	92.6	92.6	92.6
	250	86.8	88.7	91.8	94.1	96.1	97.2	97.2	97.2	97.2	97.2	97.2
	500	87.2	87.7	91.7	95.5	98.3	99.7	99.7	99.7	99.7	99.7	99.7
	1000	87.6	87.0	90.6	95.1	98.7	101.3	101.3	101.3	101.3	101.3	101.3
	2000	86.4	86.4	88.7	92.4	95.9	99.1	99.1	99.1	99.1	99.1	99.1
	4000	80.9	82.2	84.0	86.6	89.1	91.7	91.7	91.7	91.7	91.7	91.7
	8000	65.1	67.2	69.6	72.4	74.6	76.0	76.0	76.0	76.0	76.0	76.0
Total Sound Power Level [dB]	93.8	94.5	97.6	101.0	103.9	106.0	106.0	106.0	106.0	106.0	106.0	106.0

Table A.3 Siemens Gamesa 6.0MW-155, Mode 0 expected sound power performance provided by manufacturer

SG 6.0-155 Mode 0, P6000	
Wind Speed	LW
[m/s]	[dB(A)]
3	92.0
4	92.0
5	94.8
6	98.8
7	102.1
8	105.0
9	105.0
10	105.0
11	105.0
12	105.0
13	105.0
Up to cut-out	105.0

Table A.4 Senvion 4.2MW-140 expected sound power octave band performance, dBA

Frequency	Octave Band Data in dB(A) for wind speed at hub height						
	6.0 m/s	6.5 m/s	7.0 m/s	7.5 m/s	8.0 m/s	8.5 m/s	9.0 m/s
31.5 Hz	72.3	72.5	74.1	76.5	77.9	79.2	79.4
63 Hz	80.9	81.3	83.8	85.3	86.8	88.3	88.4
125 Hz	84.3	86.0	88.9	90.8	92.4	94.3	94.1
250 Hz	87.4	89.1	92.6	94.6	96.0	97.3	97.1
500 Hz	90.2	91.9	93.8	95.6	97.1	98.3	98.1
1000 Hz	94.1	95.8	96.4	97.5	98.5	99.4	99.4
2000 Hz	91.2	92.9	94.1	95.3	96.9	97.8	97.9
4000 Hz	86.6	88.3	89.6	90.4	92.4	91.5	92.2
8000 Hz	66.8	68.6	71.2	72.4	75.8	76.8	77.3
L _{WA} [dB(A)]	98.0	99.7	101.2	102.6	104.0	105.0	105.0

Frequency	Octave Band Data in dB(A) for wind speed at hub height						
	9.5 m/s	10.0 m/s	10.5 m/s	11.0 m/s	11.5 m/s	12.0 m/s	12.5 m/s
31.5 Hz	79.2	79.2	79.2	78.9	79.5	78.4	78.4
63 Hz	88.6	88.5	88.2	88.0	87.9	87.1	87.1
125 Hz	94.2	94.2	93.8	93.1	93.5	93.0	93.0
250 Hz	97.0	96.8	96.6	96.3	96.2	96.0	96.0
500 Hz	98.0	97.9	97.8	97.6	97.6	97.6	97.6
1000 Hz	99.4	99.3	98.9	98.7	98.8	99.0	99.0
2000 Hz	98.1	98.2	98.4	98.6	98.5	98.5	98.5
4000 Hz	92.6	93.1	94.8	96.0	95.9	96.3	96.3
8000 Hz	78.0	79.2	81.0	81.9	81.6	80.5	80.5
L _{WA} [dB(A)]	105.0	105.0	105.0	105.0	105.0	105.0	105.0

APPENDIX B



B1 ASSESSMENT RESULTS

Table B.1 Stage 3 only predicted L_{Aeq} at noise sensitive receivers with assessment of turbine option with highest noise levels, Vestas V162 5.6MW

WIND SPEED AT HUB HEIGHT (m/s)	HOUSE, H1 (dBA)	SHEARER'S QUARTERS, S1 (dBA)
3	21.5	20.0
4	21.7	20.2
5	22.4	20.9
6	25.5	24.0
7	28.5	27.0
8	31.2	29.7
9	32.4	30.9
10	32.4	30.9
11	32.3	30.8
12	32.3	30.8
13	32.3	30.8
14	32.3	30.8
15	32.4	30.9
16	32.5	31.0
17	32.5	31.1
18	32.6	31.1
19	32.6	31.1
20	32.8	31.3

Table B.2 Cumulative Stages 1, 2, and 3 predicted L_{Aeq} at noise sensitive receivers with assessment of turbine option with highest noise levels, Vestas V162 5.6MW

WIND SPEED AT HUB HEIGHT (m/s)	HOUSE, H1 (dBA)	SHEARER'S QUARTERS, S1 (dBA)
3	40.6	42.4
4	40.6	42.4
5	40.6	42.4
6	40.6	42.4
7	40.8	42.5
8	41.0	42.6
9	41.1	42.6
10	41.1	42.6
11	41.1	42.6
12	41.1	42.6
13	41.1	42.6
14	41.1	42.6
15	41.1	42.6
16	41.1	42.6
17	41.1	42.6
18	41.2	42.6
19	41.2	42.6
20	41.2	42.6

Table B.3 Cumulative Stages 1, 2, and 3 with 125m micro-siting predicted L_{Aeq} at noise sensitive receivers with assessment of turbine option with highest noise levels, Vestas V162 5.6MW

WIND SPEED AT HUB HEIGHT (m/s)	HOUSE, H1 (dBA)	SHEARER'S QUARTERS, S1 (dBA)
3	40.6	42.4
4	40.6	42.4
5	40.6	42.4
6	40.6	42.4
7	40.8	42.5
8	41.0	42.6
9	41.1	42.6
10	41.1	42.6
11	41.1	42.6
12	41.1	42.6
13	41.1	42.6
14	41.1	42.6
15	41.1	42.6
16	41.1	42.6
17	41.1	42.6
18	41.2	42.6
19	41.2	42.6
20	41.2	42.6

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APPENDIX I

SHADOW FLICKER ASSESSMENT



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**LINCOLN GAP
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SHADOW FLICKER
ASSESSMENT

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NOVEMBER 2019

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Lincoln Gap Wind Farm Stage 3 Shadow Flicker Assessment

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1 INTRODUCTION

At the request of Lincoln Gap Wind Farm Pty Ltd (LGWF P/L), a subsidiary of Nexif Energy Australia Pty Ltd (Nexif), WSP Australia Pty Ltd (WSP) has performed an assessment of the shadow flicker impact resulting from the proposed Stage 3 of Lincoln Gap Wind Farm (LGWF) (the Project). The proposed Project is located approximately 15 km west of Port Augusta, South Australia, and is adjacent to LGWF Stage 1 and 2; both currently under construction.

This report outlines a shadow flicker assessment undertaken on a single indicative layout consisting of one Wind Turbine Generator (WTG) model with a maximum tip-height of 206 m. WSP have assessed the shadow flicker using the largest WTG configuration under consideration for the Project. It should be noted that the cumulative shadow flicker impact of all three (3) stages of LGWF has not been assessed and is not considered within the scope of this study.

Table 1.1 outlines the WTG model dimensions and layout details considered under this assessment.

Table 1.1 WTG configuration evaluated for the Project (Nexif Energy Australia Pty Ltd, 2019)

HUB HEIGHT [m]	ROTOR DIAMETER [m]	BLADE LENGTH [m]	NUMBER OF WTGS	MAX. CHORD WIDTH [m]	WTG TIP HEIGHT [m]
125	162	81	42	4.3	206

Shadow flicker has been assessed at two (2) receptors, as specified by Nexif (Senvion, 2018). Receptor details are outlined in Table 1.2 below.

Table 1.2 Receptor locations considered in this assessment – WGS84 UTM Zone 53

RECEPTOR ID	EASTING [m]	NORTHING
Shearing Sheds	741052	6389727
Landowner House	741879	6389280

1.1 THE PROJECT

The current Project (LGWF Stage 3) proposes up to 42 WTGs with a maximum capacity up to 252 MW. For the purpose of this study, the largest WTG configuration, corresponding to a rotor diameter of 160 m and maximum tip height of 206 m, has been considered by WSP.

ABOUT US

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1.2 PROJECT AREA

Proposed infrastructure will be located within the site boundaries previously Approved for LGWF Stage 1 and 2, and an off-site substation located to the south of Eyre Highway. Proposed infrastructure will be located to the east and south of the infrastructure Approved for LGWF Stage 1 and 2.

The LGWF project is located approximately 15 km west of Port Augusta as shown in Figure 1.1. The proposed Project is located either side of the Eyre Highway on elevated plateaus, at approximately 250 m above mean sea level (amsl).

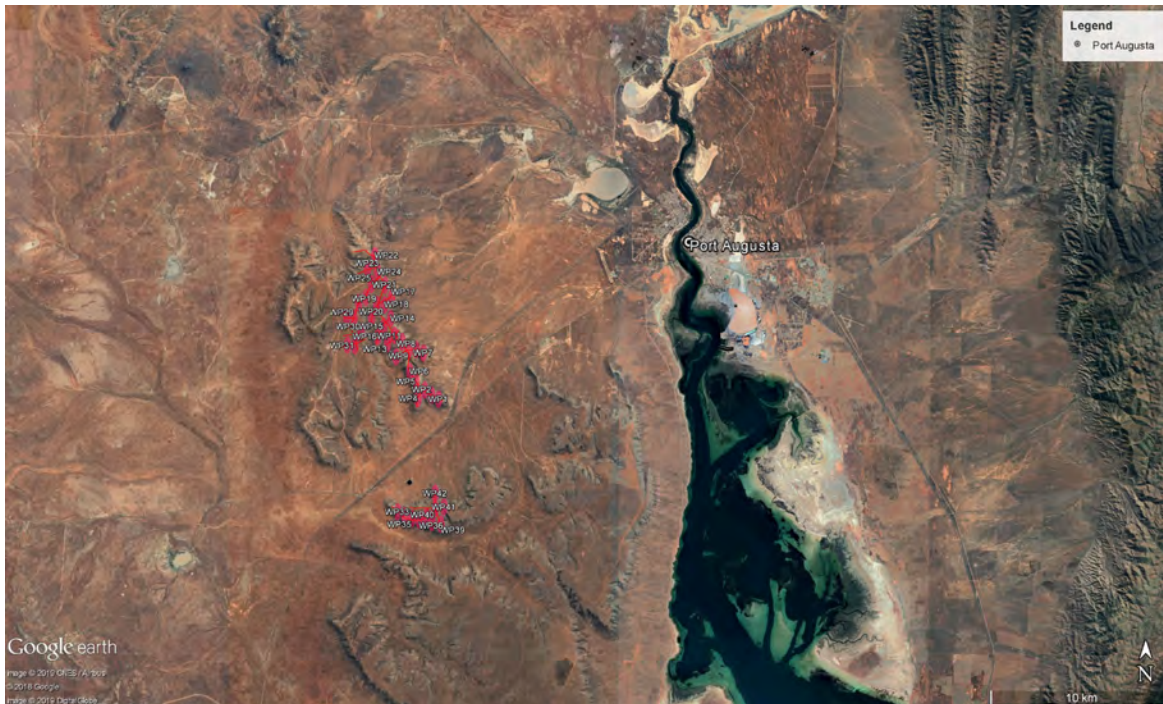


Figure 1.1 The Lincoln Gap Wind Farm project area with the proposed approval corridor

1.3 LEGISLATIVE AND POLICY REQUIREMENTS

The methodology and assumptions included in this assessment are in accordance with

- Environment Protection and Heritage Council’s National Wind Farm Development (NWFD) Guidelines – Draft July 2010 (Environment Protection and Heritage Council, 2010)
- Draft Planning Bulletin – Wind Farms (Planning SA, 2002) (Planning SA, 2002), and
- CLGR Wind Farm Development Guidelines for Developers and Local Government Planners (CLGR, June 2014) (CLGR, 2014).

The NWFD Guidelines suggest that the effects of shadow flicker are dependent on the WTG blade dimensions and recommend an assessment distance of 265 times the maximum blade chord when investigating shadow flicker. The WTG blades of the selected WTG model assessed for the proposed Project have a maximum chord length of 4.3 m, therefore the effective assessment distance considered is 1.140 km.

Table 1.3 Wind farm development guidelines

GUIDELINE	MAX DISTANCE OF INFLUENCE	MAX EXPOSURE FOR WORST CASE	MAX EXPOSURE FOR REALISTIC CASE
Draft National Wind Farm Development Guidelines – July 2010 (Environmental Protection and Heritage Council, 2010)	265 times chord length (1.140 km)	30 hrs per year	10 hrs per year

1.4 ASSESSMENT METHODOLOGY

WSP has used WindPro v.3.2 to assess shadow flicker on the supplied receptors at the Project Site. The model used for the calculation of flicker effects contains a mathematical model of the sun’s position in the sky for a given location and time of year. The model also considers the three-dimensional positions and sizes of the turbines, as well as the locations where the flicker is to be calculated. This information is combined to calculate the times for which the turbine rotors will cast shadows over the locations of interest. Shadow flicker is assumed to occur when the centre of the sun passes behind any part of a turbine rotor.

WSP has modelled both worst-case and realistic shadow flicker scenarios for the selected WTG dimensions. These scenarios were assessed against the shadow flicker limits detailed in the NWFD guidelines (Environment Protection and Heritage Council, 2010), which are outlined below:

- Shadow flicker duration taken as the maximum within 50 m of building centre:
 “Shadow flicker duration can be very sensitive to location, varying by up to approximately 0.8 hours per metre of horizontal displacement. Thus, in an extreme case, one end of a house may experience no shadow flicker while the other end may exceed the limit. For this reason, the assessment method requires reporting of the maximum value of shadow flicker duration within 50 m of the centre of a dwelling.”
- Worst-case scenario shadow flicker duration limit of 30 hours per year:
 “In most circumstances where a dwelling experiences a ‘modelled’ level of shadow flicker less than 30 hours per year, no further investigation is required. However, if this level is exceeded in the modelled scenario, mitigation measures may be introduced and the ‘actual’ or ‘measured’ level of shadow flicker will need to be determined.”
- Realistic scenario shadow flicker duration limit of 10 hours per year:
 “The modelling approach includes a number of assumptions and, as such, the ‘modelled’ exposure limit is set higher to account for these conservatisms. The assumptions used in the modelling approach should produce an outcome equivalent to 10 hours per year actual exposure.”

A comparison of assumptions made in the realistic, and worst-case scenario assessments are summarised in Table 1.4 below:

Table 1.4 Comparison of realistic and worst-case scenario assumptions

ASSUMPTION	REALISTIC SCENARIO	WORST CASE SCENARIO
Sunlight Cover	Mean daily sunshine hours obtained from Woomera Aerodrome (1951–2016)	Direct sunlight during all daylight hours
WTG operational hours	Operation hours based on power curve, and wind speed and direction data measured by monitoring mast LG01 (~2010–2017). WSP has not accounted for hysteresis.	The wind turbines are always operating.
WTG orientation	WTG operation based on wind direction data measured by the monitoring mast LG01 (~2010–2017).	The wind turbines are always orientated in the horizontal plane to face the sun.
Maximum distance for influence	1.14 km	
WTG visibility	All the WTGs are visible except those screened by topography	
Minimum sun height over horizon for influence	3°	
Dimensions of receptor window	Represented by a vertical rectangle facing each turbine; termed as a “Greenhouse” configuration, 10 m wide and 2 m high, centred 1.5 m off the ground (any shadow on any part of this rectangle is included in the count). Grid size of no more than 25 m.	

In addition to the assumptions outlined above, the following WTG parameters are considered in the assessment (Vestas Wind Systems A/S, 2019) (Vestas Wind Systems A/S, 2019)

- WTG rotor diameter of 162 m
- WTG chord length of 4.3 m.

WSP has applied a reduction factor to account for cloud cover at the Project to convert the worst-case shadow flicker results to a more realistic annual estimate. This is based on recorded information on sunlight and cloud cover by the Bureau of Meteorology (BoM). The closest reference site is Woomera Aerodrome (Station ID: 016001), located 170 km northwest of the Site. This information is applied to the realistic shadow flicker assessment on a monthly average basis, measured using a Campbell-Stokes device. The average daily sunshine hours for Woomera Aerodrome are shown in Table 1.5 and the distance of the Woomera Aerodrome from the Site is shown in Figure 1.2.



Figure 1.2 Location of Woomera Aerodrome and relative to LGWF

Table 1.5 Average sunshine hours per day on a monthly mean basis (Bureau of Meteorology, 2019)

STATISTICS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean daily sunshine (hours) for years 1951–2016	11.0	10.5	9.7	8.8	7.5	6.9	7.3	8.4	9.1	9.7	10.4	10.6

The cloud cover reduction factor is applied to the worst-case results for the annual aggregate value only. The worst-case shadow hours experienced in a day remains a realistic assumption as a dwelling may experience no cloud cover on the day of the year that has the maximum shadow flicker.

The operational hours have been determined by applying the power curve to the site measured wind speed data at hub height. The WTG power curve considered in this assessment is presented in Appendix B. The operational hours per direction sector have been calculated by grouping the operational hours in 30 degree direction sectors. The operational hours per direction sector are presented in Table 1.6 below:

Table 1.6 Operational hours per direction sector based on LG01

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	SUM
1031	5464	377	414	651	1434	1716	5066	606	433	329	480	8524

1.5 TERMINOLOGY

Shadow flicker is the fluctuating light levels caused by intermittent (moving or changing) shadows. If a location is in the shadow of a moving object, then there will be a momentary reduction in light intensity as the shadow passes by. This is most noticeable in an enclosed room that is lit by the sun, when the shadow falls across the window that is providing the light. WTGs can cause shadow flicker from the moving shadow of the WTG blades. Shadow flicker can also be caused by any moving object that cast a shadow, such as vehicles or aeroplanes.

Shadow flicker occurs when the sun passes behind the blades of a WTG, casting an intermittent shadow. This effect is known to cause annoyance when this shadow is received at a building.

In order for a WTG to cause shadow flicker at a given location, the following conditions have to be satisfied:

- The sun must be in the correct position in the sky to cast a shadow of the WTG onto the location. This will only occur for certain times of day and days of the year.
- Wind direction will have an impact on shadow flicker impact, as the area of the shadow cast by the WTG will depend on which direction the WTG is pointing (yaw), which in turn is dependent on the wind direction.
- There has to be unobstructed line of sight between the WTG and the location.
- The sun must not be significantly obscured by cloud or diffused by the atmosphere (significant diffusion typically occurs for angles of less than 3° above the horizon).
- The WTG has to be operating (i.e. the blades rotating).
- The dimension of the part of the blade causing the shadow has to be large enough to cast significant shadow. The largest dimension of blades is the chord near the root, which may be up to 4.5 m on large WTGs, and the smallest is the depth of the blade near the tip, which may be 0.3 m or less. The latter is not sufficient to cast any noticeable shadow. If the blade is edge-on to the sun, then the shadow will be very small.
- The shadow must fall over most of a room's natural light source, i.e. window or skylight. If the windows are large (compared to the size of the shadow), or do not face the WTG, then the room's light levels will not vary significantly.

If any one of the abovementioned conditions is not met, then shadow flicker will not occur, or will have a diminished impact, at that location.

The sun's position varies with the time of day and the time of year. This means that the locations affected by shadow flicker from WTGs vary with the time of day and time of the year.

The shadow flicker usually occurs to the east and west of the WTGs or to the south if there is a large height difference between the WTGs and the observer location.

2 POTENTIAL IMPACTS

2.1 CONSTRUCTION

The occurrence of shadow flicker on a residence is unlikely during the construction phase of a wind farm.

2.2 OPERATION

The results of the shadow flicker assessment including worst case results and realistic results are shown below in Table 2.1. The realistic case incorporates the average sunshine and site wind speed statistics.

Neither of the receptors assessed were determined to be within the 1.14 km zone of influence; where shadow flicker is still considered to have a noticeable effect. A shadow flicker and receptor map is presented in Appendix A.

Table 2.1 Project Shadow Flicker results on each receptor location (UTM WGS84 Zone 53)

ID	LOCATION		WORST CASE	MAXIMUM SHADOW HOURS PER DAY	REALISTIC CASE	DISTANCE TO NEAREST LGWF3 WTG
	EASTING [m]	NORTHING [m]	H/YEAR [hh:mm]	H/DAY [hh:mm]	H/YEAR [hh:mm]	[km]
Shearing Sheds	741052	6389727	00:00	00:00	00:00	2.4
Landowner House	741879	6389280	00:00	00:00	00:00	3.3

3 MANAGEMENT AND MITIGATION MEASURES

3.1 PLANNING AND DESIGN

Shadow flicker is very sensitive to turbine position. Micro-siting, even within the limits allowable for an approved development application, can significantly change the duration of shadow flicker at some locations. Following micro-siting, the NWFD Guidelines recommend that shadow flicker should be reassessed.

The revised assessment should be submitted to the relevant authority.

If the assessment of the micro-sited layout results in the exposure limits being exceeded, mitigation measures should be introduced. The primary mitigation method is to relocate WTGs to a distance where the impacts of shadow flicker become negligible.

3.2 CONSTRUCTION

Shadow Flicker is not typically an issue during the construction phase of a wind farm. Therefore, there are no management and mitigation measures required during the construction phase.

3.3 OPERATION

Generally, mitigation of shadow flicker involves manipulation of the turbine layout so that impacts are controlled. However, the wind farm proponent's considerations may make other options feasible (providing there is agreement amongst the relevant parties).

The NWFD Guidelines recommend that independent modelling of shadow flicker, using as-constructed turbine positions is undertaken. If the results of this assessment show that the wind farm does not comply with the NWFD Guidelines, mitigation strategies such as planting of vegetation or scheduling turbine operation should be implemented to achieve compliance.

In the event where a complainant is not satisfied by the outcome of this approach, an observational study may be required. When completing an observational study, it is difficult to gauge the level of shadow flicker. This is due to a range of variables (especially cloud cover) which will reduce the duration of the observed shadow flicker to below modelled durations. Additionally, a full year of monitoring against which the annual exposure can be judged is likely to be impractical. As an alternative, it is recommended that an observational study of shadow flicker be carried out during a chosen day when shadow flicker is present and there is no cloud cover.

This observational assessment should be carried out using a video recorder placed at the receptor and monitored by an independent observer. A comparison of the time and duration of shadow flicker on that day would effectively validate or invalidate the predictions of the shadow flicker model, (which will need to be modelled for the same day).

Validation of the model (within a tolerance of ± 3 minutes) should be considered to demonstrate compliance with the NWFD Guidelines. In the unlikely scenario where a wind farm is shown to comply with the NWFD Guidelines but a nearby dwelling is dissatisfied by the amount shadow flicker, the resident should be recommended to take the following steps:

- plant screening vegetation between their property and the turbine(s)
- install heavy blinds or shutters on affected windows

4 SUMMARY AND RECOMMENDATIONS

The shadow flicker assessment identified that neither receptors is within the 1.14 km maximum distance of influence. Therefore, it is expected that neither receptor will experience effective shadow flicker as per the NWFd guidelines.

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APPENDIX A

SHADOW FLICKER MAP



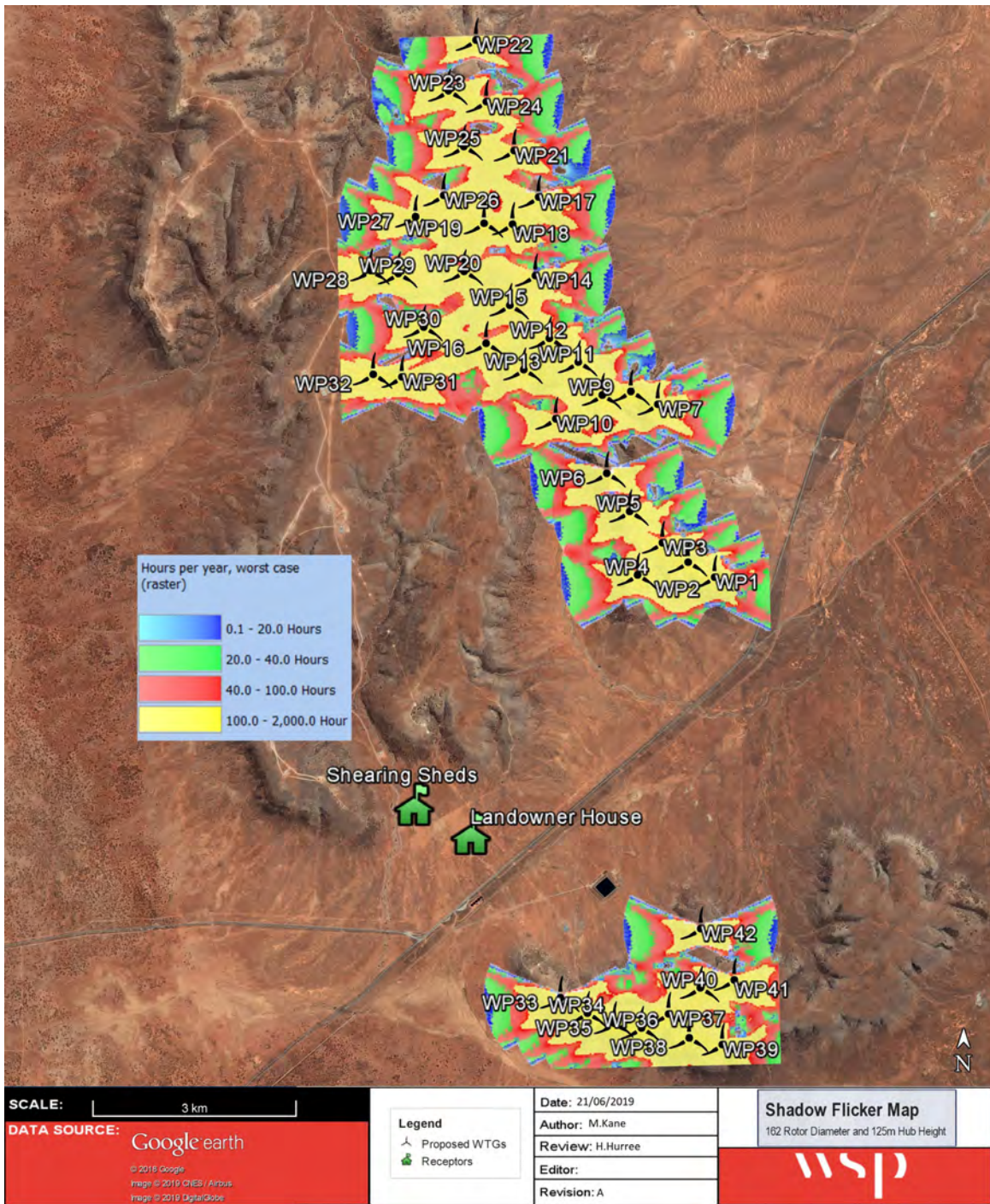


Figure A.1 Shadow flicker map: Worst case scenario

APPENDIX B

WTG POWER CURVE AND LAYOUT



Table B.1 WTG Power and thrust curve considered at LGWF3 – 1.225 kg/m³ (Nexif Energy Australia Pty Ltd, 2019)

WIND SPEED	POWER OUTPUT	THRUST CURVE
m/s	kw	ct
3	52	0.915
4	304	0.845
5	672	0.83
6	1224	0.823
7	1996	0.81
8	3012	0.798
9	4245	0.764
10	5238	0.62
11	5574	0.451
12	5600	0.33
13	5600	0.253
14	5600	0.2
15	5600	0.162
16	5600	0.133
17	5600	0.112
18	5600	0.095
19	5558	0.081
20	5147	0.065
21	4514	0.05
22	3870	0.039
23	3225	0.03
24	2584	0.022

Table B.2 Assessed WTG Layout configuration for the Project

WTG ID	EASTING	NORTHING	ELEVATION
	UTM WGS84 ZONE 53 [m]		[m]
WP1	745579	6393291	240
WP2	745193	6393521	247.6
WP3	744822	6393815	260
WP4	744443	6393351	260
WP5	744348	6394286	265
WP6	744025	6394855	250
WP7	744803	6395849	247.4
WP8	744410	6396048	250
WP9	743987	6396005	270
WP10	743293	6395673	257.2
WP11	743645	6396497	280
WP12	743227	6396859	268.6
WP13	742838	6396407	255.6
WP14	743044	6397784	270
WP15	742656	6397357	270
WP16	742292	6396807	260.1
WP17	743119	6398935	280
WP18	742725	6398547	277.4
WP19	742306	6398570	277.8
WP20	741993	6397872	270
WP21	742775	6399628	285
WP22	742253	6401266	276.2
WP23	741827	6400531	290
WP24	742382	6400356	290
WP25	742034	6399707	280
WP26	741719	6398996	270
WP27	741297	6398691	271.9
WP28	740614	6397918	290.3
WP29	741023	6397863	275
WP30	741378	6397069	259.9
WP31	741039	6396342	270

WTG ID	EASTING	NORTHING	ELEVATION
	UTM WGS84 ZONE 53 [m]		[m]
WP32	740617	6396391	270
WP33	743157	6387170	220
WP34	743548	6386934	230
WP35	743942	6386775	241.9
WP36	744340	6386695	255
WP37	744745	6386893	260
WP38	745040	6386534	265
WP39	745525	6386423	270.8
WP40	745222	6387264	286.9
WP41	745725	6387369	270
WP42	745249	6388134	245.3

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APPENDIX J

ELECTROMAGNETIC INTERFERENCE ASSESSMENT



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WIND FARM STAGE 3**

**ELECTROMAGNETIC
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Lincoln Gap Wind Farm Stage 3 Electromagnetic Interference Study

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REV	DATE	DETAILS
00	26/06/2019	Initial issue to client
01	23/08/2019	Cumulative impacts of LGWF Stage I & II assessed
02	19/11/2019	Final

	NAME	DATE	SIGNATURE
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ABBREVIATIONS

ACMA	Australian Communications and Media Authority
AM	Amplitude Modulation
BoM	Bureau of Meteorology
EMI	Electromagnetic Interference
FM	Frequency Modulation
GIS	Geographic Information System
ISP	Internet Service Provider
LGWF3	Lincoln Gap Stage 3 Wind Farm
P2MP	Point-to-multipoint
P2P	Point-to-point
RADCOM	Register of radio licences, radio communication towers and radio services
TV	Television
UHF	Ultra-High Frequency
WSP	WSP Australia Pty Ltd
WTG	Wind Turbine Generator

EXECUTIVE SUMMARY

At the request of Nexif Energy Australia Development Pty Limited (Nexif), WSP Australia Pty Ltd (WSP) has undertaken an assessment of the potential electromagnetic interference (EMI) impacts arising from the development and operation of the Lincoln Gap Wind Farm Stage 3 (LGWF3) including the cumulative EMI impacts of Lincoln Gap Stages 1 and 2 Wind Farms (LGWF1 and LGWF2). LGWF3 is located adjacent to LGWF1 and LGWF2, currently under construction.

LGWF1 consists of 35 Wind Turbine Generators (WTGs) with a rotor diameter of 140 m and maximum tip height of 180 m. LGWF2 will consist of 24 WTGs with a rotor diameter of 136 m and maximum tip height of 178 m.

As part of this study, WSP has considered potential impacts of LGWF on registered point-to-point, point-to-multipoint and broadcast services in the vicinity of the wind farm.

Nexif has provided a layout for the site of 42 WTG locations. Nexif has indicated three (3) potential Wind Turbine Generator (WTG) configurations currently under investigation at LGWF3 and for the purpose of this study, the largest WTG configuration has been considered further.

For this investigation, WSP identified existing radio communication services listed within the ACMA register of radio licences, radio communication towers and radio services (RADCOM). This database was reviewed by WSP and sites within 75 km of LGWF3 were identified.

249 radio communication sites were found within 75 km of the approximate LGWF3 project area, with 72 towers within 30 km of the site. This data was mapped against the proposed wind farm layout, provided by Nexif. Communication towers and service paths identified to cross the project area were selected for further investigation.

A refined search was undertaken to identify any towers located within 2 km of any proposed WTG on site and assessed for potential near-field impacts. Two (2) towers were identified, with only one (1) tower located within the site boundary. WSP notes that no assignment IDs nor licences are currently registered to this tower and as such, it is considered unlikely that this tower is currently in operation.

Three (3) fixed point-to-point links were identified to intersect with the approximate project area of LGWF3. The 2nd Fresnel zones were calculated for each link and it was observed that one WTG is proposed within one (1) blade length of the 2nd Fresnel zone of one link.

The preferential mitigation technique for dealing with encroachment is to relocate or microsite the WTG such that interference is eliminated. WSP recommends that the WTG exclusion distances established within this report are observed to avoid potential impact on the services and operations identified. Please refer to Section 3.2 for additional information regarding the point-to-point links identified in the vicinity of LGWF3.

Point-to-multipoint licences, point-to-area licences and broadcast services were assessed in the vicinity of LGWF3. Based on information publicly available, WSP notes that digital radio services in the LGWF3 region may be very limited. As such, it is recommended that a ground survey is undertaken to assess the current status of digital radio signals in the area prior to the construction and operation of LGWF3.

Residences close to LGWF3 may experience some interference to their television (TV) services if they are located in a region of existing marginal coverage. WSP recommends that a ground survey of TV signal strength is undertaken amongst the residences surrounding LGWF3 prior to the construction of the wind farm. Should some residences experience TV interference, a number of mitigation options are available to rectify this issue.

WSP has also assessed the cumulative EMI impacts arising from the development and operation of all three stages of LGWF. This is described further in Section 4.

WSP recommends that licensees identified within this report as possibly being adversely affected by the development and operation of LGWF3 are contacted to discuss the potential impact of LGWF3 development and operations on their services.

1 INTRODUCTION

Lincoln Gap Wind Farm Pty Ltd (LGWF P/L), a subsidiary of Nexif Energy Australia Development Pty Limited (Nexif), is developing the Lincoln Gap Wind Farm Stage 3 (LGWF3), located approximately 17 km southwest of Port Augusta, South Australia. LGWF3 is proposed to consist of up to 42 Wind Turbine Generators (WTGs), for which Nexif has provided a table of WTG model parameters [1].

LGWF3 is currently the last stage of development of the Lincoln Gap Wind Farm Project. Stage 1, or LGWF1, is currently under construction and consists of 35 WTGs with a rotor diameter of 140 m and a maximum tip height of 180 m. Stage 2, or LGWF2, is proposed to consist of 24 WTGs with a rotor diameter of 136 m and a maximum tip height of 178 m.

WSP Australia Pty Ltd (WSP) has been engaged by Nexif to assess the potential Electromagnetic Interference (EMI) impacts on the radio communication services surrounding LGWF3.

The EMI assessment conducted by WSP has included but is not limited to the analysis of:

- fixed point-to-point radio communication links in the vicinity of the proposed WTG locations
- fixed point-to-multipoint licences within 30 km of the site
- radar operations within 250 nautical miles of the site
- television (TV) and radio broadcasting services in operation around LGWF3
- mobile phone services
- internet services, and
- licences operated by emergency services in proximity to the development.

This report details the methodology adopted to assess the potential EMI impact resulting from the development and operation of LGWF3. It also describes potential mitigation options to manage and minimise likely EMI impacts arising from LGWF3 development and operation.

1.1 PROJECT UNDERSTANDING

LGWF3 is located approximately 17 km southwest of Port Augusta in South Australia. The site is proposed to consist of up to 42 WTGs, as shown in Figure 1.1. The proposed WTG models currently under consideration for LGWF3 are listed in Table 1.1.

Table 1.1 WTG model parameters considered in EMI assessment of LGWF3

WTG CONFIGURATION	HUB HEIGHT [m AGL]	ROTOR DIAMETER [m]	BLADE LENGTH [m]	MAXIMUM TIP HEIGHT [m]
1	121	158	79	200
2	125	162	81	206
3	107	155	78	185

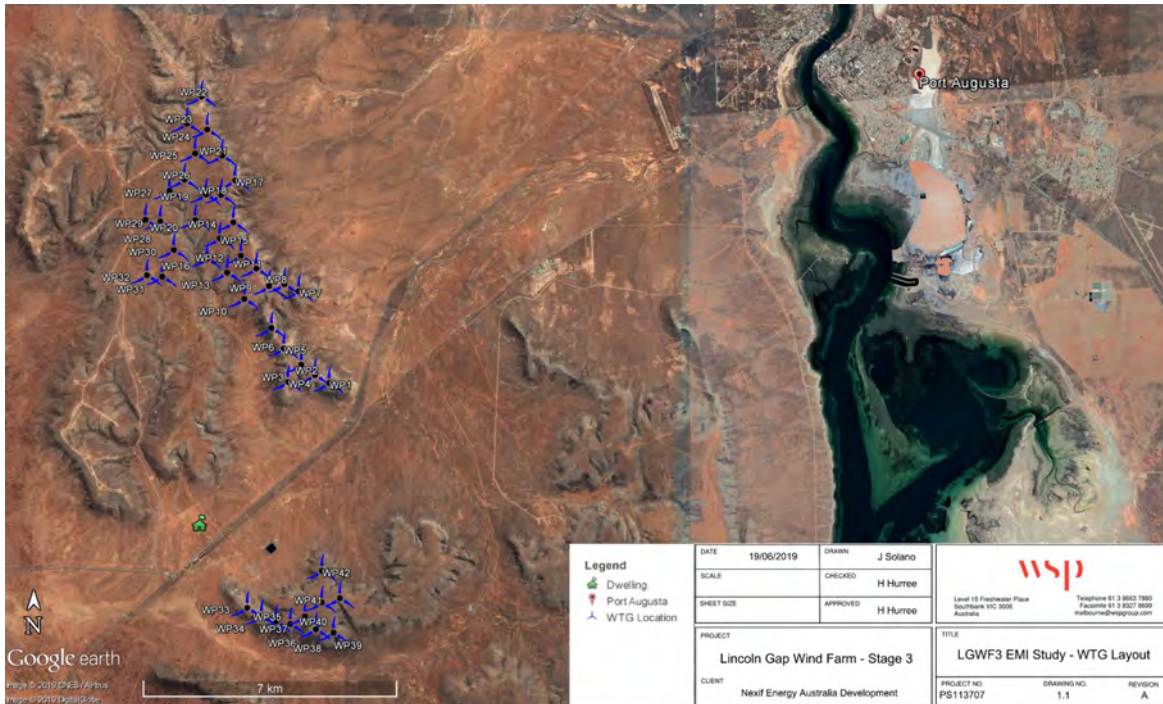


Figure 1.1 Layout of LGWF3

As part of this assessment, WSP has only assessed the largest WTG model, which corresponds to the WTG Configuration 2, with a rotor diameter of 162 m and a maximum blade tip height of 206 m.

WSP notes LGWF3 is situated approximately 1 km east of the Lincoln Gap Wind Farm Stages 1 and 2 (LGWF1 and LGWF2), with LGWF1 currently under construction. WSP has assessed the cumulative EMI impacts of LGWF1 and LGWF2 in Section 4 of this document.

1.2 APPLICABLE GUIDELINES

The following industry standard guidelines and references have been used in the EMI assessment:

- fixed link WTG exclusion zone method [2]
- draft National Wind Farm Development Guidelines [3]
- Guidelines for Minimizing the Impact of Wind Farms on the SAGRN (Doc: TR049-SA) [4].

1.3 LIMITATIONS OF REPORT

This Report is provided by WSP Australia Pty Limited (WSP) for Nexif (Client) in response to specific instructions from the Client and in accordance with WSP's proposal dated 15 February 2019 and agreement with the Client dated 14 March 2019 (Agreement).

1.3.1 PERMITTED PURPOSE

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2 METHODOLOGY ADOPTED

2.1 WIND FARMS AND ELECTROMAGNETIC INTERFERENCE

Communication systems using radio waves are heavily utilised in Australia. Mobile phones, television (TV), commercial radio, land mobile radio and emergency radio are common examples of systems that rely on radio and telecommunication. These systems generally use radio towers to transmit and receive signals across a wide area. In the context of wind farm development and operation, electromagnetic interference (EMI) is the impact of a wind farm on surrounding communication services resulting in an unacceptably detrimental effect to the communication service. Radar services (civil and weather) can potentially be impacted by wind farms also.

2.1.1 TYPES OF IMPACTS AND EXCLUSIONS ZONES

The different effects wind farms can have on communication services are summarised below.

- *Near field impact:* A property of a transmitting and/or receiving antenna is a “near field” zone that is present around the antenna. Any object that can conduct or absorb radio waves, placed within the near field zone, can alter the behaviour of the antenna.
- *Obstruction impact:* If a conductive object is placed in the path of an advancing radio wavefront, wave energy can be absorbed, detrimentally affecting the signal detected at the receiver.
- *Reflection and scattering impacts:* If an object reflective to radio waves is placed in the path of an advancing radio wavefront, it may reflect energy away. The reflected signal may be reflected to the transmitting or receiving antenna which can interfere with the desired signal.
- *Electromagnetic fields / Radio frequency interference:* The operation of a WTG and the associated electrical transmission infrastructure creates an electromagnetic emission that can, theoretically, interact with radio communications.

In many cases, impacts can be sufficiently characterised and mitigated using calculated “exclusion zones” and ensuring these zones are free from WTGs. In other cases, such as when exclusion zones are not feasible to calculate or not appropriate for the communication service, other options are available. Details of the calculated exclusion zones are given below [2].

- *Near field impact:* Recommendations for determining exclusion zones to mitigate near field impacts are given by [2]. Exclusion zones for the LGWF3 site can be calculated using this method. Communication towers in proximity to the site were reviewed, as discussed in Section 3.1.1. In many cases, the required exclusion zones are very small. However, WSP recommends a minimum standard 500 m radio tower exclusion zone as a precautionary measure for any reflection and scattering impacts that may be produced.
- *Obstruction impact:* Recommendations for determining exclusion zones to mitigate obstruction are given by [2]. Exclusion zones have been calculated at LGWF3 using this method (2nd Fresnel zone method) and are discussed in Section 3.2.
- *Reflection and scattering impacts:* The accepted methods for calculating these impacts generally require information on signal performance requirements specific to each service and client. Additionally, impact calculations from this effect require complex modelling to determine. The scope of this assessment does not include the calculation of reflection/scattering impacts. WSP has undertaken a qualitative assessment to determine potentially affected licensees within the vicinity of LGWF3. WSP generally suggests these impacts are calculated, if required, following the receipt of any specific requirements from the potentially impacted stakeholders as listed in Section 3.

- *Electromagnetic fields / Radio frequency interference*: These effects are not considered in this assessment. Providing appropriate standards and guidelines are observed in the WTG and balance of plant design, these electromagnetic fields are not expected to cause impacts that are relevant to this assessment. WSP's scope does not include assessing this type of interference.

The possible wind farm electromagnetic impacts have only been briefly discussed. See the cited reference for further information.

2.1.2 RELEVANT CATEGORIES OF RADIO COMMUNICATION SERVICES

In assessing EMI impacts resulting from wind farm development and operation, radio systems are commonly broken into several different categories based on type. For the purposes of the current investigation, the following categories of services are considered.

- *Fixed point-to-point*: Radio links that transmit and receive between two fixed points fall under this category. For example, network backhaul commonly utilises point-to-point communication.
- *Fixed point-to-multipoint*: A central location transmits to, and sometimes receives from, several independent locations. TV and radio broadcasting and reception, mobile phones (to the cell site mast) and land mobile systems fall under this category.
- *Radar*: Radar transmits a signal which is reflected back to the transmitting station (some systems involve communication between a radar station and a transponder). Services that utilise radar technology include aircraft detection and weather services.

Point-to-point, point-to-multipoint and radar impacts are considered separately in this assessment. WSP has also considered the impact of the wind farm development on nearby mobile phone networks, internet services, TV broadcasting services and other types of point-to-area licences.

In order to assess the potential EMI impacts arising from LGWF3 development and operation, WSP has adopted the following course of action:

- 1 Using the Australian Communications and Media Authority (ACMA) radio communication towers and radio services (RADCOM) database, all licences currently in use within 75 km of LGWF3 have been identified.
- 2 All communication towers within 2 km of LGWF3 were investigated and assessed for potential near-field and obstruction effects. Recommended exclusion zones were also established.
- 3 All potential fixed point-to-point licences passing through or near the proposed WTG locations were identified and assessed for potential EMI impacts.
- 4 All fixed point-to-multipoint licences within 30 km of the WTGs were identified and assessed for potential EMI impacts.
- 5 All other remaining licences were assessed for potential impacts within 30 km of LGWF3.
- 6 Operators of radar services, including the Bureau of Meteorology (BoM) and aviation services, were identified within 250 nautical miles of LGWF3.
- 7 Network coverage of mobile phone services, internet services and TV broadcast services were assessed in the vicinity of LGWF3.
- 8 Emergency services operating licences within 30 km of LGWF3 were also identified.

As noted previously, the cumulative potential EMI impacts arising from the development and operation of all three (3) stages of LGWF has also been assessed by WSP.

2.2 AUSTRALIAN COMMUNICATIONS AND MEDIA AUTHORITY

ACMA is the Australian government body that regulates the use of Australia's radio spectrum. ACMA maintains a register of radio licences, radio communication towers and radio services (RADCOM). The RADCOM database contains a register of all radio apparatus, each having a unique radio assignment number. WSP accessed the ACMA RADCOM database in May 2019 to conduct the current EMI assessment [5].

The RADCOM database has been known to potentially contain inaccurate information. Additionally, the precision of some tower location coordinates can be considered low for the purposes of this assessment. WSP recommends that identified licensees are contacted to confirm the accuracy of the information sourced from the RADCOM database.

2.3 INPUTS TO ASSESSMENT

Several inputs were considered for this assessment. Table 2.1 details the various files and associated sources used by WSP to determine the potential EMI impacts arising from LGWF3 development and operations.

Table 2.1 Inputs to EMI assessment

INPUT	DESCRIPTION	REFERENCE
WTG Model	WTG layout and model at LGWF3, corresponding to a maximum tip height of 206 m and a maximum rotor diameter of 162 m	[1]
Dwellings	List of dwellings surrounding LGWF3	[6]
RADCOM Database	Details of licences in operation in Australia, publicly available in the RADCOM database	[5]
BoM data	Locations of nearby weather radars and stations as per the BoM website	[7] [8]
Broadcasting data	Location of nearby TV and radio broadcast towers	[9]
Mobile phone coverage	Mobile phone coverage maps as provided by Telstra, Optus and Vodafone	[10] [11] [12]

2.4 EXCLUSIONS

As mentioned, this assessment does not include the calculation of reflection/scattering impacts. WSP has undertaken a qualitative assessment to determine potential affected licensees within the vicinity of LGWF3. WSP suggests these impacts are calculated, if required, following the consultation with the potentially impacted radio stakeholders. WSP has not contacted any of the affected parties identified within this analysis. It is recommended that consultation is undertaken with the affected licensees to assess the potential EMI impact arising from LGWF3 development and operation on their services.

3 POTENTIAL IMPACTS OF LGWF3

Following the methodology and inputs described above, WSP has undertaken an independent analysis of the potential EMI impacts arising from the development and operation of LGWF3.

As mentioned previously, the RADCOM database [5] was accessed and used to identify all licences in operation within 75 km of the project. This database formed the basis of WSP’s analysis, as described in the following sub-sections.

3.1 RADCOM DATABASE

The ACMA RADCOM database [5] was used to identify all licences within 75 km of LGWF3. While it is recommended that all licences within 30 km are identified, it is possible that point-to-point licences span over distances greater than 30 km. As such, WSP has considered the larger distance as a first-pass analysis.

249 communication towers were identified within 75 km of LGWF3, with approximately 72 towers within 30 km of the site boundaries.

3.1.1 NEAR FIELD EXCLUSION

A refined search was undertaken to identify any towers located within 2 km of any WTG on site and assessed for potential near-field and scattering effects. Two (2) communication towers were identified and are listed in Table 3.1.

Table 3.1 Communication towers within 2 km of LGWF3

SITE ID	LATITUDE [°]	LONGITUDE [°]	NAME	DISTANCE [km]
25019	-32.62	137.59	Tower Hill, Lincoln Gap	0.7
9003053	-32.61	137.60	SA Water Site, Lincoln Gap	1.6

As discussed in Section 2.1.1, WSP recommends a WTG-communication tower separation distance equal to the maximum of either the calculated near field exclusion zone or at least 500 m. It is noted that Tower ID 25019 is located within the site boundary, approximately 700 m northwest of WTG 33 of LGWF3. However, according to the RADCOM database, there are no operators and assignment IDs associated with this tower. It is likely that this tower is currently not in use by the operators servicing this area.

3.2 POINT-TO-POINT LICENCES

As mentioned previously, all registered fixed point-to-point links within 75 km of LGWF3 have been identified and further analysed for potential intersection with the wind farm. Three (3) point-to-point links were identified in the vicinity of the proposed WTG locations. Details of the links are shown below in Table 3.2.

Table 3.2 Summary of point-to-point links passing nearby LGWF3

LINK	SITE 1	SITE 2	LICENSEES	MINIMUM FREQUENCY
1	25015	25476	Santos Limited	451.25 MHz
2	25011	25343	Vodafone Australia Pty Limited	6.15 GHz
3	500896	9001188	Silk Telecom Pty Limited	7.74 GHz

Figure 3.1 depicts the three (3) fixed point-to-point links that intersect with the proposed LGWF3 project area.

In order to assess the likely impact of the LGWF3 development and operation on the identified point-to-point links, WSP has assessed the 2nd Fresnel exclusion zones for each identified link. As a conservative approach, the lowest frequency associated with each link has been used to estimate the 2nd Fresnel zones as this results in the largest Fresnel zone radius. To avoid potential EMI impacts on the links, WSP recommends that no WTG encroach the 2nd Fresnel zones of the identified links. A set-back distance of one blade length is also recommended from the 2nd Fresnel zones to avoid blade overhang. For this assessment, a blade length of 81.0 m, as supplied by Nexif, has been used.

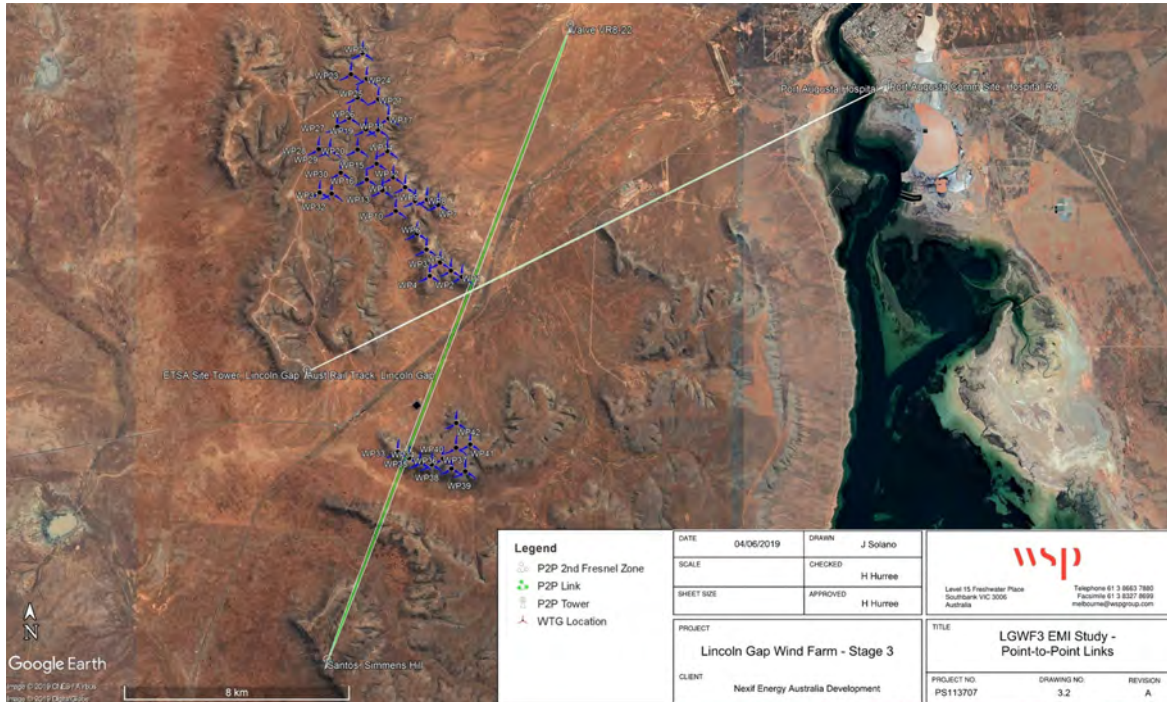


Figure 3.1 Point-to-point links identified within vicinity of LGWF3

3.2.1 LINK 1

Table 3.3 lists the details for Link 1, between the communication towers 25015 and 25476, including the associated Assignment IDs and frequencies.

Table 3.3 Point-to-point assignments between sites 25015 and 25476

LICENSEE	SITE 1	SITE 2	ASSIGNMENT IDS	FREQUENCY [MHZ]
Santos Limited	25015	25476	1262143 – 1262144	460.75
	Santos Port Augusta, Simmens Hill	Valve VR8-22, Elalamcin	1262146 – 1262145	451.25

WSP has calculated the 2nd Fresnel zone for the lowest frequency, shown in Figure 3.2. It was observed that one WTG as currently proposed, is likely to interfere with the 2nd Fresnel zone of the link, as shown in Figure 3.3. While no WTG is currently proposed within the 2nd Fresnel zone, WTG34 is located 45 m from the 2nd Fresnel zone, which is less than one blade length.

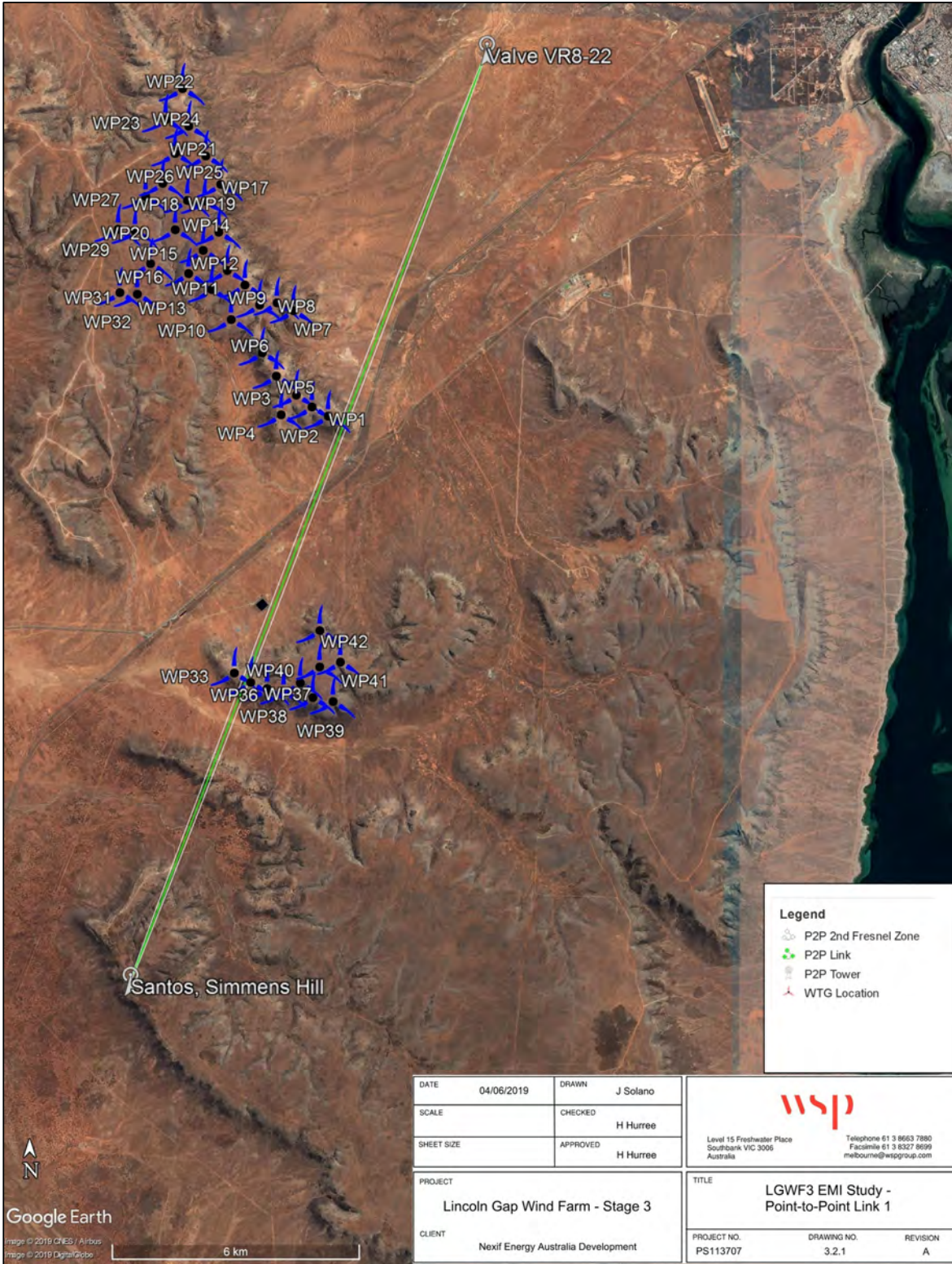


Figure 3.2 Point-to-Point Link 1, calculated 2nd Fresnel Zone



Figure 3.3 Point-to-point Link 1, WTG 34 encroachment

Shown in Figure 3.3, WTG 34 is currently located that the WTG blade is expected to interfere with the 2nd Fresnel zone. WSP has also reviewed the WTG elevation with respect to the elevation of the two (2) towers and it has been deemed that the point-to-point link is lower than the maximum tip height of the WTG. Hence, it is expected that the WTG will interfere with the link listed above. WSP recommends that before any mitigation options are assessed, that the link details are confirmed with the licensee, such as tower coordinates and status of the link assignments.

3.2.2 LINK 2

Table 3.4 lists the details for Link 2, between the communication towers 25011 and 25343, including the associated Assignment IDs and frequencies.

Table 3.4 Point-to-point assignments between sites 25011 and 25343

LICENSEE	SITE 1	SITE 2	ASSIGNMENT IDS	FREQUENCY [GHZ]
Vodafone Australia Pty Limited	25011	25343	2666065 – 2666064	6.405
	Aust Rail Track/CMTS Site Tower Hill, Lincoln Gap	Comm Site Hospital Rd, Port Augusta	2666066 – 2666067	6.153

WSP has calculated the 2nd Fresnel zone for the lowest frequency, shown in Figure 3.4. It was observed that no WTGs are currently proposed within the 2nd Fresnel zone. Additionally, the closest WTG is approximately 596 m away from the 2nd Fresnel zone, i.e. more than one blade length.

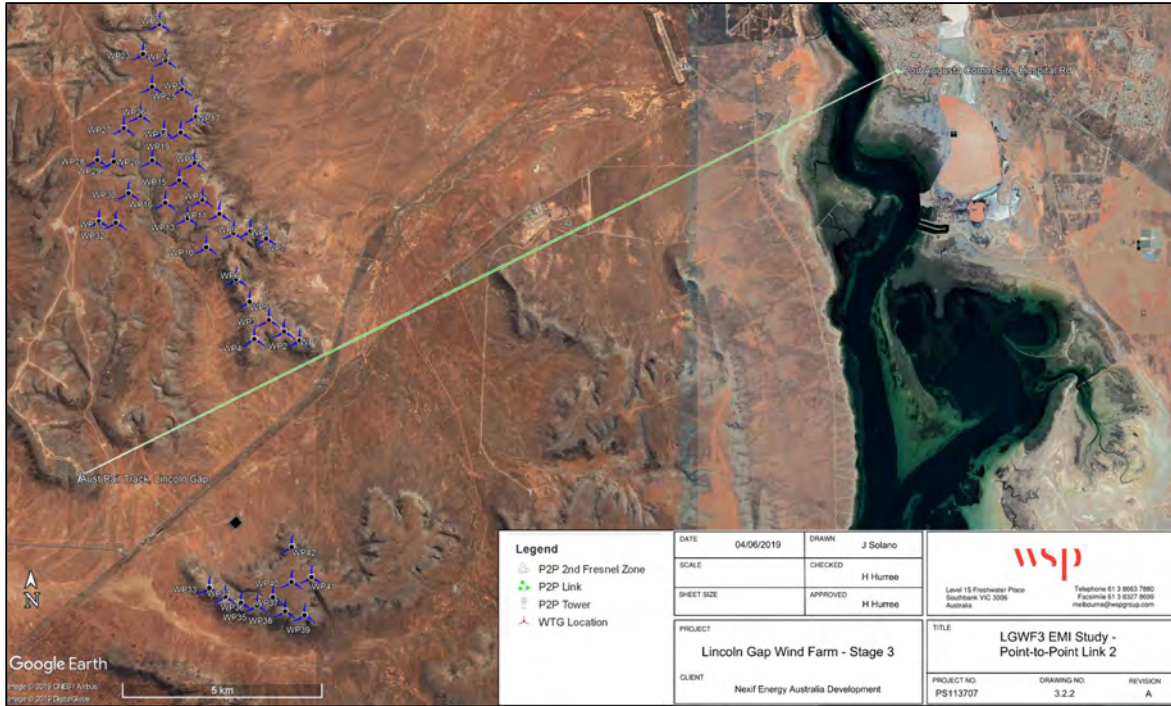


Figure 3.4 Point-to-point Link 2

3.2.3 LINK 3

Table 3.5 lists the details for Link 3, between the communication towers 500896 and 9001188, including the associated Assignment IDs and frequencies.

Table 3.5 Point-to-point assignments between sites 500896 and 9001188

LICENSEE	SITE 1	SITE 2	ASSIGNMENT IDS	FREQUENCY [GHZ]
Silk Telecom Pty Limited	500896 Port Augusta Hospital Road, Port Augusta	9001188 ETSA Site Tower, Lincoln Gap	751581 – 751582	8.596
			751584 – 751583	7.748
			751589 – 751590	8.118
			751592 – 751591	7.807
			751597 – 751598	8.149
			751600 – 751599	7.837
			893733 – 893735	8.089
			893738 – 893736	7.777
			893740 – 893741	8.178
893744 – 893743	7.866			

WSP has calculated the 2nd Fresnel zone for the lowest frequency, shown in Figure 3.5. It was observed that no WTGs are currently proposed within the 2nd Fresnel zone. Additionally, the closest WTG is approximately 605 m away from the 2nd Fresnel zone, i.e. more than one blade length.

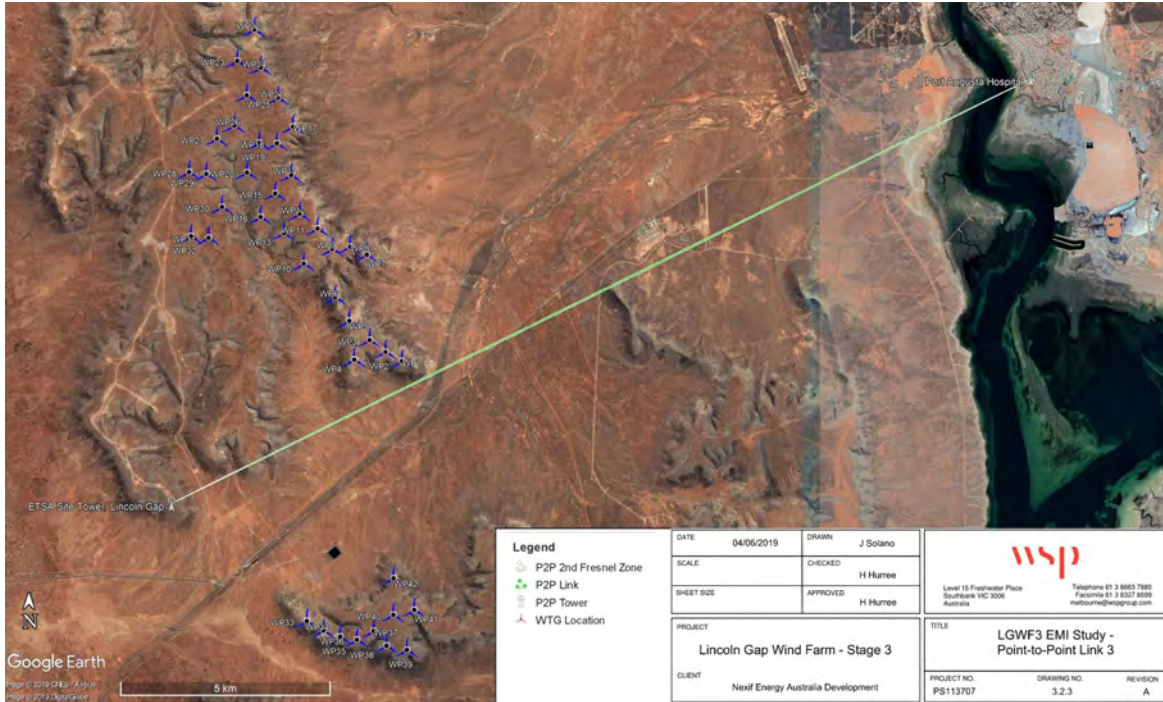


Figure 3.5 Point-to-point Link 3

3.2.4 SUMMARY OF POINT-TO-POINT ANALYSIS

Based on the analysis of the three (3) identified links conducted above, three (3) licensees were identified that operate links passing in the vicinity of LGWF3 WTGs. Based on the 2nd Fresnel zone analysis, it is expected that one (1) of the three (3) identified licensees will be impacted by the development and operation of LGWF3. A summary of the findings is shown in Table 3.6.

Table 3.6 Summary of results for point-to-point link analysis

LICENSEE	SITE 1	SITE 2	ASSIGNMENT ID OF MINIMUM FREQUENCY	FREQUENCY	WTGS ENCROACHING FRESNEL ZONE
Santos Limited	25015 Santos Port Augusta, Simmens Hill	25476 Valve VR8-22, Elalamein	1262146 – 1262145	451.25 MHz	1
Vodafone Australia Pty Limited	25011 Aust Rail Track/CMTS Site Tower, Lincoln Gap	25343 Comm Site Hospital Rd, Port Augusta	2666066 – 2666066	6.15 GHz	0
Silk Telecom Pty Limited	500896 Port Augusta Hospital, Port Augusta	9001188 ETSA Site Tower, Lincoln Gap	751584 – 751583	7.75 GHz	0

Before investigating mitigation options for LGWF3, WSP recommends the coordinates of the transmitting and receiving radio sites, the status of the services and requirements of the licensees are verified during consultation with the identified licensees.

WSP also reiterates, the RADCOM radio site coordinates may not be accurate, the services may not be active or the requirements of the licence holders may influence the requirements for layout adjustment.

3.3 POINT-TO-MULTIPOINT LICENCES

Point-to-multipoint links are similarly susceptible to the types of impacts discussed in Sections 3.1.1 and 3.2. However, due to the nature of many uses of point-to-multipoint licences, the likelihood of a wind farm causing unacceptable impacts is generally low.

There may be point-to-multipoint services with fixed receivers that can be impacted. Any registered services will be present and accounted for in the ACMA database used in this assessment [13].

Table 3.7 Point-to-multipoint licences within 30 km of LGWF3

LICENSEE	SITE	ASSIGNMENT ID	FREQUENCY	DISTANCE FROM LGWF3 AREA [KM]
Department of Health and Ageing	138755	886663	461.28 MHz	21.3
		886666	451.78 MHz	
Silk Telecom Pty Limited	25330	756484	3.49 GHz	20.1
		756487	3.44 GHz	
South Australia Water Corporation	9016228	933416	461.93 MHz	21.2
		933419	452.43 MHz	
		2409636	461.85 MHz	
		2409639	452.35 MHz	
Telstra Corporation Limited	25345	793859	1.45 GHz	29.1
		793856	1.51 GHz	
Department of Defence	204793	1272789	82.40 MHz	7.0
		1272774	72.35 MHz	
		1272777	72.35 MHz	
		1272786	82.40 MHz	
		1272791	80.48 MHz	
		1272790	77.98 MHz	
Department of Defence	204794	1254807, 1254804	450.21 MHz	7.9
Royal Flying Doctor Service of Australia Central Operations	9003132	722237, 722234	471.55 MHz	14.6

3.3.1 AM AND FM BROADCASTING

The impact on AM and FM radio broadcasting reception is considered to be negligible beyond the boundary of the wind farm. In general, there are no known effects on AM/FM services caused by the wind farm as the wavelengths of these services are relatively large compared to the size of the WTGs. The locations of the AM and FM broadcast towers in proximity to LGWF3 are shown in Figure 3.6.

It is noted that AM signals can propagate around WTGs and as such, WSP does not expect that the LGWF3 development and operation will adversely impact the AM radio services in the area.

FM signals, however, are more susceptible to interference from nearby obstacles, such as WTGs. However, this can only occur when the receiver is in close proximity to the obstacle. Nexif has supplied WSP with the details of two (2) dwellings nearby the LGWF3 project area [14]. One dwelling is identified as a ‘house’ and WSP has included this in the EMI studies included in this report. The second identified dwelling is listed as ‘shearing shed’ and therefore has not been included in the EMI studies due to it not being a primary residence. Should any primary dwellings be subject to poor FM signals, mitigation measures, such as the installation of high gain antenna, can help to rectify this issue.

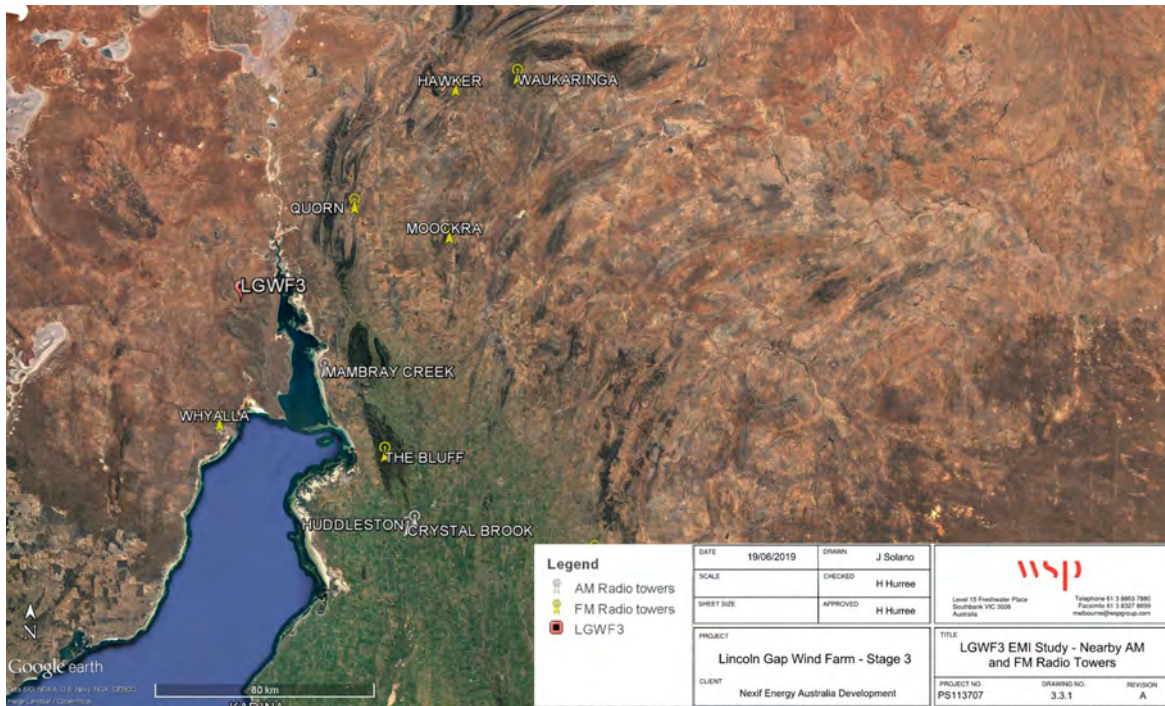


Figure 3.6 AM and FM broadcast towers in proximity to LGWF3

3.3.2 DIGITAL RADIO

Based on the ABC Reception Coverage Estimator there is currently no ABC Digital Radio services available to the LGWF area [15]. It should also be noted, that Digital Radio Plus’s coverage estimator [16] has noted that DAB+ digital radio services are currently unavailable in the LGWF3 area. As such, due to the inexistence of digital radio within the area, LGWF3 will have negligible impact on digital radio services.

3.3.3 MOBILE RADIO

Mobile radio may be affected by the shadowing effects of the LGWF3. However, if this is the case, any problems can usually be rectified through a minor adjustment in the position of the receiver.

3.3.4 MOBILE RECEPTION

Mobile reception can be affected by the development and operation of LGWF3, depending on the level of coverage surrounding LGWF3. WSP has assessed existing mobile coverage from three (3) common service providers in proximity to LGWF3, including Telstra, Optus and Vodafone.

The mobile reception coverage map for Telstra in the area surrounding LGWF3 is shown in Figure 3.7. The strength of Telstra mobile phone reception varies around LGWF3, with areas of 3G to 4G coverage, with the majority of the site area within 4G coverage. In areas of currently marginal coverage, it is possible that LGWF3 will impact the mobile reception for Telstra customers. WSP recommends contacting Telstra seeking feedback on potential EMI impacts arising from the development and operation of LGWF3.

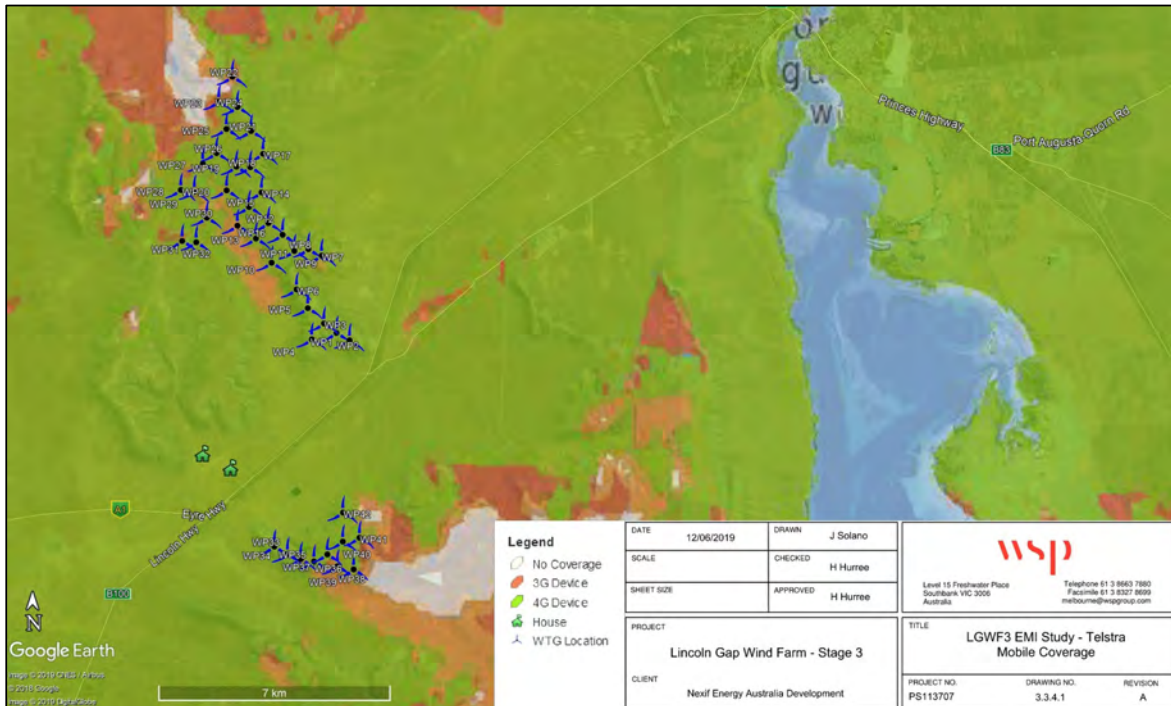


Figure 3.7 Telstra mobile reception surrounding LGWF3

The mobile reception coverage map for Optus mobile services in the area around LGWF3 is shown in Figure 3.8. The strength of Optus mobile phone reception varies around LGWF3, with areas of 3G to 4G coverage. In areas of currently marginal coverage, it is possible that LGWF3 will impact the mobile reception for Optus customers. WSP recommends contacting Optus seeking feedback on potential EMI impacts arising from the development and operation of LGWF3.

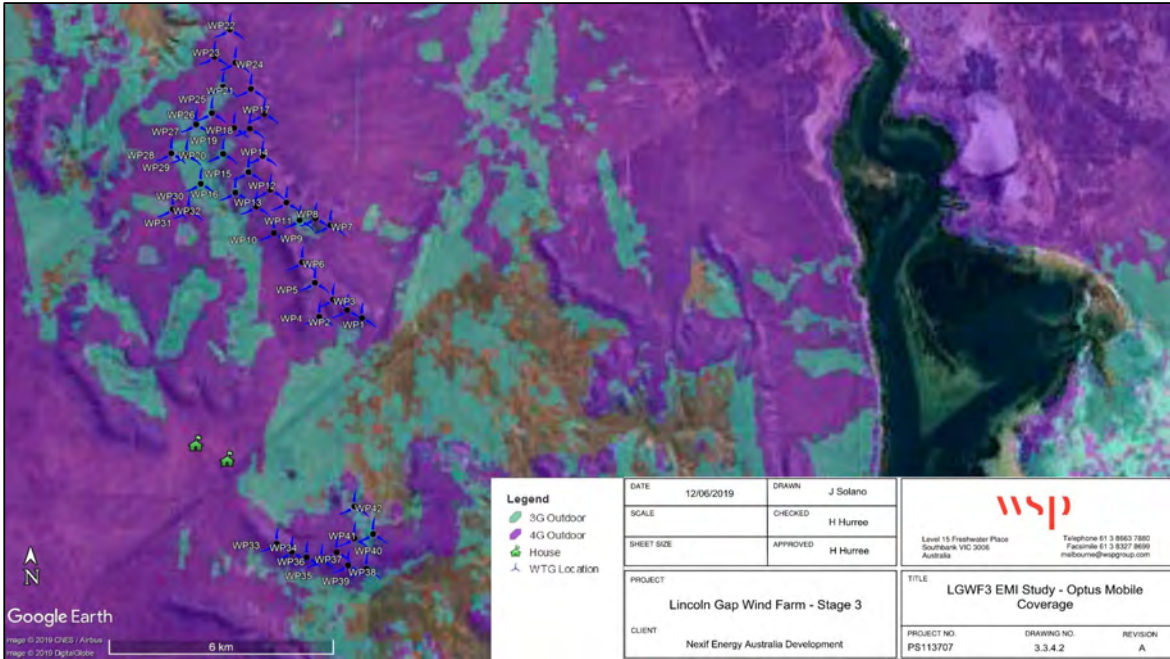


Figure 3.8 Optus mobile reception surrounding LGWF3

The mobile reception coverage map for Vodafone in the area around LGWF3 is shown in Figure 3.9. The strength of Vodafone mobile phone reception varies around LGWF3, with areas of 3G to 4G coverage. In areas of currently marginal coverage, it is possible that LGWF3 will impact the mobile reception for Vodafone customers. WSP recommends contacting Vodafone seeking feedback on potential EMI impacts arising from the development and operation of LGWF3.

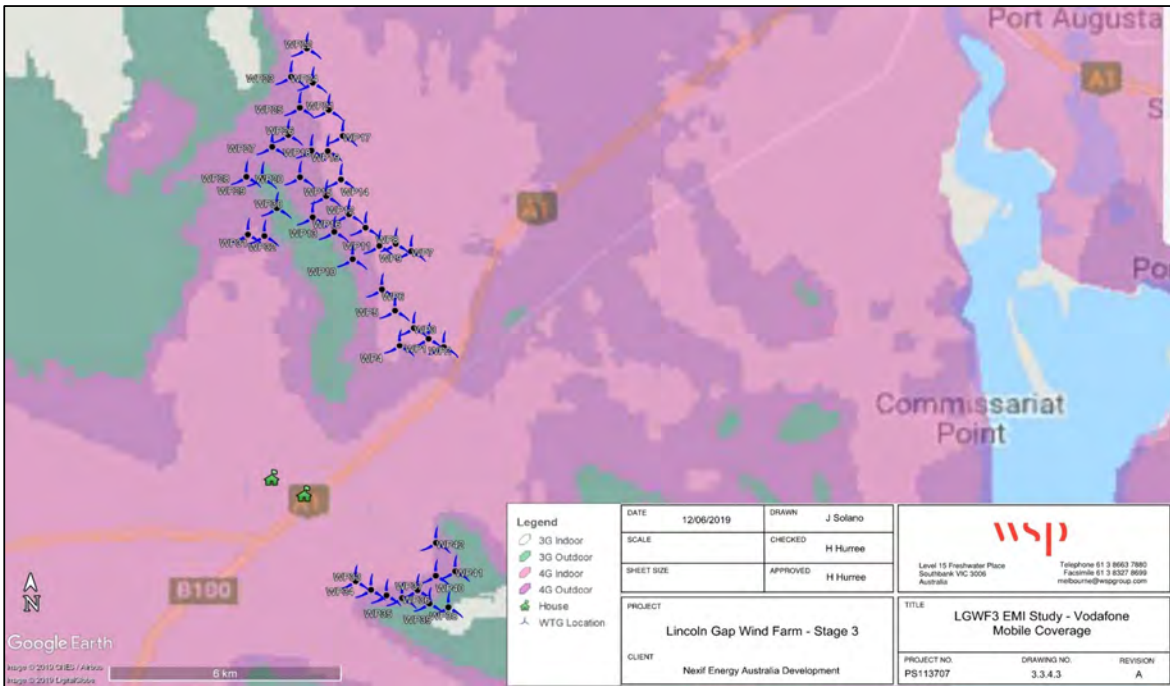


Figure 3.9 Vodafone mobile reception surrounding LGWF3

3.3.5 TELEVISION RECEPTION

Analog TV signals are known to be affected by interference from WTGs. Analog TV was gradually phased out in Australia since 2010 and completed nation-wide in 2013. At present, digital TV signals are available across the country and are usually less prone to interference, if the signal is strong enough initially. A search of the digital TV broadcast stations was conducted in proximity of LGWF3 [17].

There are only two dwellings identified in proximity to the LGWF3 project area that the WTGs can obstruct regarding the line of sight of nearby broadcast stations. If these residences are currently experiencing marginal TV coverage, they may experience interference to their TV services due to LGWF3. Should this be the case, there are a number of mitigation measures that can be put in place. These are discussed further in Section 5.1.3.

According to the MySwitch website [9], the area surrounding LGWF3 is currently serviced by Site 24650 (Broadcast Australia Site TV Track, The Bluff Tower), located approximately 75 km southeast of LGWF3, as shown in Figure 3.10. According to the MySwitch, there is currently no coverage surrounding the LGWF area.

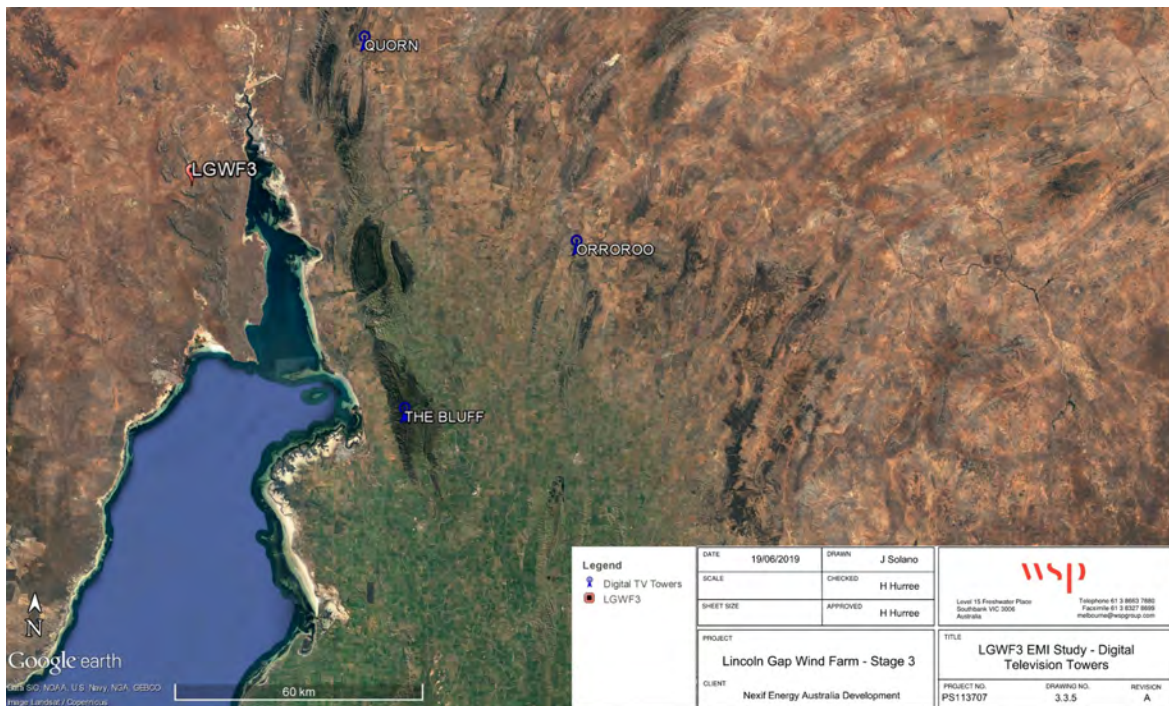


Figure 3.10 TV broadcast sites in proximity to LGWF3

WSP recommends that a ground survey of TV signal strength is undertaken with the residents surrounding LGWF3 prior to the construction of the wind farm to confirm the current status of TV signal strength.

3.4 POINT-TO-AREA SERVICES

Point-to-area services were identified within 30 km of LGWF3. Table 3.8 lists each licence type and the corresponding number of licences within 30 km of LGWF3.

Table 3.8 Details of other licences identified within 30 km of LGWF3

LICENCE TYPE	LICENCE CATEGORY	NUMBER OF LICENCE NOS	CLOSEST DISTANCE TO LGWF3 [KM]
Aeronautical	Aeronautical Assigned System	4	14.6
Broadcasting	Narrowband Area Service station(s)	1	23.5
	Narrowcasting Service (LPON)	3	20.2
Land Mobile	Land Mobile System - > 30 MHz	80	9.5
	Land Mobile System 0-30 MHz	54	17.4
	Ambulatory System	14	6.6
	CBRS Repeater	2	6.6
	Paging System – Interior	1	23.4
	Paging System – Exterior	1	20.1
Outpost	Outpost Assigned	8	11.9
PTS	PMTS Class B	34	6.3
PTS 900 MHz	PMTS Class B (935-960 MHz)	30	6.3
Spectrum	1800 MHz Band	30	17.4
	2.0 GHz Band	20	17.4
	2.3 GHz Band	56	17.4
	2.5 GHz Band	18	17.4
	700 MHz Band	88	6.3
	800 MHz Band	56	6.3

WSP recommends contacting the organisations operating the licences within 30 km of LGWF3 for comments on potential EMI impacts to their services as a result of the proposed development.

3.4.1 INTERNET SERVICES

Organisations operating point-to-area licences within 30 km of LGWF3 were identified in Section 0. Table 3.9 shows the Internet Service Providers (ISPs) and telecommunication providers operating within 30 km of LGWF3. WSP recommends that the licensees listed in Table 3.9 are contacted to comment on any potential impacts to their services as a result of the development and operation of LGWF3.

Table 3.9 Internet service and telecommunications providers holding licences within 30 km of the LGWF3

LICENSEE
NBN Co. Spectrum Pty Ltd
Optus Mobile Pty Limited
Dodo Services Pty Limited
iPrimus Telecommunications Pty Limited
Telstra Corporation Limited
Vodafone Australia Pty Limited
Vodafone Hutchison Australia Pty Limited

WSP notes that NBN Co is a government-owned enterprise that provides the infrastructure for broadband services. However, there are a number of ISPs who are also NBN providers. WSP recommends that a ground survey is undertaken to identify the ISPs providing NBN services at LGWF3.

3.5 RADAR SERVICES AND OPERATION

Radar transmits a signal which is reflected back to the transmitting station (some systems involve communication between a radar station and a transponder). Services that utilise radar technology include aircraft detection and weather services. As per the Draft National Wind Farm Development Guidelines [3], WSP has performed a qualitative assessment to identify radar services within 250 nautical miles of LGWF3.

3.5.1 METEOROLOGICAL SERVICES

A search of automatic weather stations (AWS) surrounding the LGWF3 was conducted using the Australian Bureau of Meteorology (BoM) 'Climate Data Online' database [7]. Two weather stations were found and are listed in Table 3.10.

Table 3.10 BoM stations within 30 km of LGWF3 [7]

STATION NUMBER	NAME	DISTANCE FROM LGWF3 [km]
018201	Port Augusta SA	12.7
018229	Cultana SA	25.2

However, the AWS listed in Table 3.10 may not have a radar operating at their locations. Based on the BoM website [8], four (4) meteorological radars have been identified within 250 nautical miles (approximately 400 km) of LGWF3, shown in Figure 3.11. Details of the locations are listed in Table 3.11.

Table 3.11 BoM radar stations within 250 nautical miles of LGWF3

BOM RADAR SITE	LATITUDE [°]	LONGITUDE [°]	RADAR CATEGORY	APPROXIMATE DISTANCE FROM LGWF3 [KM]
Woomera	-31.16	136.80	Dedicated weather watch	170
Adelaide (Buckland Park)	-34.62	138.47	High resolution Doppler Radar	240
Adelaide (Sellicks Hill)	-35.33	138.50	Dedicated weather watch	320
Ceduna	-32.13	133.70	Dedicated weather watch	370



Figure 3.11 Identified BoM radar transmitters within 250 miles of LGWF3

WSP recommends that the BoM is contacted to seek feedback on any potential EMI impacts on their services and operations.

3.5.2 AVIATION

The nearest major airport to LGWF3 is Adelaide Airport, located approximately 270 km southeast of LGWF3, and the nearest regional airport is Port Augusta Airport, located approximately 10 km east of LGWF3. Additional airports within vicinity to LGWF3 are shown in Figure 3.12. WSP notes that this report does not assess the impact on aviation services surrounding LGWF3.



Figure 3.12 Surrounding airports of LGWF3

WSP expects the potential impacts on aviation radar services, if any, are not likely to be of operational significance at the distances shown. However, WSP recommends that consultations are undertaken with the relevant airports to assess the potential EMI impact arising from LGWF3 development and operations on their services.

3.6 EMERGENCY SERVICES

Using the ACMA RADCOM database, a search was conducted of radio sites within 30 km of LGWF3 belonging to emergency service providers, finding 16 licences, operated by South Australian Country Fire Service, South Australian State Emergency Service and St John Ambulance Australia Incorporated. WSP recommends that all three (3) organisations are consulted to assess the potential EMI impacts of LGWF3 on their operations and services.

4 CUMULATIVE IMPACT OF LGWF

As mentioned previously, LGWF3 is currently the third and last stage of development of LGWF. LGWF1 consists of 35 WTGs and is located approximately 3 km west of LGWF3. LGWF2 consists of 24 WTGs and is located between LGWF1 and LGWF3. Figure 4.1 shows the WTG layouts of the three (3) stages of LGWF in South Australia.

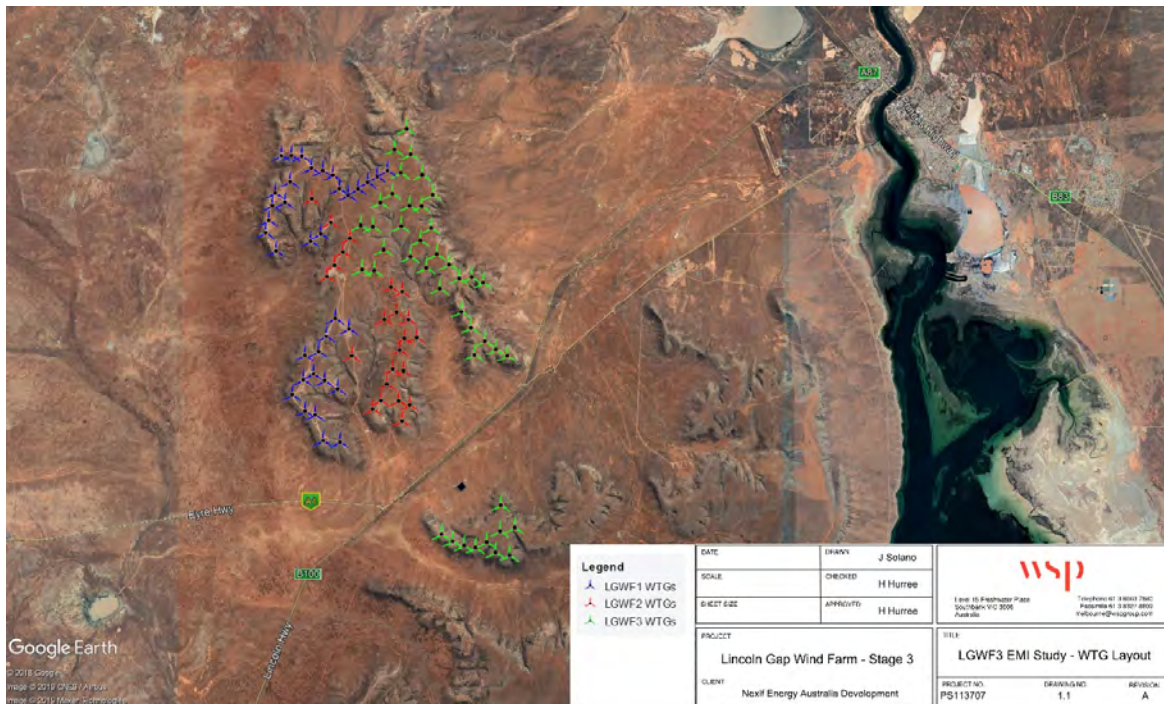


Figure 4.1 Location of all three (3) stages of LGWF

WSP has used the layouts depicted above combined with the WTG dimensions from Table 4.1 below to assess the cumulative EMI impacts arising from the development and operation of LGWF.

Table 4.1 WTG model parameters considered in Cumulative EMI Assessment of LGWF

LGWF STAGE	HUB HEIGHT [m AGL]	ROTOR DIAMETER [m]	BLADE LENGTH [m]	MAXIMUM TIP HEIGHT [m]
1	110	140	70	180
2	110	136	68	178
3	125	162	81	206

4.1 NEAR-FIELD EXCLUSION

WSP has previously identified two (2) communication towers located within 2 km of the proposed WTGs at LGWF3. Details of the identified towers are provided in Section 3.1.1. As the two identified towers are more than 2 km away from the LGWF1 and LGWF2 WTGs, WSP does not anticipate any cumulative impacts on those two (2) towers.

WSP has also undertaken an additional review of other communication towers located within 2 km of the LGWF1 and LGWF2 WTGs. Details of the additional identified towers are listed in Table 4.2 below alongside with the distance to the closest WTG.

Table 4.2 Communication towers within 2 km of LGWF

SITE ID	LATITUDE [°]	LONGITUDE [°]	NAME	DISTANCE [km]
10010234	-32.591	137.546	Lincoln Gap Wind Farm off Eyre Highway	0.24
10009454	-32.600	137.557	Lincoln Gap 2252 Eyre Hwy	0.39
25011	-32.601	137.557	Aust Rail Track/CMTS Site Tower Hill	0.50
9001188	-32.601	137.557	ETSA Site Tower Hill	0.50

As noted previously, the recommended separation distance between a WTG and a communication tower should be equal to the maximum of either the calculated near field exclusion zone or at least 500 m. WSP notes that Tower ID 10010234 is only 240 m from the nearest WTG of LGWF1. Upon review of the operators associated with this tower (Global Wind Service Australia and Electra Net), WSP deemed that Tower ID 10010234 is linked to the LGWF operations. It is therefore expected that the WTG layout has already been reviewed prior to the installation of this tower in order to minimise the impact of the wind farm on the tower's operations.

Tower ID 10009454 is located approximately 390 m south of the nearest WTG at LGWF1. According to the ACMA register, no assignment IDs have been registered to this tower [18]. It is likely that this tower is currently not in use by the operators servicing this area.

Tower IDs 25011 and 9001188 are deemed sufficiently far from the WTGs at LGWF and may not be impacted by the wind farm operations.

It is therefore expected that there will be no cumulative impacts to the near field effects of the communication towers from the development of the three (3) stages of LGWF.

4.2 POINT-TO-POINT

WSP has reviewed the three (3) fixed point-to-point links identified in the vicinity of LGWF3 and has noted that no WTGs from LGWF1 and LGWF2 are located within 1 blade length of each link already identified.

A fourth point-to-point link, originating from the Lincoln Gap Tower to Mt Karia, has also been assessed by WSP. Table 4.3 lists the details for Link 4, between the communication towers 100010234 and 9004498, including the associated Assignment IDs and frequencies.

Table 4.3 Point-to-point assignments between sites 100010234 and 9004498

LICENSEE	SITE 1	SITE 2	ASSIGNMENT IDS	FREQUENCY [GHZ]
ElectraNet Pty Ltd	100010234 Lincoln Gap Wind Farm off Eyre Highway	9004498 Mt Karia 7 km W of Wilmington	4212279-4212280	8.103
			4212282-4212281	7.792

WSP has calculated the 2nd Fresnel zone for the lowest frequency. It was observed that no WTGs are currently proposed within the 2nd Fresnel zone. Additionally, the closest WTG is approximately 596 m away from the 2nd Fresnel zone, i.e. more than one blade length.

Figure 4.2 illustrates the 2nd Fresnel zones of all four (4) point-to-point links in the vicinity of LGWF.

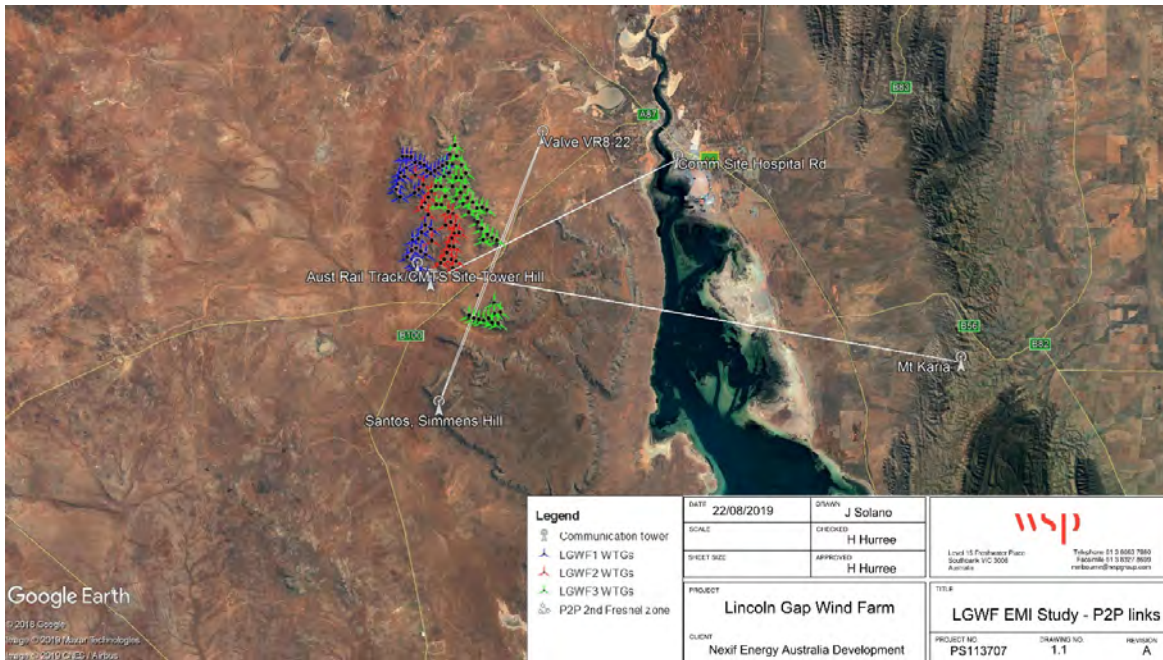


Figure 4.2 All Point-to-point links, and associated 2nd Fresnel zones in the vicinity of LGWF

Figure 4.3 shows a close up of all four (4) links near the WTGs proposed at LGWF.

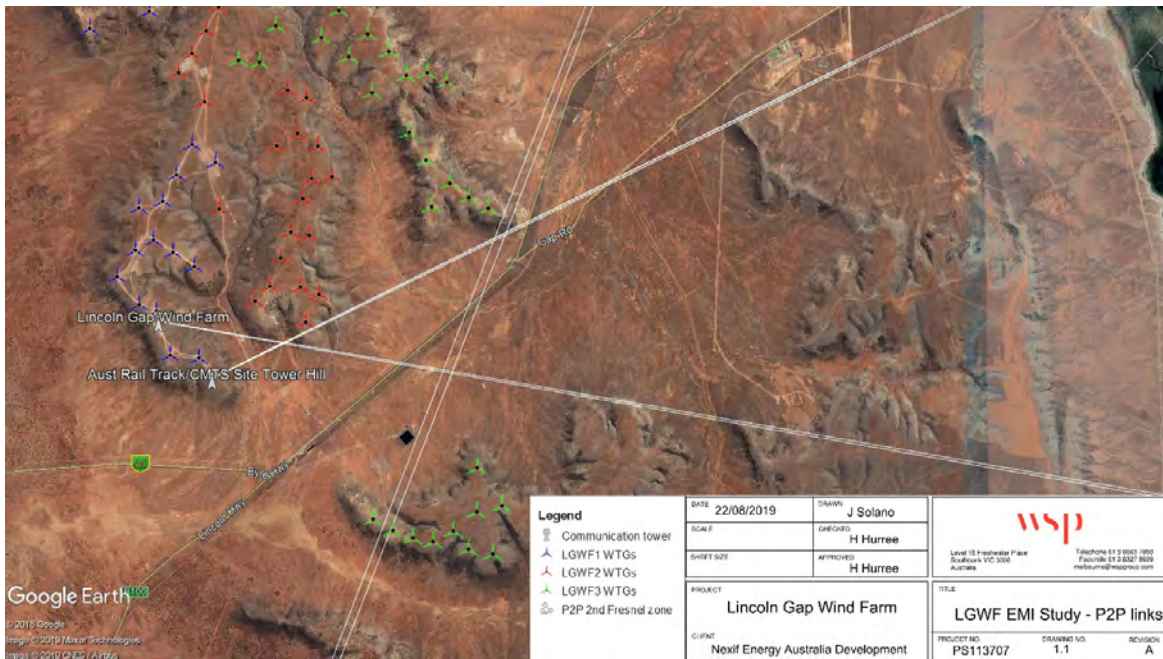


Figure 4.3 Close-up of all 2nd Fresnel zones in the vicinity of LGWF

As noted previously, WTG34 of LGWF3 is located 45 m from the 2nd Fresnel zone of one point-to-point link identified. This is less than one blade length of the largest WTG configuration considered and it is recommended that the operator of the link (Santos Limited) is consulted to assess the likely impact of the wind farm on its operation and services.

However, no additional WTGs from LGWF1 and LGWF2 encroach any of the 2nd Fresnel zones identified and it is expected that there will be no cumulative impacts to the four (4) point-to-point links arising from the development of the three (3) stages of LGWF.

4.3 POINT-TO-MULTIPOINT LICENCES

Due to the significant distance between the proposed WTGs from LGWF and the identified point-to-multipoint licenses, it is expected that there will be no cumulative impacts from the three (3) stages of LGWF on these point-to-multipoint licenses. However, WSP recommends that the identified operators, as listed in Section 3.3, are consulted to seek feedback regarding the potential impact of LGWF on their operations and services.

WSP also expects that cumulative impacts to radio broadcasting will be minimal and if any interference is encountered, mitigation measures such as the installation of a high quality antenna, can be implemented.

Mobile reception can be affected by multiple wind farms, particularly if the signal strength was already marginal in the affected area. WSP has reviewed the mobile phone coverage in the vicinity of LGWF and noted that WTGs for LGWF1 and LGWF2 are within the 3G to 4G coverage for all three mobile phone service providers. WSP recommends that all mobile phone service providers are contacted to seek feedback regarding potential EMI impacts arising from the development and operation of all three (3) stages of LGWF.

Digital TV signals are less prone to interference if the signal strength is of adequate level. According to MySwitch website [9], there is currently no TV coverage in the vicinity of LGWF. As such, it is not expected that there will be cumulative impacts to TV interference arising from the development and operation of LGWF. However, WSP recommends that a ground survey of TV signal strength is undertaken with the residents surrounding LGWF to establish the current level of TV coverage at the site.

4.4 POINT-TO-AREA SERVICES

Point-to-area licenses are generally not affected by the presence of WTGs and as such, WSP deems that there will not be any cumulative impacts from the development and operation of LGWF on the licenses identified in this study.

4.5 RADAR SERVICES

As WSP expects the potential impacts of LGWF3 on radar services to be of marginal significance at the distances assessed, WSP deems that there will be no cumulative impacts to the radar services. However, it is recommended that the Bureau of Meteorology as well as regional airport operators are consulted to assess the potential impact of LGWF on their operations and services.

4.6 EMERGENCY SERVICES

As noted in section 3.6, WSP has conducted a search of emergency services operating within 30 km of LGWF3. It is recommended that the three (3) identified parties are consulted to assess any potential cumulative impacts arising from the development and operation of the three (3) stages of LGWF.

5 MANAGEMENT AND MITIGATION MEASURES

Generally, mitigation of radio impacts involves manipulation of the WTG layout so that impacts are acceptably controlled. However, the wind farm proponent's consideration may make other options feasible (providing there is agreement amongst the relevant parties). The Draft National Wind Farm Development Guidelines [3] provides the following hierarchy of mitigation options (in order of most preferable to least preferable):

- 1 re-location/removal of WTGs
- 2 replacement of existing radio communications service equipment with another less affected type (e.g. replace UHF link with microwave link)
- 3 re-location of radio communications services to another existing radio communications site
- 4 re-location of radio communications services to a new telecommunications site
- 5 substitute radio communication for underground or overhead optical fibre
- 6 enhance radar filters.

5.1 CONSTRUCTION, MAINTENANCE AND DECOMMISSIONING

It is recommended that the exclusion distances, which are established and applied to the final layout, be respected during construction, maintenance and decommissioning. These exclusions should be agreed upon by the licence holders and the wind farm proponent. Crane booms and the raising and lowering of WTG parts may also cause interference. It is recommended that management plans for these activities include these considerations.

5.1.1 *RECOMMENDATIONS AND MITIGATION OPTIONS FOR NEAR FIELD INTERFERENCE*

For the registered assignments identified within 30 km of LGWF3, WSP recommends the licensees identified in Table 3.1 are contacted seeking feedback regarding potential EMI impacts on their services and operations. At this stage, it is deemed unlikely that the proposed LGWF3 layout will cause near field effects to the nearby towers holding registered licences.

However, should the licensees, after consultation, deem LGWF3 to cause potential EMI impacts, the first mitigation technique to be considered should be to microsite or relocate WTGs to locations outside of the near field exclusion zones. The specific requirements of near field zones should be discussed with the affected licensees to minimise disruption to the WTG layout and to avoid radio interference.

In the event that relocation of WTGs is not possible or preferable, it may be possible to modify or upgrade affected services to new apparatus or frequencies with smaller near field zones. If this mitigation technique is not possible, the next option will be to re-locate and/or re-direct services to alternative existing sites.

Further mitigation techniques (including commission of new radio towers and fibre optic cabling) are possible beyond the options discussed; however significant cost may be incurred if these options are undertaken.

5.1.2 RECOMMENDATIONS AND MITIGATION OPTIONS FOR POINT-TO-POINT LINK INTERFERENCE

For the registered point-to-point links identified in the vicinity of the proposed WTGs, WSP recommends that the identified licensees in Table 3.2 are contacted to seek feedback regarding potential EMI impacts on their services and operations arising from the development and operation of LGWF3.

Assuming that each of the links (and corresponding assignments) are currently active and the locations given by the ACMA are accurate, the first mitigation technique to be considered is to ensure WTG locations, including their blades and towers, do not intrude on the 2nd Fresnel exclusion zone. It is noted that one WTG is currently encroaching one of the three (3) identified links, based on the maximum WTG dimensions provided. WSP recommends that the licensees are consulted to verify the location of the identified towers as well as the frequencies associated with the point-to-point links.

In the event that relocation of WTGs is required but not possible or preferable, it may be possible to modify or upgrade affected services to new apparatus or frequencies with narrower 2nd Fresnel exclusion zones. If this mitigation technique cannot be performed, then the next option will be to re-locate and/or re-direct services to alternative existing sites.

Further mitigation techniques (including commissioning of new radio towers and fibre optic cabling) are possible beyond the options discussed, however, significant cost may be incurred if these options are undertaken.

5.1.3 RECOMMENDATIONS AND MITIGATION OPTIONS FOR BROADCASTING SERVICES

As mentioned previously, TV broadcast services across Australia are now digital broadcast. Digital TV signals are usually less prone to interference from WTGs. However, in areas where the digital TV signals are considered marginal, it is possible that TV signals can be subject to some interference from nearby obstacles, like WTGs.

For such instances, a number of mitigation options are available, such as:

- 1 retuning the antenna to another tower, not within the line of sight of the WTGs
- 2 the use of a higher gain antenna
- 3 moving the existing antenna to a less affected position
- 4 installation of satellite TV at the affected residence.

WSP recommends that a ground survey of TV signal strength is undertaken with the resident surrounding LGWF3 prior to the construction of the wind farm.

6 CONCLUSIONS

WSP has undertaken an analysis of potential EMI impacts on operators of radiocommunication licences within the vicinity of LGWF3. The licences have been identified using the data registered with the ACMA, which is known to be prone to some inaccuracies.

Three (3) fixed, point-to-point, links were identified to intersect with the approximate project area of LGWF3. The 2nd Fresnel zones were calculated for each link and it was observed that one WTG is located within one blade length of the 2nd Fresnel zone, considering the WTG dimensions provided. WSP recommends that the WTG exclusion zones established within this report are acknowledged to avoid impact on the services and operations identified. It is also recommended that the licensees are consulted to verify the location of the identified towers as well as the frequencies associated with the point-to-point links.

Point-to-multipoint licences, point-to-area licences and broadcast services were assessed in the vicinity of LGWF3. Residences close to LGWF3 may experience some interference to their TV services if they are located in a region of marginal coverage. WSP recommends that a ground survey of TV signal strength is undertaken amongst the residences surrounding LGWF3 prior to the construction of the wind farm. Should some residences experience TV interference, a number of mitigation options are available to rectify this issue.

Possible cumulative impacts of all three (3) stages of LGWF have been considered in Section 4. WSP deemed unlikely that cumulative EMI impacts will arise from the development and operation of LGWF1, LGWF2 and LGWF3. However, the possibility of cumulative impacts to television, mobile phone reception and emergency services can occur and options exist to mitigate most interference issues should they occur. WSP also recommends that consultation is undertaken with all identified parties regarding potential cumulative EMI impacts arising from the three (3) wind farms.

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APPENDIX K

AVIATION ASSESSMENT



SGS AVIATION COMPLIANCE

AVIATION ADVISORY REPORT

ON BEHALF OF:	WSP Australia Pty. Ltd. (WSP)
PROJECT NUMBER:	18-1302-01
REPORT DATE:	3 May 2019
ADVISOR:	Mel Dunn

The logo for SGS, consisting of the letters 'SGS' in a bold, grey, sans-serif font. A thin orange vertical line is positioned to the right of the 'S', and a thin orange horizontal line is positioned below the 'S'.



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		Date: 3-May-19
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1. EXECUTIVE SUMMARY


Following approval of Lincoln Gap Wind Farm Stages 1 and 2 (covering 59 turbines) situated approximately 10 – 17 km west of Port Augusta, Nexif Energy is now considering the potential development of Lincoln Gap Stage 3. This will be a new wind farm in the same location comprising an additional 42 wind turbines and ancillary infrastructure.

It is understood that there are three turbines under consideration as follows: -


- GE – 5.3 MW – 158 m rotor diameter – tip height 200 m
- Vestas – 5.6 MW – 162 m rotor diameter – tip height 206 m
- Siemens – 5.8 MW – 155 m diameter – tip height 185 m

For the purpose of the aviation assessment, a maximum tip height of 206 m (~675.8 ft) will be assumed.

- Operations from identified airfields in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3 will not be affected.
- Aviation operations, generally, will unlikely be affected.
- The specific situation in respect of the proposed Lincoln Gap Wind Farm Stage 3 is that the proposed wind turbines will penetrate navigable airspace. Despite this, aircraft operations in the vicinity are considered to be so low as to not warrant the provision of obstacle lights.
- Reference towers for meteorological monitoring are difficult to see and such should be marked in accordance with the recommendations of NASAG Guideline D, with the exception that SGS Aviation Compliance does not believe that a flashing strobe light is necessary.
- Airspace considerations.
 - CASA should be advised of the presence of the proposed Lincoln Gap Wind Farm Stage 3.
 - Airservices:
 - LSALTs are adjudged as not being affected, but Airservices should be advised of the proposed Lincoln Gap Wind Farm Stage 3 for an independent assessment, relevant NOTAM action, when necessary, and to eventually record the presence of the wind farm on relevant aviation maps.
 - Department of Defence (DoD) operations should not be affected but both the DoD & RAAF AIS should be advised of the proposed Lincoln Gap Wind Farm Stage 3 for an independent assessment and to eventually record the presence of the wind farm on relevant military aviation maps.
- The position in respect of the proposed Lincoln Gap Wind Farm Stage 3 in respect of aerial fire-fighting activities is no different from any other wind farm.

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- Aerial agricultural operations, such as aerial spraying and, possibly, fertilising, may occur in the region as there is some evidence that the area of the proposed wind farm site is used for agricultural purposes, which may very well require such activities to be undertaken.
- With respect to rural ambulance services, the potential impact on either helicopter or fixed wing ambulance services are common factors for all wind farms. The situation in respect of the proposed Lincoln Gap Wind Farm Stage 3 does not raise any different or special issues.
- The effect of downstream turbulence from the wind turbines is not considered to be an issue of concern.
- SGS Aviation Compliance considers that “micro-siting” (i.e. allowing the provision of a “corridor” within the wind farm) should be approved in principle by the relevant development approval authority.

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2 TERMS OF REFERENCE

Following approval of Lincoln Gap Wind Farm Stages 1 and 2 (covering 59 turbines) west of Port Augusta, Nexif Energy is now considering the potential development of Lincoln Gap Stage 3.

SGS Aviation Compliance has been advised that there will be a reduction in the number of turbines and changes to the layout for Lincoln Gap Stage 3 which will be a new wind farm comprising an additional 42 wind turbines (WTGs) and ancillary infrastructure, located across two areas within and south of the Lincoln Gap Wind Farm (LGWF) Stage 1 and 2 site. A separate Development Application is being submitted to State Commission Assessment Panel (SCAP) as the relevant authority. To support the planning approval process for LGWF Stage 3, a number of specialist technical studies are being undertaken.

WSP Australia Pty. Ltd. (WSP) requested SGS Aviation Compliance to conduct a risk assessment of the potential development of Lincoln Gap Stage 3.


In particular, it is understood that approval is being sought for a “corridor” to allow the ability to micro-site turbines without having to obtain approval for a variation to the development application and this should be a feature of the requested risk assessment.

SGS Aviation Compliance was requested to address the potential impacts to aviation safety of the wind farm and include such matters as: -

- review of the detailed project layout, taking particular note of relevant maps of the area, surrounding terrain, project site plan, number of wind turbine and their position and heights. The review of relevant aviation charts for the area may include: -
 - o relevant World Aeronautical Chart (WAC)
 - o designated airspace and other airspace considerations
 - o relevant En Route Charts (ERC)
 - o departure and arrival procedures for any aerodromes in the vicinity
 - o relevant Visual Terminal Charts (VTC)
 - o available airstrips' guides for the area
- an assessment of all the aviation-related issues will involve a review of relevant aviation legislation and make reference to the National Airports Safeguarding Framework guideline with respect to managing the risk to aviation safety of wind turbine installations (wind farms)/wind monitoring towers.
- Based on the above assessments, the requirements, if any, for aviation safety (obstacle) lights will be determined. This determination will be based on a risk analysis of the potential impact on any aviation operations within the vicinity of the proposed wind farm. The risk analysis principles of ISO 31000:2018 (Risk management) {which has replaced AS/NZS 4360:2004 “Risk Management”, but the principles are much the same} will be used as the basis for the Aviation Compliance assessment.

In undertaking the review, SGS Aviation Compliance particularly assessed the following matters: -

- Aircraft operating under:
 - o Visual Flight Rules (VFR), and
 - o Instrument Flight Rules (IFR), and

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- Night Visual Flight Rules (Night VFR)
 - Lowest Safe Altitude (LSALT) implications
 - All general aviation operations, including gliding, hang-gliding, paragliding and ultralight operations
 - Military aircraft
 - Commercial aircraft
 - Aerial agricultural operations
 - Aerial firefighting services
 - Rural ambulance services
 - The effect of downstream turbulence from the wind turbines
 - Local airfields (within 30 kilometres) and other private airstrips which may not be identified by consultation with CASA.

Further, SGS Aviation Compliance has recognised the need to provide advice as to whether aviation safety lighting is required and has also used the risk analysis principles of ISO 31000:2018 (Risk management) as the basis for the Aviation Compliance assessment.


This report also addresses the potential impacts of the wind farm suitable to inform a Development Application and other planning processes.

All current relevant guidelines and legislation have been considered and any further issues that may be important to CASA and Airservices at present.

3 SCOPE OF CONSIDERATION

SGS Aviation Compliance moved to address the following scope of works: -

- Assessment of all the aviation-related issues relevant to the Lincoln Gap Wind Farm Stage 3 area:
 - i. Including risk assessment issues; and
 - ii. Liaison with WSP as necessary.
- Review the need, or otherwise, for obstacle lighting:
 - iii. Assessment of risks associated with aviation operations and the need or otherwise for obstacle lighting:
 - a. Using ISO 31000:2018 risk assessment methodology as necessary.
 - iv. Liaison with CASA and Airservices regarding requirements, if necessary.

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4 REVIEW OF LINCOLN GAP WIND FARM STAGE 3

a. Methodology

In SGS Aviation Compliance's considerations of the issues, the following approach was taken: -

- Assessment and review of all aviation related elements associated with the site including:
 - Charts, maps, airspace (including Prohibited, Restricted and Danger areas [PRDs]), airfield and airstrip guides / directories, en route and visual terminal charts, Notices to Airmen (NOTAMs), etc.
- Review all aviation activities and potential aviation activities occurring or likely to occur within the boundaries of the proposed wind farm or potentially affected by the presence of the wind farm, including both civil and military operations.
 - Note that a site visit was not undertaken, rather aviation activities were assessed from a desktop study. As a consequence, the potential presence of aviation activities, or any other related activities in the vicinity, was not able to be verified.
- Consideration of the relevance of any Australian regulatory authority requirements and international standards, recommendations and guidelines.
- On the basis of the above assessments, assessment of risks associated with aviation operations and the need or otherwise for obstacle lighting.

b. Assumptions, Limitations & Exclusions

A site visit was not undertaken as an element of this assessment. As a consequence, the potential presence of aviation activities, or any other related activities, in the vicinity was not able to be assessed and such has not been verified.

The information and any assessments contained within are based on the information provided by WSP and independent research of the proposed Lincoln Gap Wind Farm Stage 3 and its surrounds.


Otherwise, no specific assumptions, limitations and exclusions exist.

c. Overview of Proposed Wind Farm

SGS Aviation Compliance has been advised that there will be a reduction in the number of turbines and changes to the layout for Lincoln Gap Stage 3 which will be a new wind farm comprising an additional 42 wind turbines (WTGs) and ancillary infrastructure, located across two areas within and south of the Lincoln Gap Wind Farm (LGWF) Stage 1 and 2 site. Further, it is understood that there are three turbines under consideration as follows: -

- GE – 5.3 MW – 158 m rotor diameter – tip height 200 m
- Vestas – 5.6 MW – 162 m rotor diameter – tip height 206 m
- Siemens – 5.8 MW – 155 m diameter – tip height 185 m

For the purpose of the aviation assessment, a maximum tip height of 206 m (~675.8 ft) will be assumed.

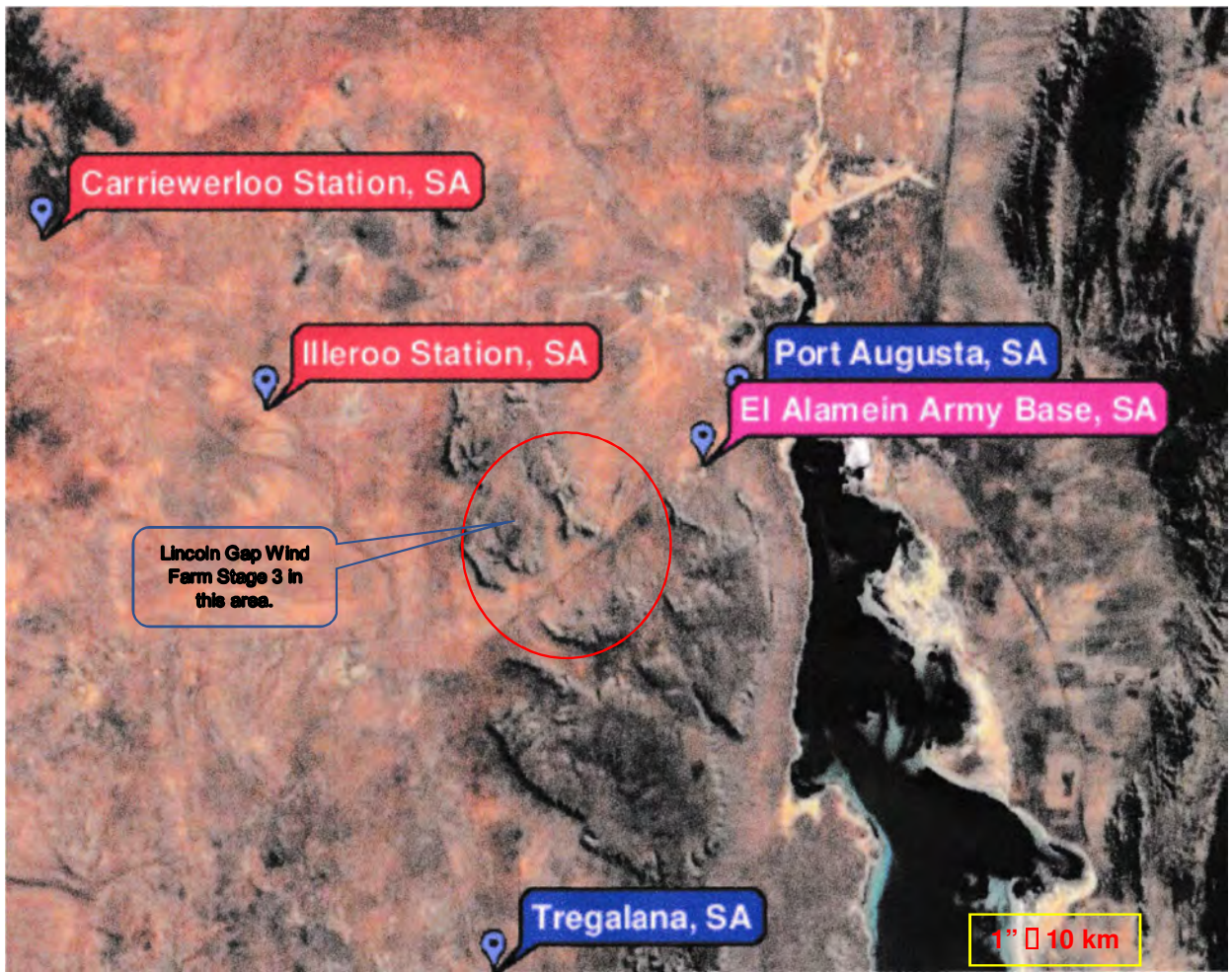
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The proposed Lincoln Gap Wind Farm Stage 3 is planned to be situated approximately 10 – 17 km west south west of Port Augusta is shown in Appendix 9 a.

d. Specific Issues and Associated Risk Assessment


i. Airfields in the vicinity of the proposed wind farm

Airfields identified in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3 site are shown below. The source of this advice is the Flightace® Country Airstrip Guide.



The area considered was extended out to 30 nm (~ 55.6 km) and there was still no evidence of any significant potential for any adverse impact on aviation operations due to the presence of the proposed Lincoln Gap Wind Farm Stage 3.

Note that, as a matter of principle, an area of 30 km from any proposed wind farm site is normally investigated for any aviation-related activities even though Obstacle Limitation Surfaces (OLS) do not extend beyond 15 km from even the largest aerodromes. Whilst this is recognised as a conservative

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approach, to meet Airservices' needs & stated policy the area investigated has been extended to 30 nm (55.56 km).

Aerodromes or airfields outside a radius of approximately 30 km from a wind farm site are not generally specifically considered of concern.

Whilst a site inspection was not undertaken, the area was studied to the extent possible using such programmes as, Google Earth, and it is clear that the site for the proposed wind farm is somewhat desolate and whilst there is some evidence that the area may be used for agricultural purposes, no evidence of any aviation operations was found anywhere near the proposed wind farm site. Further, no strips, temporary or otherwise, were observed to be present on the site itself.

Licensed aerodromes:

Port Augusta

There was only **one** licensed aerodrome near the proposed wind farm site and that is **Port Augusta**, estimated to be some 10 km east north east north of the nearest edge of the proposed wind farm site.

This aerodrome has one runway oriented 15 – 33 (principally a north – south direction) and operations off runway 15 to the south are required to turn right to avoid any potential conflict with operations from the El Alamein Army Base, the latter of which is 2.2 nm SSW of the Port Augusta Aerodrome.

Nominated missed approach procedures are required to be used on the eastern side of the aerodrome and minimum circling heights towards the wind farm development are 2,500 ft, well clear of any potential wind turbines.

Whyalla

This licensed aerodrome is approximately 30 nm (over 55 km) due south of the proposed wind farm site and operations from that aerodrome would not be affected by the presence of the proposed wind farm.

Tregalana

The airstrip is reported to be Registered with information available within the En Route Supplement Australia (ERSA). However, whilst its registration is recorded, little other information is available.

It is now understood to be on military land and has been so since 2014.

The airstrip is approximately 20 km south of the proposed wind farm site and is reported to have three grass runways (18-36 – 1,851 m / 6,072 ft; 12-30 & 07-25 {no length reported on the latter two}).

The types of operations undertaken on this airstrip are unknown, but it is understood that this airstrip is hardly used at the moment.


It is understood that this was originally the home of the Whyalla Gliding Club.

However, the airstrip is too far south of the proposed Lincoln Gap Wind Farm Stage 3 to be any cause for concern.

Unlicensed aerodromes:

Three other aerodromes were identified as potentially being affected by the presence of the wind farm.

Illeroo Station – approximately 10 km west

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Carriewerloo Station – approximately 30 km west north west

Both the above station airstrips are closed and, therefore, would not be affected at all by the presence of the wind farm.

El Alamein Army Base

This facility is some 8-10 km from the eastern edge of the proposed wind farm site.

Advice from the Department of Defence indicates that it only has a short inactive gravel / dirt runway which is only available for an emergency.

It is understood that this facility is now part of the expanded Cultana Training Area which includes such matters as: -

- combined arms manoeuvring training
- live firing of ammunition, including small arms, field and medium artillery weapons and air-delivered weapons
- air mobile and airborne operations including air to ground live firing
- unmanned aerial system training activities, and/or
- electronic warfare training activities.

The facility may be activated for Cultana training purposes, in which case a NOTAM to that effect would be issued. Consequently, it has Restricted Areas associated with it – see 4. d. v. (c). It is understood that, in such a circumstance, helicopters would be the principal form of operating vehicle.

It is not expected that any operations from this Army Base would be impacted by the presence of the proposed wind farm.

Other aerodromes

Other than the above identified aerodromes / airstrips, none were considered close enough to warrant attention and none would be impacted by the presence of the wind farm itself.

As indicated, a site inspection was not undertaken, but one would not expect ad hoc airstrips to be established in the area for, such as, agricultural operations or any other such reason.


A comprehensive search of all available documentation on airfields including, the En Route Supplement Australia (ERSA), the Aircraft Owners and Pilots Association (AOPA) National Airfield Directory and the Flightace® Country Airstrip Guide, failed to identify any other airstrips within the immediate vicinity of the proposed Lincoln Gap Wind Farm Stage 3 site which would be in any way affected by the presence of the proposed wind farm.

ii. Aviation Operations - General

VFR Operations

Whilst there are some exceptions in respect of operations that require low flying (e.g., during take-off and landing, search & rescue and agricultural spraying operations) pilots undertaking VFR operations (i.e., during daylight hours) must not fly over:

- Any city, town or populous area, at a height lower than 1,000ft; or
- Any other area at a height lower than 500ft.

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The regulations define the height specified above as the height above the highest point of the terrain vertically below the aircraft, and any object in it, within a radius of 600m for aircraft and 300m for helicopters. In principle, therefore, all VFR aircraft operations should be above the level of any wind turbines. However, any objects extending higher than 500ft above the terrain clearly penetrate navigable airspace and this should not be overlooked in assessing the potential impact of wind farms on aviation operations.

In any event, the wind turbines should be clearly visible to pilots undertaking VFR operations.

IFR and Night VFR Operations.

Such operations would be undertaken under either Night VFR or IFR flight plan conditions, which require operations not below the Lowest Safe Altitude (LSALT), except when landing or taking off.

In principle: -

- a. Where the highest obstacle is more than 360ft above the height determined for terrain, the LSALT must be 1,000ft above the highest obstacle; or
- b. Where the highest obstacle is less than 360ft above the terrain, or there is no charted obstacle, the LSALT must be 1,360ft above the elevation determined for terrain; except that
- c. Where the elevation of the highest terrain or obstacle in the tolerance area is not above 500ft, the LSALT must not be less than 1,500ft.

Civil Aviation Regulations require that, unless it is necessary for take-off or landing, a Night VFR aircraft must not be flown at a height less than 1,000ft above the highest obstacle within a 10nm (~18.5km) radius of the aircraft in flight.

In the circumstances, the presence of the proposed Lincoln Gap Wind Farm Stage 3 should have no impact on civil Night VFR or IFR operations which may occur in the vicinity, possibly originating from the closest certified aerodrome at Port Augusta.


As per VFR operations, the altitude limitations in respect of both civil Night VFR and IFR operations as mentioned above are important in the context of assessing whether obstacle lights are required or not for the wind turbines.

Gliding operations

Gliding operations are not known to occur within the vicinity of the proposed Lincoln Gap Wind Farm Stage 3. However, such may occur originating from the Tregalana airstrip.

However, if gliding operations did occur, they would be subject to the same constraints as VFR operations mentioned above and the presence of the wind farm should not have any impact on such operations.

Be that as it may, knowledge of the presence of the wind farm is essential to ensure that gliding operators avoid the area in the event of a need for an out-landing. See Section 4. d. v. re airspace considerations and the need for advice to Airservices Australia and the RAAF.

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Hang Gliding and Paragliding operations

As noted above, whilst a site visit was not undertaken, the surrounding terrain is believed to be such that any aviation operations anywhere near the proposed wind farm site would be unlikely. Indeed, it is noted that none of the charts studied (e.g. WAC, VNC, TAC, ERC - excerpts at Appendices 9. b. to 9. f.) showed any evidence of such.

It should be noted, however, that hang gliding and paragliding operations are often launched from ridges on hills and occasionally such do exist associated with wind farm developments. In the case of the proposed Lincoln Gap Wind Farm Stage 3, some ridges and / or hills would seem to exist.

If, indeed, hang gliding or paragliding operations or Winch or Auto Tow launched Sports Aviation Operations, do occur in the vicinity, the presence of the proposed Lincoln Gap Wind Farm Stage 3 may very well impact adversely on such operations.

It is, therefore, considered advisable to notify the relevant sports aviation bodies of the proposed development of the Lincoln Gap Wind Farm Stage 3. In particular, Hang Gliding Federation of Australia (HGFA), Recreation Aircraft Australia (RAAus) and Sport Aircraft Association of Australia (SAAA).

Ultralight operations

Ultralight operations are not known to exist in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3 site. However, should such occur within the local area they would, in effect, be subject to the same fundamental limitations as per VFR aircraft.

The presence of the proposed Lincoln Gap Wind Farm Stage 3 would likely have no effect on any such operations, provided “see and avoid” procedures were used. Also, there is a need for appropriate identification on aviation maps as recommended later.

iii. Reference masts for meteorological monitoring


Wind monitoring masts are usually present on proposed wind farm sites as a source of preliminary wind data for the Project. Indeed, some have been highlighted in the map at Appendix 9. a., but they are indeed difficult to identify.

SGS Aviation Compliance comments that wind monitoring masts, particularly those of a light lattice structure, can be quite difficult to see. For this reason, these masts may be of particular concern to any local aerial agricultural operators – if indeed such exists.

Whilst no evidence was found of any aerial agricultural aircraft operations in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3 site, it is considered important that advice as to the presence of these masts is readily available.

SGS Aviation Compliance draws particular attention to the measures recommended in the National Airports Safeguarding Advisory Group (NASAG) Guideline D {excerpt at Appendix 9. g.}, which, among other things, recommends as a minimum contrasting colours and marker balls should be used. The NASAG Guideline also suggests a flashing strobe light during daylight hours as an alternative.

SGS Aviation Compliance is of the view that, unless there is some very telling evidence otherwise, a flashing strobe light is not necessary. However, SGS Aviation Compliance recommends that the top 1/3rd of the wind monitoring towers be painted in alternating contrasting bands of colour and marker

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balls or high visibility flags or sleeves be placed on the outside guy wires. This is consistent with the NASAG Guideline D and such action will assist in allaying some of the fears of the aerial agricultural community. The current status of any existing masts is not known, the site not having been visited.

If the height of the met masts / wind monitoring masts is less than 110 m, monitoring towers are not required to be reported to the Civil Aviation Safety Authority (CASA) under Civil Aviation Safety Regulation (CASR) 139.365, which requires CASA to be informed of structures 110 m or more above ground level.

However, the CASA Advisory Circular AC 139-08(0) of April 2005 “Reporting of Tall Structures” refers to the fact that the RAAF Aeronautical Information Services (AIS) has been assigned the task of maintaining a database of tall structures the top measurement of which is: -

- 30 m or more above ground level - within 30 km of an aerodrome, or
- 45 m or more above ground level elsewhere.

The principles of the Advisory Circular are sound, and it is strongly recommended that the existence of any such met masts / wind monitoring towers is advised in accordance with the procedures mentioned in the referenced Advisory Circular. {See also Section 4. d. v. (c)}.

iv. Effect of downstream turbulence


Whilst a site visit was not undertaken, it is considered unlikely that any residences exist within or near the wind farm site. Certainly, a close look at the relevant maps would suggest such. However, it is considered that the issue of the potential effects of downstream turbulence from wind turbines needs to be addressed to ensure knowledge of the issue is provided.

SGS Aviation Compliance has undertaken a study of available research on the general effects of downstream turbulence of wind turbines. This has shown quite a degree of overlap and repetition of data used, which are principally based in wind tunnel work, with very little, if any at all, practical investigations. As a consequence, there are several different estimates of the distance at which turbulence downstream of a wind turbine exists to any degree, so much so that one particular researcher has commented, “Wind turbine wakes have been extensively studied both experimentally and analytically. Nevertheless, their knowledge is far from being satisfactory. Many of the numerical models proposed show an acceptable degree of agreement with the experiments which they are compared.”

Concerning the “acceptable level of agreement”, it is considered that there is quite a deal of evidence to support the view that the velocity deficit is recovered to approximately 85% of the original at 10 rotor diameters and turbulence is down to about 15% at 16 rotor diameters.

One issue that is not addressed in any detail is the question of the potential level of turbulence that might be experienced at 10 – 16 rotor diameters downstream. In assessing this particular issue, it was noted that the wind turbines do not operate when wind speeds are too low or too high. Typical operating ranges quoted are understood to be between 4 – 25 m/s; i.e. 14.4 – 90 kph.

Postulating the actual situation – if the wind speed were 90 kph (the worst case) and there were a velocity deficit at 10 rotors to 15% as suggested above, then, if one were to cross the wind turbine wake at that point, it is estimated that there would be the potential for a maximum wind shear evident of 13.5 kph. Prima facie, this would be not much more than one would expect during normal turbulence

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which would be experienced in 90 kph conditions when operating at low level, such as during take-off and landing. At lesser wind speed levels, the effect would be less.

Equally, if the turbulence is down to about 15% at 16 rotor diameters, the effect is considered as being no more than would be expected in normal low-level operations in 90 kph winds.

One issue that does not appear to be addressed in any of the research is the question of possible wake drift. The view is held that there may very well be some drift (up, down or sideways) but this is unlikely to occur until significant velocity deficit has occurred, perhaps only beyond 16 rotor diameters. At this stage, as mentioned before, it is considered that the overall effect would likely be no more than generally expected turbulence.

In considering all the research to date, SGS Aviation Compliance considers it would be quite appropriate to establish a nominal downstream setback of wind turbines of no more than 16 rotor diameters from any operating area of an airstrip. This is considered to be a conservative approach.

Having established this position, the matter is somewhat academic in respect of the proposed Lincoln Gap Wind Farm Stage 3 as there are no evidence of any airstrip nearby which would be affected by any downstream wind turbulence from any of the planned wind turbines.

v. Airspace considerations

In assessing the potential impact on aviation operations, the En Route Charts (ERC), Visual Terminal Charts (VTC), Visual Navigation Charts (VNC) and Terminal Area Charts (TAC) potentially relevant to the area concerned were studied in depth.

In addition, the Designated Airspace Handbook and the relevant World Aeronautical Chart [WAC] 3459 PORT AUGUSTA, were studied for any issues of concern. An excerpt from the latter is at Appendix 9. b.

The proposed Lincoln Gap Wind Farm Stage 3 is well clear of any the airspace control zones and the operating height of aircraft over the area is such that the presence of the wind farm would have no effect at all. There are no aircraft traffic control issues nor is there any potential influence on any instrument approach procedures or aeronautical navigation aids.


No Prohibited, Restricted or Danger (PRD) zones were evident in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3.

Further, there are no known active Notices to Airmen (NOTAM), which might impact on the development of the wind farm.

SGS Aviation Compliance is of the view that, even though there have been no issues of concern identified in respect of airspace considerations, it is considered that there is still a need for consultation with CASA, Airservices and the Department of Defence and particular comments on this follow.

a) CASA

It is considered advisable that CASA be informed of the proposed Lincoln Gap Wind Farm Stage 3. This will give an opportunity to CASA to comment. It will also serve to alert CASA as to the number and proposed heights of the wind turbines in anticipation of the formal requirement to advise CASA of any obstacles which will be 110m or more above ground level – CASR 139.365 refers. This is not

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designed to anticipate any requirements for obstacle lights or to seek a CASA view on such. This is a matter for later consideration. (See 4. e. below).

b) Airservices.

The proposed Lincoln Gap Wind Farm Stage 3 will not affect any sector or circling altitude, nor any approach or departure altitudes. It is, however, necessary to consider in some more detail the possible effect on en route LSALT.

Note that, by definition the minimum LSALT required to ensure clearance of all the wind turbine “obstacles” associated with the proposed Lincoln Gap Wind Farm Stage 3 would be 206 m (~675.8 ft) {height of highest turbine GP011 above sea level} + 1,000 ft = 1,675.8 ft.

In reviewing the particular routes which pass over or within 10 nm of the proposed wind farm (referring to the maps in Appendices 9. b to 9. f), there would appear to be potentially three routes of concern:

Route	Way points	LSALT
J37	Whyalla to Leigh Creek	4,200 ft
W238	Port Augusta to Olympic Dam	4,200 ft
Z92	Whyalla to Gaany	2,500 ft

(The latter may be outside the 10 nm limit suggested.)

If one assumes that the tallest wind turbine (206 m ≈ 675.8 ft) is placed on the highest point identified at the Lincoln Gap area (i.e. 1,004 ft), in the worst possible case, a wind turbine could be as high as ≈ 1,680 ft – and such would require a change in the Lowest Safe Altitude (LSALT) for route Z92. Routes J37 & W238 would not require any change.


Despite the above potential concern re the LSALT for route Z92, because that route is at the limits of its distance west of the wind farm site and a worst case scenario has been considered, SGS Aviation Compliance is of the view that the presence of the proposed Lincoln Gap Wind Farm Stage 3 will have no adverse effect on, or introduce any need for change to, the LSALTs for any nearby overflying route.

Regardless, it is considered important to advise Airservices of the proposed Lincoln Gap Wind Farm Stage 3 development as it may wish to review the LSALTs for the above routes. Note that there may be a charge imposed on the proponent for any assessment exercise and any necessary changes which Airservices might consider need to be made to the relevant aeronautical charts.

The proposed Lincoln Gap Wind Farm Stage 3 will not impact on Precision/Non-Precision Navigational Aids, HF/VHF Communications, Advanced Surface Movement Guidance and Control Systems, Radar or Satellite/Links.

In respect of civil radar sites, the nearest identified civil radar site is at or near Adelaide Airport, some 300 km south of the proposed Lincoln Gap Wind Farm Stage 3 site. The presence of the wind farm will have no adverse effect on the provision of radar.

Whilst Airservices works closely with CASA in respect of airspace considerations and other matters, there is value in advising that organisation separately, in respect of the proposed wind farm development and for any met masts / wind monitoring masts. Sometimes Airservices chooses, in consultation with CASA, to issue a Notice to Airmen (NOTAM) advising of associated hazards. There is also a close link between Airservices AIS and the RAAF AIS.

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c) Department of Defence & RAAF AIS.

Among other things, the RAAF Aeronautical Information Service (AIS) issues (military) aviation charts defining low level operational routes used by the RAAF aircraft. These often cover low level jet aircraft operations.

SGS Aviation Compliance has held discussions with the Department of Defence in an endeavour to obtain specific information on the above matters. The Department of Defence proved reluctant to provide specific information and advised formally as follows: -

“Land Planning & Spatial Information (LPSI) coordinates the Defence assessment of wind farm proposals. The Defence assessment not only ascertains any impact on the aviation activities of RAAF, Army and Navy but also any impact on Defence communications and the operation of Defence Radars. Please forward any proposals to: -
DSRGIDEP.ExecutiveSupport@defence.gov.au for Defence assessment.”

Despite the above formal position, which clearly needs to be taken into account, SGS Aviation Compliance has undertaken its own assessment of the situation.

The El Alamein Army Base is known to exist nearby, and reference is made to this base in Section 4. d. i. above. As indicated, this base is now believed to be part of the Cultana Training Area which is understood to extend up and down the western edge of Spencer Gulf. Operations are not now undertaken from this El Alamein Army Base – it is only used as in the event of an emergency.

There are no known military Prohibited, or Danger (PRD) areas identified anywhere near the proposed Lincoln Gap Wind Farm Stage 3 site which would lead to any restrictions on military aircraft activities. However, there have been several Restricted Areas identified in the vicinity, all on which would seem to be associated with the Cultana Training Area and, judging from the lateral limits defined, two of which have the potential to have an impact on the operations of the Lincoln Gap Wind Farm Stage 3.


The two identified are: -

- R302A CULTANA
- R303A ALAMEIN

Both these Restricted Areas introduce military flying / non-flying with vertical limits “surface to 3,000 ft” with hours of activity defined by NOTAM and the Controlling Authority is the Army RCO Cultana. Advice from the Department of Defence is that the likelihood of aviation operations occurring from the El Alamein Army Base is remote and the potential for activation of the Restricted Areas is low.

There are no identified perceived adverse effects on primary radar (civil or military) or secondary surveillance radar which would arise as a result of the establishment of the proposed Lincoln Gap Wind Farm Stage 3. There is no known military radar installation in South Australia.

Note that SGS Aviation Compliance has taken due note of the decision of the US Federal Aviation Administration (FAA) in respect of a wind farm planned off the coast of Massachusetts. In this case the FAA said that, because the wind farm will be located more than 2.4 nm (4.4 km) from the closest radar sites, there will be no effect on radar images. This decision has been an influencing factor in SGS Aviation Compliance’s position on this matter – both for the potential impact on civil and military radars.

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Note that it is the RAAF AIS which keeps and manages a central aeronautical data base of tall structures, including those reported in accordance with the advice detailed within the AC 139-08(0), mentioned in Section 4. d. iii. above. This data base is made available for use by other mapping agencies and the RAAF AIS liaises closely with Airservices' AIS in this respect.

vi. Aerial fire-fighting activities

Aerial fire-fighting activities can be separated into two elements – those using helicopters and those using fixed wing aircraft.

SGS Aviation Compliance is of the opinion that any operations of fixed wing aircraft for fire-fighting purposes within the confines of the proposed Lincoln Gap Wind Farm Stage 3 would be hazardous and are not recommended. This is a position held in respect of all wind farms.

The operation of helicopters within the confines of the wind farm is perhaps possible, but not desirable.

It is also possible that aerial fire-fighting could be undertaken above the level of the wind turbines but dropping water or retardant from this height (a maximum of 206 m {≈ 675.8 ft} in the case of the proposed Lincoln Gap Wind Farm Stage 3) would reduce the effectiveness. This is a matter for the expert fire-fighting operators to assess.

The position in respect of the proposed Lincoln Gap Wind Farm Stage 3 is no different from any other wind farm.

Helicopter or fixed wing aircraft operations within the confines of any wind farm and below the top of the wind turbines are potentially hazardous and not recommended.

vii. Aerial agricultural operations


Agricultural aerial spraying and, possibly, fertilising, may occur in the region even though SGS Aviation Compliance (despite no site visit) has developed the view that such is unlikely to be a regular feature at the proposed Lincoln Gap Wind Farm Stage 3 site. It is, perhaps important, therefore, to understand the position of the aerial agricultural fraternity in respect of wind farms.

The Aerial Application Association of Australia (AAAA) holds the view that wind farms and their pre-construction wind monitoring towers are a direct threat to aviation safety and especially aerial application.

It should be noted that aerial application includes not only spraying but also seeding and the spreading of fertilisers.

Aerial agricultural operations generally occur between 20 – 30m from the ground. Any objects, such as a wind turbine, which penetrate the airspace above 20 – 30m, will need to be taken into account if planning to undertake any such aerial agricultural operations.

It should be noted, of course, that it is standard operating practice that any approved low-level operations, by their very nature, are required to check for any obstacles which might impact on such operations, before undertaking any such operations. Except in special cases where night spraying of crops is deemed necessary, all such operations would be day VFR. No such "special cases" are adjudged to exist in the region.

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Aerial agricultural operations from any airstrips which might be established on the fringes of the proposed wind farm and clear of any wind turbines could be undertaken satisfactorily as agricultural operators are familiar with operating from constrained areas.

In summary, aerial spraying, seeding or fertilising operations, be they by helicopter or fixed wing aircraft, within the confines of any wind farm and below the top of the wind turbines is potentially hazardous and not recommended.

viii. Rural ambulance services

The existence of wind turbines does have the potential to limit the flexibility of operations of helicopter ambulance services within the confines of the wind farm, but it would not be an issue outside the boundaries of the wind farm.

For fixed wing air ambulance operations, it is an issue which is not considered relevant to the proposed Lincoln Gap Wind Farm Stage 3. It is understood that such services do not exist within the confines of the proposed wind farm site now, or even nearby, and the presence of the wind farm would not change that position.

The potential impact on either helicopter or fixed wing ambulance services are common factors for all wind farms. The situation in respect of the proposed Lincoln Gap Wind Farm Stage 3 does not raise any different or special issues.

e. Lincoln Gap Wind Farm Stage 3 and Aviation Safety

i. Obstacle lighting – current regulatory situation

Before commenting on the need, or otherwise, for obstacle lighting on the proposed wind turbines within the proposed Lincoln Gap Wind Farm Stage 3, it is thought necessary to summarise the current regulatory position in this respect within Australia.

CASA powers in respect of the control of obstacles in and around aerodromes flow from the Civil Aviation Regulations 1988 (CAR), Part 9, Subpart 95, which provides for the marking or removal of hazardous objects within the OLS of any aerodrome. For major aerodromes, the OLS could extend up to 15 km from the aerodrome.


CASR 1998, Subpart 139.E covers the specific definitions of hazardous objects and the reporting requirements.

In summary CASR 139.E requires: -

1. Aerodrome operators to monitor the surrounding airspace for any object that might infringe the OLS and to notify CASA;
2. Any person who proposes to construct any structure which will be 110 m or more AGL to inform CASA; and
3. CASA may determine whether the proposed structure(s) will be a hazardous object because of its location, height or lack of marking or lighting.

Detailed aerodrome design requirements are within the CASA Manual of Standards 139 – Aerodromes. Chapter 7 covers the detailed requirements for Obstacle Restriction and Limitation.

In support of the above regulations, CASA issued two Advisory Circulars; viz:

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- AC 139-08(0) "Reporting of Tall Structures" April 2005; and
- AC 139-18(0) "Obstacle Marking and Lighting of Wind Farms" December 2005.

There is no doubt that CASA has the necessary regulatory powers to control the marking and removal of hazardous objects within the OLS around aerodromes and for the reporting of tall structures. However, there is some question as to CASA's powers to insist on marking and / or lighting of obstacles outside the OLS of an aerodrome. As a consequence, in mid-2008, CASA withdrew Advisory Circular AC139-18(0) and initiated an internal review process to look at how wind farms located near aerodromes are assessed and regulated. Subsequently, following the release of the Australian Government's National Aviation Policy White Paper in December 2009, the Department of Infrastructure and Transport, which was then the policy department of Government overseeing CASA (it is now the Department of Infrastructure and Regional Development), established a National Airports Safeguarding Advisory Group (NASAG). Amongst other things, NASAG developed a draft Guideline D "Managing the Risk of Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers". This was first released in draft form in February 2012 as Version 4.1.1. The latest version is 4.1.3, dated 15 July 2012.


The principles of the NASAG Guideline D (an excerpt of which is included at Appendix 9. g.) are being upheld in this aviation assessment.

ii. Risk to aviation operations – general

A risk assessment of the Lincoln Gap Wind Farm Stage 3 and its potential impact on aeronautical operations was carried out using the principles of ISO 31000:2018.

In an overall sense, the view is that the risk to aviation operations due to the presence of the proposed Lincoln Gap Wind Farm Stage 3 is **low** based on the following: -

- There are only two certified or registered aerodromes within the vicinity of the wind farm area.
 - o One is Port Augusta some 10 km east north east north of the proposed wind farm site.
 - o One is Tregalana some 20 km south of the proposed wind farm site.
- Operations from both the above-mentioned aerodromes would not be affected by the presence of the proposed Lincoln Gap Wind Farm Stage 3.
- There is one military airstrip near the proposed Lincoln Gap Wind Farm Stage 3 and that is the El Alamein Army Base.
 - o It is, in effect, non-operational; for emergency use only.
 - o Operations from this airstrip are unlikely to occur.
- There are no other aerodromes identified near the proposed Lincoln Gap Wind Farm Stage 3.
- VFR operations should be above the height of the wind turbines if such are operated strictly in accordance with the Regulations.
 - o However, it is noted that the maximum size of the proposed wind turbines will penetrate navigable airspace (i.e. being higher than 500 ft {~152.4 m} at a proposed maximum of 206 m {~675.8 ft.}).
 - o Whilst SGS Aviation Compliance is cautious in its considerations of this matter, the view is held that aircraft operations in the vicinity of the proposed Lincoln Gap Wind


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Farm Stage 3 are limited to the extent that the proposed wind turbines will not constitute a hazard to aeroplanes and, therefore, obstacles lights are not recommended.

- Civil Night VFR or IFR aircraft operations are required to abide by lowest safe altitude requirements, which should ensure that all such operations would be above the highest point of any of the wind turbines within the proposed Lincoln Gap Wind Farm Stage 3.
- Any approved low-level operations, by their very nature, are required to check for any obstacles which might impact on such operations, before undertaking any such operations. All such operations would be day VFR.
- The proposed Lincoln Gap Wind Farm Stage 3 turbines will not affect any sector or circling altitude, nor any approach or departure altitudes. They will not impact on Precision/Non-Precision Navigational Aids, HF/VHF Communications, Advanced Surface Movement Guidance and Control Systems, Radar or Satellite/Links.
- The presence of the wind turbines within the proposed Lincoln Gap Wind Farm Stage 3 is assessed as having no effect on LSALTs.
 - o Although, in this sense, the potential impact on route Z92 may lead to such and advice from Airservices Australia may have to be sought.
 - o Be that as it may, SGS Aviation Compliance is of the view that there will be no impact on the operation of the wind farm itself and there will not be any real significance on any aircraft operations over the wind farm.
- There are no known military Prohibited, or Danger (PRD) areas identified anywhere near the proposed Lincoln Gap Wind Farm Stage 3 site which would lead to any restrictions on military aircraft activities.
- There have been several Restricted Areas identified in the vicinity, two of which have the potential to have an impact on the operations of the Lincoln Gap Wind Farm Stage 3.
 - o R302A CULTANA
 - o R303A ALAMEIN
 - Both these Restricted Areas introduce military flying / non-flying with vertical limits “surface to 3,000 ft” with hours of activity defined by NOTAM and the Controlling Authority is the Army RCO Cultana.
 - Advice from the Department of Defence is that these Restricted Areas are unlikely to be regularly activated.
- Whilst the site visit was not undertaken, SGS Aviation Compliance developed the view that agricultural operations would be unlikely to occur in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3.
- SGS Aviation Compliance holds the view that suitable identification on aviation maps of the proposed Lincoln Gap Wind Farm Stage 3 (once established) is required.

What is meant by “navigable airspace”?

Under the Civil Aviation Regulations, aircraft undertaking VFR operations, except during take-off and landing, are required to maintain a minimum height of 500ft AGL outside of built up areas and 1,000ft

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over built up areas. Any aircraft undertaking VFR operations outside controlled airspace is, therefore, legally entitled to operate as low as 500ft AGL.

The Civil Aviation Regulations further require that, unless it is necessary for take-off and landing, an IFR or a Night VFR aircraft operation must not be flown at a height less than 1,000ft above the highest obstacle within a 10nm radius of the aircraft in flight. This defines the LSALT for any such operation which, by definition, would be higher than any wind turbine in any proposed wind farm development.

In principle, therefore, this defines “**navigable airspace**”.

As indicated above, whilst the specific situation in respect of the proposed Lincoln Gap Wind Farm Stage 3 is that the proposed wind turbines will penetrate navigable airspace (i.e. being higher than 500 ft {~152.4 m} at a proposed 206 m {~675.8 ft.}). Despite this, SGS Aviation Compliance has developed the view that the proposed wind turbines will not constitute a hazard to aeroplanes and, therefore, obstacles lights are not recommended.

Additional risk mitigation


The risk to aviation operations would be further reduced if, in the fullness of time, the wind turbines were identified on the relevant aeronautical charts i.e. both the civil WACs and the RAAF produced chart series. This is considered an essential risk mitigation element. Pending such identification on maps, it would be advisable to ensure that all aviation operators are made aware of the existence of the wind farm. Airservices, if they were made aware of the wind farm, would normally do this via NOTAM action covering both the construction phase and prior to identification on maps. It is, therefore, essential that the wind farm developer advise both Airservices and the RAAF AIS, not only of the wind farm itself, but also of any temporary or permanent met masts / wind monitoring towers.

iii. Micro-siting of Wind Turbines

It is understood that approval is being sought for a “corridor” to allow the ability to micro-site turbines without having to obtain approval for a variation to the development application.

SGS Aviation Compliance has assessed this issue with respect to all the relevant matters listed above and has reached the view that variations in the actual position of specific wind turbines within the proposed complex (i.e. “micro-siting”) will not have any effect on the overall impact of the Lincoln Gap Wind Farm Stage 3 on aviation operations as identified.


SGS Aviation Compliance considers that “micro-siting” should be approved in principle by the relevant development approval authority.

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5 SUMMARY COMMENTS

- Operations from identified airfields in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3 will not be affected.
- Aviation operations, generally, will unlikely be affected.
- The specific situation in respect of the proposed Lincoln Gap Wind Farm Stage 3 is that the proposed wind turbines will penetrate navigable airspace. Despite this, aircraft operations in the vicinity are considered to be so low as to not warrant the provision of obstacle lights.
- Reference towers for meteorological monitoring are difficult to see and such should be marked in accordance with the recommendations of NASAG Guideline D, with the exception that SGS Aviation Compliance does not believe that a flashing strobe light is necessary.
- Airspace considerations.
 - CASA should be advised of the presence of the proposed Lincoln Gap Wind Farm Stage 3.
 - Airservices:

LSALTs are adjudged as not being affected, but Airservices should be advised of the proposed Lincoln Gap Wind Farm Stage 3 for an independent assessment, relevant NOTAM action, when necessary, and to eventually record the presence of the wind farm on relevant aviation maps.
 - Department of Defence (DoD) operations should not be affected but both the DoD & RAAF AIS should be advised of the proposed Lincoln Gap Wind Farm Stage 3 for an independent assessment and to eventually record the presence of the wind farm on relevant military aviation maps.
- The position in respect of the proposed Lincoln Gap Wind Farm Stage 3 in respect of aerial fire-fighting activities is no different from any other wind farm.
- Aerial agricultural operations, such as aerial spraying and, possibly, fertilising, may occur in the region as there is clear evidence of cropping in and on the proposed wind farm site, which may very well require such activities to be undertaken.
- With respect to rural ambulance services, the potential impact on either helicopter or fixed wing ambulance services are common factors for all wind farms. The situation in respect of the proposed Lincoln Gap Wind Farm Stage 3 does not raise any different or special issues.
- SGS Aviation Compliance considers that “micro-siting” (i.e. allowing an approved “corridor”) should be approved in principle by the relevant development approval authority.

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6. CONCLUSIONS

The risk to aviation operations in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3 is considered to be low and the view is held that, despite the fact that the proposed wind turbines will penetrate navigable airspace, the provision of obstacle lights is not warranted.

SGS Aviation Compliance considers that “micro-siting” should be approved in principle by the relevant development approval authority.


7. KEY RECOMMENDATIONS

1. Obstacle lights are not recommended to be installed on the wind turbines within the proposed Lincoln Gap Wind Farm Stage 3.
2. Reference towers for meteorological monitoring should be marked in accordance with the recommendations of NASAG Guideline D, with the exception that SGS Aviation Compliance does not believe that a flashing strobe light is necessary.
3. All interested parties should be advised of the proposed Lincoln Gap Wind Farm Stage 3 and be kept informed of the development process. In particular, the following should be kept informed: -
 - a. CASA
 - b. Airservices
 - c. Department of Defence
 - d. RAAF AIS
 - e. Aerial Application Association of Australia (AAAA)
 - f. Hang Gliding Federation of Australia (HGFA),
 - g. Recreation Aircraft Australia (RAAus)
 - h. Sport Aircraft Association of Australia (SAAA).

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8. ABBREVIATIONS USED IN THIS REPORT


AAAA	Aerial Application Association of Australia	LGWF	Lincoln Gap Wind Farm
AC	Advisory Circular	LPSI	Land Planning & Spatial Information
AGL	Above Ground Level	LSALT	Lowest Safe Altitude
AIS	Aeronautical Information Service	m	Metre
ALA	Aircraft Landing Area	m/s	Metres per Second
amsl	Above Mean Sea Level	MOS	Manual of Standards
AOPA	Aircraft Owners and Pilots Association of Australia	MW	Megawatt
AS	Australian Standard	nm	nautical mile
CAAP	Civil Aviation Advisory Publication	NASAG	National Airports Safeguarding Advisory Group
CASA	Civil Aviation Safety Authority	NOTAM	Notice to Airmen
CAR	Civil Aviation Regulation	NZ	New Zealand
CASR	Civil Aviation Safety Regulation	OLS	Obstacle Limitation Surfaces
CID	Community Infrastructure Designation	PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations
DoD	Department of Defence	PRD	Prohibited, Restricted, Danger areas
EIS	Environmental Impact Statement	RAAus	Recreation Aircraft Australia
ERC	En Route Chart	RAAF	Royal Australian Air Force
ERSA	En Route Supplement Australia	RCO	Regimental Commanding Officer
FAA	Federal Aviation Administration	SAAA	Sport Aircraft Association of Australia
ft	Feet	SCAP	State Commission Assessment Panel
GFA	Gliding Federation of Australia	TAC	Terminal Area Chart
GWH	Gigawatt Hours	USA	United States of America
HGFA	Hang Gliding Federation of Australia	VFR	Visual Flight Rules
ICAO	International Civil Aviation Organisation	VNC	Visual Navigation Chart
IFR	Instrument Flight Rules	VHF	Very High Frequency
HF	High Frequency	VTC	Visual Terminal Chart
km	Kilometre	WA	Western Australia
kph	Kilometres per Hour	WAC	World Aeronautical Chart
		WTG	Wind Turbine Group

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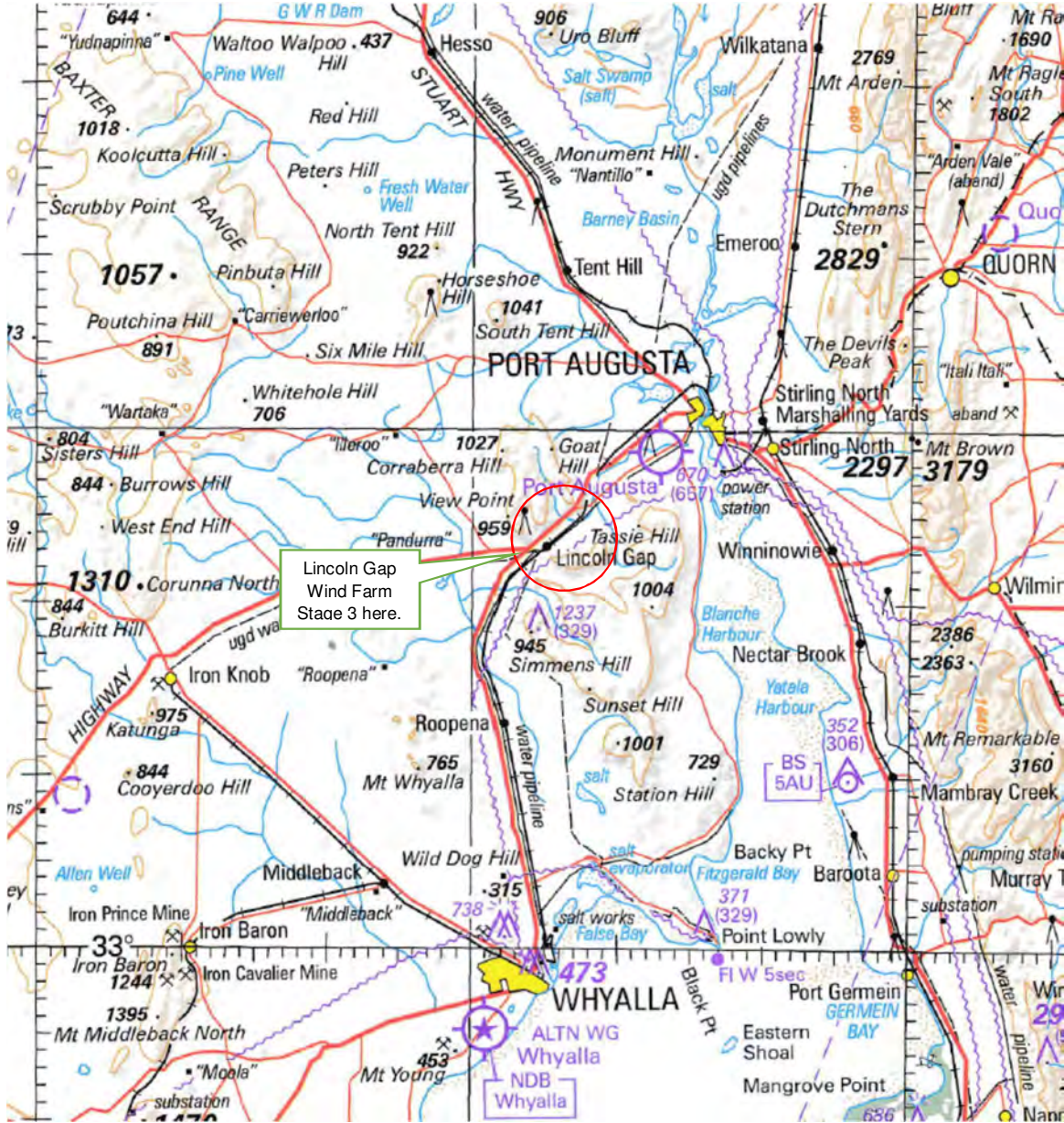
9. APPENDICES


a. Overview of Lincoln Gap Wind Farm Stage 3



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b. Excerpt from World Aeronautical Chart WAC (3459) PORT AUGUSTA



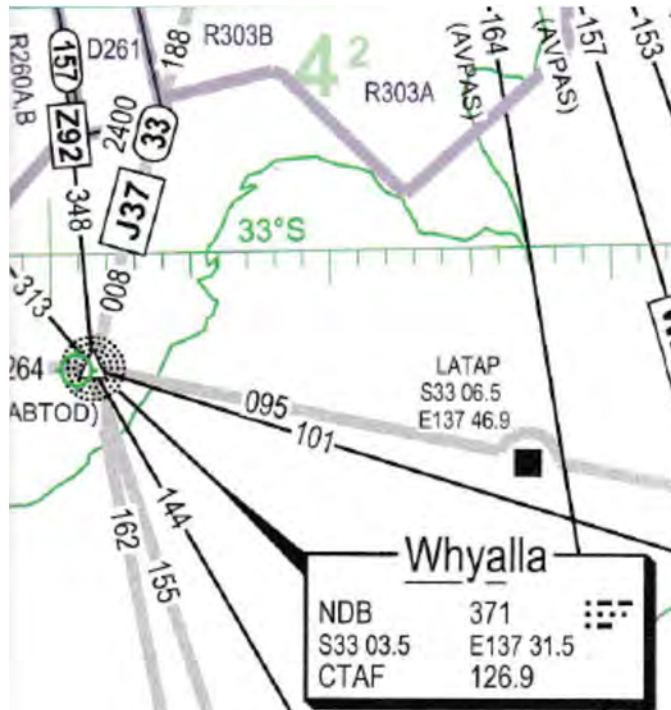
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c. Excerpt from Visual Navigation Chart (VNC) ADELAIDE

Not included as, whilst considered, was not assessed as relevant to this assessment as the chart does not extend beyond Port Pirie and, therefore, does not impact on any feature of the proposed Lincoln Gap Wind Farm Stage 3.

d. Excerpt from Terminal Area Chart TAC-6 ADELAIDE

(Upper left edge only relevant and approximate position of Lincoln Gap Wind Farm Stage 3 is north of the map extremity – map ceases after that. ERC Low L 7 covers off the routes better – refer Appendix 9 e.)




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e. Excerpt from En Route Chart (ERC) Low L 7

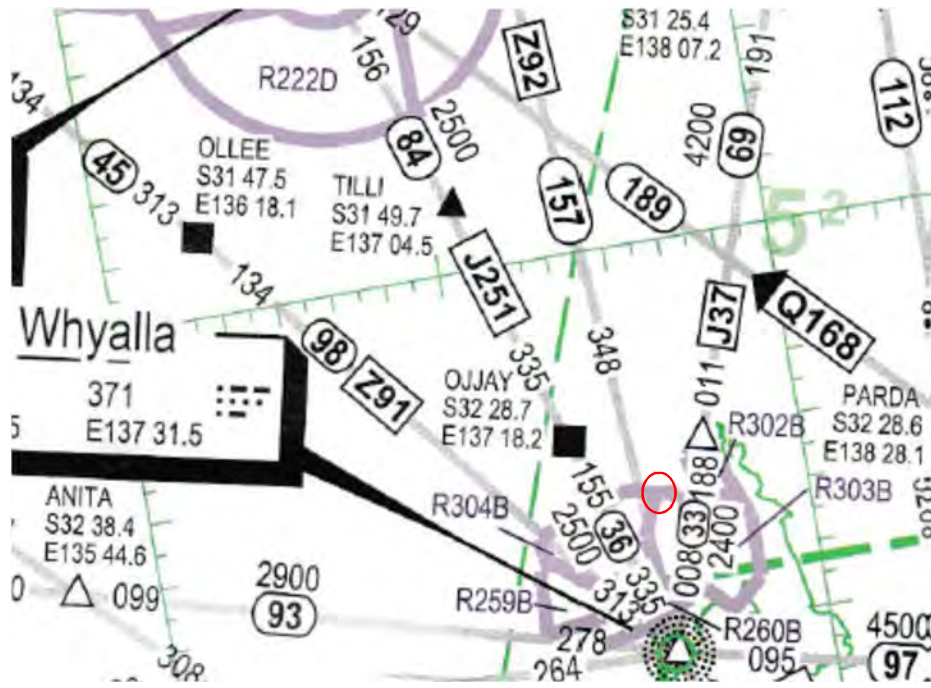
(Approximate position of Lincoln Gap Wind Farm Stage 3 shown by red circle.)




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f. Excerpt from En Route Chart (ERC) High H 8

(Approximate position of Lincoln Gap Wind Farm Stage 3 shown by red circle.)



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g. NASAG Obstacle Lighting Standard for Wind Turbines & Wind Monitoring Towers

The following is an excerpt from the National Airports Safeguarding Framework Guideline D. It will be seen that there is direct equivalence with the ICAO Annex 14 Recommendations regarding wind turbines as noted in Appendix 9 j. below.

Obstacle lighting standards for wind turbines


35. When lighting has been recommended by CASA to reduce risk to aviation safety, medium-intensity obstacle lights should be used. Where used, lighting on wind farms should be installed:
 - (a) to identify the perimeter of the wind farm;
 - (b) respecting a maximum spacing of 900m between lights along the perimeter, unless an aeronautical study shows that a greater spacing can be used;
 - (c) where flashing lights are used, they flash simultaneously; and
 - (d) within a wind farm, any wind turbines of significantly higher elevation are identified wherever located.
36. To minimise the visual impact on the environment, obstacle lights may be partially shielded, provided it does not compromise their operational effectiveness. Where obstacle lighting is provided, lights should operate at night, and at times of reduced visibility. All obstacle lights on a wind farm should be turned on simultaneously and off simultaneously.
37. Where obstacle lighting is provided, proponents should establish a monitoring, reporting and maintenance procedure to ensure outages, including loss of synchronisation, are detected, reported and rectified. This would include making an arrangement for a recognised responsible person from the wind farm to notify the relevant CASA office, so that CASA can advise pilots of light outages.

Alternatives to fixed obstacle lighting

38. In some circumstances, it may be feasible to install obstacle lights that are activated by aircraft in the vicinity. This involves the use of radar to detect aircraft within a defined distance that may be at risk of colliding with the wind farm. When such an aircraft is detected, the wind farm lighting is activated. This option may allow aviation safety risks to be mitigated where obstacle lighting is recommended while minimising the visual impact of the wind farm at night.

Marking and lighting of wind monitoring towers

39. Before developing a wind farm, it is common for wind monitoring towers to be erected for anemometers and other meteorological sensing instruments to evaluate the suitability or otherwise of a site. These towers are often retained after the wind farm commences operations to provide the relevant meteorological readings. These structures are very difficult to see from the air due to their slender construction and guy wires. This is a particular problem for low flying aircraft including aerial agricultural operations. Wind farm proponents should take appropriate steps to minimise such hazards, particularly in areas where aerial agricultural operations occur. Measures to be considered should include:
 - (a) the top 1/3 of wind monitoring towers to painted in alternating contrasting bands of colour. Examples of effective measures can be found in the Manual of Standards for Part 139 of the Civil Aviation Safety Regulations 1998. In areas where aerial agriculture operations take place, marker balls or high visibility flags can be used to increase the visibility of the towers;
 - (b) marker balls or high visibility flags or high visibility sleeves placed on the outside guy wires;
 - (c) ensuring the guy wire ground attachment points have contrasting colours to the surrounding ground/vegetation; or
 - (d) a flashing strobe light during daylight hours.

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h. Airservices Aviation Assessments for Wind Farm Developments Policy

Note: This was issued in 2012 and, whilst the NASG Guidelines have since been developed (see Appendix 9 g.) it is still understood to be valid.

To Whom It May Concern



Airservices Aviation Assessments for Wind Farm Developments

Guidelines to manage the risk to aviation safety from wind turbine installations (Wind Farms/Wind Monitoring Towers) are under development by the National Airports Safeguarding Advisory Group (NASAG). NASAG is comprised of high-level Commonwealth, State and Territory transport and planning officials and has been formed to develop a national land use planning regime to apply near airports and under flight paths.

The wind farm guidelines will provide information to proponents and planning authorities to help identify any potential safety risks posed by wind turbine 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.

To facilitate these assessments all wind farm proposals submitted to Airservices must include an Aviation Impact Statement (AIS) prepared by an aeronautical consultant in accordance with the AIS criteria set out below.

AIS must be undertaken by an aeronautical consultant with suitable knowledge and capabilities to provide a reliable and comprehensive report. All data is to be supplied in electronic form. If you are not familiar with any aeronautical consultants, you may wish to view the list on the Civil Aviation Safety Authority (CASA) website:


http://www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_90412

AIS Criteria

The AIS must provide a detailed analysis covering, as a minimum:

Airspace Procedures:

1. Obstacles

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- Co-ordinates in WGS 84 (to 0.1 second of arc or better)
 - Elevations AMSL (to 0.3 metres)
2. Drawings
 - Overlaid on topographical base not less than 1:250,000. Details of datum and level of charting accuracy to be noted.
 - Electronic format compatible with Microstation version 8i.
 3. Aerodromes
 - Specify all registered/certified aerodromes that are located within 30nm (55.56km) from any obstacle referred to in (1) above.
 - Nominate all instrument approach and landing procedures at these aerodromes.
 - Confirmation that the obstacles do not penetrate Annex 14 or OLS for any aerodrome. If an obstacle does penetrate, specify the extent.
 4. Air Routes
 - Nominate air routes published in ERC-L & ERC-H which are located near/over any obstacle referred to in (1) above.
 - Specify two waypoint names located on the routes which are located before and after the obstacles.
 5. Airspace
 - Airspace classification – A, B, C, D, E, G etc where the obstacles are located.


Navigation/Radar:

1. Detect the presence of dead zones
2. False target analysis
3. Target positional accuracy
4. Probability of detection
5. Radar coverage implications
6. We would expect the analysis to follow the guidelines outlined in the EUROCONTROL Guidelines on How to Assess the Potential Impact of Wind Turbines on Surveillance Sensors.

http://www.eurocontrol.int/surveillance/public/standard_page/sur_WTTF.html

Airservices Review of AIS

Airservices will review the quality and completeness of an AIS and will undertake limited modelling and analysis to confirm the findings and recommendations of the report.

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Provided the AIS is of sound quality and is complete in accordance with the above criteria, there will be no charge for the review or limited modelling and analysis.


If the AIS is not of sound quality or is not complete in accordance with the above criteria, no modelling or analysis will be undertaken. Airservices will advise the proponent that the AIS does not meet the requirements and that the proposal cannot be assessed by Airservices.

If Airservices review of an AIS confirms impacts identified in the report (or identifies additional impacts), Airservices will advise the proponent of the impacts and the required mitigating actions (where mitigation is feasible). The proponent will also be advised that there will be charges for any mitigation actions to be undertaken by Airservices.

These charges may be advised at the time, but it is likely that a detailed quote will be needed, and this will only be provided on request from the proponent.

Please contact Joe Doherty, Airport Development Manager (02) 62685101 or alternatively joseph.doherty@airservicesaustralia.com if you have any questions.

Current as at 5 March 2012

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i. Excerpts from CASA Manual of Standards (MOS) 139

(FOR INFORMATION ONLY)

Section 9.4: Obstacle Lighting

9.4.1 General

9.4.1.1 Under the Civil Aviation Regulations, CASA may determine that an object or a proposed object which intrudes into navigable airspace requires, or will be required to be provided with, obstacle lighting. Responsibility for the provision and maintenance of obstacle lighting on a building or structure rests with the owner of the building or structure. Within the limits of the obstacle limitation surfaces of an aerodrome, responsibility for the provision and maintenance of obstacle lighting on natural terrain or vegetation, where determined necessary for aircraft operations at the aerodrome, rests with the aerodrome operator.

9.4.1.2 In general, an object in the following situations would require to be provided with obstacle lighting unless CASA, in an aeronautical study, assesses it as being shielded by another lit object or that it is of no operational significance:

(b) outside the obstacle limitation surfaces of an aerodrome, if the object is or will be more than 110m above ground level.

9.4.3.4A In the case of a wind farm whose wind turbines must have obstacle lighting, medium intensity lights are to be installed as follows:

(a) if any part of the wind turbine, including the rotating blades, penetrates the obstacle limitation surface (OLS) of an aerodrome, top lights must mark the highest point reached by the rotating blades;

Note: Because it is not practicable to install obstacle lights at the tip of the blades, these lights may be located on a separate structure, adjacent to the wind turbine, at a height that corresponds to the highest point of the rotating blade of the turbine.

(b) if the rotating blades do not penetrate the OLS, the top lights must be placed on top of the generator housing;

(c) obstacle lights must be provided on a sufficient number of individual wind turbines to indicate the general definition and extent of the wind farm, with intervals between lit turbines not exceeding 900m;


(d) all of the obstacle lights on a wind farm must be synchronised to flash simultaneously;

(e) the downward component of obstacle lighting may be shielded to the extent mentioned in either or both of the following sub-subparagraphs:

(i) so that no more than 5% of the nominal light intensity is emitted at or below 5° below horizontal;

(ii) so that no light is emitted at or below 10° below horizontal;

(e) to prevent obstacle light shielding by the rotating blades, 2 lights must be provided on top of the generator housing in a way that allows at least 1 of the lights to be seen from every angle in azimuth.

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j. ICAO ANNEX 14 Recommendations Re Wind Farms

(FOR INFORMATION ONLY)

4.3 Objects outside the obstacle limitation surfaces

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.*

6.3.14 In the case of an extensive object or of a group of closely spaced objects, top lights shall be displayed at least on the points or edges of the objects highest in relation to the obstacle limitation surface, so as to indicate the general definition and the extent of the objects. If two or more edges are of the same height, the edge nearest the landing area shall be marked. Where low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45 m. Where medium-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900 m.

6.4 Wind turbines

6.4.1 A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.

Note.— *See 4.3.1 and 4.3.2.*

Markings

6.4.2 **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

6.4.3 **Recommendation.**— *When lighting is deemed necessary, medium-intensity obstacle lights should be used. In the case of a wind farm, i.e. a group of two or more wind turbines, it 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 6.3.14, 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; and*
- d) *so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located.*

6.4.4 **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.*

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APPENDIX L

TRAFFIC AND ACCESS ASSESSMENT



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Lincoln Gap Wind Farm Stage 3 Traffic Impact Statement

Lincoln Gap Wind Farm Pty Ltd

WSP

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REV	DATE	DETAILS
00	12/09/2019	Draft
01	22/11/2019	Final

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Reviewed by:	Andrew Leedham	22/11/2019	
Approved by:	Amol Kingaonkar	22/11/2019	

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APPENDIX A	DPTI TRAFFIC COUNTS
------------	---------------------

ABBREVIATIONS

AADT	Average Annual Daily Traffic
LGWF	Lincoln Gap Wind Farm
vpd	Vehicles per day
vph	Vehicles per hour

1 INTRODUCTION

1.1 REPORT PURPOSE AND OBJECTIVES

This Traffic Impact Assessment (TIA) report assesses the traffic related aspects of the proposed Lincoln Gap Wind Farm Stage 3 (LGWF Stage 3 hereinafter referred to as the Project) and has been prepared in support of the development application for the Project. The Project is proposed by Lincoln Gap Wind Farm Pty Ltd (LGWF P/L), a subsidiary of Nexif Energy Australia Pty Ltd (Nexif Energy).

The objective of the TIA is to identify any key traffic operational and safety issues that may arise out of the Project (during and after construction) and to suggest measures that may mitigate these.

This assessment is based on a desktop assessment and site inspection (undertaken on 27 June 2019) of roads and traffic operations at, and surrounding, the proposed Project site. The assessment was informed by information on construction activities provided by Nexif Energy.

1.2 ASSESSMENT METHODOLOGY

The assessment approach included:

- determining the existing (baseline) road and traffic conditions near the Project site that may be impacted by the proposed Project
 - developing an understanding of the construction staging and traffic generating activities
 - identifying and assessing options for vehicle access to the Project site
 - estimating the volume, type, frequency and patterns of traffic movements associated with the construction and ongoing operations activities of the Project
 - assessing the impacts of the traffic generated by the Project on the existing (baseline) road and traffic operations
 - identifying and suggesting mitigation measures that may be implemented to minimise or eliminate these impacts.
-

1.3 OVERVIEW OF THE DEVELOPMENT PROPOSAL

The proposal for LGWF Stage 3 is to construct 42 wind turbines with a maximum tip height of 206 m, at the Lincoln Gap Wind Farm. The Project would have a combined generating capacity of up to 252 MW. It will form an extension to the LGWF (the completed Stages 1 and Stage 2 under construction) located approximately 14 km west of Port Augusta (refer Figure 2.1). The proposed LGWF Stage 3 would be developed on land parcels known as Section 2 and 4 of Hundred Plan 540400 and Piece 1 of Deposited Plan 37168 in the Hundred of Handyside. The Project will comprise two sections located to the north-east and to the south of the LGWF (Stages 1 and 2) which consists of a 59 wind turbines. LGWF Stages 1 and 2 are expected to be fully operational by mid-2020.

The LGWF site, once fully completed (Stages 1, 2 and 3) would have 101 turbines with a combined generation capacity of up to 464 MW.

The Project proposal is described in more detail in Section 3.

1.4 TIA REPORT STRUCTURE

The following sections of this TIA report describe:

- existing (baseline) road and traffic conditions (Section 2)
- the development proposal (Section 3)
- access options and the impacts of the project (Section 4)
- summary and recommendations (Section 5).

2 EXISTING CONDITIONS

2.1 LOCALITY

The Project site is located approximately 14 km to the west of Port Augusta, South Australia.

The LGWF site (Stages 1, 2 & 3) comprises parcels of land on both sides of the Eyre Highway (refer Figure 2.1). Stage 1 and 2 are both located north of the Eyre Highway. Stage 3 comprises two separate sites:

- Site 1 is situated immediately to the north of Eyre Highway and adjacent to Stages 1 and 2.
 - Site 2 is situated to the south-east of the Eyre Highway and an active rail line (which runs parallel to Eyre Highway near the site).
-

2.2 TOPOGRAPHY AND LAND USE

The topography of the land in the immediate vicinity of the Project site may be described as escarpments with plateau atop and limited accessibility by road.

The area is sparsely populated and the existing land use is predominantly Primary Industry / Primary Production activities. Natural vegetation in the form of trees and shrubs is generally located along the ridges and road corridors; with minimal to no vegetation atop hill flat where turbine towers will be located.

2.3 ROADS

2.3.1 DESCRIPTION OF ROADS

The access to Site 1 is located along the Lincoln Highway approximately 600 m west of the junction with Eyre Highway.

The access to Site 2 is via the Eyre Highway and an existing unsealed road immediately south of the Tanks Access Rest Area, approximately 640 m north of Eyre Highway junction with Lincoln Highway. The subject unsealed access road provides access to a substation constructed for the LGWF Stage 1 and 2, as well as the Lincoln Gap water storage facility. The subject access road crosses an ARTC single train track which runs between Port Augusta and Port Lincoln, and parallel to and 200 metres west of the Eyre Highway.

An inspection of the roads was conducted on Thursday 27 June 2019 to determine their current condition and identify any existing safety hazards. This inspection, together with traffic usage, provides a basis for the assessment of any traffic related impacts associated with the proposed Project.

2.3.1.1 EYRE HIGHWAY

The Eyre Highway is part of the Australian National Land Transport Network. Eyre Highway is sealed, with formed shoulders and line marking. Eyre Highway is a gazetted PBS Level 3B route which allows for use by vehicles up to 42.0 m in length (double road train).

2.3.1.2 LINCOLN HIGHWAY

The Lincoln Highway is a Rural Arterial road connecting Port Lincoln with Port Augusta. Lincoln Highway is sealed, with formed shoulders and line marking. Lincoln Highway is a gazetted PBS Level 2A route which allows for use by vehicles (either up to 26 m or less than 30 m) metres in length (B-double).

2.3.2 *EYRE HIGHWAY AND LINCOLN HIGHWAY INTERSECTION*

The Eyre Highway and Lincoln Highway intersection was inspected to determine any restrictions in sight distance and/or physical constraints that may pose safety hazards for vehicles accessing the Project site, or exacerbate any existing safety risks.

The subject T-junction of two major highways is in a 110 kph posted speed limit zone. Warning signs to encourage reduced speeds on Eyre Highway are located approximately 575 m west of the junction with Lincoln Highway. The visibility of oncoming traffic from both directions along Lincoln Highway and Eyre Highway was deemed sufficient and clear of any physical obstructions.

2.3.3 *SOUTHERN SITE ACCESS ROAD*

Inspection of the existing roads and junction identified that access to the southern site requires crossing the operational Port Augusta to Port Whyalla rail track (ARTC). The subject rail crossing is only passively controlled. Traffic generated during the construction period will require daily access across the rail line to the southern site.

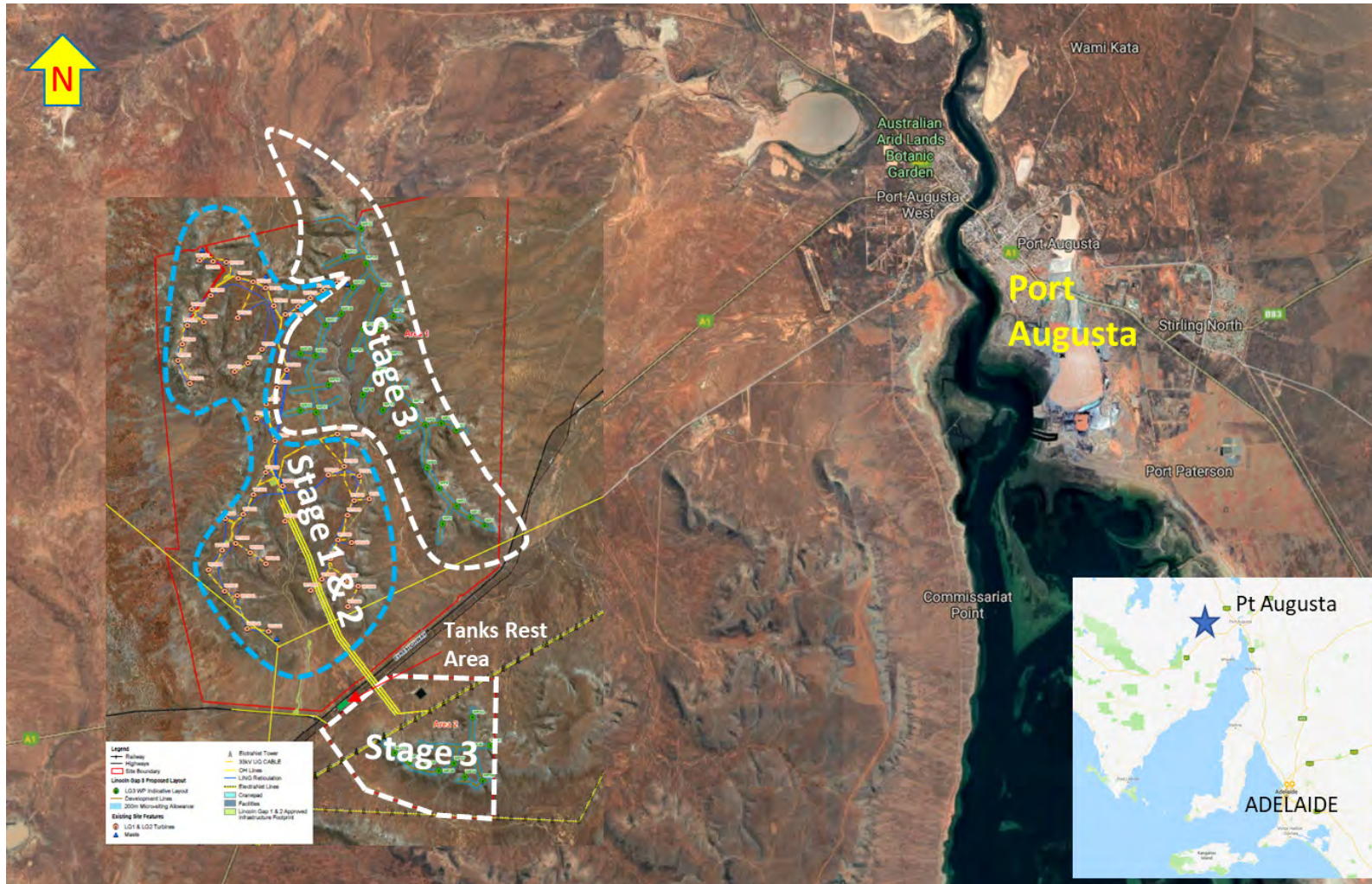


Figure 2.1 Site location

2.4 TRAFFIC

Classification counts on the Eyre and Lincoln Highways were sourced from DPTI and are summarised in Figure 2.2 below. All three count locations were located less than 10 km distance from the proposed Project site. The counts also show the proportion of traffic that are heavy vehicles. The volume of traffic using the Eyre Highway west of the Lincoln Highway intersection is about 750 vehicles per day of which about 35% are heavy vehicles. Growth in traffic volumes is expected to be low, as there is not a lot of development or population growth in the general area to generate any significant increase.

Eyre Highway/Lincoln Highway carries 2,200 to 2,700 vehicles per day of which up to 21% are heavy vehicles. It is not evident from these daily traffic counts whether there is any particular peak period of traffic flow during any time of the day. The majority of traffic movement along Eyre and Lincoln Highway appears to be occurring during daylight hours, with minimal traffic movements during evening and early hours.

Detailed classification counts sourced from DPTI are included in Appendix A.

There is no information on traffic volumes available for the unsealed road near the southern site. This road currently services a water storage facility on the south-eastern side of the rail track. A very low traffic usage of this road is envisaged under existing conditions.

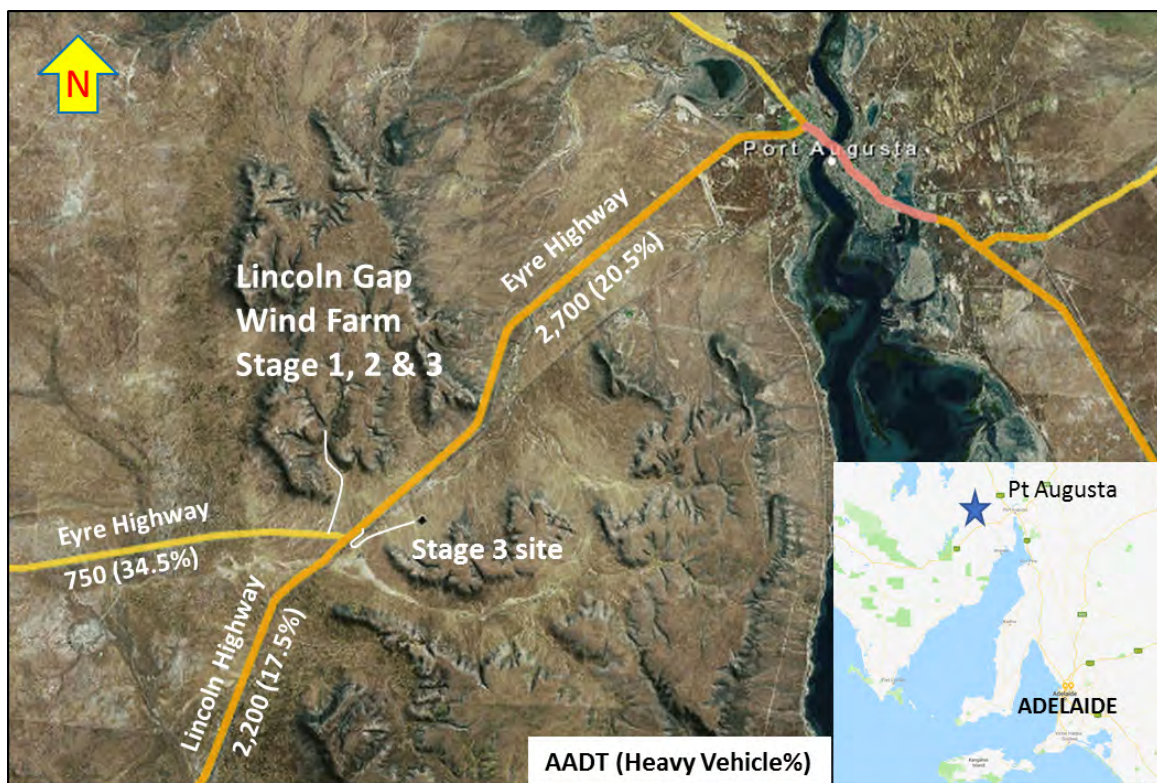


Figure 2.2 Traffic volumes (AADT and percent heavy vehicles) on surrounding road network (Department of Planning, Transport and Infrastructure, n.d.)

2.5 ROAD SAFETY RECORD

Crashes reported over the most recent five years between 2013 and 2017 were reviewed to identify any specific trends in crash events or locations where crashes are frequent. Crashes of relevance to the Project site are summarised in Table 2.1, and discussed in detail below. The general location of reported crashed is displayed in Figure 2.3.

Table 2.1 Crash record summary (2013–17)

LOCATION (REF FIGURE 2.2)	TOTAL CRASHES	PDO	INJURY	SERIOUS INJURY	FATALITY	HIT FIXED OBJECT	NIGHT TIME
1	1	✓	–	–	–	1	1
2	2	✓	✓	–	–	2	2
3	1	–	✓	–	–	1	1

Along the section of Eyre Highway west of the junction with the Lincoln Highway, only one crash was reported. This crash involved hitting a fixed object at night time and resulted in property damage only.

Two crashes were reported at the junction of Eyre Highway and Lincoln Highway in the five years between 2013 and 2017. Both crashes occurred at night time, and involved hitting a fixed object. One crash resulted in injury and the other resulted in property damage only.

One crash was reported on Eyre Highway approximately 1.3 km north-east of the junction with Lincoln Highway. This involved hitting a fixed object at night time and resulted in injury. There were no casualties.



Figure 2.3 Crash locations near the LGWF site (Government of South Australia, n.d.)

Although the number of recorded crashes is low, all occurred at night time and involved a single vehicle running off the road and hitting a fixed object. This suggests perhaps some issues with driver behaviour and an unforgiving road environment.

3 THE DEVELOPMENT PROPOSAL

3.1 INFORMATION PROVIDED

Nexif Energy has provided the following information in relation to the proposed Project, to assist in the traffic impact assessment:

- a general layout plan
- general advice on construction staging and duration
- estimates of staffing levels
- estimates of traffic generation during and after construction.

3.2 SITE LAYOUT

The general layout of the Project comprises two areas, as discussed in Section 2.1:

- Site 1 (north-eastern section) comprising 32 wind turbines.
- Site 2 (southern section) comprising 10 wind turbines.

A preliminary site layout, including infrastructure approved under LGWF Stage 1 and 2, is displayed in Figure 3.1.

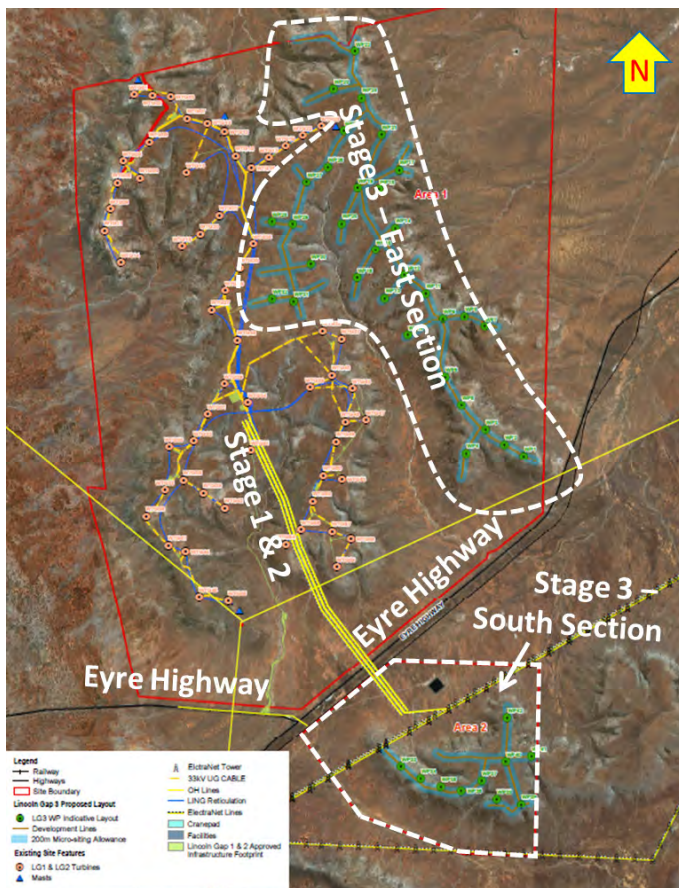


Figure 3.1 Project site and land parcels

3.3 PROJECT CONSTRUCTION

3.3.1 CONSTRUCTION ACTIVITIES

The Project will be constructed over approximately 24 months. There will be several construction phases including preliminary accommodation works (site set out for example), earthworks to prepare the site, development of the internal road network, external roadworks (including any mitigation measures recommended in this TIA), preparation of foundations for turbine towers and other structures, and first and second fix trades of the turbine assembly. The construction activities may commence in the north-eastern site before moving into the southern site.

Each of these construction activities will generate specific traffic movements; including staff movements to and from the site each day; transportation of plant and equipment (including earthmoving and lifting plant, temporary structures, and project components such as turbine blades and nacelles) and delivery of materials (e.g. quarry rubble, steel and concrete).

Indicative estimates of the specific delivery schedules and staffing arrangements are included in Table 3.1:

Table 3.1 Construction activity, equipment and workforce details

ITEM	ESTIMATED QUANTITIES	NUMBER OF VEHICLES / LOADS	NOTES
Crane	6 no.	12 loads	Delivered at the start of Phase 1 and removed at the end of Phase 2
Plant	23	23 loads	
Employees	92	90 cars /day	Daily movements in Phase 1 & 2
Crushed stone	5,500 tonnes	275 loads	Regular deliveries throughout Phase 1 – corresponding to construction schedule
Bedding sand	3,660 tonnes	183 loads	
Steel	2,772 tonnes	168 loads	
Concrete	24,570 m ³	3,510 loads	
Building materials	Various	92 loads	
Fuel	92,000 litres	46 loads	
Towers	42	126 loads	
Nacelles	42	42 loads	
Blades	126	126 loads	
Tower bases	42	42 loads	
Containerised WTG parts	252	252 loads	
Electrical components	Various items	24 loads	

3.3.2 WORKFORCE

As indicated in Table 3.1, up to 92 workers will be present on-site during peak construction activity. At this stage, it is not intended to provide on-site accommodation for workers and temporary accommodation will be sought in nearby townships in Port Augusta (and/or Port Whyalla). Workers will travel to and from the Project site each day.

3.4 SITE ACCESS

Figure 3.2 indicates site access to the north-eastern and the southern site. Road access for the daily workforce, delivery of components and equipment as well as oversize plant and equipment will use these access points. These are discussed in detail in Section 4.1.

3.4.1 NORTH EASTERN SITE – 32 TURBINES

The north-east section (Stage 1) will use the existing access off Eyre Highway approximately 600 metres west of the junction with Lincoln Highway. The access was, and is still, being used for LGWF Stage 1 and 2 construction activities and is deemed to be easily visible and accessible from Eyre Highway.

3.4.2 SOUTHERN SITE – 10 TURBINES

Access to the southern section (Stage 2) would be from Eyre Highway via an existing unsealed road, approximately 650 m north of junction with Lincoln Highway. The subject unsealed access road forms at-grade level crossing with the ARTC rail track between Pt Augusta and Pt Whyalla.

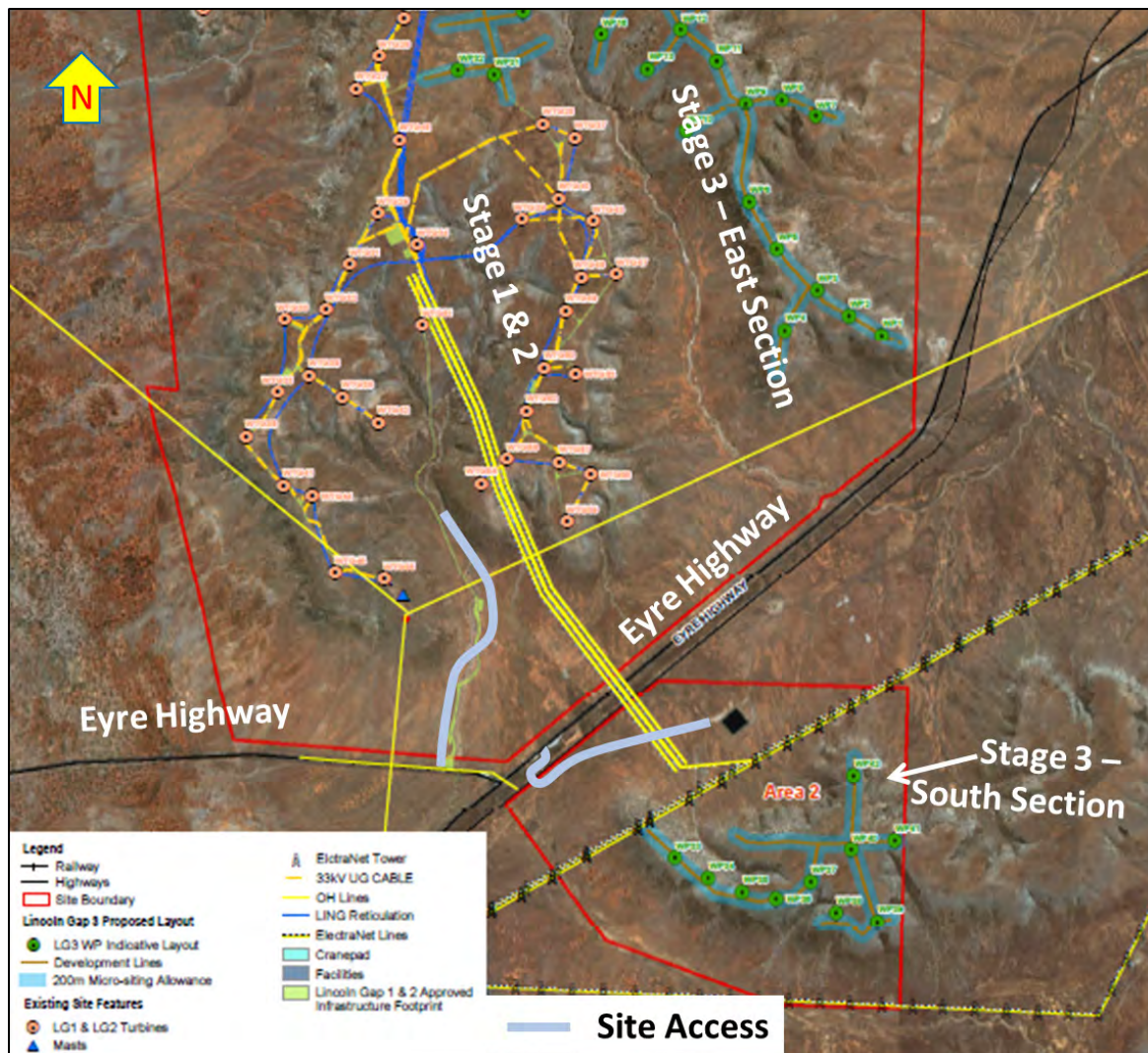


Figure 3.2 Site access from Eyre Highway

3.5 POST CONSTRUCTION

It is anticipated that the wind farm will employ up to five staff once operational. It is estimated that the vehicular traffic generated by the daily operating activities will be very low, and be predominantly light vehicles. The additional traffic movements are envisaged to be from/to Port Augusta.

4 TRAFFIC ACCESS AND IMPACTS

4.1 TRAFFIC GENERATION AND MODE OF TRAVEL

4.1.1 CONSTRUCTION SCHEDULE

Figure 4.1 shows an indicative schedule for construction activities and tasks, proposed under the Project. For the purpose of estimating traffic generated during construction, construction tasks were split into two main phases:

- Phase 1: Design, Mobilisation, and BOP Construction.
- Phase 2: WTG Manufacture, transportation and installation, and commissioning.

Testing and documentation and practical completion tasks were deemed to require minimal workforce present at site and thus excluded from traffic generation estimate.

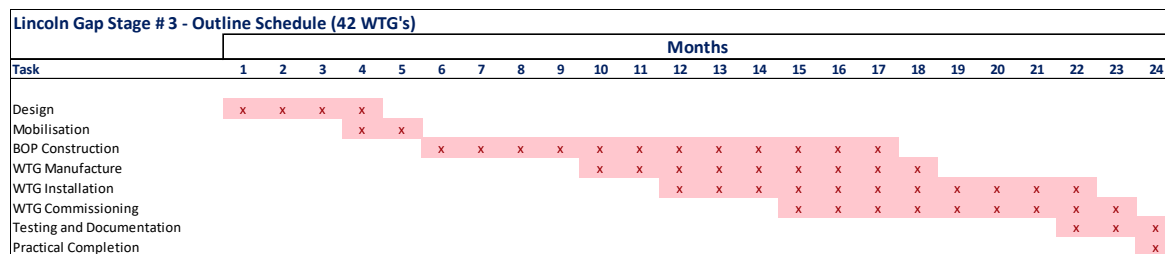


Figure 4.1 Indicative construction schedule (Source: Nexif Energy)

High-level estimates of traffic generation for each of the two construction phases were based on information provided by Nexif Energy and are summarised in Table 4.1.

4.1.2 CRANE AND PLANT DELIVERY

The estimates for heavy vehicle movements presented in Table 4.1 includes the transportation of plant and equipment, as well as the construction materials. Plant items (including for example earthmoving and lifting equipment/cranes) will be transported to site and then remain on site for a specified period before being removed at the end of construction. Plant items are not expected to be transported to and from the site on a daily or regular basis.

Table 4.1 Estimates of traffic generation by item

ITEM	LOADS	TRAFFIC (TWO-WAY)	SUBTOTAL	NOTES
Crane	12 loads	24	70	Delivered at the start of Phase 1 and removed at the end of Phase 2
Plant	23 loads	46		
Employees (Light Vehicles)	90 cars /day	180	240	Daily movements at the start and end of work shift in Phase 1 & 2 Estimated movements during work shift – lunch/coffee breaks
		60		

ITEM	LOADS	TRAFFIC (TWO-WAY)	SUBTOTAL	NOTES
Crushed stone	275 loads	550	8,560	Regular deliveries throughout Phase 1 – corresponding to construction schedule Average daily deliveries over 12 months (Phase 1) = 35
Bedding sand	183 loads	376		
Steel	168 loads	336		
Concrete	3,510 loads	7,000		
Building materials	92 loads	184		
Fuel	46 loads	92		
Towers	126 loads	252	1,225	Delivered throughout Phase 2 – corresponding to construction schedule Average daily deliveries over 11 months (Phase 2) = 5
Nacelles	42 loads	84		
Blades	126 loads	252		
Tower bases	42 loads	84		
Containerised WTG parts	252 loads	505		
Electrical components	24 loads	48		

These traffic movement estimates are further summarised by movement type and construction phase in Table 4.2:

Table 4.2 Traffic Generation Summary – Lincoln Gap Stage 3 (Construction phase 1 & 2)

EYRE HIGHWAY PT AUGUSTA TO PROJECT SITE	EXISTING SITUATION	PHASE 1 TRAFFIC ESTIMATE DURATION 1-17 MONTHS	EXISTING + PHASE 1	% INCREASE
Shift Start (vph)	50	90	142	284%
Shift End (vph)	200	90	292	146%
During work shift – staff*	–	60	60	–
During work shift – deliveries	–	35	35	–
Daily (vpd)	2,700	275	2,975	110%
EYRE HIGHWAY PT AUGUSTA TO PROJECT SITE	EXISTING SITUATION	PHASE 2 TRAFFIC ESTIMATE DURATION 12-24 MONTHS	EXISTING + PHASE 2	% INCREASE
Shift Start (vph)	50	90	142	284%
Shift End (vph)	200	90	292	146%
During work shift – staff*	–	60	60	–
Turbine components	–	5	5	–
Daily (vpd)	2,700	215	2,915	109%

* staff movements for lunch/coffee breaks resulting in travel outside Project site (e.g. Nuttbush Retreat or Port Augusta)

4.1.3 LIGHT VEHICLE MOVEMENTS

The numbers of light vehicle movements trips shown in Table 4.1 represent conservative upper limit estimates assuming workers travelling individually in a private vehicle to and from the site. The Project site is remote and it is unlikely that the majority of workers will live close by (see Section 3.3.2). Accordingly, it can be expected that a high proportion of workers will reside in nearby townships (e.g. Port Augusta) and would likely share rides to and from the Project site. A higher proportion of ride sharing (e.g. 3 workers per car) would reduce the estimated number of light vehicle movements to 80 trips (two-way movements) per day during construction (Phase 1).

It is understood that there will be one working shift between 7 am–6 pm Monday to Friday and 8 am to 1 pm on Saturdays. As such arrival and departure of construction staff in light vehicles will be concentrated at the start of shift (6.30–7.30 am) and end of shift (5–6 pm).

The nearest food place, the Nuttbush Retreat, is located approximately 13 km to the west of the Project site, along Eyre Highway. Construction workers will have the option to travel to the Nuttbush Retreat or to Port Augusta for lunch/coffee breaks (although many would be expected to bring packed meals and refreshments from their home each day. Trips related to lunch/coffee breaks are deemed relatively low, with a higher anticipated level of ride sharing.

As mentioned above, a higher-level car ride sharing will reduce the overall traffic movements by light vehicles.

4.1.4 HEAVY VEHICLE MOVEMENTS

Construction materials such as steel, bedding sand, crushed stone etc. will be transported in bulk at regular intervals. Other construction materials (e.g. concrete) will be transported at a regular interval consistent with construction schedule.

Components for the wind turbines (e.g. tower, nacelles, blades and base) are expected to be manufactured and/or assembled and shipped from interstate/overseas. Wind turbine components will be shipped to Port Augusta and then transport by road (Eyre Highway) to the Project site.

Transportation of the wind turbine components is expected to be predominantly by 19.5 m semi-trailers (general access vehicles) with larger sized equipment (e.g. tower, nacelles, blades and tower bases) requiring special/longer vehicles with special permits. Any such permit requirements will be addressed at the time of detailed design.

Components delivered in bulk to the site are anticipated to be unloaded at a single location on the individual site (the north-eastern and the southern site). Individual components will then be moved to specific tower locations within the Project site by smaller trucks or utilities/cranes.

As mentioned, heavy vehicles will likely include 19.5 m semi-trailers and tray top trucks, however B-doubles may be considered for transporting bulk items.

As mentioned earlier, the Eyre Highway is part of the Australian National Land Transport Network and is a gazetted PBS Level 3B route which allows for use by vehicles up to 42.0 m in length (double road train).

This should be adequate to accommodate the majority of truck deliveries of plant and equipment using B-Doubles to the site during the construction phase of the Project. Special permits will be required to transport larger/longer parts of the wind turbines; such as nacelles, blades and tower parts.

4.2 TRAFFIC DISTRIBUTION AND IMPACT ON SURROUNDING ROAD NETWORK

There is an overlap of six months between Phase 1 and Phase 2 tasks which run concurrently. However, the number of daily light vehicle trips would drop significantly from 180 during Phase 1 to Phase 2 to below 100 as construction of tower bases nears completion towards the end of Phase 1. This estimate could be reduced if higher level of ride sharing between construction staff is realised.

As shown in Table 4.2, the estimates of traffic volumes for Phase 1 represent about 10% increase in the daily volumes of traffic using the Eyre; which currently carries 2,700 vehicles per day. The increase in traffic will likely occur over two short periods of time in the day, when construction workers travel to and from the Project site before the start and at the end of the working shift. The morning hour traffic could then increase from about 50 to 150 (3 times) at the time of shift start (7 am) and the evening hour traffic could increase from about 200 to 300 (1.5 times) at the time of shift end (5 pm) during Phase 1. Increase in morning and evening hour traffic volumes would be similar at the start of Phase 2, but estimated to decrease significantly as construction activities are completed and installation/assembly of tower is in progress.

For the purpose of estimating impacts on the road network, additional traffic, related to transporting tower components in Phase 2 was assumed to not coincide with construction shift start/end times. This will reduce the overall impact on development generated traffic on the surrounding road network. An estimated 660 trips associated with transporting of turbine components would be spread over a period of 12 months. If averaged over the number of working days over six months there would be an average of 2 large deliveries every day.

It is further assumed that construction material and tower components will be delivered to respective sites (north eastern and the southern) proportionate with the number of towers in each site. This will minimise inter-site transporting of construction/tower material which requires passing through junction of Eyre Highway and Lincoln Highway and level crossing at ARTC train line.

Eyre Highway has the capacity to carry this extra traffic.

TRAFFIC IMPACT ON ROAD NETWORK IN PORT AUGUSTA

Traffic movements relating to construction workers (up to 180 two-way trips per day) are expected to be dispersed through the local network in Port Augusta and not deemed likely to adversely impact on local road network.

Increasing traffic movements through Port Augusta, in particular special permit vehicles carrying wind turbine components will require detailed route assessment at the time of detailed design.

4.2.1 SAFETY AND CRASHES

The safety record of Eyre and Lincoln Highway near the Project site is good; with 5 crashes in 5 years occurring on Eyre Highway, and 4 out of 5 occurring at night time.

As mentioned earlier, construction activities including the majority of deliveries, will be scheduled during daylight (work shift) hours, thus minimising crash risks during evening/night times.

4.3 SOUTHERN SITE ACCESS ROAD – RAIL CROSSING

The increase in both light vehicles and heavy vehicles on the unsealed road access to the southern site will undoubtedly accelerate the deterioration of the road surface conditions. The condition of the road, at-grade rail crossing and the extent of additional traffic use suggest that increased maintenance alone may not be sufficient and will likely require road treatment to carry construction traffic movements.

Movement of large vehicles transporting turbine components will require careful planning and liaison with ARTC regarding schedule of trains using rail track between Port Lincoln and Port Augusta to minimise any risks associated with large vehicles crossing rail crossing. This will need to be addressed in the detailed design stage.

5 SUMMARY AND RECOMMENDATIONS

5.1 THE PROPOSAL

Nexif Energy propose to develop the LGWF project, located approximately 14 km west of Port Augusta. The Project site covers two parcels of land; located to the north-east and to the south of LGWF Stage 1 and 2. The both parcels of land are adjacent to, and accessible via, the Eyre Highway.

5.2 ROAD AND TRAFFIC CONDITIONS

The Project site is split in two parts, located to the north and south of Eyre Highway, which is sealed rural highway and a gazetted B-double route. Transporting larger turbine components from Port Augusta to the construction site will require special permits.

The minor road (unsealed) linking the southern site to Eyre Highway crosses ARTC Rail line between Port Augusta and Port Whyalla. Further detailed assessment and special permits (including liaison with ARTC on train timings/frequency) will be required when scheduling delivery of turbine towers and other construction material for the southern site.

Traffic volumes on roads near the Project site are low to moderate; varying between 750 vehicles per day on Eyre Highway west of Lincoln Highway to 2,700 vehicles per day on Eyre Highway between Lincoln Highway and Port Augusta. Hourly traffic volumes around shift start/end times were deemed lower, and varied between less than 100 vehicles per hour around shift start times to less than 200 vehicles per hour around shift end times.

There have been no recorded crashes on the unsealed road (access to the southern site) and four crashes reported in the vicinity of Project site access points all occurred at night time and involved single vehicles running off the road.

5.3 ROAD ACCESS TO THE PROJECT SITE

Direct access from Eyre Highway is available to the north-eastern site (with 32 turbines proposed). Access to the southern site (with 10 turbines proposed) is available via an unsealed access road from Eyre Highway. Access to the southern site also crosses ARTC rail line between Port Augusta and Port Whyalla.

5.4 TRAFFIC IMPACTS

The construction of the Project will generate both light vehicle trips and heavy vehicle trips across the two proposed construction phases.

Assuming the construction workforce will reside offsite and travel to the Project site daily (with some sharing rides), it is estimated that up to 240 and 210 vehicle trips per day will be generated during Phase 1 and Phase 2 respectively during construction. Up to 35 and 5 heavy vehicle trips per day (average) are estimated for each of the Phases respectively.

The majority of the light vehicle trips (240 and 210) are predicted to travel via Eyre Highway with some on Lincoln Highway. All heavy vehicle trips are predicted will travel via Eyre Highway.

These numbers of vehicle trips are not high in absolute terms, and do not represent a significant increase in the daily traffic volumes currently using Eyre Highway and Lincoln Highway.

5.5 RECOMMENDATIONS

Traffic related impacts due to construction traffic movement (light vehicles) are not deemed significant. The Eyre Highway has spare capacity to accommodate the anticipated increase in traffic during the construction period.

A detailed route assessment should be undertaken at the time of transporting wind turbine tower components. Furthermore, special permits are likely to be required to transport these components.

An assessment of the existing rail crossing south of Lincoln Gap station to access the southern site should be undertaken to determine any upgrades/changes required to the unsealed road and at the rail crossing. It is also recommended that a schedule of transporting large components be discussed with ARTC, to minimise any impacts on the rail crossing located on the access road to the southern site.

It is strongly recommended that no construction related travel be undertaken outside of daylight hours, unless otherwise warranted.

6 BIBLIOGRAPHY

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Government of South Australia. (n.d.). *Location SA Map Viewer*. Retrieved from Location SA:
<http://location.sa.gov.au/viewer/>

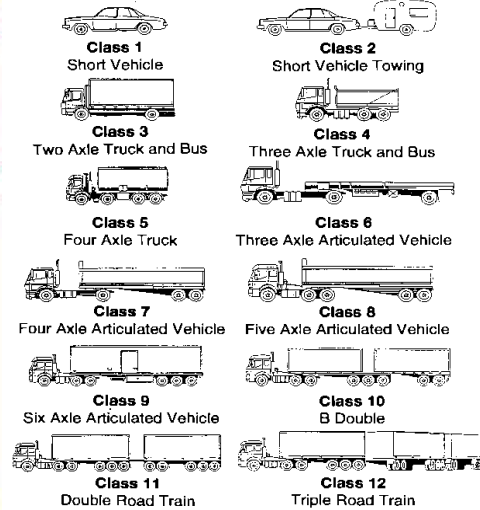
APPENDIX A

DPTI TRAFFIC COUNTS



Road No.	2000	Road Name	EYRE HIGHWAY	Site	7554
Location	8.4 km west of intersection with Lincoln Highway (Culway Site)			AMG	QD330875
RRD	917	Locality	IRON KNOB	Year	2018
				Meter Type	

Click to view the location in Google Maps (imagery may not be current)



Based on 365 days acceptable data (100% of the Year)

Annual Average Daily Count Summary (Two Way)

All Vehicles 5 day (weekday) Average	723	Heavy Vehicles (Classes 3 to 12) 5 Day Average	254
All Vehicles 7 day Average	725	Heavy Vehicles (Classes 3 to 12) 7 Day Average	260
Est AADT (Annual Average Daily Traffic)	750	Heavy Vehicle (Classes 3 to 12) Content	36%

COMMENTS:

Totals by AUSTROADS Vehicle Classification (Dominant vehicles shown in diagram above) See Back Page for detailed description

Two way Traffic - 2018 Average

NB. Bin 13 contains unclassifiable vehicles

Class	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Monday	355	121	48	6	1	9	19	6	31	27	68	0	0	691
Tuesday	308	111	48	8	1	8	19	7	30	35	88	0	0	662
Wednesday	329	114	50	9	2	9	18	7	29	63	111	0	0	741
Thursday	369	119	52	8	1	11	19	6	30	47	113	0	0	774
Friday	396	125	50	9	1	9	18	7	29	32	71	0	0	747
Saturday	311	112	39	7	1	9	17	5	25	58	121	0	0	705
Sunday	372	118	42	5	1	9	16	6	27	51	109	0	0	757
5 Day Average	351	118	49	8	1	9	19	6	30	41	90	0	0	723
7 Day Average	349	117	47	8	1	9	18	6	29	45	97	0	0	725

East Bound - 2018 Average

Class	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Monday	171	58	21	2	0	4	9	2	17	15	36	0	0	336
Tuesday	156	56	22	3	0	4	9	3	13	14	36	0	0	316
Wednesday	175	58	26	3	1	4	9	4	15	27	50	0	0	373
Thursday	207	62	29	4	1	6	10	3	16	30	67	0	0	435
Friday	217	66	27	4	1	5	11	3	14	14	34	0	0	395
Saturday	160	58	20	3	1	4	8	3	11	15	37	0	0	320
Sunday	190	60	21	3	1	4	8	3	13	33	65	0	0	401
5 Day Average	185	60	25	3	1	5	10	3	15	20	45	0	0	371
7 Day Average	182	60	24	3	1	5	9	3	14	21	46	0	0	368

West Bound - 2018 Average

Class	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Monday	184	63	27	4	1	5	10	3	14	12	32	0	0	355
Tuesday	152	55	25	5	1	4	10	4	17	21	52	0	0	346
Wednesday	154	55	24	5	1	4	9	3	15	36	61	0	0	368
Thursday	162	57	24	4	1	5	9	2	14	16	46	0	0	339
Friday	179	59	23	5	1	4	8	4	14	18	37	0	0	352
Saturday	150	54	19	4	1	5	9	3	14	43	85	0	0	385
Sunday	182	58	21	3	1	5	8	3	14	19	44	0	0	356
5 Day Average	166	58	24	5	1	4	9	3	15	21	46	0	0	352
7 Day Average	166	57	23	4	1	5	9	3	15	24	51	0	0	357

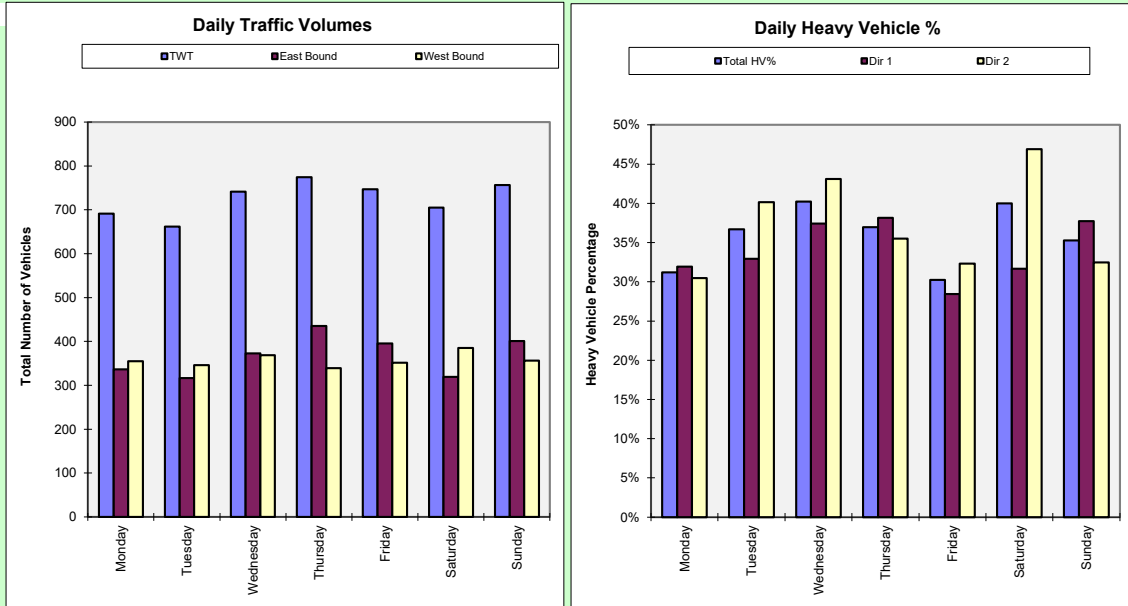
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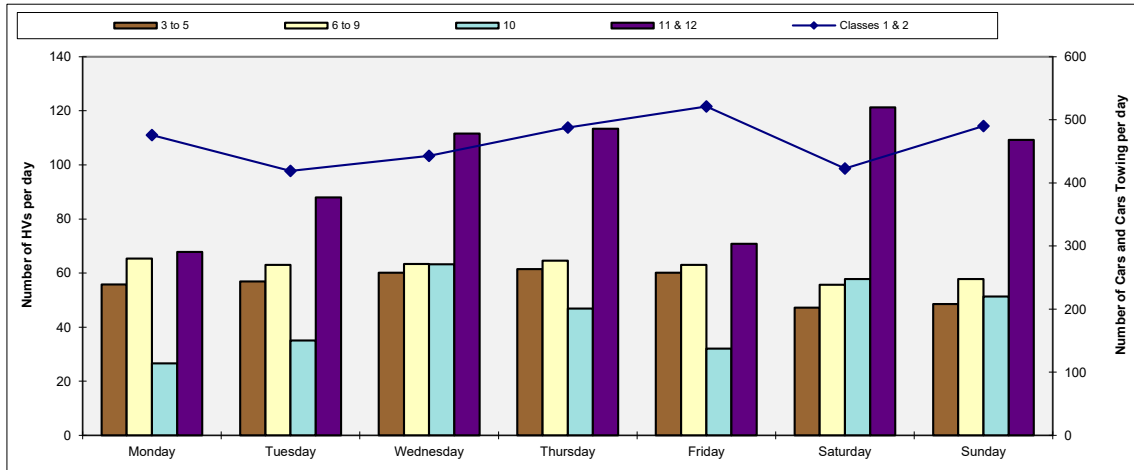
Road No.	2000	Road Name	EYRE HIGHWAY	Site	7554
Location	8.4 km west of intersection with Lincoln Highway (Culway Site)			AMG	QD330875
RRD	917.13	Locality	IRON KNOB	Year	2018

Annual Average Daily Traffic Volumes and Heavy Vehicle %

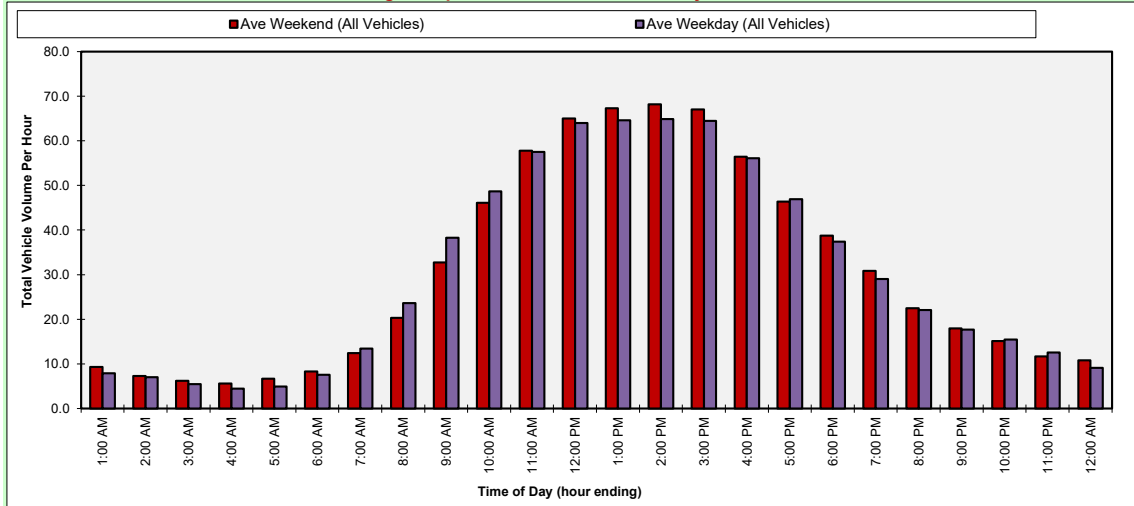


Annual Average Breakdown of Classifications by Broad Groupings

Cars and Cars Towing - Class 1 & 2, Rigid HVs - 3 to 5, Articulated HVs - 6 to 9, B-Doubles - 10, Road Trains or MAD 25m Combination Vehicles - 11 & 12



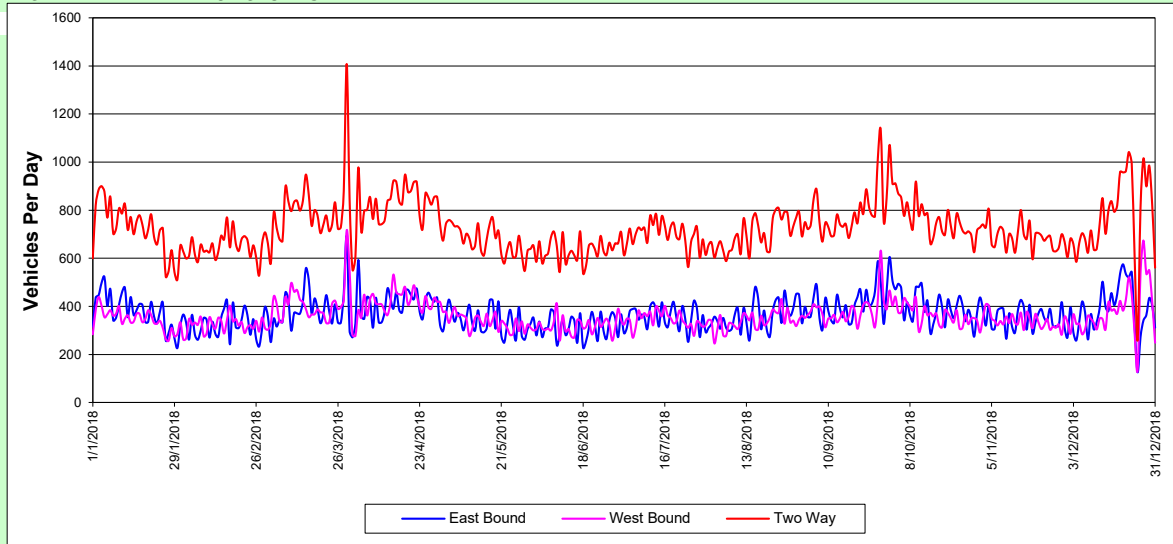
Annual Average Temporal Distribution for Weekday and Weekend Traffic



Note: Please see page 1 for disclaimer.

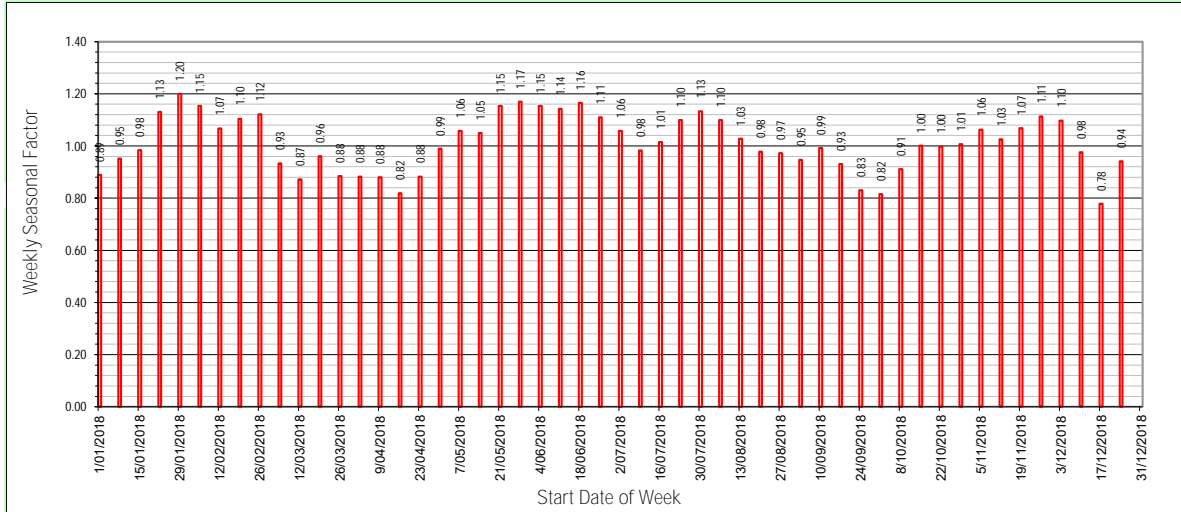
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Location	8.4 km west of intersection with Lincoln Highway (Culway Site)			AMG	QD330875
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TWO WAY DAILY TRAFFIC VOLUMES

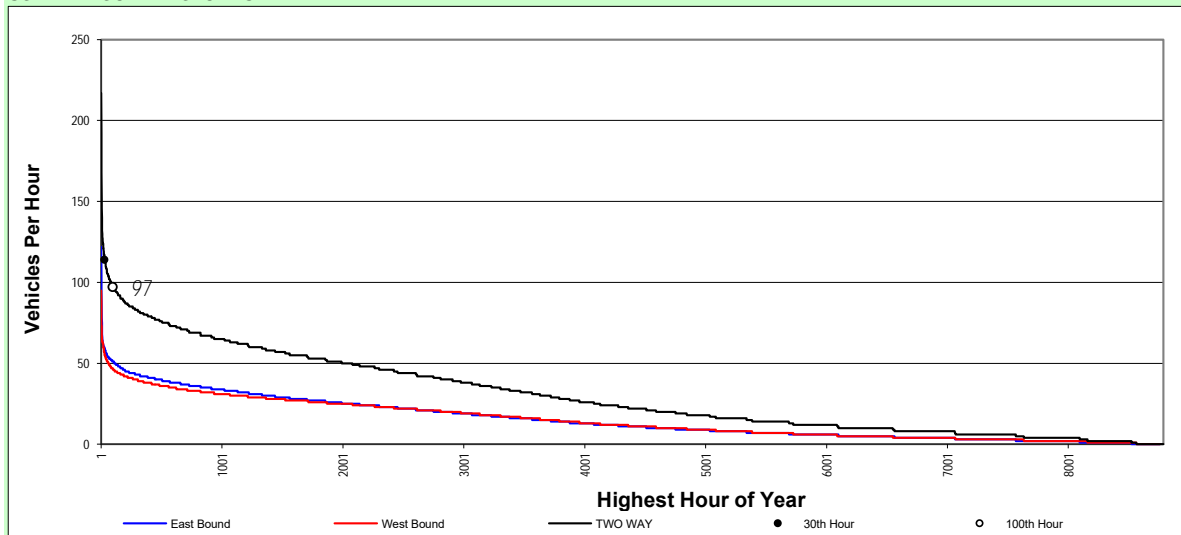


WEEKLY SEASONAL FACTOR

WADT = AADT / WSF



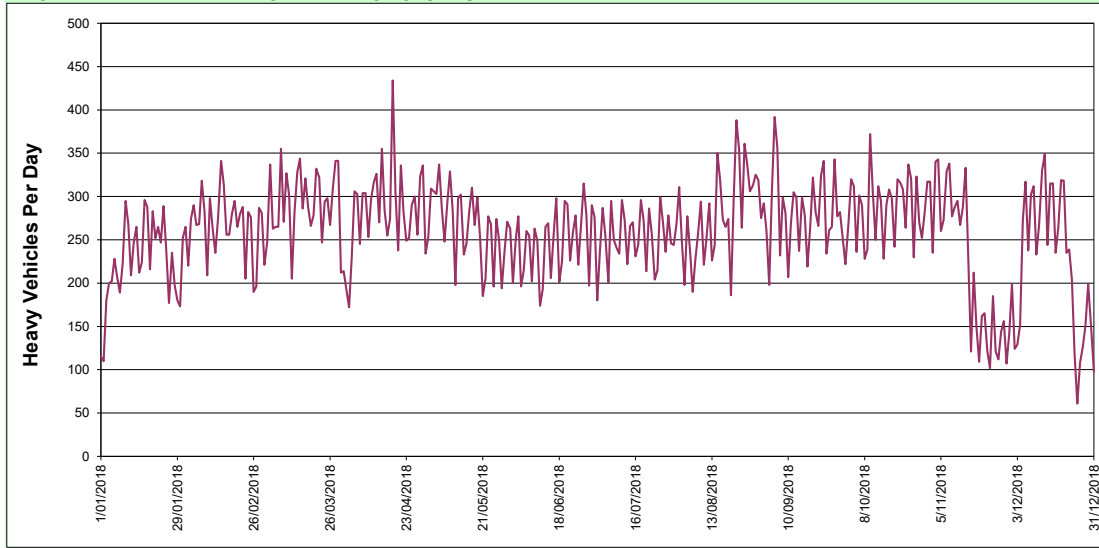
SORTED HOURLY VOLUMES



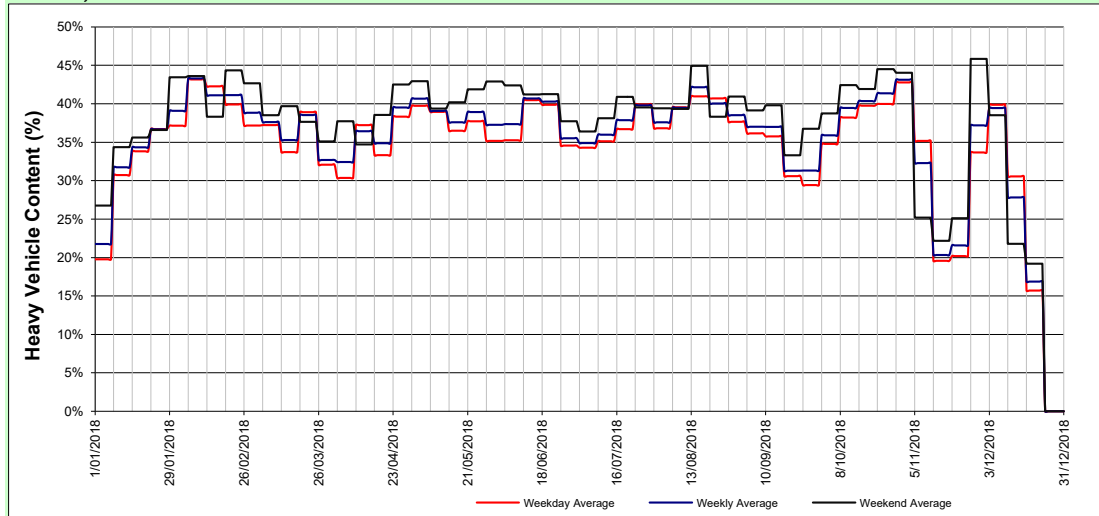
Note: Please see page 1 for disclaimer.

Road No.	2000	Road Name	EYRE HIGHWAY	Site	7554
Location	8.4 km west of intersection with Lincoln Highway (Culway Site)			AMG	QD330875
RRD	917.13	Locality	IRON KNOB	Year	2018

TWO WAY DAILY HEAVY VEHICLE TRAFFIC VOLUMES



WEEKLY, WEEKDAY AND WEEKEND TWO WAY HEAVY VEHICLE CONTENT



Public Holidays

- Monday, 1 January 2018
- Friday, 26 January 2018
- Monday, 12 March 2018
- Friday, 30 March 2018
- Saturday, 31 March 2018
- Monday, 2 April 2018
- Wednesday, 25 April 2018
- Monday, 11 June 2018
- Monday, 1 October 2018
- Tuesday, 25 December 2018
- Wednesday, 26 December 2018
- New Years Day
- Australia Day
- Adelaide Cup
- Good Friday
- Easter Saturday
- Easter Monday
- Anzac Day
- Queens Birthday
- Labour Day
- Christmas Day
- Proclamation Day

School Holidays

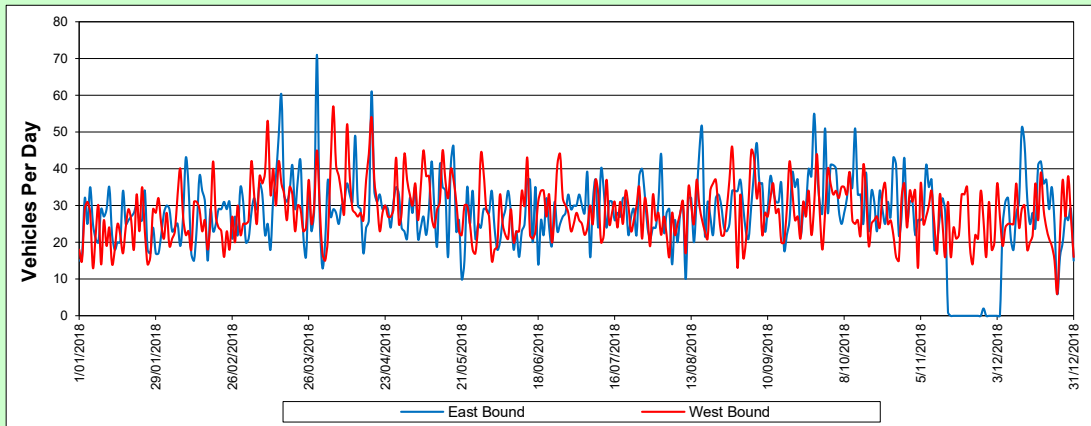
- 16 December 2017 – 28 January 2018
- 14 April 2018 - 29 April 2018
- 7 July 2018 - 22 July 2018
- 29 September 2018 - 14 October 2018
- 15 December 2018 – 29 January 2019

Events Possibly Affecting the Survey

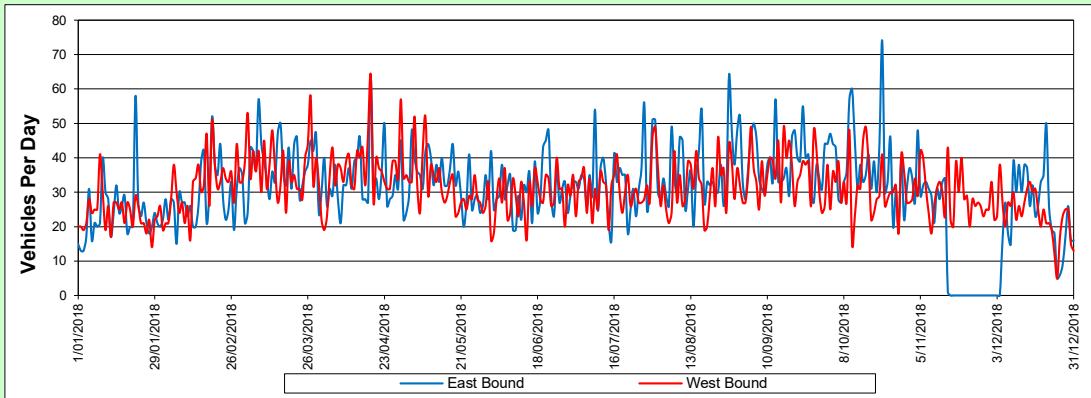
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Road No.	2000	Road Name	EYRE HIGHWAY	Site	7554
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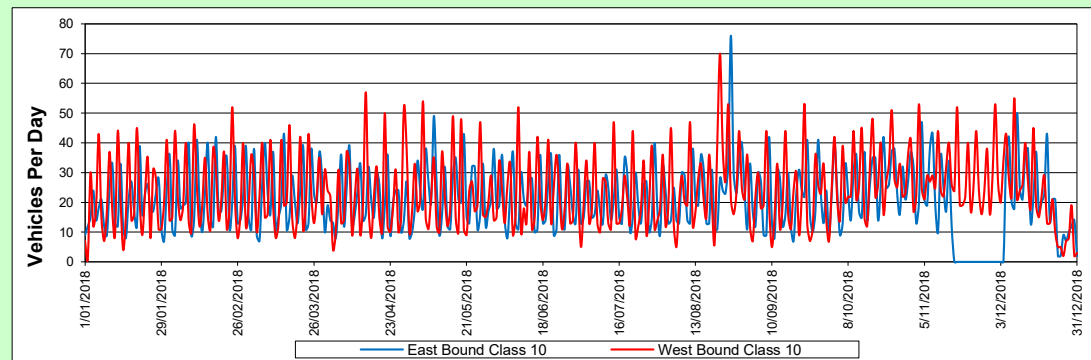
RIGID HEAVY VEHICLES - CLASSES 3 to 5



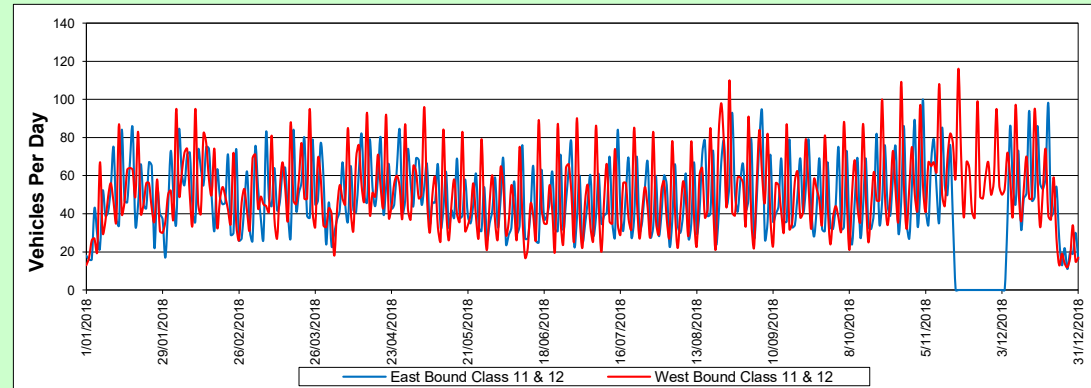
ARTICULATED HEAVY VEHICLES - CLASSES 6 to 9



ARTICULATED HEAVY VEHICLES - CLASS 10



ARTICULATED HEAVY VEHICLES - CLASSES 11 & 12

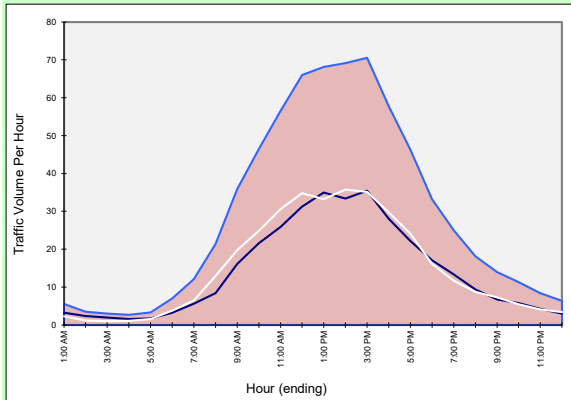


Annual Average Daily Temporal Distributions
EYRE HIGHWAY

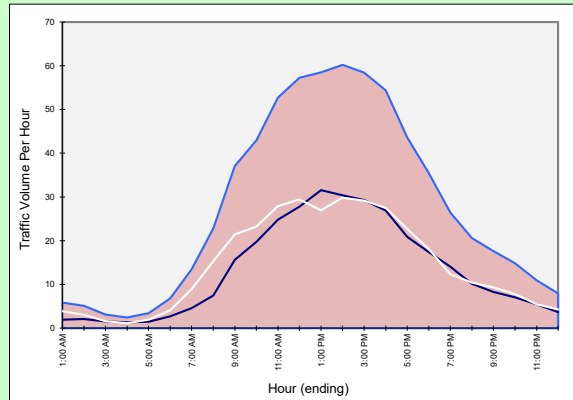
Site **7554**
AMG **QD330875**
Year **2018**

8.4 km west of intersection with Lincoln Highway (Culway Site)

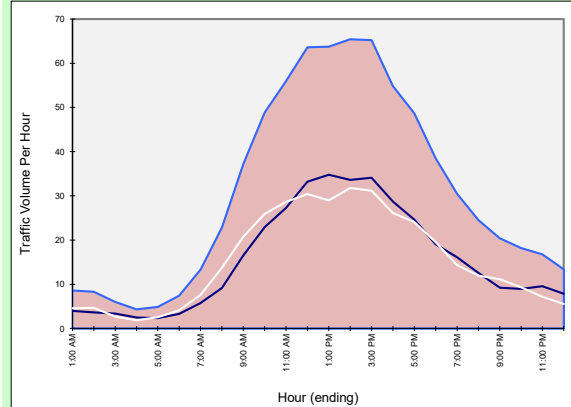
Monday



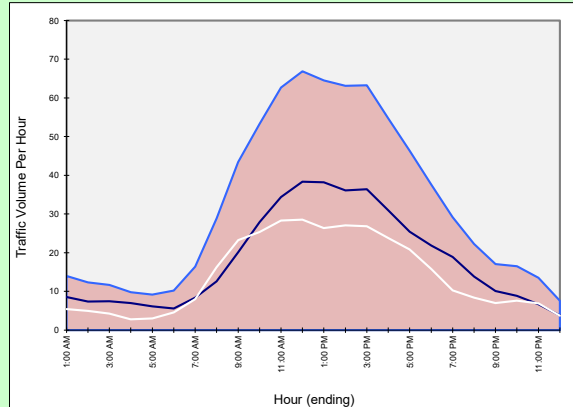
Tuesday



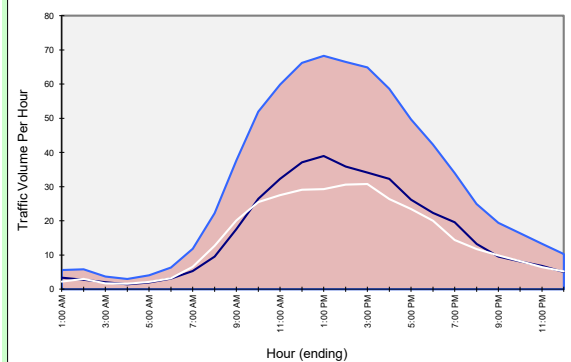
Wednesday



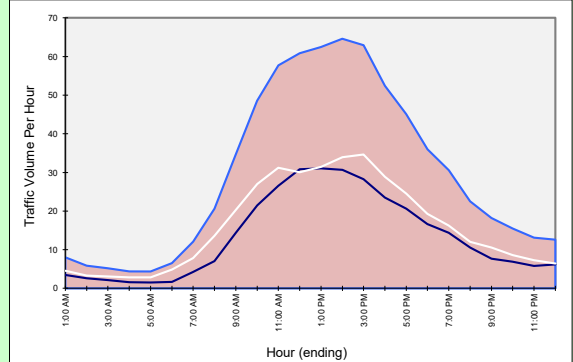
Thursday



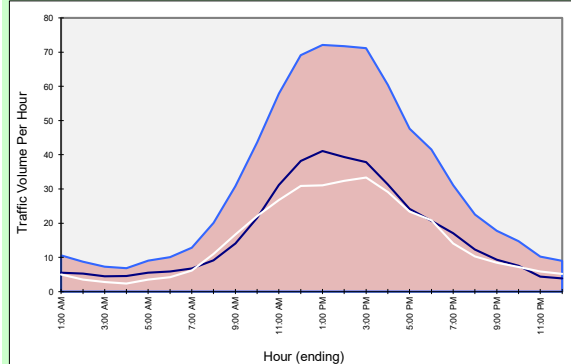
Friday



Saturday



Sunday



Annual Average Daily Count Summary (Two Way)

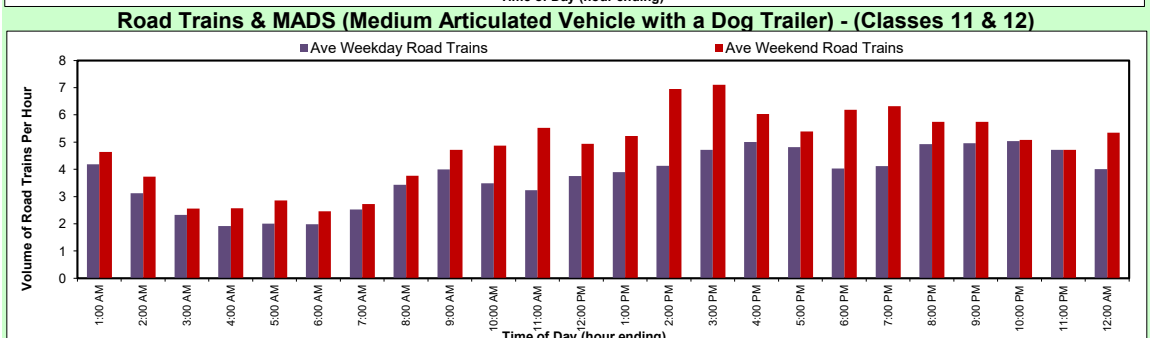
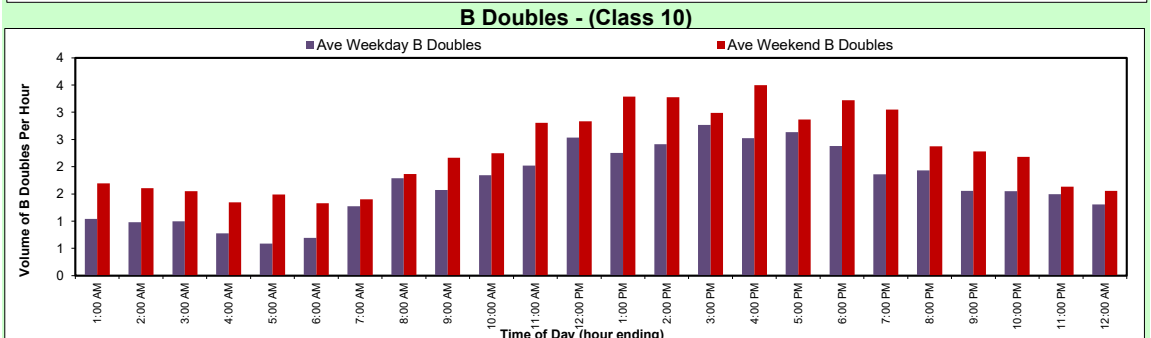
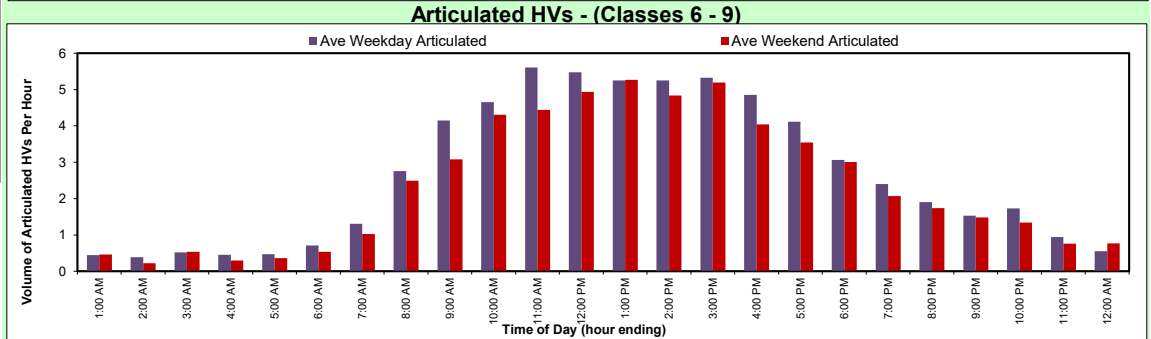
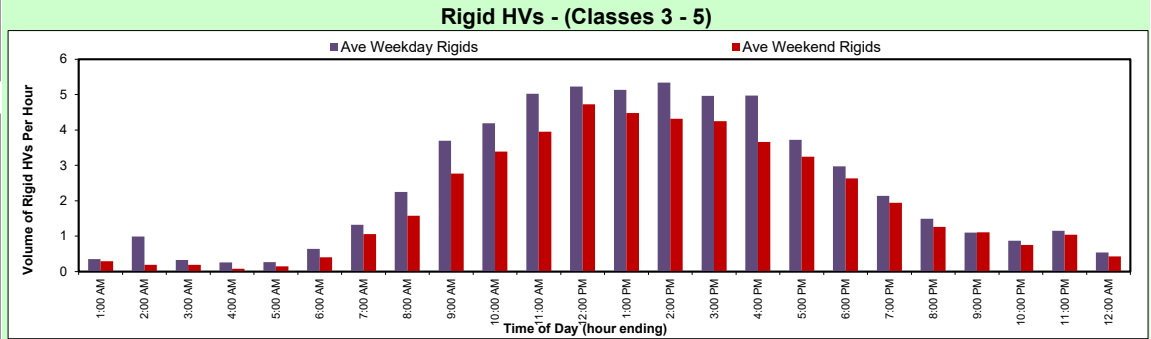
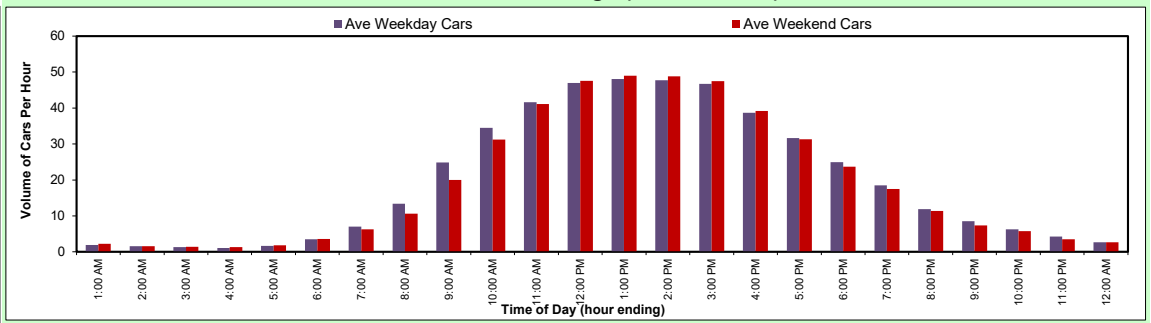
All Vehicles 7 day Average	725
All Vehicles 5 day (weekday) Average	723
Est AADT (Annual Average Daily Traffic)	750

Legend

Total Traffic	
East Bound	
West Bound	

Note: Please see page 1 for disclaimer.

Annual Average Temporal Plots for Broad Classifications
 EYRE HIGHWAY
 8.4 km west of intersection with Lincoln Highway (Culway Site)
 Site 7554
 AMG QD330875
 Year 2018



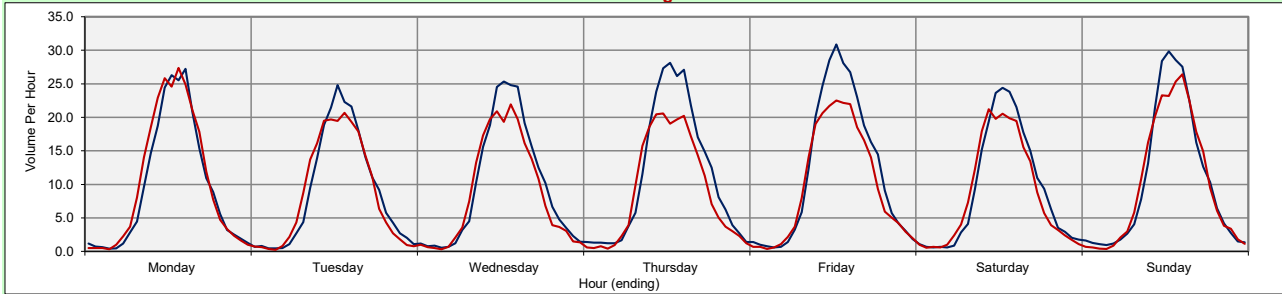
Note: Please see page 1 for disclaimer.

Annual Average Directional Daily Temporal Distributions of Vehicle Classification Groups
EYRE HIGHWAY

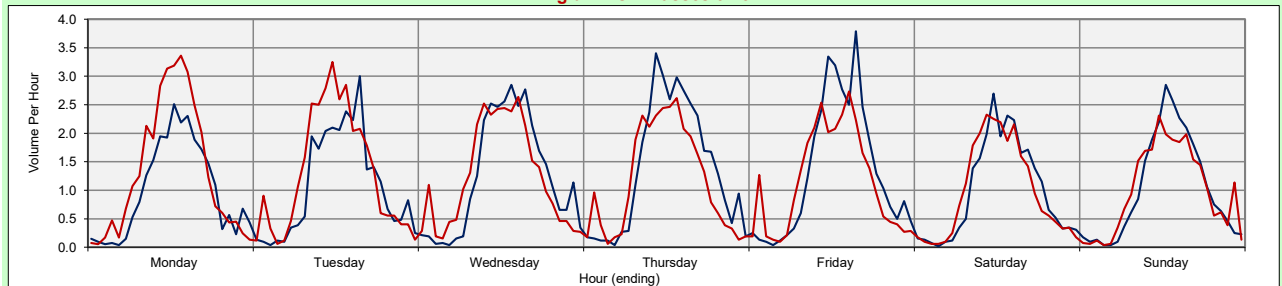
Site **7554**
AMG **QD330875**
Year **2018**

8.4 km west of intersection with Lincoln Highway (Culway Site)

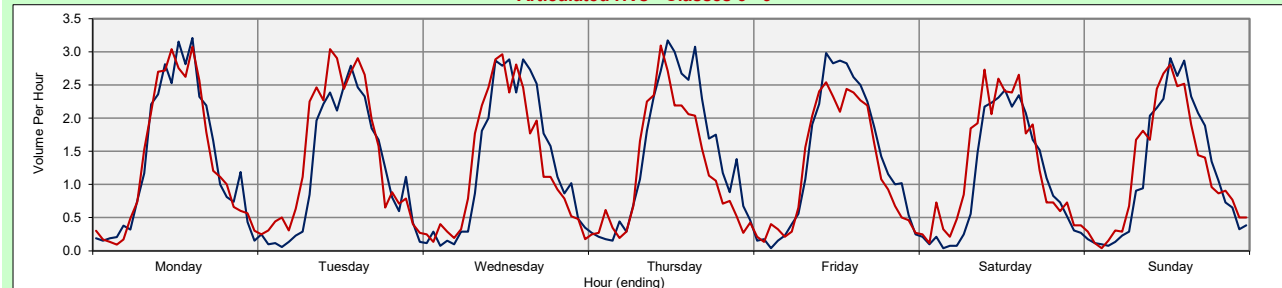
Cars and Cars Towing - Classes 1 & 2



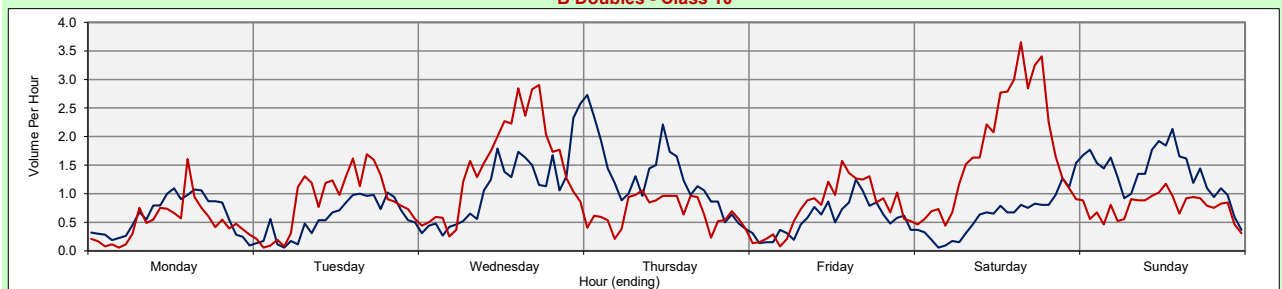
Rigid HVs - Classes 3 - 5



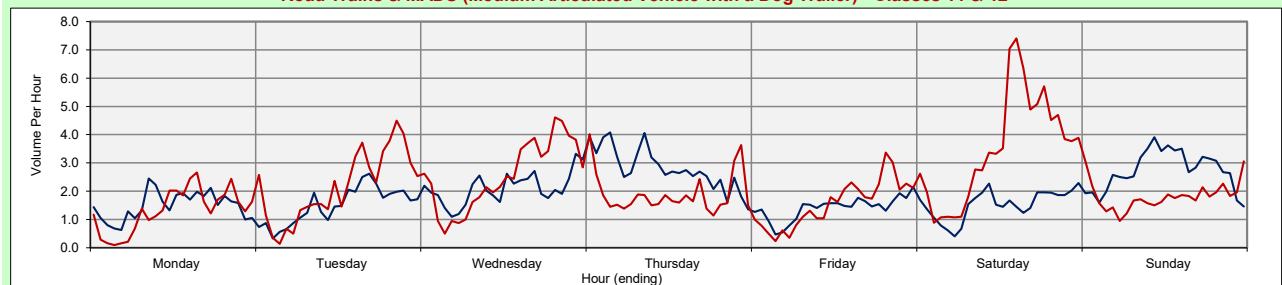
Articulated HVs - Classes 6 - 9



B Doubles - Class 10



Road Trains & MADS (Medium Articulated Vehicle with a Dog Trailer) - Classes 11 & 12





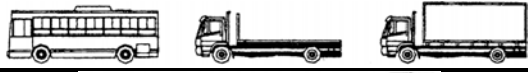
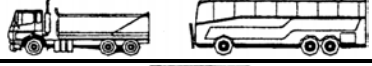








Legend

East Bound —
West Bound —

Note: Please see page 1 for disclaimer.

	East Bound	West Bound
7 Day Average Daily Traffic	368	357
5 Day Average Daily Traffic	371	352
7 Day Percentage of HVs	34%	37%
5 Day Percentage of HVs	34%	36%

AUSTROADS Vehicle Classification System

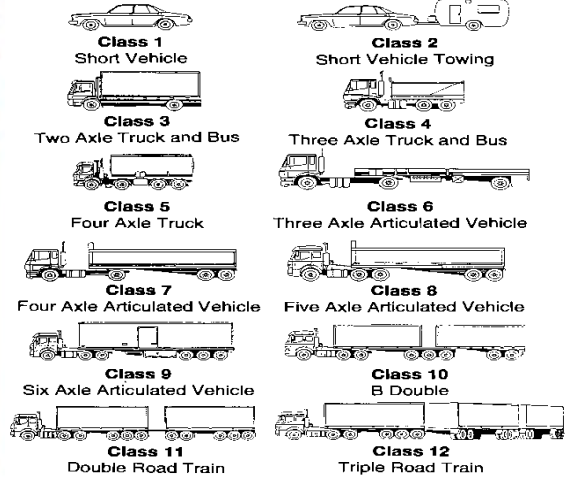
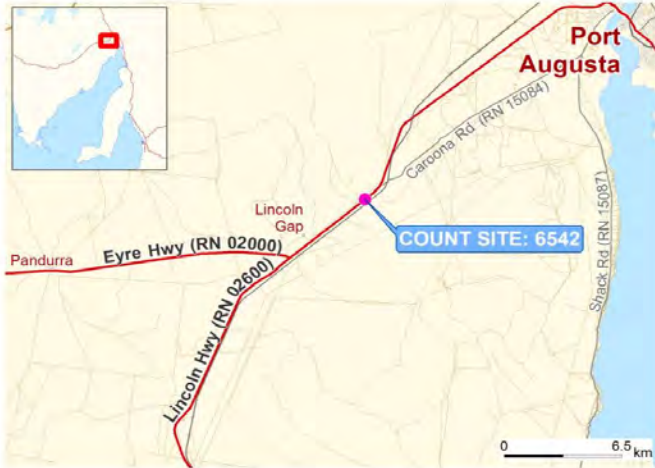
Level 1	Level 2		Level 3	AUSTROADS Classification		
Length (indicative)	Axles and Axle Groups		Vehicle Type			
Type	Axles	Groups	Typical Description	Class	Parameters	Typical Configuration
LIGHT VEHICLES						
Short up to 5.5m		1 or 2	Short Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc	1	$d(1) \leq 3.2\text{m}$ and axles = 2	
	3, 4 or 5	3	Short - Towing Trailer, Caravan, Boat, etc	2	groups = 3 $d(1) \geq 2.1\text{m}$, $d(1) \leq 3.2\text{m}$, $d(2) \geq 2.1\text{m}$ and axles = 3, 4 or 5	
HEAVY VEHICLES						
Medium 5.5m to 14.5m	2	2	Two Axle Truck or Bus	3	$d(1) > 3.2\text{m}$ and axles = 2	
	3	2	Three Axle Truck or Bus	4	axles = 3 and groups = 2	
	> 3	2	Four Axle Truck	5	axles > 3 and groups = 2	
Long 11.5m to 19.0m	3	3	Three Axle Articulated Three axle articulated vehicle, or Rigid vehicle and trailer	6	$d(1) > 3.2\text{m}$, axles = 3 and groups = 3	
	4	> 2	Four Axle Articulated Four axle articulated vehicle, or Rigid vehicle and trailer	7	$d(2) < 2.1\text{m}$ or $d(1) < 2.1\text{m}$ or $d(1) > 3.2\text{m}$ axles = 4 and groups > 2	
	5	> 2	Five Axle Articulated Five axle articulated vehicle, or Rigid vehicle and trailer	8	$d(2) < 2.1\text{m}$ or $d(1) < 2.1\text{m}$ or $d(1) > 3.2\text{m}$ axles = 5 and groups > 2	
	≥ 6	> 2	Six Axle Articulated Six axle articulated vehicle, or Rigid vehicle and trailer	9	axles = 6 and groups > 2 or axles > 6 and groups = 3	
Medium Combination Over 33.0m	> 6	4	B Double B Double, or Heavy truck and trailer	10	groups = 4 and axles > 6	
	> 6	5 or 6	Double Road Train Double road train, or Medium articulated vehicle and one dog trailer (M.A.D.)	11	groups = 5 or 6 and axles > 6	
Large Combination Over 33.0m	> 6	> 6	Triple Road Train Triple road train, or Heavy truck and three trailers	12	groups > 6 and axles > 6	

Definitions:
 Group: Axle group, where adjacent axles are less than 2.1m apart
 Groups: Number of axle groups
 Axles: Number of axles (maximum axle spacing of 10.0m)

$d(1)$: Distance between first and second axle
 $d(2)$: Distance between second and third axle

Road Name **EYRE HIGHWAY** Site No. **6542**
 Road No. **2000** RRD **930.93** AMG **QD357881**
 Locality **LINCOLN GAP** Meter Type **Metrocount**
 Location **5.1km northeast of Lincoln Highway** Latitude, Longitude **-32.58725,137.61307**

[Click Here to view location in Google Maps](#) (imagery may not be current)



Count Summary (Two Way)		Count Period : Friday	4/04/2014	to Thursday	10/04/2014	inclusive
5 Day Average Daily Traffic			2779			599
7 Day Average Daily Traffic			2738			564
Est AADT (Annual Average Daily Traffic)*			2,600			21%

COMMENTS:

Totals by AUSTROADS Vehicle Classification (Dominant vehicles shown in diagram above) See Back Page for detailed description

Two Way Traffic *Seasonal Factor applied: 0.95 NB. Bin 13 contains unclassifiable vehicles

Date		1	2	3	4	5	6	7	8	9	10	11	12	13	Total
4/04/2014	Friday	2009	296	127	31	4	26	32	11	80	56	95	0	4	2771
5/04/2014	Saturday	1790	290	103	28	7	20	26	18	58	99	126	3	1	2569
6/04/2014	Sunday	1928	305	114	25	4	8	37	13	57	78	127	3	2	2701
7/04/2014	Monday	1754	287	166	30	7	20	26	19	96	89	115	5	0	2614
8/04/2014	Tuesday	1764	252	149	36	5	13	33	12	127	107	139	1	2	2640
9/04/2014	Wednesday	1908	256	182	30	8	18	25	13	109	125	166	1	1	2842
10/04/2014	Thursday	2075	286	160	41	7	26	29	21	129	110	137	2	4	3027
5 Day Ave		1902	275	157	34	6	21	29	15	108	97	130	2	2	2779
7 Day Ave		1890	282	143	32	6	19	30	15	94	95	129	2	2	2738

South Bound

Date		1	2	3	4	5	6	7	8	9	10	11	12	13	Total
4/04/2014	Friday	879	126	62	12	2	14	17	5	33	33	52	0	3	1238
5/04/2014	Saturday	869	136	65	11	4	12	13	8	29	60	79	3	0	1289
6/04/2014	Sunday	1053	156	74	13	1	5	11	7	24	30	44	2	1	1421
7/04/2014	Monday	937	157	113	13	4	17	13	9	46	51	51	4	0	1415
8/04/2014	Tuesday	921	118	79	13	3	7	16	8	72	59	84	1	0	1381
9/04/2014	Wednesday	915	119	91	16	3	12	10	5	56	64	87	1	1	1380
10/04/2014	Thursday	947	129	88	14	5	10	12	9	54	45	55	1	1	1370
5 Day Ave		920	130	87	14	3	12	14	7	52	50	66	1	1	1357
7 Day Ave		932	134	82	13	3	11	13	7	45	49	65	2	1	1356

North Bound

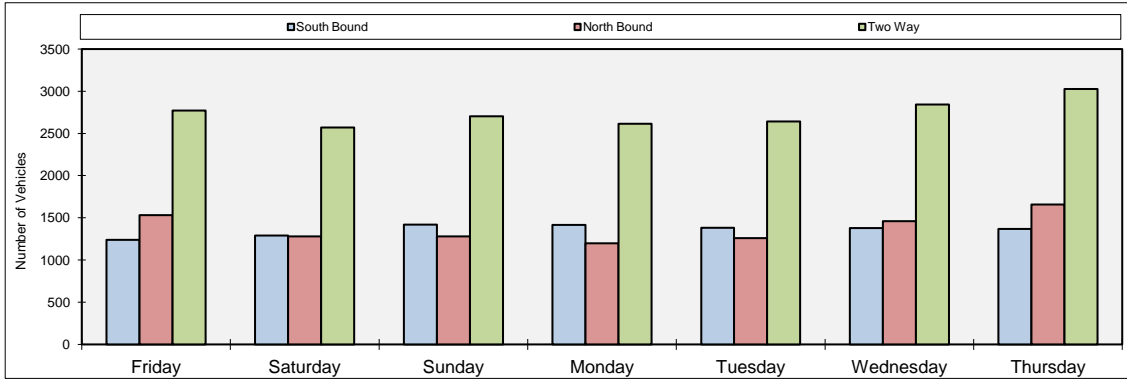
Date		1	2	3	4	5	6	7	8	9	10	11	12	13	Total
4/04/2014	Friday	1130	170	65	19	2	12	15	6	47	23	43	0	1	1533
5/04/2014	Saturday	921	154	38	17	3	8	13	10	29	39	47	0	1	1280
6/04/2014	Sunday	875	149	40	12	3	3	26	6	33	48	83	1	1	1280
7/04/2014	Monday	817	130	53	17	3	3	13	10	50	38	64	1	0	1199
8/04/2014	Tuesday	843	134	70	23	2	6	17	4	55	48	55	0	2	1259
9/04/2014	Wednesday	993	137	91	14	5	6	15	8	53	61	79	0	0	1462
10/04/2014	Thursday	1128	157	72	27	2	16	17	12	75	65	82	1	3	1657
5 Day Ave		982	146	70	20	3	9	15	8	56	47	65	0	1	1422
7 Day Ave		958	147	61	18	3	8	17	8	49	46	65	0	1	1381

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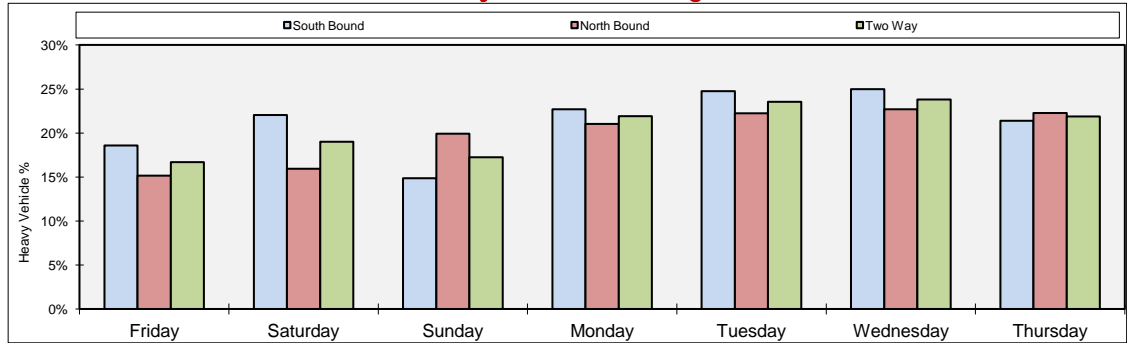


Road Name	EYRE HIGHWAY		Site	6542
Road No.	2000	RRD 930.93	AMG	QD357881
Locality	LINCOLN GAP			
Location	5.1km northeast of Lincoln Highway			

Daily Traffic Volumes

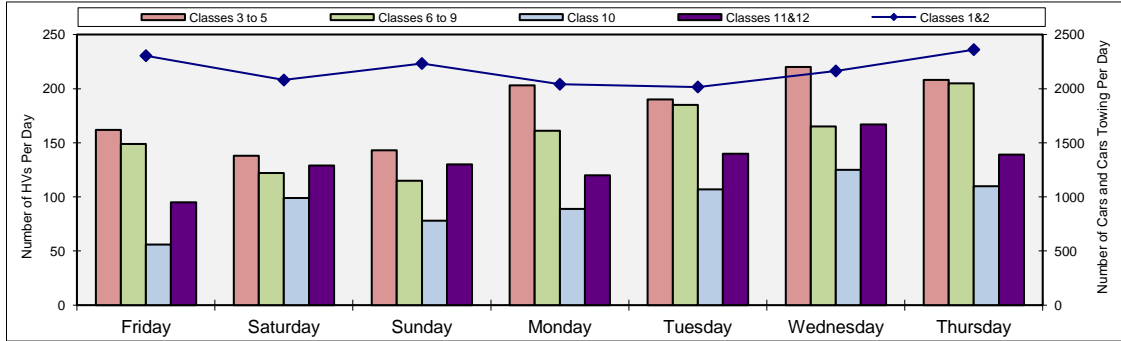


Heavy Vehicle Percentage

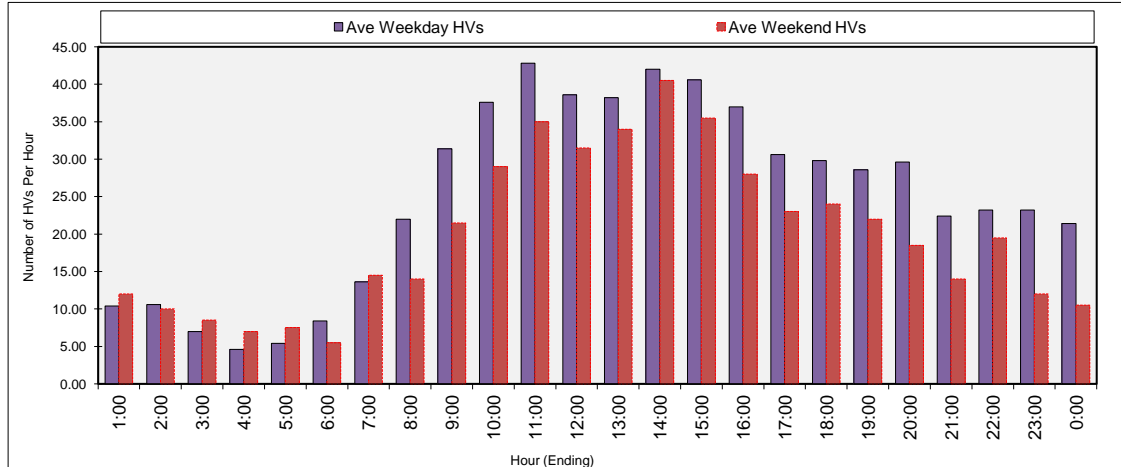


Breakdown of Classifications by Broad Groupings

Cars and Cars Towing - 1&2, Rigid HVs - 3,4 & 5, Articulated HVs - 6,7,8 & 9, B-Doubles - 10, Road Trains or MAD 25m Combination Vehicles - 11, 12

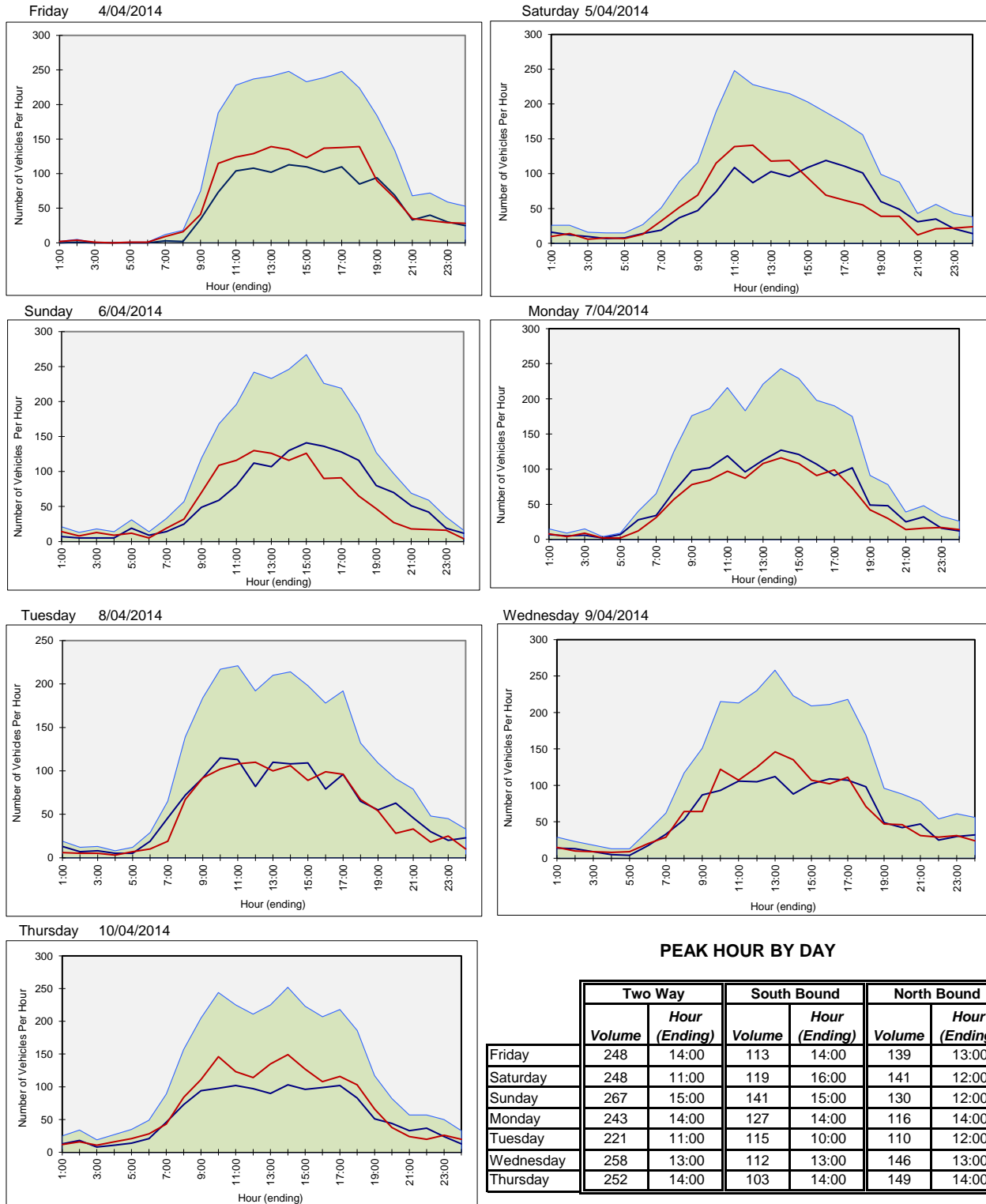


Average Weekday and Weekend Temporal Distributions (see page 5 for broad groupings)



Road Name EYRE HIGHWAY **Site** 6542
Road No. 2000 **RRD** 930.93 **AMG** QD357881
Locality LINCOLN GAP
Location 5.1km northeast of Lincoln Highway

Temporal Distributions of All Vehicles



Legend

Total Vehicles	
South Bound	
North Bound	

PEAK HOUR BY DAY

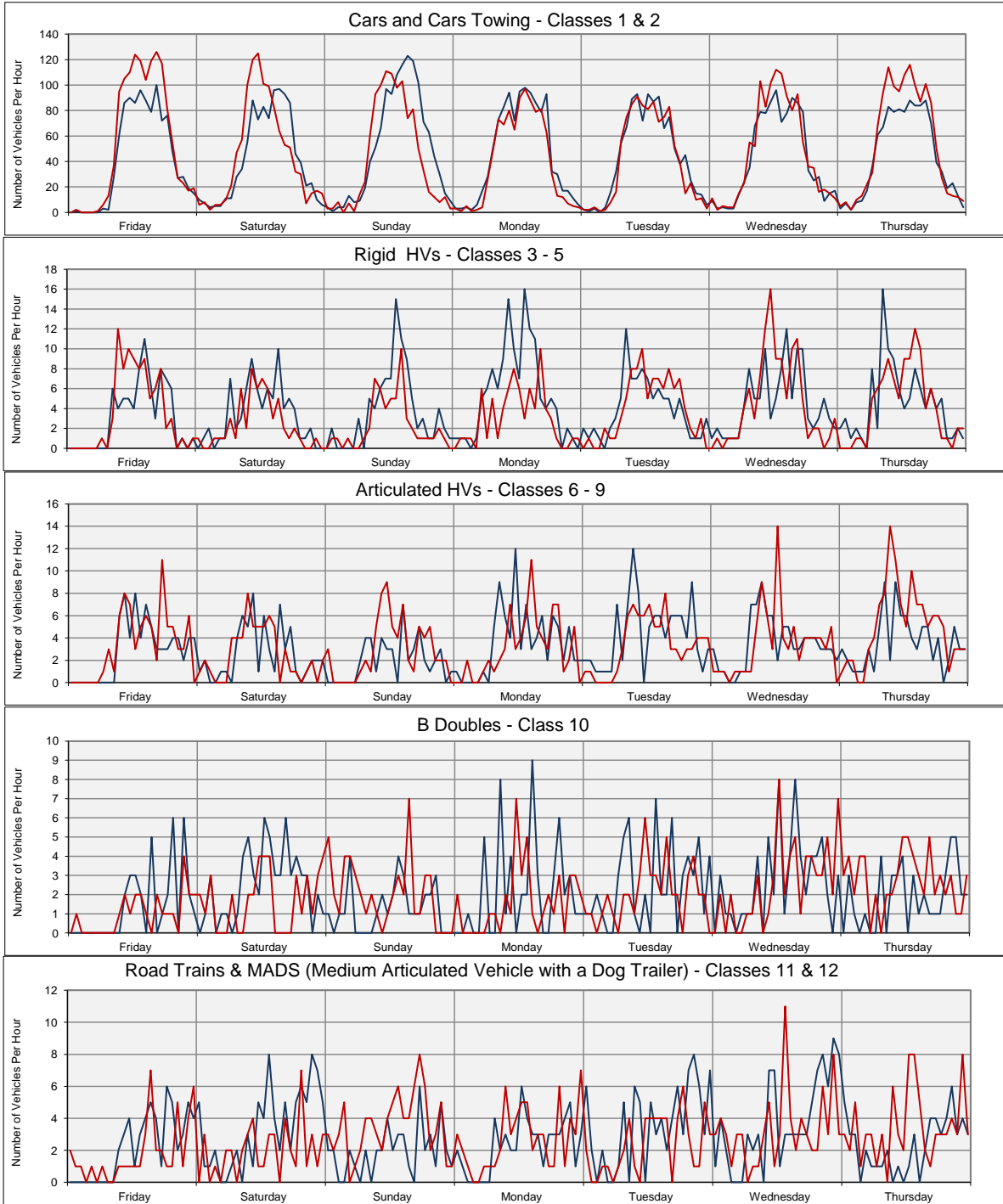
	Two Way		South Bound		North Bound	
	Volume	Hour (Ending)	Volume	Hour (Ending)	Volume	Hour (Ending)
Friday	248	14:00	113	14:00	139	13:00
Saturday	248	11:00	119	16:00	141	12:00
Sunday	267	15:00	141	15:00	130	12:00
Monday	243	14:00	127	14:00	116	14:00
Tuesday	221	11:00	115	10:00	110	12:00
Wednesday	258	13:00	112	13:00	146	13:00
Thursday	252	14:00	103	14:00	149	14:00

Count Summary (Two Way)

5 Day Average Daily Traffic	2779
7 Day Average Daily Traffic	2738
Est AADT (Annual Average Daily Traffic)	2,600

Road Name EYRE HIGHWAY **Site** 6542
Road No. 2000 **RRD** 930.93 **AMG** QD357881
Locality LINCOLN GAP
Location 5.1km northeast of Lincoln Highway

Temporal Distribution of Vehicle Classification Groups



Legend	
—	South Bound
—	North Bound

South Bound Traffic - Count Summary

5 Day Average Daily Traffic	1357
7 Day Average Daily Traffic	1356
5 Day Percentage of HVs	22.6%
7 Day Percentage of HVs	21.3%

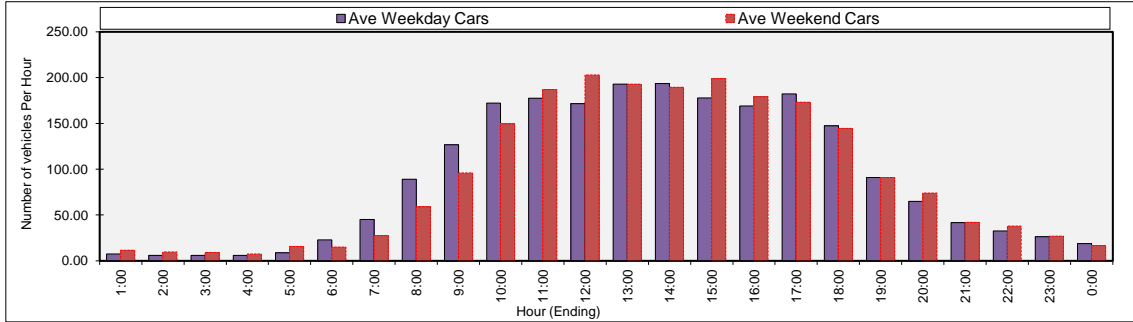
North Bound Traffic - Count Summary

5 Day Average Daily Traffic	1422
7 Day Average Daily Traffic	1381
5 Day Percentage of HVs	20.6%
7 Day Percentage of HVs	19.9%

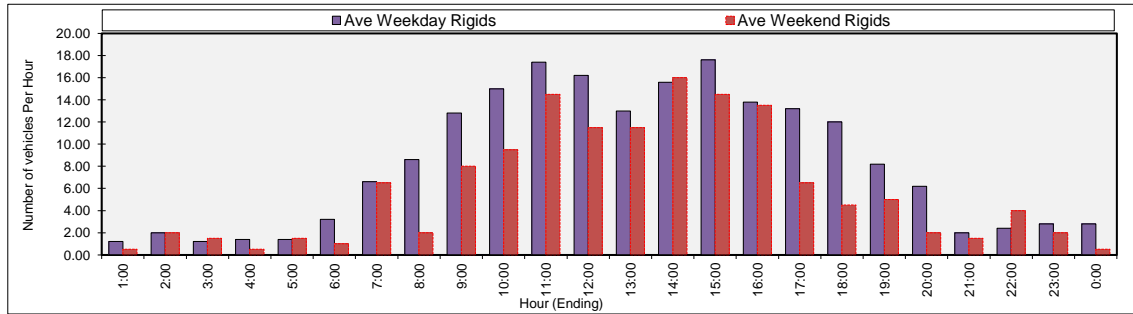
Road Name	EYRE HIGHWAY	RRD 930.93	Site	6542
Road No.	2000		AMG	QD357881
Locality	LINCOLN GAP			
Location	5.1km northeast of Lincoln Highway			

Average Weekday and Weekend Temporal Distributions

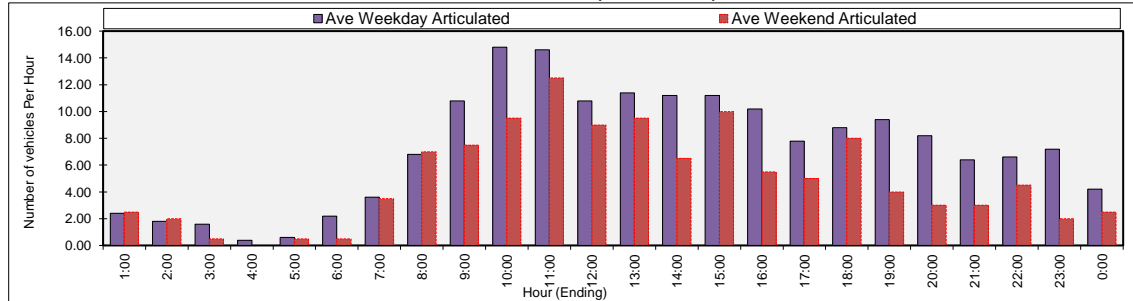
Cars and Cars Towing - (Classes 1 & 2)



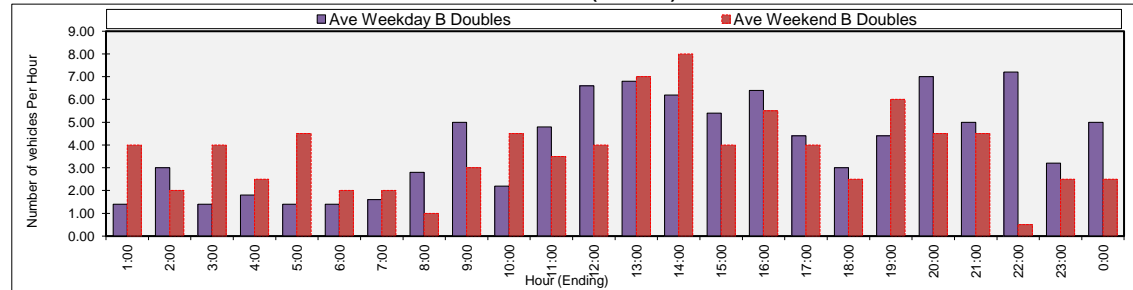
Rigid HVs - (Classes 3 - 5)



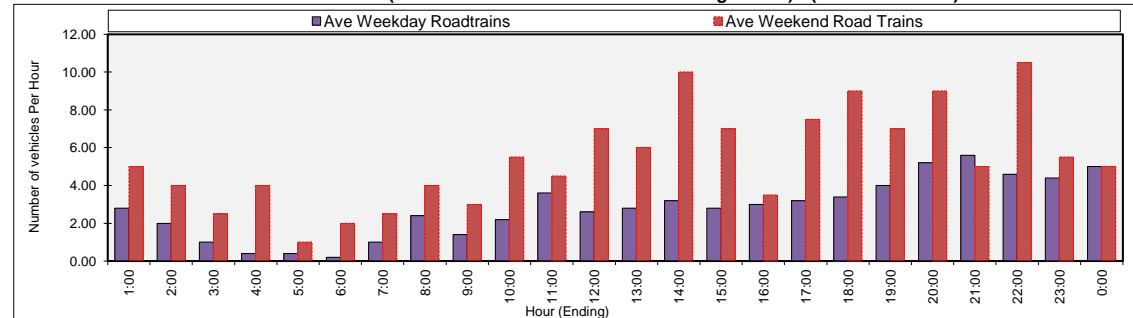
Articulated HVs - (Classes 6 - 9)















B Doubles - (Class 10)



Road Trains & MADS (Medium Articulated Vehicle with a Dog Trailer) - (Classes 11 & 12)



AUSTRROADS Vehicle Classification System

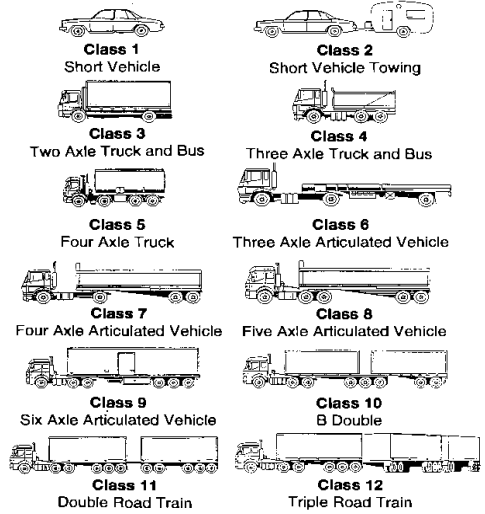
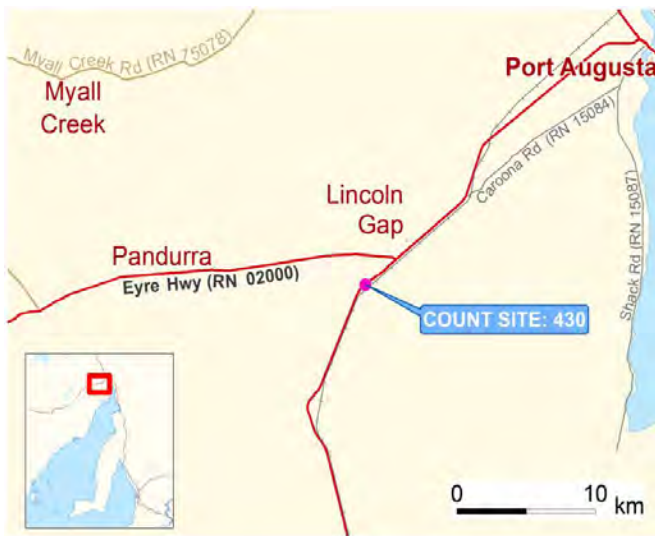
Level 1	Level 2		Level 3	AUSTRROADS Classification			
Length (indicative)	Axles and Axle Groups		Vehicle Type				
Type	Axles	Groups	Typical Description	Class	Parameters	Typical Configuration	
LIGHT VEHICLES							
Short up to 5.5m		1 or 2	Short Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc	1	$d(1) \leq 3.2\text{m}$ and axles = 2		
Medium 5.5m to 14.5m	3, 4 or 5	3	Short - Towing Trailer, Caravan, Boat, etc	2	groups = 3 $d(1) \geq 2.1\text{m}$, $d(1) \leq 3.2\text{m}$, $d(2) \geq 2.1\text{m}$ and axles = 3, 4 or 5		
	HEAVY VEHICLES						
		2	2	Two Axle Truck or Bus	3	$d(1) > 3.2\text{m}$ and axles = 2	
		3	2	Three Axle Truck or Bus	4	axles = 3 and groups = 2	
	> 3	2	Four Axle Truck	5	axles > 3 and groups = 2		
Long 11.5m to 19.0m	3	3	Three Axle Articulated Three axle articulated vehicle, or Rigid vehicle and trailer	6	$d(1) > 3.2\text{m}$, axles = 3 and groups = 3		
	4	> 2	Four Axle Articulated Four axle articulated vehicle, or Rigid vehicle and trailer	7	$d(2) < 2.1\text{m}$ or $d(1) < 2.1\text{m}$ or $d(1) > 3.2\text{m}$ axles = 4 and groups > 2		
	5	> 2	Five Axle Articulated Five axle articulated vehicle, or Rigid vehicle and trailer	8	$d(2) < 2.1\text{m}$ or $d(1) < 2.1\text{m}$ or $d(1) > 3.2\text{m}$ axles = 5 and groups > 2		
	≥ 6	> 2	Six Axle Articulated Six axle articulated vehicle, or Rigid vehicle and trailer	9	axles = 6 and groups > 2 or axles > 6 and groups = 3		
Medium Combination 17.5m to 36.5m	> 6	4	B Double B Double, or Heavy truck and trailer	10	groups = 4 and axles > 6		
	> 6	5 or 6	Double Road Train Double road train, or Medium articulated vehicle and one dog trailer (M.A.D.)	11	groups = 5 or 6 and axles > 6		
Large Combination Over 33.0m	> 6	> 6	Triple Road Train Triple road train, or Heavy truck and three trailers	12	groups > 6 and axles > 6		

Definitions:
 Group: Axle group, where adjacent axles are less than 2.1m apart
 Groups: Number of axle groups
 Axles: Number of axles (maximum axle spacing of 10.0m)

$d(1)$: Distance between first and second axle
 $d(2)$: Distance between second and third axle

Road No.	2600	Road Name	LINCOLN HIGHWAY	Site	430
Location	2.8km south of RN 2000 (Eyre Highway)			AMG	QD398869
RRD	2.87	Locality	LINCOLN GAP	Meter Type	Metrocount
				Year	2018

Click to view the location in Google Maps (imagery may not be current)



Based on 338 days acceptable data (93% of the Year)
Annual Average Daily Count Summary (Two Way)

All Vehicles 5 day (weekday) Average	2,284	Heavy Vehicles (Classes 3 to 12) 5 Day Average	454
All Vehicles 7 day Average	2,173	Heavy Vehicles (Classes 3 to 12) 7 Day Average	389
Est AADT (Annual Average Daily Traffic)	2,200	Heavy Vehicle (Classes 3 to 12) Content	18%

COMMENTS:

Totals by AUSTROADS Vehicle Classification (Dominant vehicles shown in diagram above) See Back Page for detailed description

Two way Traffic - 2018 Average

NB. Bin 13 contains unclassifiable vehicles

Class	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Monday	1639	159	169	34	9	13	22	12	63	45	70	1	1	2236
Tuesday	1527	132	184	34	12	10	20	14	68	49	81	1	2	2132
Wednesday	1592	134	188	35	11	10	19	11	63	51	75	1	1	2192
Thursday	1699	149	193	36	11	12	20	12	67	46	77	1	1	2323
Friday	1932	179	183	35	11	13	22	11	54	37	57	1	1	2536
Saturday	1433	151	115	18	6	10	18	3	27	18	22	0	1	1823
Sunday	1591	163	114	13	2	11	18	4	16	12	25	0	1	1968
5 Day Average	1678	150	183	35	11	12	21	12	63	46	72	1	1	2284
7 Day Average	1630	152	163	29	9	11	20	10	51	37	58	1	1	2173

South Bound - 2018 Average

Class	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Monday	857	85	106	18	5	8	14	7	32	22	33	0	1	1187
Tuesday	765	66	104	16	6	6	12	7	33	24	41	0	1	1081
Wednesday	784	66	103	18	6	6	11	5	32	26	38	0	1	1096
Thursday	813	70	104	19	5	7	11	7	34	23	40	0	1	1135
Friday	901	82	93	17	5	7	11	4	26	19	30	0	0	1195
Saturday	724	73	65	9	3	6	11	1	13	9	12	0	1	929
Sunday	825	82	67	6	1	6	10	3	9	6	11	0	1	1027
5 Day Average	824	74	102	18	5	7	12	6	32	23	36	0	1	1139
7 Day Average	810	75	92	15	4	6	11	5	26	19	29	0	1	1093

North Bound - 2018 Average

Class	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Monday	782	74	63	16	4	5	9	5	30	23	37	1	0	1049
Tuesday	762	66	80	18	5	4	8	7	35	25	40	0	1	1051
Wednesday	808	68	85	17	5	4	8	6	31	26	37	0	1	1096
Thursday	886	79	89	17	5	5	9	5	32	23	38	0	1	1188
Friday	1031	97	89	18	6	6	11	7	29	19	27	0	1	1341
Saturday	709	78	50	8	3	4	7	2	14	9	10	0	0	895
Sunday	766	80	47	7	1	4	7	1	7	6	13	0	0	941
5 Day Average	854	77	81	17	5	5	9	6	31	23	36	0	1	1145
7 Day Average	821	77	72	14	4	5	8	5	25	18	29	0	1	1080

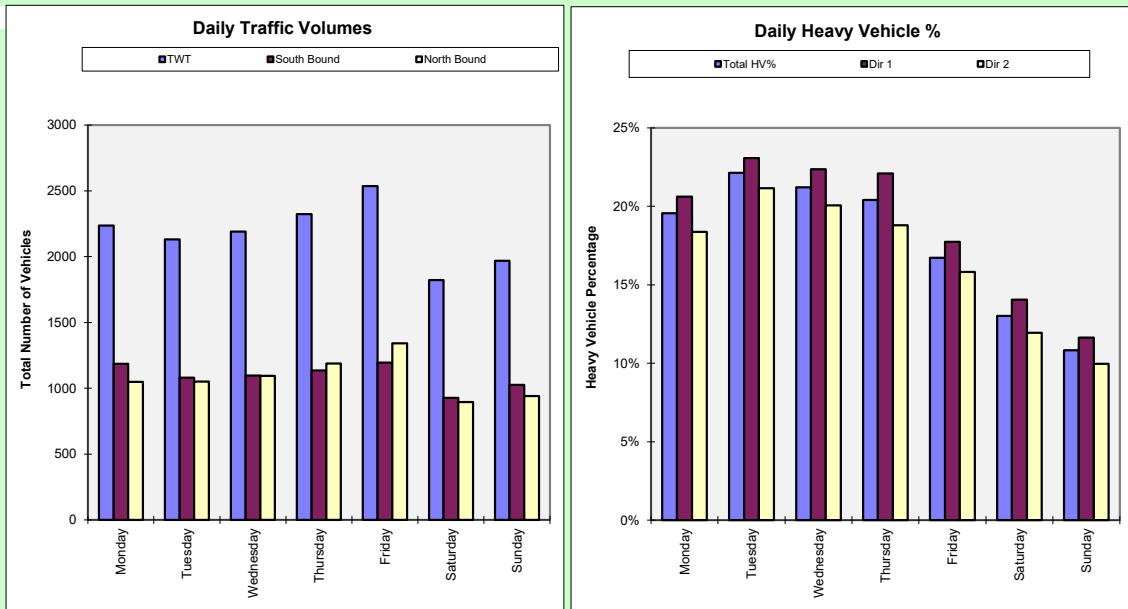
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Government of South Australia
Department of Planning,
Transport and Infrastructure

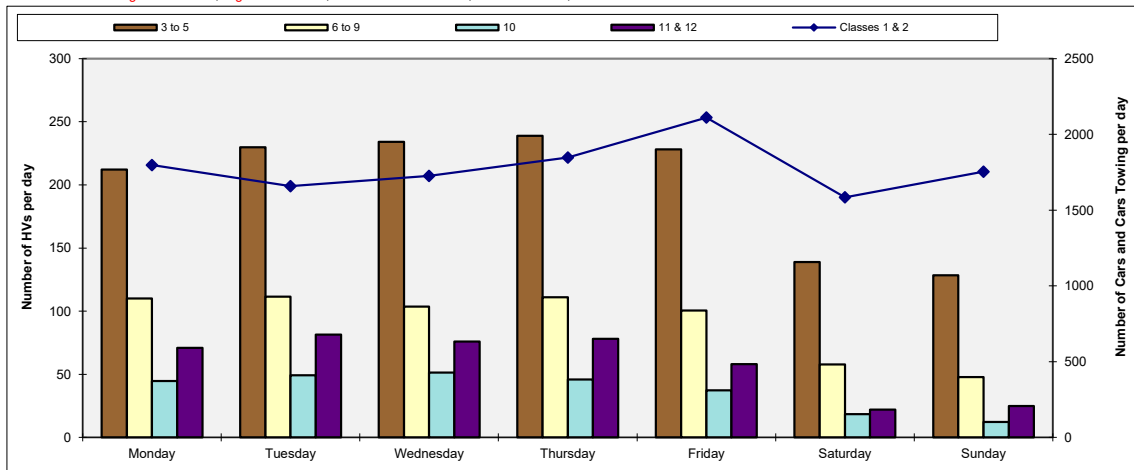
Road No.	2600	Road Name	LINCOLN HIGHWAY	Site	430
Location	2.8km south of RN 2000 (Eyre Highway)			AMG	QD398869
RRD	2.87	Locality	LINCOLN GAP	Year	2018

Annual Average Daily Traffic Volumes and Heavy Vehicle %

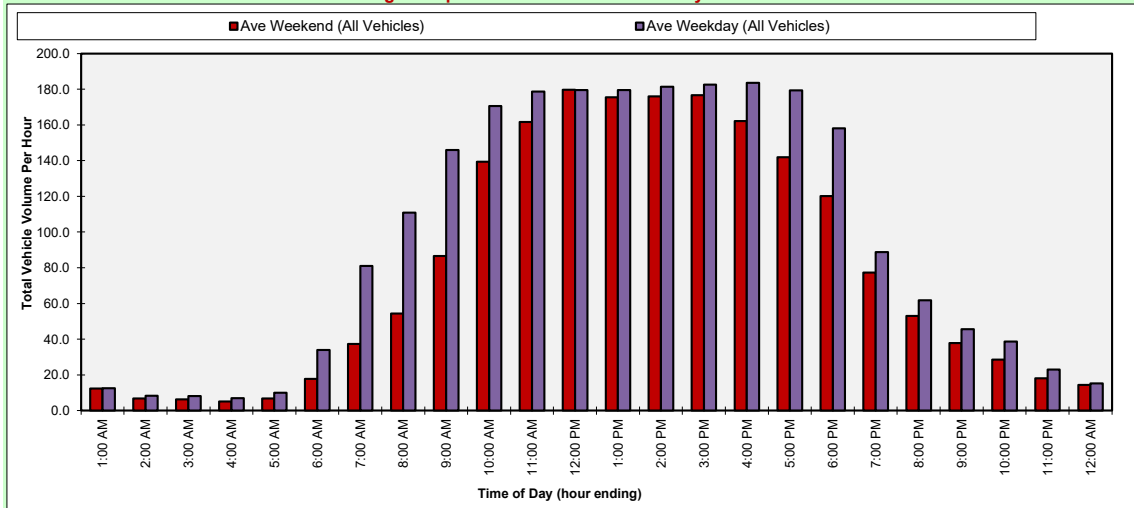


Annual Average Breakdown of Classifications by Broad Groupings

Cars and Cars Towing - Class 1 & 2, Rigid HVs - 3 to 5, Articulated HVs - 6 to 9, B-Doubles - 10, Road Trains or MAD 25m Combination Vehicles - 11 & 12



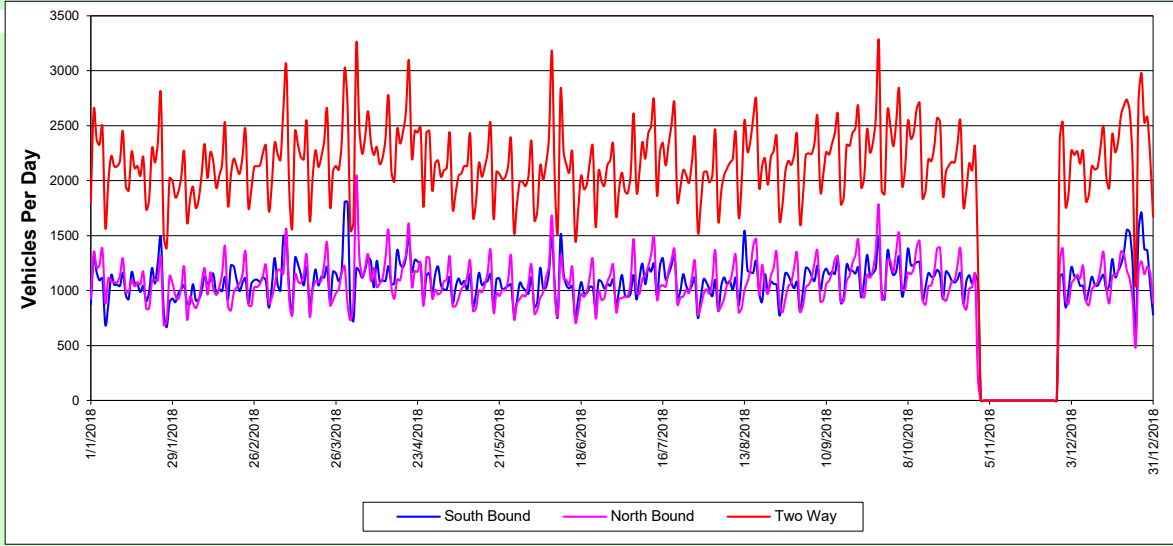
Annual Average Temporal Distribution for Weekday and Weekend Traffic



Note: Please see page 1 for disclaimer.

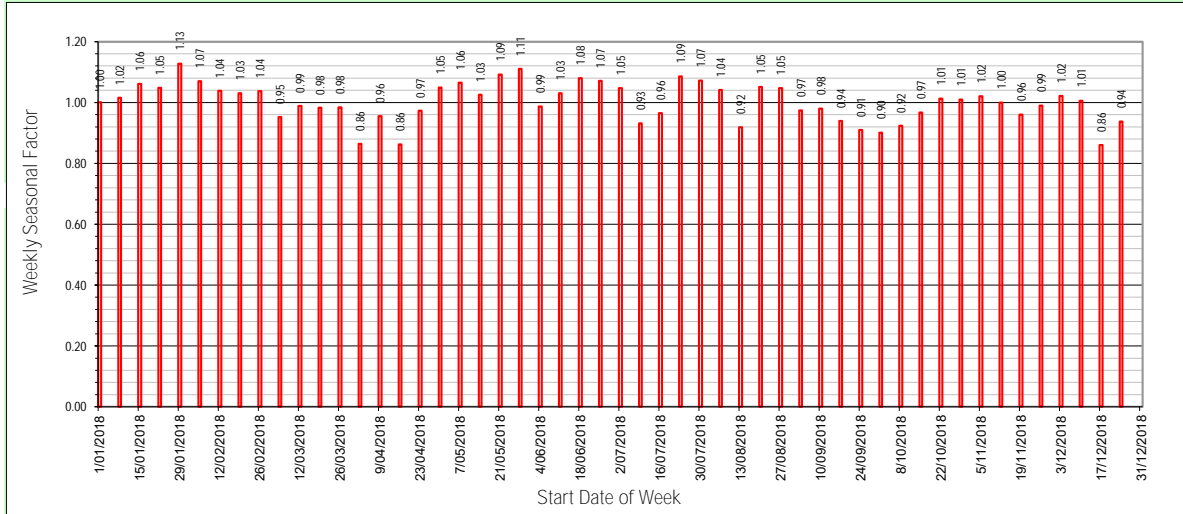
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Location	2.8km south of RN 2000 (Eyre Highway)			AMG	QD398869
RRD	2.87	Locality	LINCOLN GAP	Year	2018

TWO WAY DAILY TRAFFIC VOLUMES

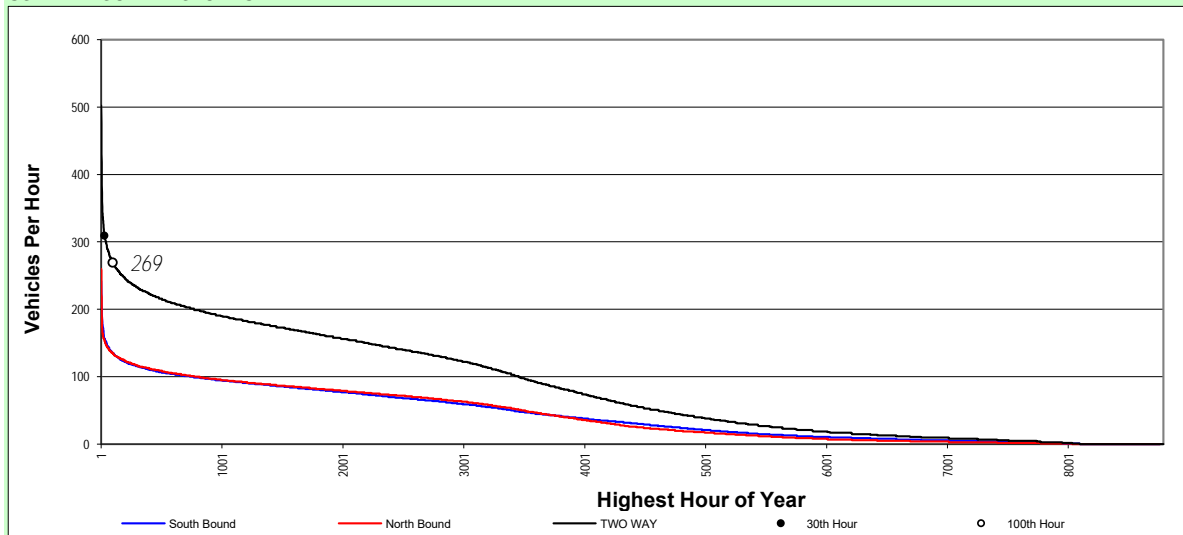


WEEKLY SEASONAL FACTOR

WADT = AADT / WSF



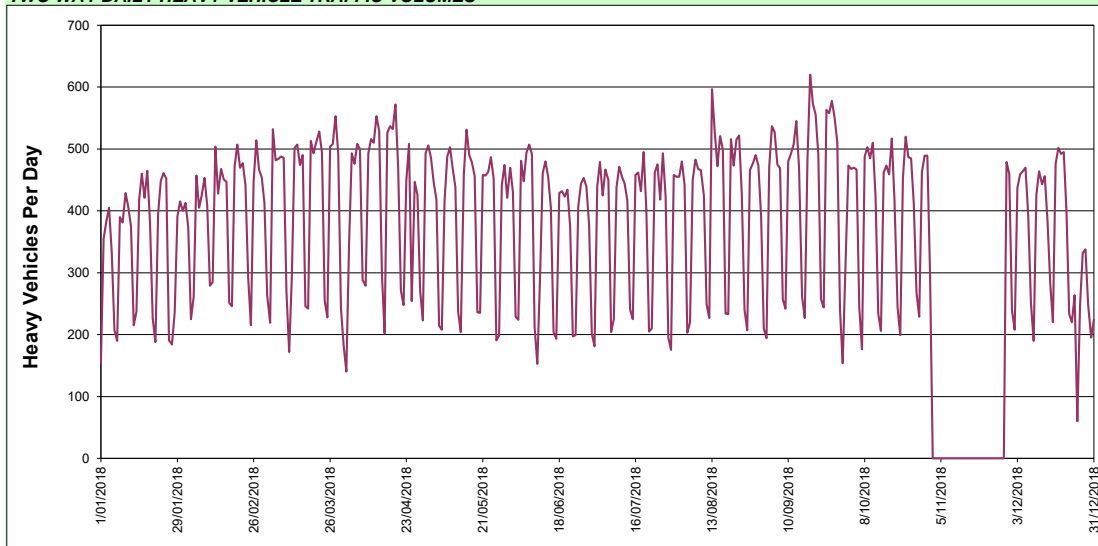
SORTED HOURLY VOLUMES



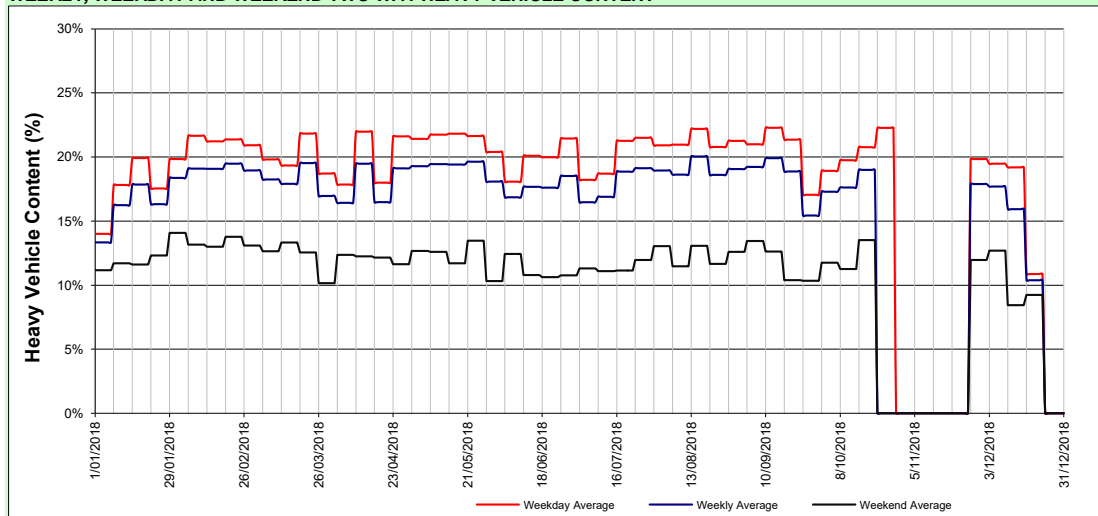
Note: Please see page 1 for disclaimer.

Road No.	2600	Road Name	LINCOLN HIGHWAY	Site	430
Location	2.8km south of RN 2000 (Eyre Highway)			AMG	QD398869
RRD	2.87	Locality	LINCOLN GAP	Year	2018

TWO WAY DAILY HEAVY VEHICLE TRAFFIC VOLUMES



WEEKLY, WEEKDAY AND WEEKEND TWO WAY HEAVY VEHICLE CONTENT



Public Holidays

- Monday, 1 January 2018
- Friday, 26 January 2018
- Monday, 12 March 2018
- Friday, 30 March 2018
- Saturday, 31 March 2018
- Monday, 2 April 2018
- Wednesday, 25 April 2018
- Monday, 11 June 2018
- Monday, 1 October 2018
- Tuesday, 25 December 2018
- Wednesday, 26 December 2018

- New Years Day
- Australia Day
- Adelaide Cup
- Good Friday
- Easter Saturday
- Easter Monday
- Anzac Day
- Queens Birthday
- Labour Day
- Christmas Day
- Proclamation Day

School Holidays

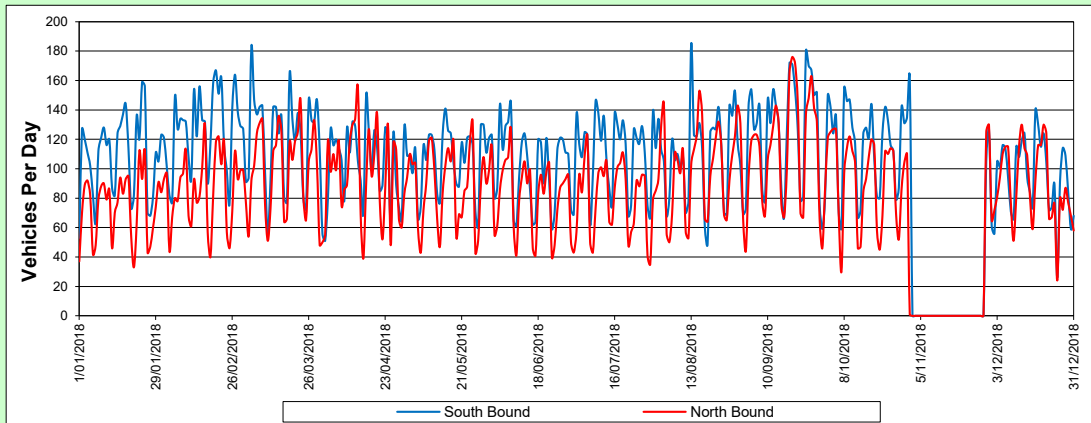
- 16 December 2017 – 28 January 2018
- 14 April 2018 - 29 April 2018
- 7 July 2018 - 22 July 2018
- 29 September 2018 - 14 October 2018
- 15 December 2018 – 29 January 2019

Events Possibly Affecting the Survey

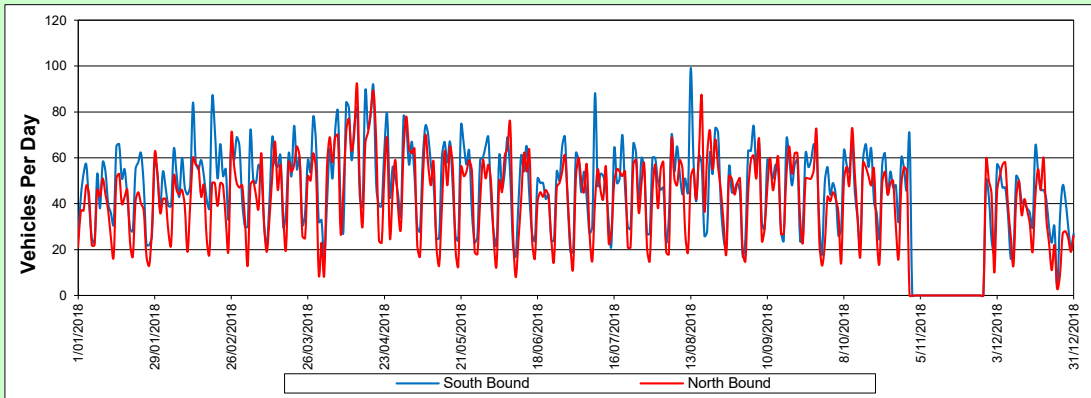
Note: Please see page 1 for disclaimer.

Road No.	2600	Road Name	LINCOLN HIGHWAY	Site	430
Location	2.8km south of RN 2000 (Eyre Highway)			AMG	QD398869
RRD	2.87	Locality	LINCOLN GAP	Year	2018

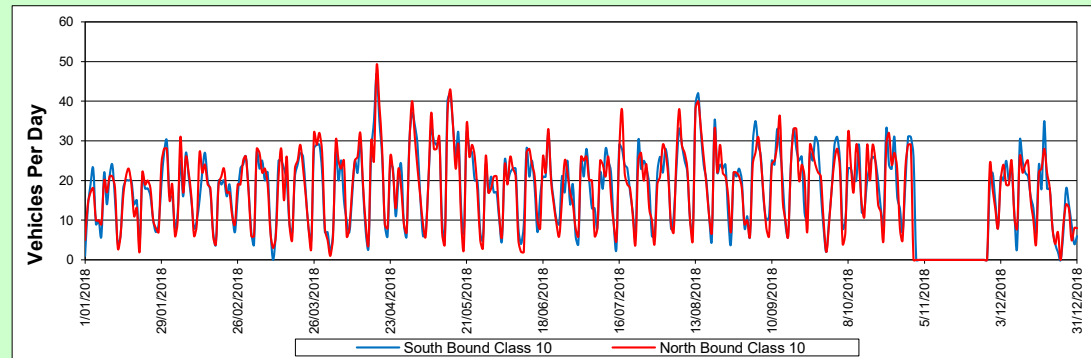
RIGID HEAVY VEHICLES - CLASSES 3 to 5



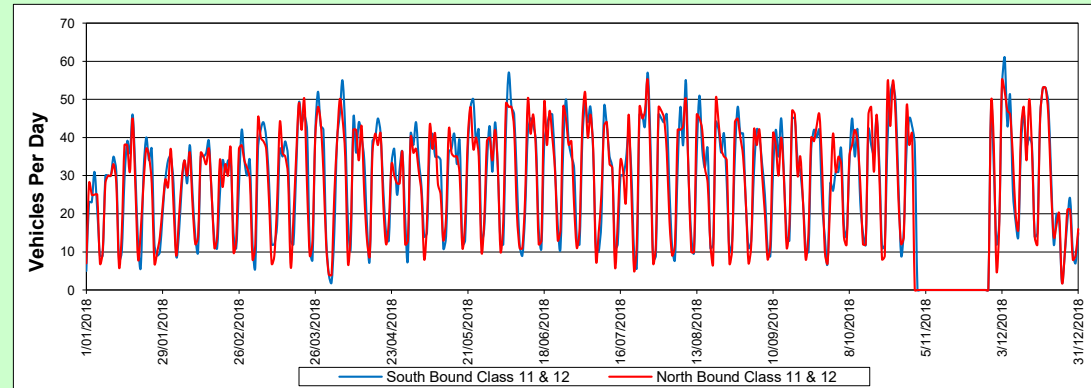
ARTICULATED HEAVY VEHICLES - CLASSES 6 to 9



ARTICULATED HEAVY VEHICLES - CLASS 10



ARTICULATED HEAVY VEHICLES - CLASSES 11 & 12

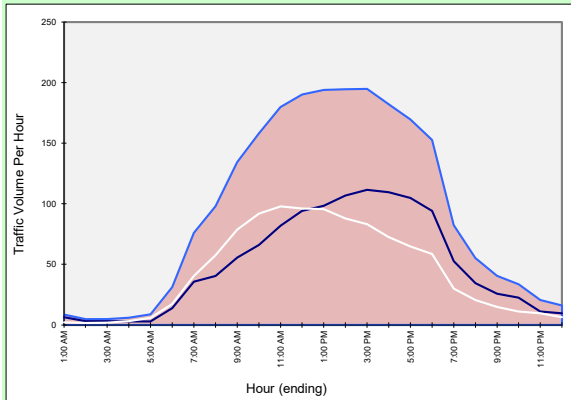


Annual Average Daily Temporal Distributions
LINCOLN HIGHWAY

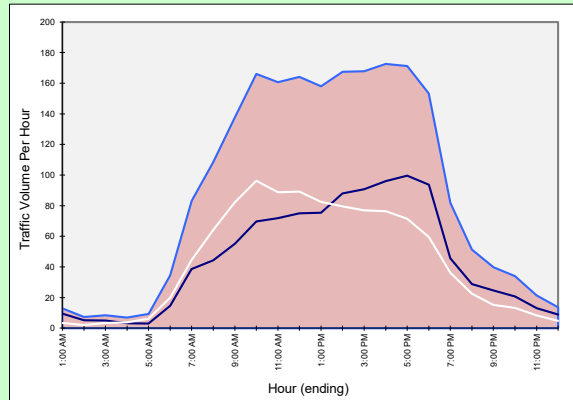
2.8km south of RN 2000 (Eyre Highway)

Site **430**
AMG **QD398869**
Year **2018**

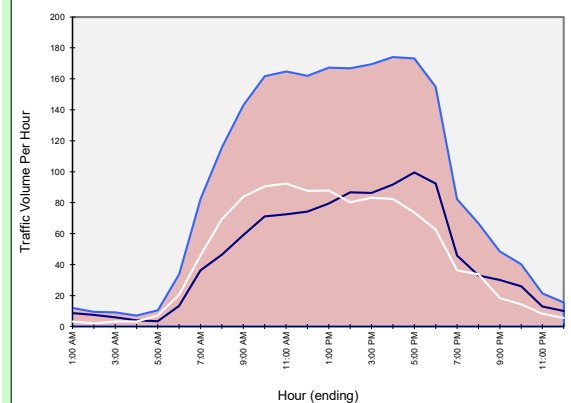
Monday



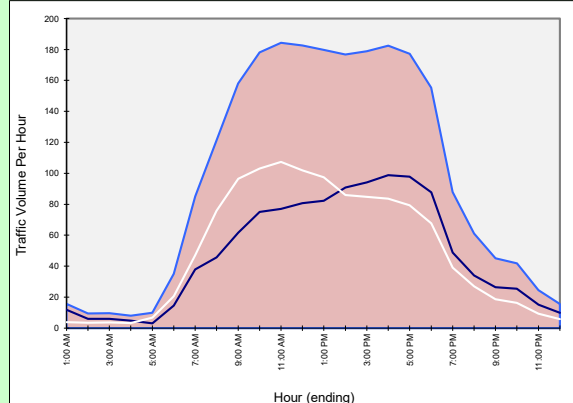
Tuesday



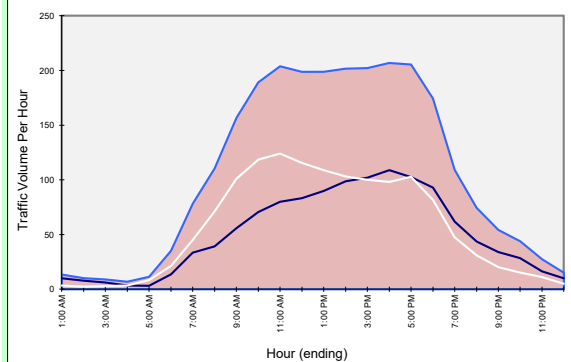
Wednesday



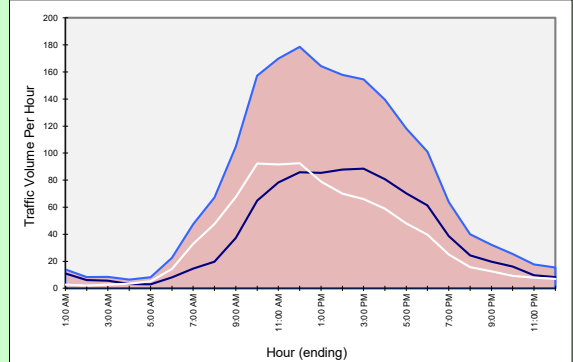
Thursday



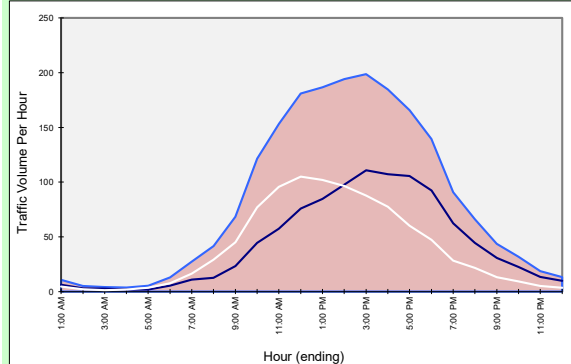
Friday



Saturday



Sunday



Annual Average Daily Count Summary (Two Way)

All Vehicles 7 day Average	2,173
All Vehicles 5 day (weekday) Average	2,284
Est AADT (Annual Average Daily Traffic)	2,200

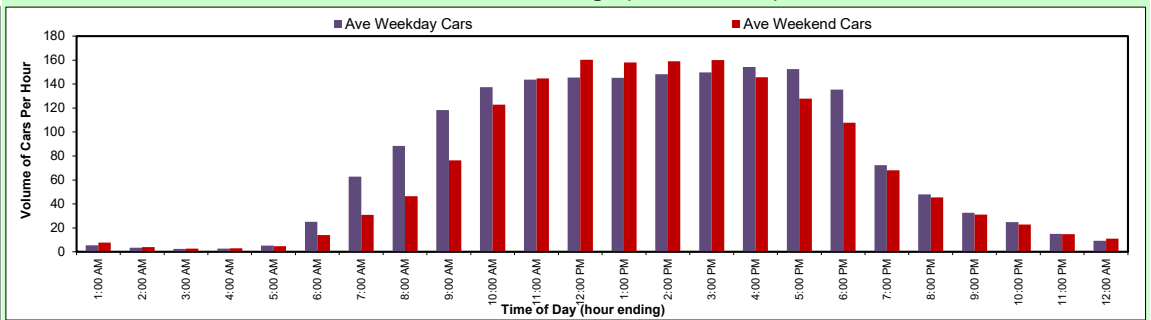
Legend

Total Traffic	
South Bound	
North Bound	

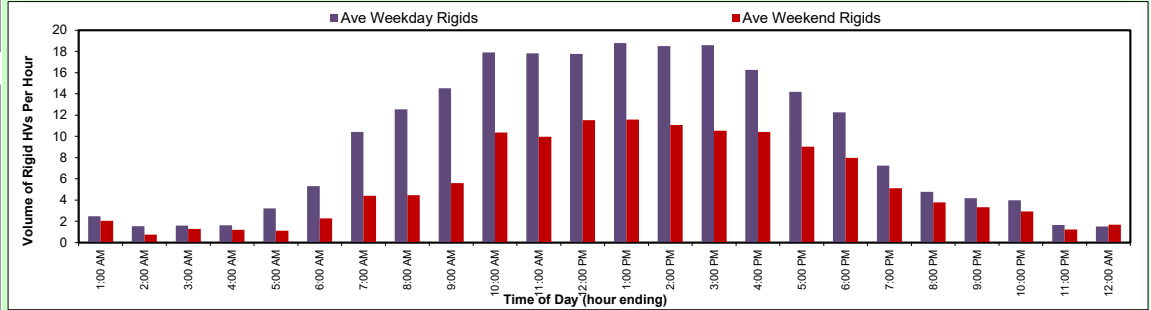
Note: Please see page 1 for disclaimer.

Annual Average Temporal Plots for Broad Classifications
 LINCOLN HIGHWAY
 2.8km south of RN 2000 (Eyre Highway)
 Site 430
 AMG QD398869
 Year 2018

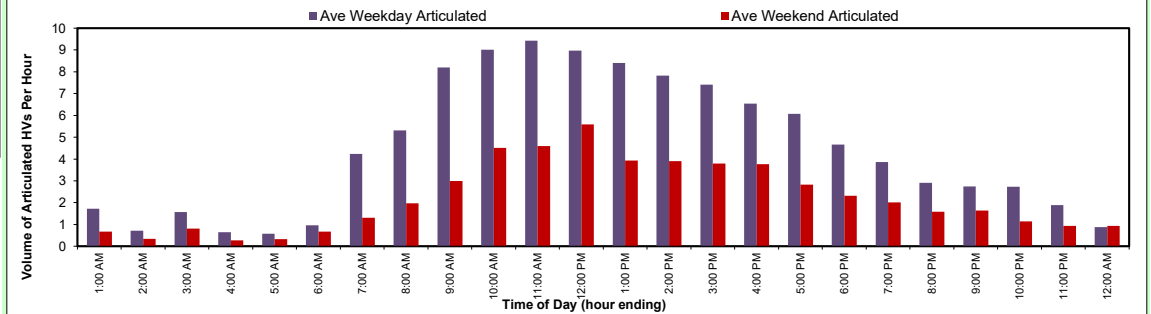
Cars and Cars Towing - (Classes 1 & 2)



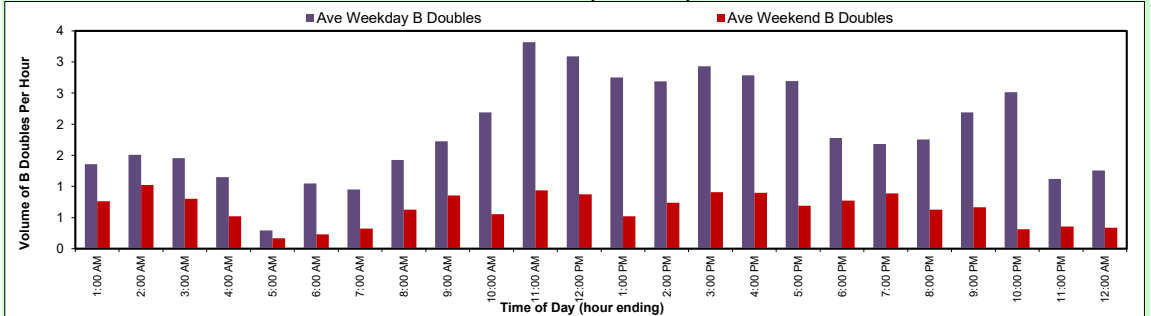
Rigid HVs - (Classes 3 - 5)



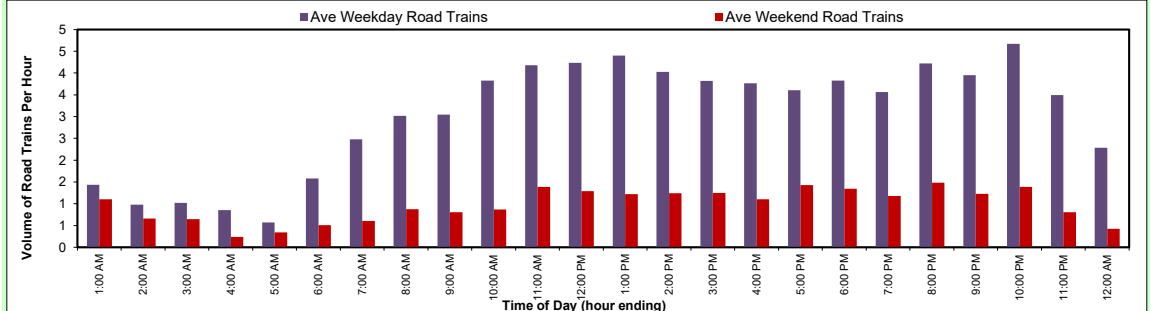
Articulated HVs - (Classes 6 - 9)



B Doubles - (Class 10)



Road Trains & MADs (Medium Articulated Vehicle with a Dog Trailer) - (Classes 11 & 12)



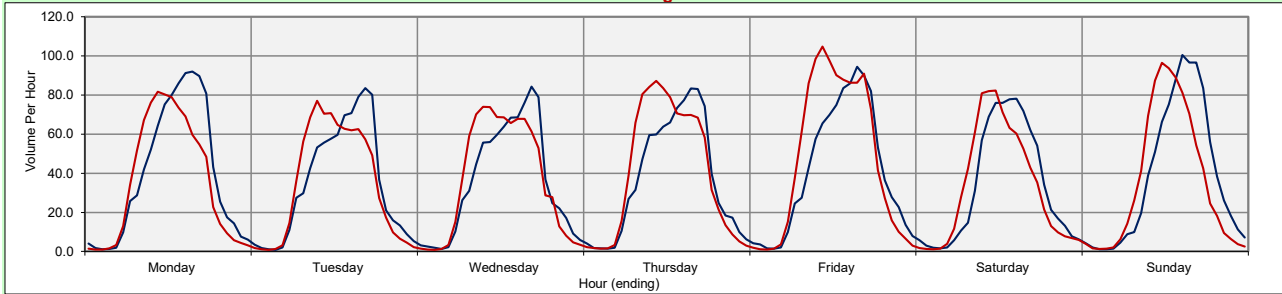
Note: Please see page 1 for disclaimer.

Annual Average Directional Daily Temporal Distributions of Vehicle Classification Groups
LINCOLN HIGHWAY

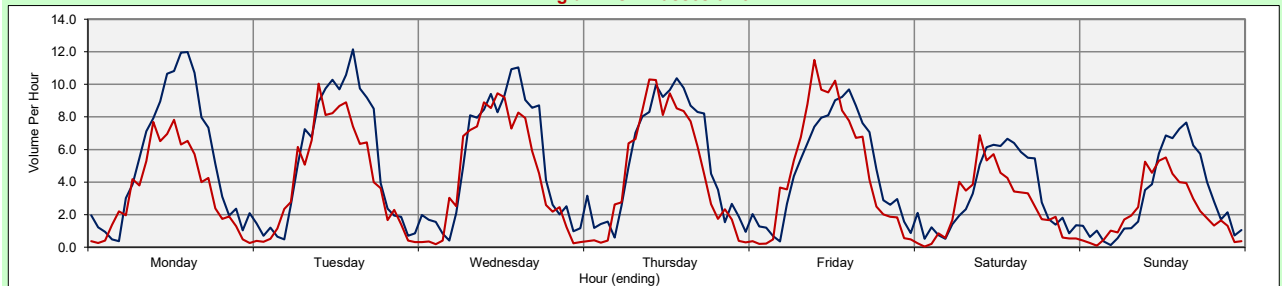
2.8km south of RN 2000 (Eyre Highway)

Site **430**
AMG **QD398869**
Year **2018**

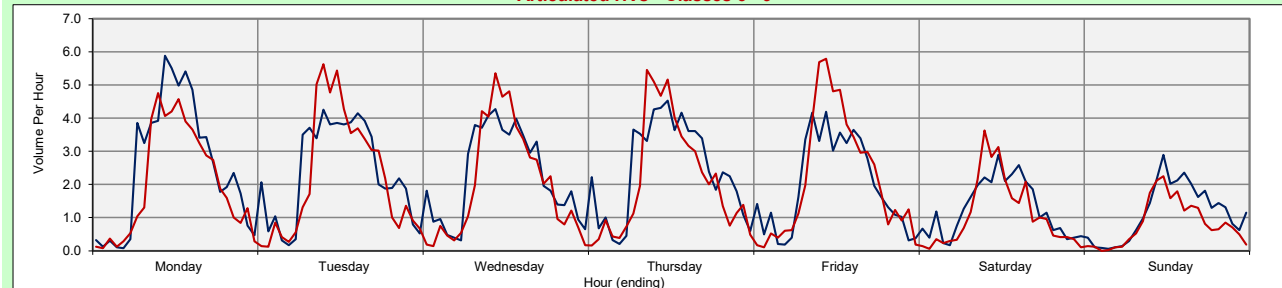
Cars and Cars Towing - Classes 1 & 2



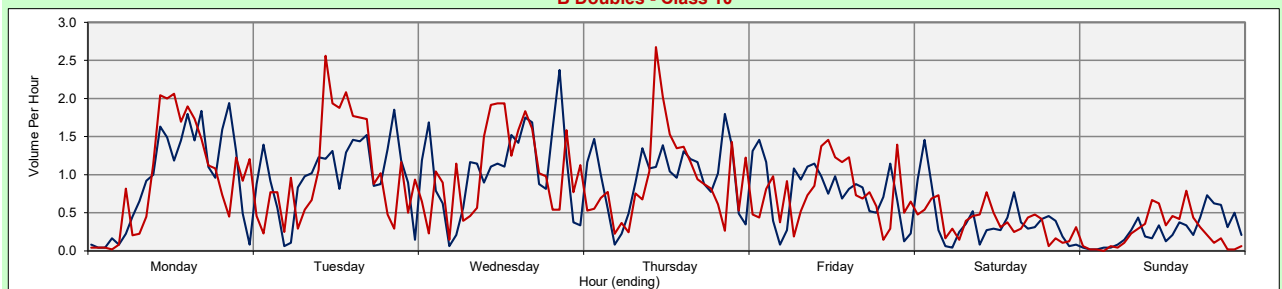
Rigid HVs - Classes 3 - 5



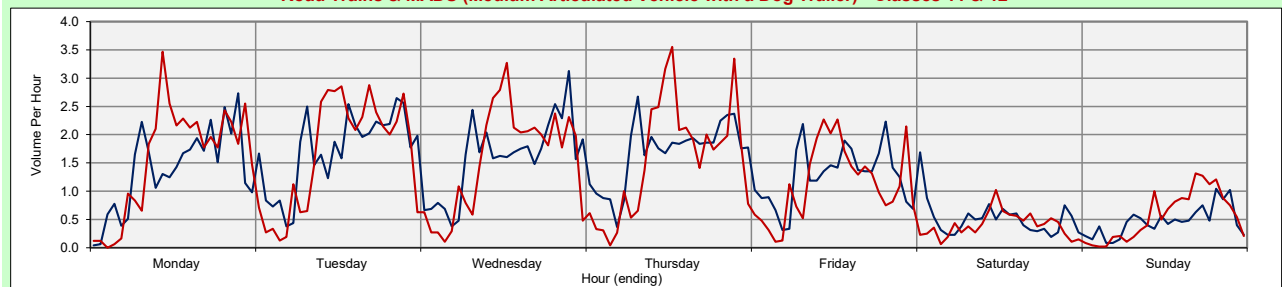
Articulated HVs - Classes 6 - 9



B Doubles - Class 10



Road Trains & MADS (Medium Articulated Vehicle with a Dog Trailer) - Classes 11 & 12





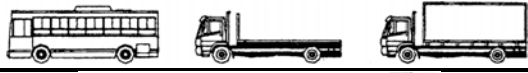
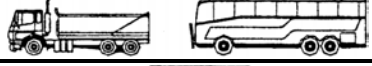








Legend

South Bound — (blue line)
North Bound — (red line)

Note: Please see page 1 for disclaimer.

	South Bound	North Bound
7 Day Average Daily Traffic	1,093	1,080
5 Day Average Daily Traffic	1,139	1,145
7 Day Percentage of HVs	19%	17%
5 Day Percentage of HVs	21%	19%

AUSTROADS Vehicle Classification System

Level 1	Level 2		Level 3	AUSTROADS Classification			
Length (indicative)	Axles and Axle Groups		Vehicle Type				
Type	Axles	Groups	Typical Description	Class	Parameters	Typical Configuration	
LIGHT VEHICLES							
Short up to 5.5m		1 or 2	Short Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc	1	$d(1) \leq 3.2m$ and axles = 2		
Medium 5.5m to 14.5m	3, 4 or 5	3	Short - Towing Trailer, Caravan, Boat, etc	2	groups = 3 $d(1) \geq 2.1m$, $d(1) \leq 3.2m$, $d(2) \geq 2.1m$ and axles = 3, 4 or 5		
	HEAVY VEHICLES						
		2	2	Two Axle Truck or Bus	3	$d(1) > 3.2m$ and axles = 2	
		3	2	Three Axle Truck or Bus	4	axles = 3 and groups = 2	
	> 3	2	Four Axle Truck	5	axles > 3 and groups = 2		
Long 11.5m to 19.0m	3	3	Three Axle Articulated Three axle articulated vehicle, or Rigid vehicle and trailer	6	$d(1) > 3.2m$, axles = 3 and groups = 3		
	4	> 2	Four Axle Articulated Four axle articulated vehicle, or Rigid vehicle and trailer	7	$d(2) < 2.1m$ or $d(1) < 2.1m$ or $d(1) > 3.2m$ axles = 4 and groups > 2		
	5	> 2	Five Axle Articulated Five axle articulated vehicle, or Rigid vehicle and trailer	8	$d(2) < 2.1m$ or $d(1) < 2.1m$ or $d(1) > 3.2m$ axles = 5 and groups > 2		
	≥ 6	> 2	Six Axle Articulated Six axle articulated vehicle, or Rigid vehicle and trailer	9	axles = 6 and groups > 2 or axles > 6 and groups = 3		
Medium Combination Over 33.0m	> 6	4	B Double B Double, or Heavy truck and trailer	10	groups = 4 and axles > 6		
	> 6	5 or 6	Double Road Train Double road train, or Medium articulated vehicle and one dog trailer (M.A.D.)	11	groups = 5 or 6 and axles > 6		
Large Combination Over 33.0m	> 6	> 6	Triple Road Train Triple road train, or Heavy truck and three trailers	12	groups > 6 and axles > 6		

Definitions:
 Group: Axle group, where adjacent axles are less than 2.1m apart
 Groups: Number of axle groups
 Axles: Number of axles (maximum axle spacing of 10.0m)

$d(1)$: Distance between first and second axle
 $d(2)$: Distance between second and third axle

ABOUT US

WSP is one of the world's leading engineering professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors, environmental specialists, as well as other design, program and construction management professionals. We design lasting Property & Buildings, Transportation & Infrastructure, Resources (including Mining and Industry), Water, Power and Environmental solutions, as well as provide project delivery and strategic consulting services. With approximately 48,000 talented people globally, we engineer projects that will help societies grow for lifetimes to come.





Environment Protection Authority
GPO Box 2607 Adelaide SA 5001
211 Victoria Square Adelaide SA 5000
T (08) 8204 2004
Country areas 1800 623 445

EPA Reference: PDI 3

21 April 2020

Simon Neldner
Team Leader - Crown and Major Developments
Planning and Land Use Services
Department of Planning, Transport and Infrastructure

Simon.Neldner@sa.gov.au

Dear Simon Neldner

Referral Response - Section 49 Development Act (Crown Development by State Agencies)

Development Application Number	923/V001/19
Applicant	Lincoln Gap Wind Farm Pty Ltd
Location	Eyre Highway, Lincoln Gap Land Not Within A Council Area
Proposal	Construction of 42 wind turbines and ancillary infrastructure, adjacent existing wind farm at Lincoln Gap (Stage 3)

This application was referred to the Environment Protection Authority (EPA) by the Minister for Planning in accordance with section 122 of the *Planning, Development and Infrastructure Act 2016*. The following response is provided in accordance with section 122(5)(b)(ii) of the *Planning, Development and Infrastructure Act*.

The EPA assessment criteria are outlined in section 57 of the *Environment Protection Act 1993* and include the objects of the Environment Protection Act, the general environmental duty, relevant environment protection policies and the waste strategy for the State.

Advice in this letter includes consideration of the location with respect to existing land uses and is aimed at protecting the environment and avoiding potential adverse impacts upon the locality.

PROPOSAL

The proposal is for a further stage to the renewable energy project known as Lincoln Gap Wind Farm. The development seeks the construction of Stage 3 of the Lincoln Gap Wind Farm (Stage 3) at Lincoln Gap, in the north of the Eyre Peninsula in South Australia. The project involves the construction of 42 wind turbine generators (WTG) and ancillary infrastructure.

The initial stages of the Lincoln Gap Wind Farm (LGWF) involved the construction of 59 wind turbines, and were approved in 2018 (referred to as Stage 1 and 2). Stage 3 would position 42 additional turbines across two areas; within, and south, of the LGWF Stage 1 and 2 site. This stage would provide up to 252

Megawatts (MW) of generating capacity, providing further contribution to the reliability and stability of South Australia's energy system.

The wind farm proposal would comprise:

- Up to 42 WTGs with a maximum 252 MW capacity and ancillary infrastructure
- At least three potential wind turbine models are under consideration consist of:
 - GE 5.3 MW model; with a rated capacity of 5.3 MW, hub height of 121 m, rotor diameter of 158 m, and maximum tip height of 200 m
 - Vestas 5.6 MW model; with a rated capacity of 5.6 MW, hub height of 125 m, rotor diameter of 162 m, and a maximum tip height of 206 m
 - Siemens Gamesa, SG 6.0-155 model; with a rated capacity of 6.0 MW, hub height of 107.5 m, rotor diameter of 155 m, and maximum tip height of 185 m.

It is anticipated that the Project would generate approximately 960 GWh of clean energy per year (based in the largest turbine model under consideration).

SITE DESCRIPTION

The site of the proposed development is located 15 km south-west of Port Augusta. The site is located across three allotments, and is intersected by the Eyre Highway. The allotments are as follows:

- Area 1, north of the Eyre Highway: Section 4 of Hundred Plan 540400, in the Hundred of Handyside, CT6138/344. Plus Section 2 of Hundred Plan 540400, in the Hundred of Handyside, CT 6138/388 (this allotment will be used for site access only)
- Area 2, south of the Eyre Highway: Piece 1 in Deposited Plan 37168, in the Hundred of Handyside - CT 6138/331.

The site of the proposed renewable energy project is located within the Remote Areas Zone under the Planning and Design Code as applying to Land Not Within a Council Area. The proposed site is located adjacent to the existing LGWF Stage 1 and 2, and was used primarily for pastoral grazing.

Two beneficiary dwellings are located within the affected area.

CONSIDERATION

Advice in this letter includes consideration of the location with respect to existing land uses and is aimed at protecting the environment and avoiding potential adverse impacts upon the locality.

It should be noted that the referral trigger to the EPA is for 'Energy generation and storage facilities - Windfarm' + 'Energy Generation and Storage' as per the Planning and Design Code: Part 8. The EPA has therefore only provided an assessment relating to potential noise impacts from the proposed wind farm turbines.

In its assessment, the EPA considered the plans and specifications supplied in the development application including the following documents:

- Lincoln Gap Wind Farm Stage 3 Development Application Report dated 22 November 2019 by WSP
- WSP Lincoln Gap Stage 3 Noise Assessment Report dated 19 November 2019 (document

reference PS119707-ACO-REP-001 Rev1, July 2019)

- Letter from WSP titled 'Response to EPA RFI for the LGWF Stage 3 - DA 923V00119'

ENVIRONMENTAL ASSESSMENT

Wind Farm Noise

The proposed wind farm layout is based on the installation of up to 42 wind turbine generators (WTGs). Noise from the proposed wind farm was assessed by the EPA against the provisions of the EPA's *Wind farms environmental noise guidelines 2009* (the Guidelines). The Guidelines outline noise criteria specific to the assessment of environmental noise impacts generated by wind farms. The acoustic report also contains key information relevant to the consideration of the proposal against the criteria contained in the Guidelines.

The WSP Development Application report was prepared with regard to relevant zoning being in the Remote Areas Zone of the Planning and Design Code, Phase 1 in The Outback (land not within a council area), within which the closest noise sensitive receivers are located.

An acoustic assessment of Lincoln Gap Stage 1 and 2 was completed by Marshall Day in September 2014 and an updated assessment was completed by Sonus in August 2018. The Sonus assessment found that noise levels due to Stage 1 and Stage 2 at the two nearest identified noise sensitive receivers achieve the nominated 45 dB(A) LA_{eq} noise criterion.

It is understood that four models of wind turbines are being considered for Lincoln Gap Stage 3 including:

- Vestas V162 5.6MW
- Senvion 4.5 MW
- Siemens Gamesa 6.0 MW-155
- GE 5.3 MW-158

The WSP Development Application report notes that the Stage 3 proposed wind turbine locations have been assessed based on expected environmental noise from the Vestas V162 5.6MW model with a hub height of 125m. The Vestas V162 5.6 MW model has the highest maximum sound power level at 106.8 dB(A), and was therefore assessed as the worst case turbine, from a noise perspective.

Beneficiary Land Owners

There are two beneficiary land owners. The Guidelines acknowledge that commercial agreements may be entered into with landowners having financial involvement in the wind farm. Where landowners enter into a commercial agreement with the wind farm developer, the recommended noise levels at their residences may be different to that of landowners without any such agreement.

The Guidelines indicate that meeting an indoor noise level of 30dB(A) and 45dB(A) outside is considered acceptable for land owners having a financial involvement in the wind farm. The Guidelines also state that in particular situations the expected noise impact may be above the recommended limits, and in such cases the landowner must agree in writing with the higher level of exposure. Furthermore, the Guidelines stipulate that the likely exposure should not result in adverse health impacts (i.e. causing sleep disturbance).

Two noise sensitive receivers were identified in the area of Stage 3 and consist of a house (H1) and a shearer's quarters (S1). It is understood that the landowner of the two noise sensitive receiver locations has a commercial interest in the project. The assessment has therefore adopted a 45dB(A) LAeq,10min noise criterion for outdoors localities belonging to the 'host receivers'.

WSP provided additional information (letter titled 'Response to EPA RFI for the LGWF Stage 3 - DA 923V00119') regarding micro-siting on the 30 March 2020. This considered adverse impacts from changes associated with a 250m micro-siting diameter by moving each Stage 3 turbine 125m closer to the midpoint between the two host receivers (S1 and H1). The response advises that it is highly unlikely that all turbines will be re-positioned in this manner; turbine micro-siting is more likely to occur in an incoherent manner, subject to local conditions at the base of each turbine.

This assessment predicts noise levels at the identified noise sensitive receivers H1 (house) and S1 (shearer's quarters) due to:

- the proposed Stage 3 only
- the cumulative effects of Lincoln Gap Stages 1, 2, and 3
- the cumulative effects of Lincoln Gap Stages 1, 2, and 3 with allowance for 125m micro-siting of the Stage 3 turbines.

Due to the relatively low noise contribution of the Stage 3 turbines, the cumulative result of Stages 1, 2, and 3 is predicted to increase noise levels by less than 1 dB(A) at the relevant noise receiver locations as compared to Stages 1 and 2 only. Micrositing Stage 3 turbines 125m closer to the receivers is predicted to increase noise levels at the relevant noise receivers by less than 1 dB(A). Sound levels predictions for all assessed configurations achieve the nominated criterion of 45 dB(A) LAeq at the house (H1) and shearer's quarters (S1). This is acceptable to the EPA.

Noise Sensitive Receivers Without Commercial Interest in the Development

In addition to the two 'host receivers' five potential additional noise-sensitive receivers have also been considered. Of the five potential additional noise-sensitive locations, four are located further than 3,500m from the nearest Lincoln Gap Stage 3 Windfarm turbine, and include:

- Vacant residence 1 (3,500m from nearest Stage 3 turbine)
- Vacant residence 2 (4,000m from nearest Stage 3 turbine)
- El Alamein Airfield (7,500m from nearest Stage 3 turbine)
- Nuttbush retreat (15,000m from nearest Stage 3 turbine)

Following the methodology described in the WSP Lincoln Gap Stage 3 Noise Assessment Report, wind turbine noise at these four locations is predicted to be significantly less than 30 dB(A), for all of the evaluated turbine configurations.

The fifth potential additional noise-sensitive location, "The Tanks" Truck Rest Area is located 1900m from the nearest Lincoln Gap Stage 3 turbine. The correspondence advises that if the Truck Rest Area is considered a noise-sensitive receiver (not primarily intended for rural living) for the purpose of this assessment, a criteria of 40 dB(A) would apply. Wind turbine noise is predicted to be less than 38 dB(A) at this location considering Stage 1, 2, and 3 turbines (Stage 3 with 125m micro-siting). This is acceptable to the EPA.

The EPA considers that the proposed wind farm would be capable of operating in accordance within the parameters of the Guidelines if the conditions recommended below are attached to any consent granted.

CONCLUSION

The EPA considers that the proposed wind farm is appropriately located and designed to minimise noise impacts upon dwellings. The conditions advised below play an important role in reinforcing installation and commissioning requirements to ensure the wind farm development is compatible with the EPA's Wind farm environmental noise guidelines (July 2009) and the potential for adverse noise impacts at relevant receivers is minimised.

ADVICE

The following advice is provided for the purposes of section 49 of the Development Act:

Recommended conditions:

1. Noise levels at the noise sensitive receivers in the vicinity of the wind farm development must meet the recommended noise levels contained in the Environment Protection Authority's Wind Farms Environmental Noise Guidelines (July 2009). The noise levels at the relevant receivers* must not exceed:
 - a. 35dB(A) if receivers are situated in the Rural Living Zone, or
 - b. 40dB(A) if receivers are situated in zones other than the Rural Living Zone, or
 - c. 45dB(A) if receivers belong to commercial stakeholders** of the project
 - d. The background noise ($L_{A90,10}$) by more than 5dB(A) when assessed against provisions of the EPA's Wind Farms Environmental Noise Guidelines (2009) whichever is the greater.

**A relevant receiver is defined as an occupied dwelling where the owners do not have an agreement with the wind farm developer. The above measured noise levels shall be adjusted in accordance with the Environment Protection Authority's Wind Farms Environmental Noise Guidelines (2009) by the inclusion of a penalty for tonal characteristic where necessary.*

An occupied dwelling that belongs to a commercial holder. A commercial stakeholder typically has a formal agreement with wind farm developer that provides the landowner financial **compensation for hosting wind turbines or other elements of wind farm's infrastructure.

2. A final pre-construction noise assessment must be submitted which confirms compliance with the applicable operational criteria based on the final wind turbine generator selection, layout and warranted sound power levels. The warranted sound power levels must be measured and reported in accordance with IEC61400-11 Ed3.0; Wind turbines - Part 11: Acoustic noise measurement techniques. The final preconstruction noise assessment report must be submitted to the satisfaction of the Minister for Planning, having consulted with the Environment Protection Authority prior to the commencement of construction of the wind farm.
3. Noise emitted by the selected wind turbine generators intended for installation must not include tones audible at the noise receivers ($\Delta L_{a,k} > 0$) when tested in accordance with the tonality test procedure defined in IEC61400-11, Ed3.0: Wind turbines - Part 11: Acoustic noise

measurement techniques or a methodology of tones assessment otherwise agreed with the Environment Protection Authority. The absence of tones must be verified by results of post-construction tonality testing at locality Receiver H1 as shown in the WSP Lincoln Gap Stage 3 Noise Assessment Report dated 19 November 2019 (document reference PS119707-ACO-REP-001 Rev1, July 2019) or such other localities agreed by the Minister for Planning, having consulted with the Environment Protection Authority. The results of the post-construction tonality testing shall be submitted to the Minister within three months of the proposed development commencing operation. The Minister must confirm their satisfaction with any post-construction tonality testing, having consulted with the Environment Protection Authority.

4. An independent acoustical consultancy (other than the company that prepared the predictive acoustical report) must monitor noise levels at one locality at least Receiver H1 (as detailed in the acoustic report WSP Lincoln Gap Stage 3 Noise Assessment Report dated 19 November 2019 (document reference PS119707-ACO-REP-001 Rev1, July 2019), or such other localities agreed to by the Minister for Planning, having consulted with the Environment Protection Authority. Monitoring must be undertaken in accordance with the EPA's Wind Farms Environmental Noise Guidelines (2009) with all of the noise sources associated with the wind farm in full operating mode. The results of this monitoring must be submitted to the Minister within 3 months of the proposed development commencing operation. The Minister must confirm their satisfaction with the results of the post-construction noise monitoring, having consulted with the Environment Protection Authority.
5. If post-construction noise monitoring results reveal non-compliance with the specified noise criteria, the applicant must arrange for the noise monitoring of other relevant noise sensitive receivers. Measures to ensure compliance with the specified noise criteria must be undertaken by the applicant for all of the localities where non-compliance with the noise criteria is revealed. Agreement with the land owners of the noise affected premises can be considered as an option in accordance with the Environment Protection Authority's *Wind farms environmental noise guidelines (July 2009)*.

The following notes provide important information for the benefit of the applicant and are requested to be included in any approval:

- The applicant is reminded of its general environmental duty, as required by section 25 of the *Environment Protection Act 1993*, to take all reasonable and practicable measures to ensure that the activities on the whole site, including during construction, do not pollute the environment in a way which causes or may cause environmental harm.
- The applicant is reminded that construction will need to be undertaken in accordance with Division 1 of Part 6 of the *Environment Protection (Noise) Policy 2007* at all times.
- EPA information sheets, guidelines documents, codes of practice, technical bulletins etc. can be accessed on the following web site: <http://www.epa.sa.gov.au> .

If you have any questions about this response, please contact Robert de Zeeuw Senior Environmental Planner on 8204 1112 or email robert.dezeeuw@sa.gov.au .

Please forward a copy of the decision notification to the Client Services Officer via EPA.Planning@sa.gov.au .

Yours faithfully

Hayley Riggs

Delegate

ENVIRONMENT PROTECTION AUTHORITY

cc: *Applicant:* *Lincoln Gap Wind Farm Pty Ltd*
 Attention: *c/o Ms Bronte Nixon*
 Principal Environmental Scientist/Planner, WSP
 Email: Bronte.nixon@wsp.com

In reply please quote: 2019/00371, Process ID: 607679
Enquiries to: Matthew Henderson
E-mail: dpti.luc@sa.gov.au



Government of South Australia

Department of Planning,
Transport and Infrastructure

**TRANSPORT PLANNING AND
PROGRAM DEVELOPMENT**

Transport Assessment

GPO Box 1533
ADELAIDE SA 5001

ABN 92 366 288 135

15 January 2020

State Commission Assessment Panel
C/- Dr Simon Neldner
Department of Planning, Transport and Infrastructure
GPO Box 1815
ADELAIDE SA 5001

Dear Dr Neldner

REFERRAL ADVICE

Development No.	010/V070/19
Applicant	Lincoln Gap Wind Farm Pty Ltd
Location	Eyre Highway, Lincoln Gap
Proposal	Wind farm (additional turbines and transmission lines)

The above application has been referred to the Commissioner of Highways in accordance with Section 131(10) of the Planning, Development and Infrastructure Act 2016, as the prescribed body listed in Schedule 9: 2(a) of the Planning, Development and Infrastructure (General) Regulations 2017.

CONSIDERATION

The application proposes an expansion of the Lincoln Gap Wind Farm comprising an additional 42 turbines, together with associated infrastructure.

It is proposed that the development be accessed via existing access points to/from Eyre Highway as follows:

- An unsealed access located on the Eyre Highway, approximately 640 metres north east of the Eyre Highway / Lincoln Highway junction, which currently provides access to water infrastructure. This access roadway crosses a rail line that is owned and operated by the ARTC
- An unsealed access located on the Eyre Highway, approximately 600 metres west of the Eyre Highway / Lincoln Highway junction, which currently provides access to Stage 1 and 2 of the Lincoln Gap Windfarm

Both of the above access points are considered acceptable, subject to detailed design once vehicle sizes and numbers are confirmed in conjunction with a Traffic Management Plan (TMP) for the construction phase of the project. The TMP will need to address the matters listed in the conditions appended to this advice.

Any new overhead transmission line crossings of arterial roads (such as Eyre Highway) need to have a minimum vertical clearance of 7.2 metres over the road. Transmission poles must be installed outside of road reserves.

The applicant must ensure that all necessary approvals from the National Heavy Vehicle Regulator (<https://www.nhvr.gov.au/>) are obtained for all transportation of material requiring the use of Restricted Access Vehicles.

ADVICE

The Department of Planning, Transport and Infrastructure advises the planning authority to attach the following conditions to any approval:

1. A Traffic Management Plan for the development shall be provided to DPTI for approval prior to commencement of construction. The TMP must address matters including, but not limited to:
 - Traffic volumes and distributions, and types of vehicles to be used in both construction and operational phases of the development
 - Transport routes to be used for the construction phase of the development, particularly with regard to the transport of over-dimensional wind farm components
 - Assessment of risks associated with the expected transport movements and determines appropriate mitigation measures
 - Transport asset upgrades/modifications, asset maintenance requirements, and operational management requirements that may be necessitated by the project, including:
 - Any road and rail upgrades/ modifications (temporary or permanent) to enable safe and efficient movement and turning of vehicles along the route
 - Any structural improvement requirements (eg bridge/culvert improvements)
 - Any operational management measures ensure safety for other transport users (eg temporary road closures/detours), including for transport of plant and equipment to/from the site
 - Identify staging/timing of transport asset upgrades/modifications
2. Any road works on arterial roads (including, but not limited to Eyre Highway, Lincoln Highway and Augusta Highway) shall be designed and constructed in accordance with Austroads Guidelines and Australian Standards and to DPTI's satisfaction, with all associated costs to be borne by the applicant. The applicant should contact Mr Bonaventure Tan, Asset Enhancement Engineer, DPTI on 8648 5243 or bonaventure.tan@sa.gov.au to discuss the department's requirements for any proposed works.
3. The development be accessed via existing access points to/from Eyre Highway as follows:
 - An unsealed access located on the Eyre Highway, approximately 640 metres north east of the Eyre Highway / Lincoln Highway junction.
 - An unsealed access located on the Eyre Highway, approximately 600 metres west of the Eyre Highway / Lincoln Highway junction.
4. Overhead transmission lines crossing arterial roads (such as Eyre Highway) shall have a minimum vertical clearance of 7.2 metres over the road. Transmission poles shall not be installed within road reserves.
5. All vehicles shall enter and exit the site in a forward direction.
6. No stormwater from this development shall be permitted to discharge on-surface to the adjacent roads. In addition, any existing drainage of the adjacent roads shall be

accommodated in the development and any alterations to road drainage infrastructure as a result of this development are to be at the expense of the applicant.

The following note provides important information for the benefit of the applicant and is required to be included in any approval:

- The applicant must ensure that all necessary approvals from the National Heavy Vehicle Regulator (<https://www.nhvr.gov.au/>) are obtained for all transportation of material requiring the use of Restricted Access Vehicles.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Raymond', is written over the closing 'Yours sincerely'.

A/MANAGER, TRANSPORT ASSESSMENT
for **COMMISSIONER OF HIGHWAYS**



Australian Government
Civil Aviation Safety Authority

AIRSPACE AND AERODROME REGULATION

File Ref: F18/1775

28 January 2020

Mr Simon Neldner
Team Leader – Crown and Major Developments
Planning and Land Use Services
Department of Planning, Transport and Infrastructure
GPO Box 1815
ADELAIDE SA 5001

simon.neldner@sa.gov.au

Dear Mr Neldner,

PROPOSED LINCOLN GAP WIND FARM (STAGE 3) – CASA ASSESSMENT

CASA has reviewed the aeronautical impact assessment prepared for the proposed Lincoln Gap Wind Farm (Stage 3), near Port Augusta in South Australia as received by CASA on 6 December 2019.

The Lincoln Gap Wind Farm (Stage 3) development comprises 42 wind turbines, at a maximum of 206 m high (676 ft) AGL

With regard to Visual Flight Rules (VFR) operations, pilots are permitted to fly as low as 500 ft AGL. The turbines will reach to a height of 676 ft AGL, and therefore the turbine blades will infringe navigable airspace by 176 ft.

Due to their skeletal nature and difficulty in being seen from an aircraft, consideration should be given to marking any wind monitoring masts associated with the project, in accordance with CASA's Manual of Standards Part 139 Section 8.10: Obstacle Markings.

As military aircraft operate to lower heights than civilian aircraft, the Department of Defence should be contacted to confirm that they do not have concerns with the wind farm location.

CASA notes that there are three different turbines being considered and that they vary in overall height. Given the low volume of aircraft movements in this area but acknowledging that at heights over 200 m AGL, potential risk to aircraft operations cannot be ruled out, CASA recommends that any turbines at or exceeding 200 m AGL, be lit with low intensity steady red aviation hazard lighting of no less than 200 candela. The additional three dot points below must also be adhered to.

Should a decision be made to install the lowest of the three turbine models (maximum height of 185 m AGL) CASA will not recommend the installation of any lighting contingent on the following steps being strictly adhered to.

- The coordinates and estimated survey heights of each turbine must be reported to the Airservices Australia Vertical Obstacle Database email address

vod@airservicesaustralia.com once Development Approval is granted to ensure that the location of the Wind Farm can be mapped for the information of pilots. Changes to maps can take in excess of six months.

- One month prior to works commencing Airservices must be contacted via the VOD email address so that a NOTAM (Notice to Airmen) can be published by Airservices advising pilots that construction of tall structures in the area is imminent.
- On completion of works, the VOD should be advised of the surveyed height and location of each turbine so that the wind farm details can be accurately recorded in the database.

CASA would be pleased to answer any questions on 131 757.

Yours sincerely



Matthew Windebank
Aerodrome Engineer



**Government
of South Australia**

Department for
Energy and Mining

Our Ref: 2020D001254

Mr Simon Neldner
Team Leader – Crown and Major Developments
Department of Planning, Transport and Infrastructure
On behalf of the State Commission Assessment Panel
simon.neldner@sa.gov.au

Dear Mr Neldner

Thank you for the opportunity to provide an agency comment on the Lincoln Gap Wind Farm Development Application (Reference DA 010/V070/19).

The Department for Energy and Mining (DEM) Mineral Resources and Energy Resources Divisions have undertaken a search to identify licences and tenements granted under the *Mining Act 1971* (Mining Act) and *Petroleum and Geothermal Energy Act 2000* (P&GE Act) existing over land included in the Lincoln Gap Wind Farm Development Application. The search has identified five Exploration Licences (EL), one Extractive Mineral Lease (EML), one Pipeline Licence (PL) and one Petroleum Exploration Licence Application (PELA).

A table of information and a map of these licences and tenements is provided for your reference (see [Attachments 1 and 2](#)). This information is also available on the South Australian Resources Information Gateway (SARIG) (see <https://map.sarig.sa.gov.au/>). This proposed project area is located within the Olympic Copper-Gold Province, a region of South Australia considered prospective for iron oxide-copper-gold (IOCG) mineralisation and containing the Olympic Dam, Prominent Hill and Carrapateena deposits.

DEM supports coexistence of land uses and early engagement with all relevant parties to identify and attempt to resolve any issues that may arise from the introduction of a new land use on existing land uses and activities.

As you know, DEM is currently working with the Department for Planning, Transport and Infrastructure (DPTI) to implement processes to ensure holders of resources licences and tenements and DEM are included in future consultations on renewable energy projects. This work is consistent with the intent of *State Planning Policy 10: Mineral and Energy Resources*.

Resource Policy and Engagement/Mineral Resources Division

Address L4, 11 Waymouth Street Adelaide 5000 | GPO Box 320 Adelaide SA 5001 | DX452

Tel (+61) 08 8463 3000 | Email DEM.minerals@sa.gov.au | www.energymining.sa.gov.au | ABN 83 768 683 934



Mining activities

The Mining Act confers rights on licence and tenement holders, including:

- An EL permits the licensee to enter the land in accordance with their rights under the Mining Act to explore for minerals in the area of the licence
- An EML gives the holder the exclusive right to mine for extractive minerals in accordance with their rights under the Mining Act.

Early engagement is critical to support coexistence of mining and exploration activities and renewable energy activities. Coexistence may require consideration and management of factors including dust and vibration impacts, land use intensity, location of mineral resources, operations and associated infrastructure, site management, land access arrangements and other associated administrative arrangements. There may be different issues to consider in the construction and operational phases of the proposed project.

Prior to commencement of construction, it is recommended the proponent must:

- Engage in good faith directly with each of the EL and EML holders identified to identify land use interactions and provide a report on the engagement undertaken and the results to DPTI and DEM.
- Develop an agreed plan to manage land use interactions between the development and mining interests on the proposed Lincoln Gap Wind Farm project area, at a minimum addressing:
 - how mineral exploration and mining activities can continue to be planned and undertaken
 - land access arrangements
 - exclusion zones.

Company	Contact	Position	Phone	Email
FMG Resources Pty Ltd	Greg Swain	Senior Exploration Geologist, SA	0407 710 098	gswain@fmgl.com.au
Strategic Energy Resources Limited	Stuart Rechner	Executive Director	03 9692 7222	geo@strategicenergy.com.au
Flinders Prospecting Pty Ltd	Susan Persichitti	Tenement Manager	08 9238 8352	susan.persichitti@igo.com.au
Nutt Bros Nominees Pty Ltd	Bruce Nutt		08 8643 8941 0428 438 940	christie.spargo@gmail.com

Petroleum activities

The PGE Act requires all transmission pipelines to be designed, constructed, operated and maintained in accordance with Australian Standard (AS) 2885: Pipelines – Gas and Liquid Petroleum. This standard exists to ensure protection of the pipeline, which in turn ensures the safety of the community, protection of the environment and security of (gas) supply to users.

Prior to any development being undertaken in the proposed location, the pipeline operator will need to be provided with further information to determine whether there are any threats associated with the construction work (including installation of new services in the vicinity of

the pipeline) and long term maintenance of the development that could impact the integrity of the pipeline. Any identified threats will need to be assessed through a Safety Management Study undertaken in accordance with AS2885.

In line with Decision Notification 010/0011/06 V1 on 14 August 2013 for the "Windfarm - Variation to previous consent 010/0011/06", prior to the commencement of construction, it is recommended the proponent:

- Obtain a written determination from the licensee of the Moomba to Port Bonython pipeline (PL2) as to:
 - (a) whether the development has the potential to impact compliance of the pipeline with AS 2885, and
 - (b) where there is potential impact on pipeline compliance, whether a Safety Management Study conducted in accordance with AS 2885 will be required.
- Participate in a Safety Management Workshop if such a workshop is required.
- Reach Agreement with the licensee of the Moomba to Port Bonython pipeline to address any actions resulting from the Safety Management Study to ensure the pipeline continues to comply with AS 2885.
- Comply with the conditions of the relevant easement.

Company	Contact	Position	Phone	Email
Santos Ltd	Justin Brown	Senior Pipeline Engineer	07 3838 5093	Justin.Brown@santos.com

Defence lands

The Development Application area slightly traverses the Lincoln Park North lease (please see map provided at Attachment 2), held by the Department of Defence for conservation purposes under the *Pastoral Land Management and Conservation Act 1989*.

The Lincoln Park North lease was originally part of the bigger Lincoln Park lease that now forms part of the Miscellaneous Lease for Defence Purposes issued by the State Government in 2014, covering the Cultana Training Expansion Area.

It is recommended the proponent:

- Engage directly with the Property Acquisitions and Land Access Directorate of the Department of Defence to ensure the proposed Wind Farm will be able to coexist with Defence's future plans and programs for the Cultana Training Area.

Name	Position	Phone	Email
Renaë Ferdinands	Estate Project Manager, Property Acquisitions and Land Access	08 7389 6769 0429 317 298	renae.ferdinands@defence.gov.au

If you have any further queries, please contact Alisha Green, Senior Policy Advisor on 8429 2542 or alisha.green@sa.gov.au.

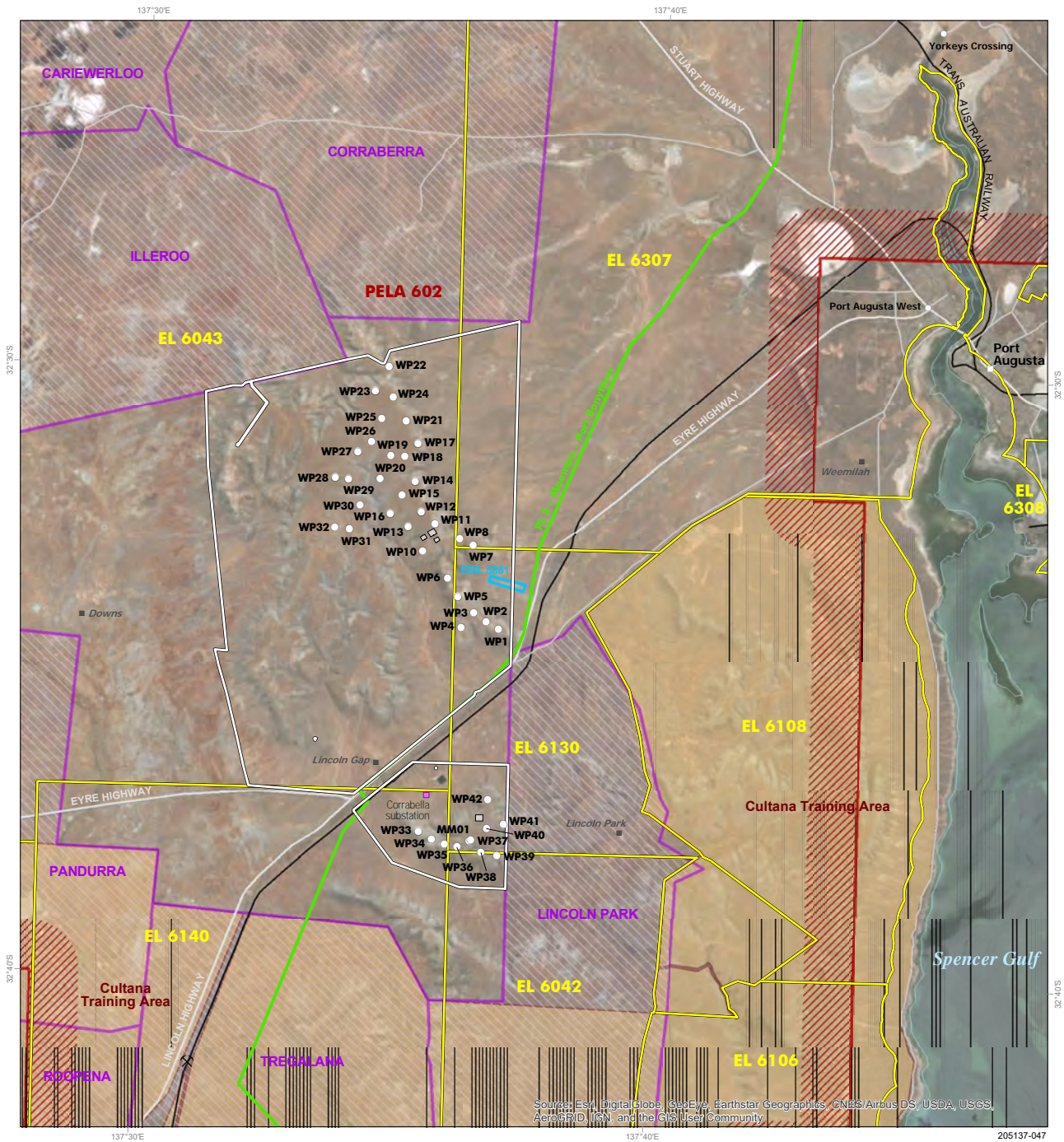
Yours sincerely



Alex Blood
EXECUTIVE DIRECTOR, MINERAL RESOURCES

29 / 1 / 2020

Attachment 1: Table of mineral and petroleum licences and tenements
Attachment 2: Map of resources interests and defence lands



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Datum GDA2020 - Projection MGA Zone 53



Lincoln Gap windfarm area

Indicative locations of Lincoln Gap Stage 3

- Stage 3 indicative locations
- Corrabella substation
- Proposed infrastructure

Mineral tenements

- Exploration licence (EL)
- Production tenement
- Extractive Minerals Lease (EML)

Petroleum tenement

- Liquids pipeline (PL)
- Petroleum Exploration Licence Application (PELA)

Cultana training area

Pastoral Lease Boundaries

Topographic features

- Deposit
- Town
- Locality
- Homestead
- Highway
- Minor road
- Railway



Government of South Australia
Department for Energy and Mining

**South Australia
LINCOLN GAP WINDFARM STAGE 3
with UNDERLYING
MINERAL and PETROLEUM TENEMENTS**

Attachment 1: Mining and petroleum licence and tenement information

Licences and tenements granted under the *Mining Act 1971* and *Petroleum and Geothermal Energy Act 2000* existing over land included in the Lincoln Gap Wind Farm project area.

Mineral exploration

Tenement	Licencee	Operator	Start Date	Expiry Date	Commodities
EL 6042	FMG Resources Pty Ltd (100%)	FMG Resources Pty Ltd	2/11/2017	1/11/2021	Uranium; Iron; Gold; Rare Earths; Copper
EL 6043	FMG Resources Pty Ltd (100%)	FMG Resources Pty Ltd	2/11/2017	1/11/2022	Uranium; Iron; Gold; Rare Earths; Copper
EL 6130	FMG Resources Pty Ltd (100%)	FMG Resources Pty Ltd	8/03/2018	7/03/2020	Uranium; Iron; Gold; Rare Earths; Copper
EL 6140	Strategic Energy Resources Limited (100%)	FMG Resources Pty Ltd; Strategic Energy Resources Limited	13/09/2017	12/09/2022	Gold; Copper
EL 6307	Flinders Prospecting Pty Ltd (100%)	Flinders Prospecting Pty Ltd	20/02/2019	19/02/2021	Cobalt; Gold; Zinc; Copper

Extractive mineral operations

Tenement	Tenement holder	Operator	Grant date	Expiry date	Commodities	Operation Name	Status	Method
EML 5851	Nutt Bros Nominees Pty Ltd	Nutt Bros Nominees Pty Ltd	23/07/1993	22/07/2022	Construction Materials - Sand	Nutt Bros Sand Deposit	Inactive	Open Cut

Petroleum Exploration Licence Applications

Tenement	Applicant	Application Date
PELA 602	NAVGAS Pty Ltd	14/11/2011

Pipeline Licence

Tenement	Licencee	Operator	Grant Date	Expiry Date	Name
PL 2	Santos Limited, Delhi Petroleum Pty Ltd, Lattice Energy Limited, Bridge Oil Developments Pty Ltd, Vamgas Pty Ltd, Reef Oil Pty Ltd, Basin Oil Pty Ltd, Santos (NARNL Cooper) Pty Ltd, Alliance Petroleum Australia Pty Ltd, Santos Petroleum Pty Ltd, Santos	Epic Energy SA Pty Ltd	26/11/2002	25/11/2023	Moomba-Port Bonython Liquids

Neldner, Simon (DIT)

From: Hogan, Timothy MR 2 <timothy.hogan2@defence.gov.au>
Sent: Tuesday, 15 September 2020 9:34 AM
To: Neldner, Simon (DIT)
Cc: Mangion, Charles MR; Seidel, Cameron MR; Murray, Adam MR 3; Williams, Matt MR 7
Subject: RE: Lincoln Gap Windfarm proposal (Stage 3). [SEC=OFFICIAL]
Attachments: Defence_comments_to_DPTI_signed.pdf

OFFICIAL

Hi Simon,

Thanks for your email below and request for comments from the Department of Defence regarding the Lincoln Gap Windfarm proposal (stage 3).

I can advise that the previous comments provided by Defence in correspondence dated 28 September 2017 (see attached pdf) in relation to this proposal are still relevant. I would like to reiterate that Defence is concerned that some wind turbine technologies can produce radio frequency interference in the form of High Frequency (HF) noise that can impact on communication equipment. Given the use of low-power short range HF communication equipment at Cultana Training Area, any increase in HF noise may impact on equipment used at the Cultana Training Area. Defence requests assurance from the proponent that the turbines will generate low amounts of HF noise, or that HF noise mitigation techniques will be employed on the turbines to reduce HF noise output.

Happy to discuss

Regards

Tim

Tim Hogan

Assistant Director, Estate Planning Land Planning and Regulation Infrastructure Division, Dept of Defence.
Ph: 02 6266 8118
Mob: 0430193035
Fax: 02 6266 8192
email: timothy.hogan2@defence.gov.au

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From: Neldner, Simon (DIT) <Simon.Neldner@sa.gov.au>
Sent: Tuesday, 8 September 2020 7:58 AM

To: Hogan, Timothy MR 2 <timothy.hogan2@defence.gov.au>

Cc: E&IG-Estate Planning Branch-External Land Planning & Regulation <land.planning@defence.gov.au>

Subject: Lincoln Gap Windfarm proposal (Stage 3).

⚠ EXTERNAL EMAIL: Do not click any links or open any attachments unless you trust the sender and know the content is safe. ⚠

Hi Tim

I'm not sure whether there was a response from Defence or not to the Lincoln Gap Windfarm proposal (Stage 3).

This was sent for comment earlier this year, but I can't lay my hands on whether any response was provided (or I've misfiled it).

We're about to conclude our assessment, so just checking. Defence has commented on previous stages re: aircraft safety and telecommunications.

Regards - Simon

Simon Neldner

Team Leader – Crown and Major Developments

Planning and Land Use Services

Attorney Generals Department

Direct (08) 7109 7058 (97058) • E simon.neldner@sa.gov.au

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THE NEW PLANNING AND
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Australian Government
Department of Defence
Estate and Infrastructure Group

Sonya Dare
Director Land Planning and Regulation
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☎: (02) 6266 8291
✉: sonya.dare@defence.gov.au

ID-EP-DLP&R/OUT/2017/AF30688416

Simon Nelder
Team Leader – Development Assessment
Department of Planning, Transport and Infrastructure
GPO Box 1815
ADELAIDE SA 5001

Dear Mr Nelder

RE: Lincoln Gap Wind Farm – variation to planning consent to increase turbine height

Thank you for referring the abovementioned Development Application (DA) to the Department of Defence (Defence) for comment. Defence understands that this application proposes to amend the existing planning consent to increase the overall height of the approved 59 wind turbines at the above wind farm from 150 metres above ground level (AGL) to 180 metres AGL. The subject site is located immediately north of the Cultana Training Area.

Defence has conducted an assessment of the proposed amendment for potential impacts on the safety of military operations at Cultana Training Area and surrounding areas, as well as possible interference to Defence communications and radar.

Defence is concerned that some wind turbine technologies can produce radio frequency interference in the form of High Frequency (HF) noise that can impact on communication equipment. Given the use of low-power short range HF communication equipment at Cultana Training Area, any increase in HF noise may impact on equipment used at the Cultana Training Area. Defence requests assurance from the proponent that the turbines will generate low amounts of HF noise, or that HF noise mitigation techniques will be employed on the turbines to reduce HF noise output.

There is an ongoing need to obtain and maintain accurate information about tall structures so that this information can be marked on aeronautical charts. Marking tall structures on aeronautical charts assists pilot navigation and enhances flight safety. Airservices Australia (ASA) is responsible for recording the location and height of tall structures. The information is held in a central database managed by ASA and relates to the erection, extension, or dismantling of tall structures, the top of which is above:

- a. 30 metres AGL, that are within 30 kilometres of an aerodrome; and
- b. 45 metres AGL elsewhere.

The proposed structures will meet the above definition of a tall structure. Defence therefore requests that the applicant provide ASA with “as constructed” details. The details can be emailed to ASA at vod@airservicesaustralia.com.

Defence notes that the *National Airports Safeguarding Framework Guideline D – Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* recommends that where a wind turbine 150 metres or taller in height is proposed away from aerodromes, the proponent should conduct an aeronautical risk assessment. It also recommends that the risk assessment be submitted to the Civil Aviation Safety Authority (CASA) to determine whether the proposal is a hazard to aircraft safety and requires approved lighting or marking. Defence supports this requirement and believes that in this instance, it would be prudent for the risk assessment of this proposal to be sent to CASA for consideration.

Should you wish to discuss the content of this advice further, my point of contact is Mrs Rebecca Soric at DSRGIDEP.ExecutiveSupport@defence.gov.au or by telephone on (02) 6266 8186.

Yours sincerely



Sonya Dare
Director
Land Planning and Regulation
Estate Planning Branch

28 September 2017

Neldner, Simon (DIT)

Subject:

FW: DA 010/V070/19 - Lincoln Gap Windfarm - Stage 3

From: Brenton Daw [<mailto:Brenton.Daw@portaugusta.sa.gov.au>]

Sent: Monday, 23 December 2019 9:53 AM

To: Yantel Burns <yantel.burns@portaugusta.sa.gov.au>

Cc: Estelle Sharpe <Estelle.Sharpe@portaugusta.sa.gov.au>; David Altmann <David@developmentanswers.com.au>

Subject: DA 010/V070/19 - Lincoln Gap Windfarm - Stage 3

Yantel,

I have looked at and reviewed the following sections of the Development Application.

1. 5.10 Traffic Access
2. 5.13 Stormwater & Flooding
3. 6.10 Construction
4. Appendix. Traffic Management Plan

In reviewing the documentation provided, I do not believe this development will have any significant effect on Councils current roadways.

All access is via the Eyre or Lincoln Highways and access seems outside of Councils responsibility.

Onsite stormwater and any potential runoff from the developed sites will have no impact on Councils stormwater systems or management.

Regards,

Brenton

Brenton Daw
Manager Technical Services
Port Augusta City Council



PO Box 1704, PORT AUGUSTA SA 5700

Phone: (08)86419100 **Fax:** (08)86410357 **Mobile:** 0407952434

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Web: www.portaugusta.sa.gov.au

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LINCOLN GAP WIND FARM PTY LTD

**LINCOLN GAP WIND
FARM STAGE 3**

SUBMISSION
RESPONSE DOCUMENT

wsp

SEPTEMBER 2020

Question today *Imagine tomorrow* Create for the future

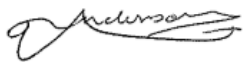
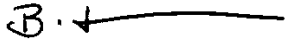
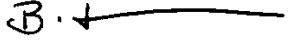
Lincoln Gap Wind Farm Stage 3 Submission Response Document

Lincoln Gap Wind Farm Pty Ltd

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REV	DATE	DETAILS
00	25/08/2020	Draft for review
01	01/09/2020	Final

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GLOSSARY

Project site	The land defined by the project boundary.
Public notification period	The process of public advertisement and invitation submissions, as set out in Section 131(13) of the <i>Planning, Development and Infrastructure Act 2016</i> .
Public submission	Submission made under Section 131(13) of the <i>Planning, Development and Infrastructure Act 2016</i> .
Referral agency submission	Comments made by State Agencies under Section 131(10) of the <i>Planning, Development and Infrastructure Act 2016</i> .
SCAP	The State Commission Assessment Panel (SCAP) is established under South Australia's <i>Planning, Development and Infrastructure Act 2016</i> . The SCAP has assumed the functions, powers and duties of the Development Assessment Commission.

ABBREVIATIONS

AGL	Above ground level
ARTC	Australian Rail Track Corporation
CASA	Civil Aviation Safety Authority
CoH	Commissioner of Highways
DA	Development Application
DEM	Department for Energy and Mining
DPTI	Department of Planning, Transport and Infrastructure
DEW	Department of Environment and Water
EPA	Environment Protection Authority
LGWF	Lincoln Gap Wind Farm
LGWF P/L	Lincoln Gap Wind Farm Pty Ltd
LX	Level crossing
MW	Megawatt
Nexif Energy	Nexif Energy Australia Pty Ltd
PACC	Port Augusta City Council
SCAP	State Commission Assessment Panel
TMP	Traffic Management Plan
VFR	Visual Flight Rules
WSP	WSP Australia Pty Ltd

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Lincoln Gap Wind Farm Pty Ltd (LGWF P/L), a subsidiary of Nexif Energy Australia Pty Ltd (Nexif Energy), is proposing to develop the Lincoln Gap Wind Farm Stage 3, at Lincoln Gap, South Australia. The initial stages of the Lincoln Gap Wind Farm (LGWF) involved the construction of 59 wind turbines, approved in 2018. To make use of the remaining available land, Stage 3 is proposed as an extension of the Project. The Project will position additional turbines across two areas; within, and south, of the LGWF Stage 1 and 2 site.

The LGWF Stage 3 proposes the construction of 42 WTGs with a maximum 252 MW capacity and ancillary infrastructure. At the time of writing this report, three potential wind turbine models were under consideration. These consist of:

- GE 5.3 MW model
- Vestas 5.6 MW model
- Siemens Gamesa SG 6.0-155 model.

Given that three turbine model options were under consideration, technical assessments undertaken in support of the Development Application for the project assessed the model presenting the worst-case scenario in relation to potential impacts.

The Development Application for the project was lodged with the State Commission Assessment Panel (SCAP) under Section 131 of the *Planning, Development and Infrastructure Act 2016* on 26 November 2019.

1.2 PUBLIC EXHIBITION

As part of the Section 131 assessment process, the Development Application (DA 010/V070/19) was released for public comment from 27 July 2020 to 14 August 2020 (the exhibition period).

A 'Notice of Application for Consent to Development' was published in the *Transcontinental*, advertising the public display of the Development Application and inviting public submissions.

During the exhibition period, no public submissions were received by the SCAP.

Referral Agency submissions were made by the Australian Rail Track Corporation (ARTC), Civil Aviation Safety Authority (CASA), Commissioner of Highways (CoH), Department for Energy and Mining (DEM) Mineral Resources and Energy Resources Divisions, Department of Environment and Water (DEW) Strategy and Impact Assessment Unit, Environment Protection Authority (EPA) and the Port Augusta City Council (PACC).

1.3 PROJECT UPDATE

Since the lodgement of the Development Application, WSP Australia Pty Ltd (WSP) Nexif Energy have responded to, and are continuing to respond to, a number of queries from SCAP and the EPA; including, but not limited to aspects relating to potential noise impacts, electromagnetic interference, and turbine models.

2 REFERRAL AGENCY SUBMISSIONS

Referral agency submissions were made by the Australian Rail Track Corporation (ARTC), Civil Aviation Safety Authority (CASA), Commissioner of Highways (CoH), Department for Energy and Mining (DEM) Mineral Resources and Energy Resources Divisions, Department of Environment and Water (DEW) Strategy and Impact Assessment Unit and the Port Augusta City Council (PACC).

The referral agency submissions were generally neutral towards the Project, and generally requested that further liaison should be undertaken between Nexif Energy and relevant organisations. The DEW and PACC submissions made no comment of the Development Application.

The referral agency submissions also raised issues for further consideration. A summary of the issues raised, and WSP's and Nexif Energy's response is provided in below.

2.1.1 AUSTRALIAN RAIL TRACK CORPORATION

The Australian Rail Track Corporation (ARTC) submission made comment on the level crossing near the southern area of the site, as well as the potential for impacts from electromagnetic interference. The submission from ARTC is summarised in Table 2.1, below.

Table 2.1 Comments from ARTC

ISSUE	SUMMARY	RESPONSE
Level crossing	With Stage 3 involving turbines on the opposite side of the rail corridor, the level crossing (LX) comes into play, as recognised in the WSP report. There are two aspects, the use of the LX for construction materials including heavy and over-dimensional loads and secondly the proposed traffic levels for the longer term use of the LX. ARTC will want to discuss the suitability of the LX and any necessary upgrades. Note that upgrades will be at the applicants cost.	Noted. As discussed in the Traffic Impact Statement prepared for the project, 'Lincoln Gap Wind Farm Stage 3 – Traffic Impact Statement – Rev 01 dated November 2019', it has been recommended that an assessment of the rail crossing be undertaken to assess the need for treatment, and furthermore, that liaison and careful planning with ARTC should take place, to minimise any risks associated with large vehicles using the crossing. Nexif Energy will engage ARTC during the detailed design, and construction stage, to ensure that the requirements of ARTC are incorporated into design and construction planning.
Electro Magnetic Interference	ARTC no longer operates radio communications from our Lincoln Gap tower, however we do have Telstra and Vodafone under licence on the tower. We presume their needs were addressed under Stages 1 & 2.	WSP, on behalf of Nexif Energy has undertaken consultation with Telstra to seek feedback on whether the wind farm has potential to impact Telstra services in the area. In an email dated 2 July 2020, Telstra notified WSP that in response to the request for feedback, a desktop study was undertaken of the area and nearby telecommunications infrastructure (Telstra), and that based on the information provided, there is no potential for undue interference from the proposed wind farm on or around the Telstra communication tower.

2.1.2 CIVIL AVIATION SAFETY AUTHORITY

The Civil Aviation Safety Authority (CASA) submission made comment on navigational airspace, and notification and safety lighting. The submission from CASA is summarised in Table 2.2 below.

Table 2.2 Comments from CASA

ISSUE	SUMMARY	RESPONSE
Navigational airspace	<p>With regard to Visual Flight Rules (VFR) operations, pilots are permitted to fly as low as 500 ft AGL. The turbines will reach to a height of 676 ft AGL, and therefore the turbine blades will infringe navigable airspace by 176 ft.</p> <p>Due to their skeletal nature and difficulty in being seen from an aircraft, consideration should be given to marking any wind monitoring masts associated with the project, in accordance with CASA's Manual of Standards Part 139 Section 8.10: Obstacle Markings.</p> <p>As military aircraft operate to lower heights than civilian aircraft, the Department of Defence should be contacted to confirm that they do not have concerns with the wind farm location.</p>	<p>Wind monitoring masts associated with the project were submitted and approved under a separate Development Application; DA 010/U017/19.</p> <p>Under this DA, masts were approved with Aviation safety marking including an alternating red and white pattern finished on the upper section of the masts and orange ball markers located on the guy wires; in line with CASA guidelines.</p>
Notification and safety lighting	<p>CASA notes that there are three different turbines being considered and that they vary in overall height. Given the low volume of aircraft movements in this area but acknowledging that at heights over 200 m AGL, potential risk to aircraft operations cannot be ruled out. CASA recommends that any turbines at or exceeding 200 m AGL, be lit with low intensity steady red aviation hazard lighting of no less than 200 candela. The additional three dot points below must also be adhered to.</p> <p>Should a decision be made to install the lowest of the three turbine models (maximum height of 185 m AGL) CASA will not recommend the installation of any lighting contingent on the following steps being strictly adhered to.</p> <ul style="list-style-type: none"> — The coordinates and estimated survey heights of each turbine must be reported to the Airservices Australia Vertical Obstacle Database email 	<p>Nexif has reviewed CASA's recommendations on obstacle lighting. A risk assessment for the project, undertaken by SGS Aviation Compliance in accordance with ISO 31000:2018, recommended the following:</p> <p><i>'In an overall sense, the view is that the risk to aviation operations due to the presence of the proposed Lincoln Gap Wind Farm Stage 3 is low based on the following:</i></p> <ul style="list-style-type: none"> — <i>There are only two certified or registered aerodromes within the vicinity of the wind farm area.</i> <ul style="list-style-type: none"> — <i>One is Port Augusta some 10 km east north east north of the proposed wind farm site.</i> — <i>One is Tregalana some 20 km south of the proposed wind farm site.</i> — <i>Operations from both the above-mentioned aerodromes would not be affected by the presence of the proposed Lincoln Gap Wind Farm Stage 3.</i> — <i>There is one military airstrip near the proposed Lincoln Gap Wind Farm Stage 3 and that is the EI Alamein Army Base.</i>

ISSUE	SUMMARY	RESPONSE
	<p>address vod@airservicesaustralia.com once Development Approval is granted to ensure that the location of the Wind Farm can be mapped for the information of pilots. Changes to maps can take in excess of six months.</p> <ul style="list-style-type: none"> — One month prior to works commencing Airservices must be contacted via the VOD email address so that a NOTAM (Notice to Airmen) can be published by Airservices advising pilots that construction of tall structures in the area is imminent. — On completion of works, the VOD should be advised of the surveyed height and location of each turbine so that the wind farm details can be accurately recorded in the database. 	<ul style="list-style-type: none"> — <i>It is, in effect, non-operational, for emergency use only.</i> — <i>Operations from this airstrip are unlikely to occur.</i> — <i>There are no other aerodromes identified near the proposed Lincoln Gap Wind Farm Stage 3.</i> — <i>VFR operations should be above the height of the wind turbines if such are operated strictly in accordance with the Regulations.</i> <ul style="list-style-type: none"> — <i>However, it is noted that the maximum size of the proposed wind turbines will penetrate navigable airspace (i.e. being higher than 500 ft {~152.4 m} at a proposed maximum of 206 m {~675.8 ft.}).</i> — <i>Whilst SGS Aviation Compliance is cautious in its considerations of this matter, the view is held that aircraft operations in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3 are limited to the extent that the proposed wind turbines will not constitute a hazard to aeroplanes and, therefore, obstacles lights are not recommended.</i> — <i>Civil Night VFR or IFR aircraft operations are required to abide by lowest safe altitude requirements, which should ensure that all such operations would be above the highest point of any of the wind turbines within the proposed Lincoln Gap Wind Farm Stage 3.</i> — <i>Any approved low-level operations, by their very nature, are required to check for any obstacles which might impact on such operations, before undertaking any such operations. All such operations would be day VFR.</i> — <i>The proposed Lincoln Gap Wind Farm Stage 3 turbines will not affect any sector or circling altitude, nor any approach or departure altitudes. They will not impact on Precision/Non- Precision Navigational Aids, HF/VHF Communications, Advanced Surface Movement Guidance and Control Systems, Radar or Satellite/Links.</i> — <i>The presence of the wind turbines within the proposed Lincoln Gap Wind Farm Stage 3 is assessed as having no effect on LSALTs.</i> <ul style="list-style-type: none"> — <i>Although, in this sense, the potential impact on route Z92 may lead to such and advice from Airservices Australia may have to be sought.</i>

ISSUE	SUMMARY	RESPONSE
		<ul style="list-style-type: none"> — <i>Be that as it may, SGS Aviation Compliance is of the view that there will be no impact on the operation of the wind farm itself and there will not be any real significance on any aircraft operations over the wind farm.</i> — <i>There are no known military Prohibited, or Danger (PRD) areas identified anywhere near the proposed Lincoln Gap Wind Farm Stage 3 site which would lead to any restrictions on military aircraft activities.</i> — <i>There have been several Restricted Areas identified in the vicinity, two of which have the potential to have an impact on the operations of the Lincoln Gap Wind Farm Stage 3.</i> <ul style="list-style-type: none"> — <i>R302A CULTANA</i> — <i>R303A ALAMEIN</i> — <i>Both these Restricted Areas introduce military flying non-flying with vertical limits "surface to 3,000 ft" with hours of activity defined by NOTAM and the Controlling Authority is the Army RCO Cultana.</i> — <i>Advice from the Department of Defence is that these Restricted Areas are unlikely to be regularly activated.</i> — <i>Whilst the site visit was not undertaken, SGS Aviation Compliance developed the view that agricultural operations would be unlikely to occur in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3.</i> — <i>SGS Aviation Compliance holds the view that suitable identification on aviation maps of the proposed Lincoln Gap Wind Farm Stage 3 (once established) is required'.</i> <p>The report concludes that 'the risk to aviation operations in the vicinity of the proposed Lincoln Gap Wind Farm Stage 3 is considered to be low and the view is held that, despite the fact that the proposed wind turbines will penetrate navigational airspace, the provision of obstacle lights is not warranted'.</p> <p>Nexif therefore are of the opinion that, provided the required notifications and reporting are undertaken and that the project does not deviate from the current design, there should be no requirement for obstacle lighting for this project.</p>

2.1.3 COMMISSIONER OF HIGHWAYS

The Commissioner of Highways (CoH) submission made comment on site access, road crossings, and approvals for heavy and restricted vehicles. Furthermore, CoH provided a number of traffic related conditions, which are to be attached to the Approval for the Development Application (note that these conditions have not been further discussed in this report). The submission from CoH is summarised in Table 2.3, below.

Table 2.3 Comments from the CoH

ISSUE	SUMMARY	RESPONSE
Access	<p>It is proposed that the development be accessed via existing access points to/from Eyre Highway as follows:</p> <ul style="list-style-type: none"> — An unsealed access located on the Eyre Highway, approximately 640 metres north east of the Eyre Highway / Lincoln Highway junction, which currently provides access to water infrastructure. This access roadway crosses a rail line that is owned and operated by the ARTC — An unsealed access located on the Eyre Highway, approximately 600 metres west of the Eyre Highway / Lincoln Highway junction, which currently provides access to State 1 and 2 of the Lincoln Gap Windfarm <p>Both of the above access points are considered acceptable, subject to detailed design once vehicle sizes and numbers are confirmed in conjunction with a Traffic Management Plan (TMP) for the construction phase of the project. The TMP will need to address the matters listed in the conditions appended to this advice.</p>	<p>Noted.</p> <p>A Traffic Management Plan will be developed for the site and will address the issues raised in the response from the CoM.</p>
Road crossings	<p>Any new overhead transmission line crossing of arterial roads (such as Eyre Highway) need to have a minimum vertical clearance of 7.2 metres over the road. Transmission poles must be installed outside of road reserves.</p>	<p>Noted</p>
Approvals	<p>The applicant must ensure that all necessary approvals from the National Heavy Vehicle Regulator (https://nhvr.gov.au) are obtained for all transportation of material requiring the use of Restricted Access Vehicles.</p>	<p>Noted</p>

2.1.4 DEPARTMENT FOR ENERGY AND MINING

The Department for Energy and Mining (DEM) submission made comment in relation to engagement with mining licence and tenement holders, pipeline operators and the Department of Defence. The submission from DEM is summarised in Table 2.4, below.

Table 2.4 Comments from the DEM

ISSUE	SUMMARY	RESPONSE
<p>Mining activities</p>	<p>The Mining Act confers rights on licence and tenement holders, including:</p> <ul style="list-style-type: none"> — An EL permits the licensee to enter the land in accordance with their rights under the Mining Act to explore for minerals in the area of the licence — An EML gives the holder the exclusive right to mine for extractive minerals in accordance with their rights under the Mining Act. <p>Early engagement is critical to support coexistence of mining and exploration activities and renewable energy activities. Coexistence may require consideration and management of factors including dust and vibration impacts, land use intensity, location of mineral resources, operations and associated infrastructure, site management, land access arrangements and other associated administrative arrangements. There may be different issues to consider in the construction and operational phases of the proposed project.</p> <p>Prior to commencement of construction, it is recommended the proponent must:</p> <ul style="list-style-type: none"> — Engage in good faith directly with each of the EL and EML holders identified to identify land use interactions and provide a report on the engagement undertaken and the results to DPTI and DEM. — Develop an agreed plan to manage land use interactions between the development and mining interests on the proposed Lincoln Gap Wind Farm project area, at a minimum addressing: <ul style="list-style-type: none"> — how mineral exploration and mining activities can continue to be planned and undertaken — land access arrangements — exclusion zones. 	<p>Noted.</p>
<p>Petroleum activities</p>	<p>The PGE Act requires all transmission pipelines to be designed, constructed, operated and maintained in accordance with Australian Standard (AS) 2885: Pipelines — Gas and Liquid Petroleum. This standard exists to ensure protection of the pipeline, which in turn ensures the safety of the community, protection of the environment and security of (gas) supply to users.</p> <p>Prior to any development being undertaken in the proposed location, the pipeline operator will need to be provided with further information to determine whether there are any threats associated with the construction work (including installation of new services in the vicinity of the pipeline) and long term maintenance of the development that could impact the integrity of the pipeline. Any identified threats will need to be assessed</p>	<p>Nexif Energy have previously engaged the licensee of the Moomba to Port Bonython pipeline under the conditions of Approval for the earlier stages of this project.</p> <p>As per the recommendation from DEM, Nexif Energy will undertake further</p>

ISSUE	SUMMARY	RESPONSE
	<p>through a Safety Management Study undertaken in accordance with A52885.</p> <p>In line with Decision Notification 010/0011/06 V1 on 14 August 2013 for the "Windfarm – Variation to previous consent 010/0011/06", prior to the commencement of construction, it is recommended the proponent:</p> <ul style="list-style-type: none"> — Obtain a written determination from the licensee of the Moomba to Port Bonython pipeline (PL2) as to: <ul style="list-style-type: none"> — whether the development has the potential to impact compliance of the pipeline with AS 2885, and — where there is potential impact on pipeline compliance, whether a Safety Management Study conducted in accordance with AS 2885 will be required. — Participate in a Safety Management Workshop if such a workshop is required. — Reach Agreement with the licensee of the Moomba to Port Bonython pipeline to address any actions resulting from the Safety Management Study to ensure the pipeline continues to comply with AS 2885. — Comply with the conditions of the relevant easement. 	<p>consultation with the licensee, in relation to Stage 3.</p>
Defence lands	<p>The Development Application area slightly traverses the Lincoln Park North lease (please see map provided at Attachment 2), held by the Department of Defence for conservation purposes under the <i>Pastoral Land Management and Conservation Act 1989</i>.</p> <p>The Lincoln Park North lease was originally part of the bigger Lincoln Park lease that now forms part of the Miscellaneous Lease for Defence Purposes issued by the State Government in 2014, covering the Cultana Training Expansion Area.</p> <p>It is recommended the proponent:</p> <ul style="list-style-type: none"> — Engage directly with the Property Acquisitions and Land Access Directorate of the Department of Defence to ensure the proposed Wind Farm will be able to coexist with Defence's future plans and programs for the Cultana Training Area. 	<p>Noted.</p>

2.1.5 DEPARTMENT FOR ENVIRONMENT AND WATER

A response was received from DEW, stating the DEW was providing no comment on the Development Application.

2.1.6 ENVIRONMENT PROTECTION AUTHORITY

The Environment Protection Authority (EPA) submission made comment in relation to the impacts and management of noise generated from the Project. The EPA concluded that the proposed Project located and designed in such a way that noise impacts on nearby dwelling will be minimised; and provided a number of conditions that will ensure that the Project is compatible with the EPA's *Wind farm environmental noise guidelines (July 2009)*. The submission from EPA is summarised in Table 2.5, below.

Table 2.5 Comments from the EPA

ISSUE	SUMMARY	RESPONSE
Noise levels	<p>Noise levels at the noise sensitive receivers in the vicinity of the wind farm development must meet the recommended noise levels contained in the Environment Protection Authority's Wind Farms Environmental Noise Guidelines (July 2009). The noise levels at the relevant receivers* must not exceed:</p> <ol style="list-style-type: none"> 1 35dB(A) if receivers are situated in the Rural Living Zone, or 2 40dB(A) if receivers are situated in zones other than the Rural Living Zone, or 3 45dB(A) if receivers belong to commercial stakeholders** of the project 4 The background noise (LA90,10) by more than 5dB(A) when assessed against provisions of the 5 EPA's Wind Farms Environmental Noise Guidelines (2009) whichever is the greater. 	<p>Noted.</p> <p>Noise modelling undertaken for the Project indicates that the required noise levels will be met, however this will be confirmed via operational noise monitoring, as discussed below.</p>
Pre-construction noise assessment.	<p>A final pre-construction noise assessment must be submitted which confirms compliance with the applicable operational criteria based on the final wind turbine generator selection, layout and warranted sound power levels. The warranted sound power levels must be measured and reported in accordance with IEC61400-11 Ed3.0; Wind turbines – Part 11: Acoustic noise measurement techniques. The final preconstruction noise assessment report must be submitted to the satisfaction of the Minister for Planning, having consulted with the Environment Protection Authority prior to the commencement of construction of the wind farm.</p>	<p>Noted.</p>
Tonality testing	<p>Noise emitted by the selected wind turbine generators intended for installation must not include tones audible at the noise receivers ($\Delta L_{a,k} > 0$) when tested in accordance with the tonality test procedure defined in IEC61400-11, Ed3.0: Wind turbines – Part 11: Acoustic noise measurement techniques or a methodology of tones assessment otherwise agreed with the Environment Protection Authority. The absence of tones must be verified by results of post-construction tonality testing at locality Receiver H1 as shown in the WSP Lincoln Gap Stage 3 Noise Assessment Report dated 19 November 2019 (document reference PS119707-ACO-REP-001 Rev1, July 2019) or such other localities agreed by the Minister for Planning, having consulted with the Environment Protection Authority. The results of the post-construction tonality testing shall be submitted to the Minister within three months of the proposed development commencing operation. The Minister must confirm their satisfaction with any post-construction tonality testing, having consulted with the Environment Protection Authority.</p>	<p>Noted.</p>

ISSUE	SUMMARY	RESPONSE
Operational noise monitoring	An independent acoustical consultancy (other than the company that prepared the predictive acoustical report) must monitor noise levels at one locality at least Receiver H1 (as detailed in the acoustic report WSP Lincoln Gap Stage 3 Noise Assessment Report dated 19 November 2019 (document reference PS119707-ACO-REP-001 Rev1, July 2019), or such other localities agreed to by the Minister for Planning, having consulted with the Environment Protection Authority. Monitoring must be undertaken in accordance with the EPA's Wind Farms Environmental Noise Guidelines (2009) with all of the noise sources associated with the wind farm in full operating mode. The results of this monitoring must be submitted to the Minister within 3 months of the proposed development commencing operation. The Minister must confirm their satisfaction with the results of the post-construction noise monitoring, having consulted with the Environment Protection Authority.	Noted.
Mitigation	If post-construction noise monitoring results reveal non-compliance with the specified noise criteria, the applicant must arrange for the noise monitoring of other relevant noise sensitive receivers. Measures to ensure compliance with the specified noise criteria must be undertaken by the applicant for all of the localities where non-compliance with the noise criteria is revealed. Agreement with the land owners of the noise affected premises can be considered as an option in accordance with the Environment Protection Authority's Wind farms environmental noise guidelines (July 2009).	Noted.

2.1.7 PORT AUGUSTA CITY COUNCIL

A response was received from PACC, and explained that having reviewed the documentation, the Council was of the opinion that the development would not have any significant effect on Council roads or stormwater systems or management.

3 LIMITATIONS

Limitations of the response document are as outlined in Section 8 of the Development Application Report ‘Lincoln Gap Wind Farm Stage 3 Development Application Report’, dated November 2019.

In summarising the submissions in a concise manner, WSP has made every attempt to accurately represent/convey the issues raised in an impartial manner. However, it is recognised that true meaning may be misconstrued through this process.

ABOUT US

WSP is one of the world's leading engineering professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors, environmental specialists, as well as other design, program and construction management professionals. We design lasting Property & Buildings, Transportation & Infrastructure, Resources (including Mining and Industry), Water, Power and Environmental solutions, as well as provide project delivery and strategic consulting services. With approximately 48,000 talented people globally, we engineer projects that will help societies grow for lifetimes to come.





Our ref: Response to EPA RFI for the LGWF Stage 3 - DA 923V00119

Your ref: PDI-3

By email
EPA.Planning@sa.gov.au

30 March 2020

Client Services Officer
Environment Protection Authority
GPO Box 2607
Adelaide SA 5001

Dear Sir/Madam

Response to EPA request for information for the Lincoln Gap Wind Farm Stage 3 Project - DA 923/V001/19

Thank you for your letter dated 6 January 2020, requesting further information relating to Development Application 923/V001/19. WSP and Lincoln Gap Wind Farm Pty Ltd (LGWF P/L) can provide the following responses to the questions raised.

1. Provide clarification of where the turbines were considered for the micro-siting model (i.e. which turbines were moved closer, how the turbines were positioned for this model, etc.)

Adverse impact from changes associated with the 250 m micro-siting diameter was considered by moving each Stage 3 turbine 125 m closer to the midpoint between the two host receivers (Shearer's Quarters S1 and House H1).

It is highly unlikely that all turbines will be re-positioned in this manner; turbine micro-siting is more likely to occur in an incoherent manner, subject to local conditions at the base of each turbine.

A map showing both the original Stage 3 locations and the micro-sited Stage 3 locations (Map 1) is provided as Attachment 1.

2. Provide maps showing the noise modelling contours and terrain contours of the site.

The following maps with predicted noise level contours and terrain contours are provided as Attachments 2, 3, and 4:

- Map 2 – Wind Turbine Stage 3 (without micro-siting)
- Map 3 – Wind Turbine Stages 1, 2 and 3 (Stage 3 without micro-siting)
- Map 4 – Wind Turbine Stages 1, 2, and 3 (Stage 3 with 125 m micro-siting)

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In addition to the two receivers identified in the WSP Lincoln Gap Stage 3 Noise Assessment Report (referred to as the “host receivers”), five potential additional noise-sensitive receivers have been considered at this stage.

Of the five potential additional noise-sensitive locations, four are located further than 3500 m from the nearest Lincoln Gap Stage 3 Windfarm turbine:

- Vacant residence 1 (3500 m from nearest Stage 3 turbine)
- Vacant residence 2 (4000 m from nearest Stage 3 turbine)
- El Alamein Airfield (7500 m from nearest Stage 3 turbine)
- Nuttbush retreat (15000 m from nearest Stage 3 turbine)

Following the methodology described in the WSP Lincoln Gap Stage 3 Noise Assessment Report, wind turbine noise at these four locations is predicted to be significantly less than 30 dBA, for all of the evaluated turbine configurations.

The fifth potential additional noise-sensitive location, “The Tanks” Truck Rest Area is located 1900 m from the nearest Lincoln Gap Stage 3 turbine. If the Truck Rest Area is considered a noise-sensitive receiver (not primarily intended for rural living) for the purpose of this assessment, a criteria of 40 dBA would apply. Wind turbine noise is predicted to be less than 38 dBA at this location considering Stage 1, 2, and 3 turbines (Stage 3 with 125 m micro-siting).

For reference, the noise contour maps in Attachments 2, 3, and 4 include the locations of the five potential additional noise-sensitive receivers.

3. Provide further details of the proposed development, including:

a) Model and hub height of the turbines intended to be installed

The three options for turbine models are still being considered. Once selected, LGWF P/L will submit the selected model and all associated details to SCAP and the EPA.

During the technical assessments for the Development Application, the technical specifications for each model were first reviewed, and the turbine models presenting the worst-case scenario outcome was selected for each discipline. As such, we consider that the potential impact of the project has been appropriately considered.

b) Consider reducing micro-siting corridor to below 100m, or provide additional justification for the proposed 250m micro-siting corridor.

Once the final turbine model has been selected, the micro-siting corridor will be able to be reduced to 100 metres.

We would like to note that the entire corridor was surveyed and assessed during the technical assessments.

By maintaining the wider micro-siting corridor at this stage, we believe that this will allow greater flexibility for avoidance of valuable ecological and heritage features, whilst allowing us to select the most appropriate locations for the turbines based on the requirements of the final turbine model and the geotechnical features of the site.

In addition, WSP would like to clarify a point regarding the four wind turbine generator models (WTGs) that were initially under consideration. At the time of initiating the Noise Assessment, four WTG models were under consideration, consisting of:

- Vestas V162 5.6 MW model
- Senvion 4.5 MW model



- Siemens Gamesa 6.0 MW-155 model
- GE 5.3 MW-158 model

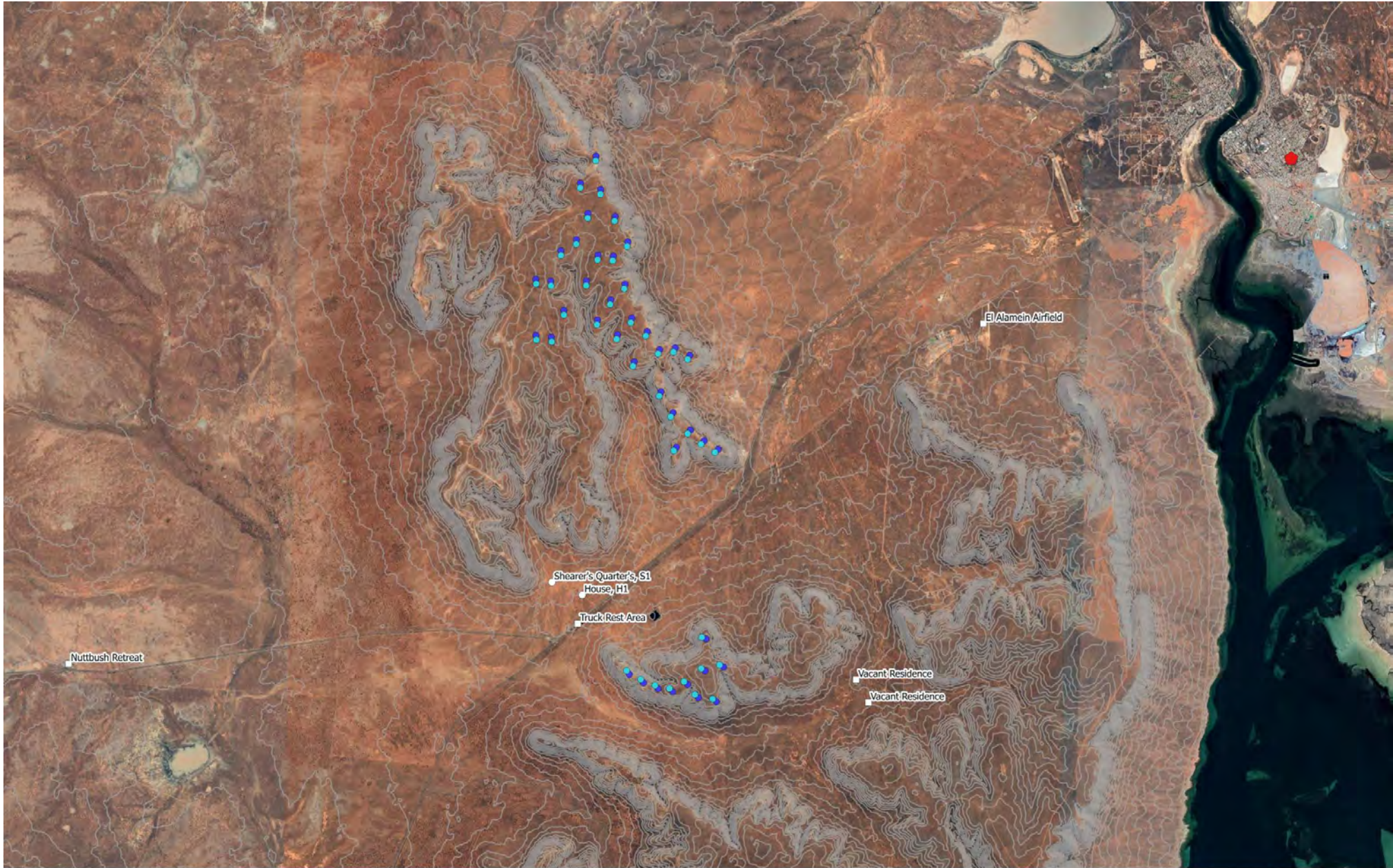
Over the course of the early planning stages, Senvion, being the supplier of one WTG model under consideration, went into administration. Due to the uncertainty of the future of the supplier, this model was subsequently removed from the pool of WTG's under consideration, and was not assessed further. Hence, the Senvion 4.5 MW model was not discussed further in the greater Development Application Report.

Thank you for allowing WSP the opportunity to provide further information on the project. Should you have and further question relating to the project, do not hesitate to contact me at Bronte.Nixon@wsp.com, or 08 8405 4421.

Yours sincerely

A handwritten signature in black ink, consisting of a stylized 'B' followed by a dot and a horizontal line that curves upwards at the end.

Bronte Nixon
Principal Environmental Scientist/Planner



Map: PS113707 Map 1	Author: LF
Date: 26/03/2020	Approved by: AC

Map Source: Google Satellite

To be read in conjunction with WSP document: PS113707-ACO-MEM-0001 Rev0
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1:90,000 at A3

Legend

- Host Receivers
- Non-host Receivers
- Stage 3 with micro-siting
- Stage 3 without micro-siting
- ⬠ Port Augusta
- Elevation Contours

Lincoln Gap Stage 3 Noise Assessment
 Wind Turbine Stage 3 Locations With and Without 125m Micro-siting



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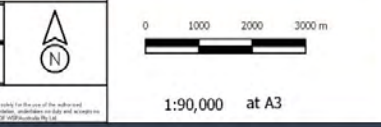


Map: PS113707 Map 2	Author: LF
Date: 26/03/2020	Approved by: AC

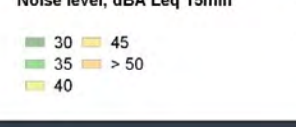
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- Legend**
- Host Receivers
 - Non-host Receivers
 - Stage 3 without micro-siting
 - Port Augusta
 - Elevation Contours
 - Host Receiver Noise Criteria, 45 dBA



Lincoln Gap Stage 3 Noise Assessment
Wind Turbine Stage 3 (without micro-siting)



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Map: PS113707 Map 3 Author: LF

Date: 26/03/2020 Approved by: AC

Map Source: Google Satellite

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1:90,000 at A3

Legend

- Host Receivers
- Non-host Receivers
- ▲ Stage 1
- ▲ Stage 2
- Stage 3 without micro-siting
- ◆ Port Augusta
- Elevation Contours
- - - Host Receiver Noise Criteria, 45 dBA

Noise level, dBA Leq 15min



Lincoln Gap Stage 3 Noise Assessment
 Wind Turbine Stages 1, 2, and 3 (Stage 3 without micro-siting)



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Map: PS113707 Map 4	Author: LF
Date: 26/03/2020	Approved by: AC

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1:90,000 at A3

Legend

- Host Receivers
- Non-host Receivers
- ▲ Stage 1
- △ Stage 2
- Stage 3 with Micro-siting
- ◆ Port Augusta
- Elevation Contours
- - - Host Receiver Noise Criteria, 45 dBA

Noise level, dBA Leq 15min



Lincoln Gap Stage 3 Noise Assessment
 Wind Turbine Stages 1, 2, and 3 (Stage 3 with 125m micro-siting)



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MEMO

TO: Bronte Nixon
FROM: Andrew Leedham
SUBJECT: **Lincoln Gap Wind Farm – RLX Treatment**
OUR REF: PS119078
DATE: **31 March 2020**

1. BACKGROUND

Lincoln Gap Wind Farm Pty Ltd (LGWF P/L), a subsidiary of Nexif Energy, are proposing to develop Stage 3 of the Lincoln Gap Wind Farm (the Project) at Lincoln Gap, in the north of the Eyre Peninsula in South Australia. The Project involves the construction of 42 wind turbine generators (WTG) and ancillary infrastructure.

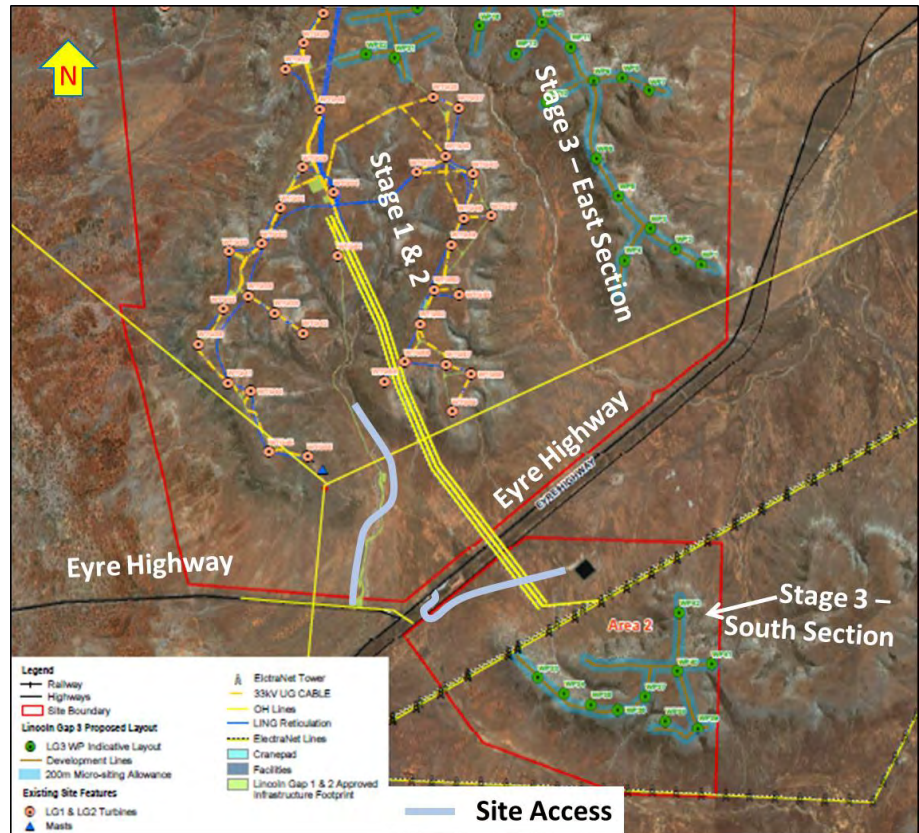
The initial stages of the Lincoln Gap Wind Farm (LGWF) involved the construction of 59 wind turbines, approved in 2018 (this initial project will hereby be referred to as Stage 1 and 2). To make use of the remaining available land, Stage 3 is proposed as an extension of the Project, and requires a separate Development Application. The proposed Project will position additional turbines across two areas; within, and south, of the LGWF Stage 1 and 2 site.

The Project site (the Site) is located 15 km south-west of Port Augusta in South Australia. The Site is located across three allotments, and is intersected by the Eyre Highway. The allotments are as follows:

- Area 1, north of the Eyre Highway: Section 4 of Hundred Plan 540400, in the Hundred of Handyside – Title reference: CT6138/344. Plus Section 2 of Hundred Plan 540400, in the Hundred of Handyside – Title reference: CT 6138/388 (this allotment will be used for site access only)
- Area 2, south of the Eyre Highway: Piece 1 in Deposited Plan 37168, in the Hundred of Handyside – Title reference: CT 6138/331.

Access to Area 1 will use existing access arrangements off Eyre Highway approximately 600m west of the junction with Lincoln Highway. The subject access was, and is still, being used for LGWF Stage 1 and 2 construction activities and was deemed to be easily visible and accessible from Eyre Highway.

Access to Area 2 would be from Eyre Highway via an existing unsealed road, approximately 650 m north of the junction with Lincoln Highway. The subject unsealed access road has an at-grade level crossing of an ARTC rail track that runs between Pt Augusta and Pt Lincoln. The rail track runs parallel to, and 200 metres west of, the Eyre Highway.



Following submission of the Development Application Report, WSP’s traffic and transport group contacted ARTC to discuss issues raised during the planning process.

ARTC has indicated that it will need to discuss the suitability of the existing RLX and any upgrades required to cater for the ongoing safe operation of the crossing during the construction phase of the project and its ongoing operation.

Determination of any physical upgrades and any operational safety improvements will be part of the next phase of design development of the wind farm but some comments based on information readily at hand are made below on what may be required.

The crossing is a “private” level crossing; the unsealed road is a private road and the single-line rail corridor is managed by ARTC. There are less than 10 scheduled and ad-hoc train movements over the crossing per week and only on specific days. The volume of road traffic is not known but based on observations of the surrounding land uses, would be very low. Trains are restricted to 80km/h over the crossing.

The road and rail line cross at right angles, the land is quite flat and there is very good sight distance from both the road and rail. The crossing is passively controlled with a regulatory stop sign on each road approach.



The issues that will need to be addressed by NEXIF might include:

- Widening the unsealed road across the crossing to allow for larger vehicles
- Improving the vertical alignment over the crossing to ensure low-loaders (if used) do not “bottom out” on the rail lines
- Maintaining a good quality road surface relatively free from loose gravel and minimise rutting during wet weather
- Restrict use of the crossing to daylight hours as the crossing is not lit.
- Alerting ARTC (and train drivers) of any concentrated use of the crossing



- Restricting use of the crossing to times when trains are not scheduled
- Educating drivers who will use the crossing on rail safety and warn of complacency
- Deploying on a part time basis and as required a competent railway protection officer when trains are scheduled to pass through the crossing.

The rail crossing was used in 2018 by construction traffic during the construction of earlier stages of the Lincoln Gap Wind Farm (the substation) and similar actions were deployed to manage the risks at the rail level crossing. NEXIF will collaborate with ARTC in the next phase of this development to manage the use of the crossing during this next stage of development.

A handwritten signature in blue ink that reads "Andrew Leedham". The signature is written in a cursive, flowing style.

Andrew Leedham

Technical Executive

Bronte Nixon

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Principal Environmental Scientist and Planner
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Friday, 19 June 2020

Project: Addendum to the Lincoln Gap Stage 3 Wind Farm Development Application to assist SCAP

Dear Bronte,

Following the approval of Lincoln Gap Wind Farm Stages 1 and 2 (59 turbines), Nexif Energy Pty Ltd are now considering the potential development of Lincoln Gap Stage 3. The Lincoln Gap Stage 3 proposal is for up to 29 wind turbine generators. This short addendum report provides advice to WSP Australia Pty Limited on at-risk raptor species relevant to Lincoln Gap Stage 3, which will assist with clarifying details to State Commission Assessment Panel (SCAP), as part of the Development Application. A spring survey is also scheduled for 2020, to identify any at-risk raptor species potentially occurring within Lincoln Gap Stage 3. The following question was raised by SCAP:

EBS' report's conclusions noted that raptors had completed their breeding at the time of the 2019 surveys. As higher turbines generally increase the risk of raptor collision (but reduce it for other species), was an additional spring survey undertaken to identify the locations of these across the project area? It is not clear even where the nearest raptor nest is located to ascertain whether a 500m exclusion area is being provided.

In helping to answer the above question, details around the following have been provided as part of this addendum:

- Background information including an overview of previous surveys and summary of the location of any raptor nests (abandoned and/or active);
- Signs of raptor nesting activity;
- Summary of raptor species likely to occur in the area (based on other wind farms and project surveys);
- Risk assessment, including:
 - Likelihood of collision based upon species, general level of risk, and based on birds present versus raptor species versus threatened species present; and
- Potential management and mitigation measures.

Background information

This section provides a summary of what is known about raptors from the Lincoln Gap Wind Farm. It includes the collation of all bird and raptor information and data from previous EBS Ecology reports as well as other relevant surveys (Table 1).

Table 1. Previous surveys conducted by EBS Ecology, relevant to raptors at the Lincoln Gap site.

Project description	Year	Survey Type	Stage	Citation	EBS Project No.
Lincoln Gap Wind Farm Avifauna survey	December 2015 & February 2016	Auswind Level 2 bird survey	Lincoln Gap Stage 1	EBS (2016a)	E51010
Lincoln Gap Vegetation Survey and Wedge-tailed Eagle Nest Inspection	August 2016	Vegetation survey, Wedge-tailed Eagle nest check and potential nesting area for Peregrine Falcon inspection	Lincoln Gap Stage 1	EBS (2016b)	E60610
Lincoln Gap Wind Farm Ecological Assessment	January 2017	Consolidated report – previous EBS surveys and reports (EBS 2016a, 2016b) and vegetation survey 2017	Lincoln Gap Stage 2	EBS (2017)	E60610
Lincoln Gap Stage 3 Flora and Fauna Baseline Assessment	June 2019	Vegetation Survey (Rangelands Assessment) & opportunistic bird survey	Lincoln Gap Stage 3	EBS (2019)	E81102

December 2015 / February 2016 survey – summary

A total of 18-point count surveys (Figure 1) were conducted across the Lincoln Gap Stage 1 in 2015, and again in 2016. In addition, targeted nest surveys were undertaken in 2015 and 2016 to assess the number of raptor nests within the Lincoln Gap Stage 1 Wind Farm.

- Maps of location of nests (abandoned and / or active)

A total of three Wedge-tailed Eagle (*Aquila audax*) nests were recorded across the two surveys (EBS 2016a). These nests were found in scattered woodland within the southern extent of the Project Area (Figure 1); two were within *Eucalyptus camaldulensis* (River Red Gum) trees located on the ridges, and a single nest was recorded within a creek line within a *E. camaldulensis* tree. A 500 m exclusion buffer was applied to all three nests, to minimise the impact of wind turbines on the Wedge-tailed Eagle (which may breed at these locations) (Figure 1).

- Signs of nesting activity

Wedge-tailed Eagles were observed during both surveys and birds were usually observed around the western flank of the Project Area. However, individuals were also detected in the south eastern corner of the Project Area (EBS 2016a). Out of the three Wedge-tailed Eagle nests, one nest (Nest 1) was assessed as being highly likely to have been utilised by a breeding pair within the last twelve months (i.e. active in

the 2015 breeding season). A pair of adult birds with a sub-adult were observed in and around Nest 2 (February 2016), which was situated opposite to where Nest 1 was situated. As such it was assumed that this was a breeding pair with offspring, and it was inferred that that the ridges and plateaus within the Project Area were the home range for this breeding pair.

- Observations of raptor species

Three raptor species were recorded across the two surveys (EBS 2016a); the Brown Falcon (*Falco berigora*) was observed opportunistically, not during the point counts (Table 2).

Table 2. Raptor species recorded during these survey periods (EBS 2016a).

Scientific name	Common name	Conservation status			Number observed	
		Aus	SA	PC	OPP	Total
<i>Aquila audax</i>	Wedge-tailed Eagle	-	-	8	7	15
<i>Falco berigora</i>	Brown Falcon	-	-	-	8	8
<i>Falco cenchroides</i>	Nankeen Kestrel	-	-	6	14	20

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **OPP:** Opportune. **PC:** Point Count.

The two surveys were undertaken in early (Dec 2015) and late summer (Feb 2016), a period in which most birds would have finalised breeding and as such there would have been low signs of any breeding activity. After the breeding season it is likely that bird species become more cryptic, due to lack of breeding displays, vocalizations, and breeding activities, such as feeding of chicks or fledged young within the area. The timing of the survey may therefore have resulted in some bird species not being recorded, as well as limiting any evidence of species that may breed within the Lincoln Gap Project Area.

August 2016 – summary

- Signs of nesting activity

The Wedge-tailed Eagle nests identified during the December 2015 / February 2016 survey periods, were checked for active signs of nesting during the August 2016 survey. All three nests were determined as being within 1.1 km of one another (Figure 1). Nests 1 and 3 were in good condition and were assessed as they may be used in the future (Figure 2 and Figure 4). Nest 2 was located in a dead tree, which was beginning to deteriorate (Figure 3). It was considered unlikely that this nest would be used again in the future. None of the three Wedge-tailed Eagle nests were determined to be active at the time of the August 2016 survey. All nests maintained a 500 m exclusion buffer from any proposed wind turbines (Figure 1).

- Observations of raptor species

A minimum of two Wedge-tailed Eagles (seven records over 5 days) were recorded flying within 250 m of Nest 1 and Nest 2 (Figure 1).

No Peregrine Falcons (*Falco peregrinus*) were recorded during the August 2016 survey. Many birds of prey hunt from elevated perches/ledges which become stained by the uric acid component of their excrement. Uric acid is not very soluble in water, so it tends to remain on the perch/ledge and stain it white where it is often referred to as “whitewash”. While two ledges along the rock escarpment contained whitewash, this was determined to not be enough evidence to confirm the presence of the Peregrine Falcon.

June 2019 – summary

- Observations of raptor species

Birds were opportunistically recorded over the Project Area in June 2019. A single raptor species, the Wedge-tailed Eagle, was recorded during the survey (with five individuals observed) (EBS 2019).

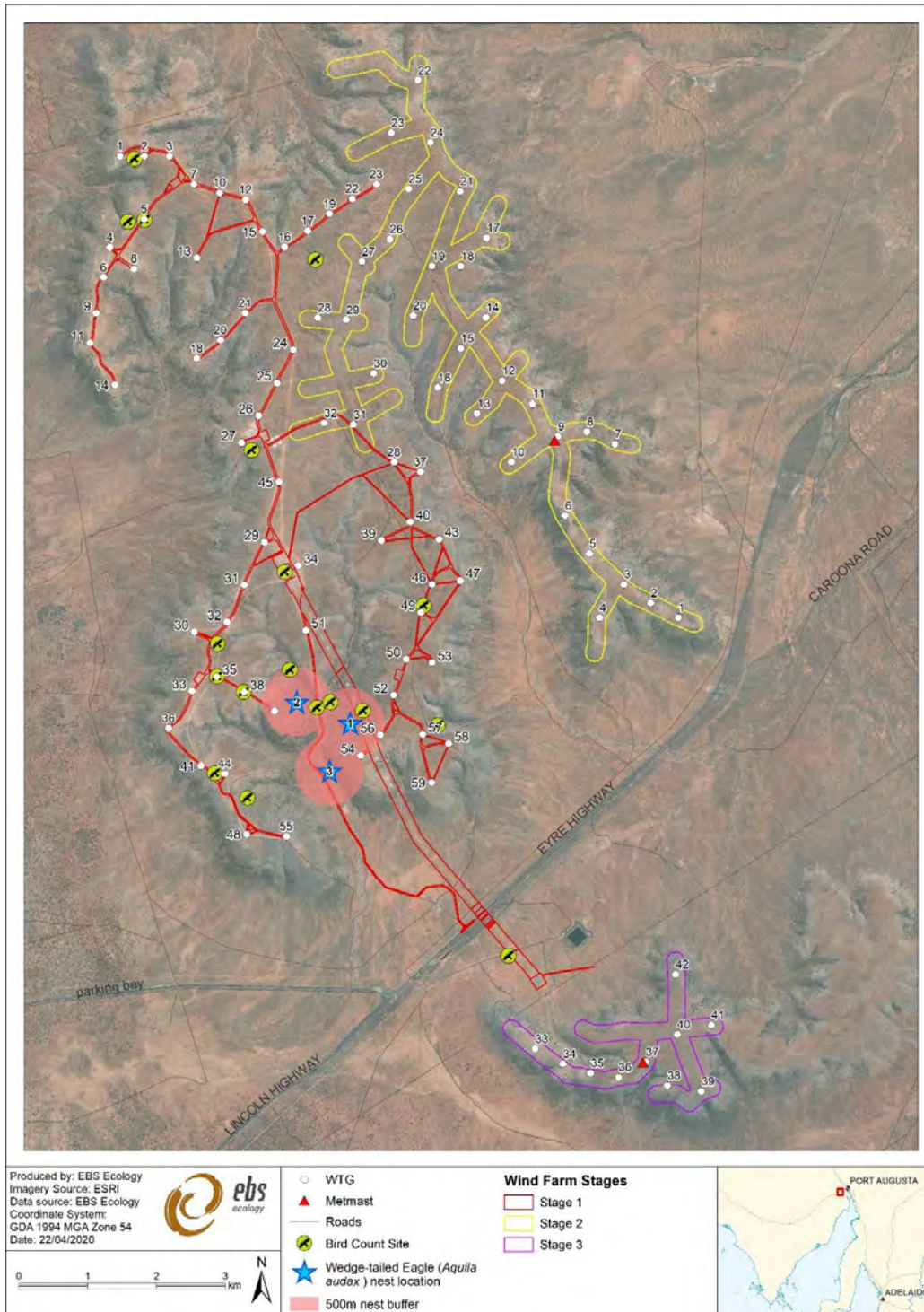


Figure 1. Location of the three Wedge-tailed Eagle nests (inclusive of a 500 m buffer), and bird count sites implemented across the three stages of the Lincoln Gap Wind Farm.



Figure 2. WTE nest 1 (EBS 2016b).



Figure 4. WTE nest 3 (EBS 2016b).



Figure 3. WTE nest 2 (EBS 2016b).

Summary of likely raptor species in the area (based on other wind farms and project surveys)

Ecological Associates (2005) identified fourteen species of raptor as potentially utilising the site, which included the White-bellied Sea Eagle (*Haliaeetus leucogaster*) and the Peregrine Falcon (*Falco peregrinus*) (Table 3). On the Eyre Peninsula, the former is a species restricted to the coast and was not expected to forage over the site. The latter was determined as having a high likelihood of occurrence at the site; individuals may have been at risk of colliding with wind turbines or power lines when foraging for prey (Ecological Associates 2005). Most raptors were determined as being occasional visitors to the site, but some may have been permanent residents.

Table 3. List of raptors that are likely to reside in or visit the site (Ecological Associates 2005).

Common name	Species	Movement	EPBC status	NPW Act status
Spotted Harrier	<i>Circus assimilis</i>	Nomadic		
Black Kite	<i>Milvus migrans</i>	Nomadic		
Whistling Kite	<i>Haliastur sphenurus</i>	Nomadic		
Black Falcon	<i>Falco subniger</i>	Nomadic		
Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>	Sedentary		
Black-shouldered Kite	<i>Elanus axillaris</i>	Sedentary / Nomadic		
Wedge-tailed Eagle	<i>Aquila audax</i>	Sedentary / Nomadic		
White-bellied Sea Eagle	<i>Haliaeetus leucogaster</i>	Sedentary / Nomadic	Migratory (CAMBA)	Vulnerable
Little Eagle	<i>Hieraaetus morphnoides</i>	Sedentary / Nomadic		
Brown Goshawk	<i>Accipiter fasciatus</i>	Sedentary / Nomadic		
Brown Falcon	<i>Falco berigora</i>	Sedentary / Nomadic		
Nankeen Kestrel	<i>Falco cenchroides</i>	Sedentary / Nomadic		
Peregrine Falcon	<i>Falco peregrinus</i>	Sedentary / Nomadic		Rare
Australian Hobby	<i>Falco longipennis</i>	Sedentary / Nomadic		

Twelve species of prey, were observed by Ornithologist Peter Langdon at Pandurra Station (includes Myall Creek and Lincoln Gap), including the Peregrine Falcon (Table 4) (Ecological Associates 2006). Most species were deemed occasional visitors to the site, but four species were noted as local residents. As noted by Ecological Associates (2006), Peregrine Falcons have been recorded on site and were classed as an occasional visitor. This species has a range of movements throughout territories, and as such was determined as more than likely to use the site from time to time. It was recommended that a survey be undertaken during early spring for this species; it should focus on rocky outcrops in an attempt to confirm if this species breeds on site, which will assist in planning to reduce any risks to the species.

Table 4. Birds of prey recorded at Pandurra Station (Ecological Associates 2006).

Common name	Species	Site Occupation	Abundance score	Breeding at site	EPBC status	NPWS status	EP status
Peregrine Falcon	<i>Falco peregrinus</i>	Occasional	2			R	R
Little Eagle	<i>Hieraaetus morphnoides</i>	Occasional	2				U
Black Kite	<i>Milvus migrans</i>	Occasional	2				U
Australian Hobby	<i>Falco longipennis</i>	Occasional	2				U
Black Falcon	<i>Falco subniger</i>	Occasional	2				U
Black-shouldered Kite	<i>Elanus axillaris</i>	Occasional	2				
Brown Goshawk	<i>Accipiter fasciatus</i>	Occasional	2				
Spotted Harrier	<i>Circus assimilis</i>	Occasional	2				
Brown Falcon	<i>Falco berigora</i>	Occasional	2				
Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>	Resident	2	+			
Wedge-tailed Eagle	<i>Aquila audax</i>	Resident	3	+			
Nankeen Kestrel	<i>Falco cenchroides</i>	Resident	3	+			

Abundance score: 1 = few or one only, 2 = low, 3 = moderate, 4 = high. EPBC status = conservation status under the *Environmental Protection and Biodiversity Conservation Act (1999)*. NPWA = status under the *South Australian National Parks and Wildlife Act (1972)*. EP Status = Status on the Eyre Peninsula according to Carpenter and Reid (2000). E = Endangered, V = Vulnerable, R = Rare and U = Uncommon.

EBS Ecology undertook detailed searches for potential nesting habitat of the Peregrine Falcon during the December 2015 and February 2016 surveys (EBS 2016a). It was determined that much of the western edge of the Lincoln Gasp Project Area contained suitable habitat for Peregrine Falcon to nest. Whitewash, located on a section of rocky ledge, was recorded during that survey period (EBS 2016a), which typically indicates that a bird of prey has utilised this spot for hunting or breeding. However, no Peregrine Falcons were recorded during the August 2016 survey (EBS Ecology 2016b).

There were no additional raptor species, identified from the desktop assessment and completed as part of the Lincoln Gap consolidated Ecological Assessment Report (EBS 2017), that were not already identified by EBS Ecology or Ecological Associates (2005 and 2006).

The desktop assessment completed as part of the Lincoln Gap Stage 3 Flora and Fauna Baseline Assessment Report (EBS 2019), identified two additional raptor species, which may possibly occur within the Project Area. This was due to the fact, that as part of the BDBSA search, a 50 km buffer was used to determine potential threatened fauna from the Project Area. In comparison, a 10 km buffer was used as part of the desktop results in the 2017 ecological assessment. These were the State rare Black-breasted Buzzard (*Hamirostra melanosternon*) and State rare Grey Falcon (*Falco hypoleucos*). Both were determined as being rare visitors to the Project Area; the Project was deemed as having a negligible impact on both species, due to the fact both species have extensive areas of suitable habitat within the region.

Risk assessment

Ecological Associates 2005, 2006

Ecological Associates (2005) determined that the use of air space by raptors was likely to be concentrated in the gullies and along the sides of the plateau of the Project Area, where prey abundance was concentrated. Ecological Associates provided an extensive background report in 2006, in consultation with local Ornithological expert Peter Langdon (Ecological Associates 2006). A risk assessment of the risk of significant impact to birds at Lincoln Gap, was undertaken as part of this report. The results of the risk assessment on raptors is provided below.

- The model (presented by Ecological Associates, 2006) considers the consequence and likelihood of an impact to arrive at a level of risk. The level of consequence (in this case mortality) and its likelihood are arranged to form a risk matrix detailing different levels of risk that arise with various combinations of consequence and likelihood.
- Consequence scores were grouped according to the conservation status of species. Consequence was considered minor for species with no conservation status, minor if the species is listed as Rare in South Australia and significant if the species is listed as Vulnerable or Endangered (at a State or National level). Likelihood of impact scores were determined from the species relative abundance on site and its risk behaviours, as described in Table 5. Risk behaviour was determined as high for birds of prey.
- The risk matrix in Table 6 describes the relationship between risk, likelihood and consequence. Species of conservation significance with a high likelihood of impact had the highest risk score. Where the risk was determined as low, no further action was advocated. If it was medium or high, mitigation actions may have been required to reduce the risk remaining after mitigation to acceptable levels.
- Preliminary risk scores were assigned to bird species known or likely to occur on or fly over the property (Ecological Associates 2006). Table 7 shows that most birds of prey had a moderate or high risk of significant impact.

Table 5. Calculation of Risk Behaviour Likelihood Scores (Ecological Associates 2006).

Risk behaviour	Abundance Score			
	1	2	3	4
Low	Very Rare	Very Rare	Rare	Moderate
Medium	Very Rare	Rare	Moderate	High
High	Rare	Moderate	High	High

Note: Risk behaviour scores were high for birds of prey.

Table 6. Risk assessment model on which planning decisions are based (Ecological Associates 2006).

Likelihood	Consequence		
	Minor (bird has no recognised conservation status)	Moderate (bird is rare in SA)	Significant (bird is vulnerable or endangered in SA and / or AUS)
Very rare	Very Low Risk	Low Risk	Low Risk
Rare	Low Risk	Moderate Risk	Moderate Risk
Moderate	Moderate Risk	Moderate – High Risk	High Risk
High	Moderate – High Risk	High Risk	Very High Risk

Table 7. Risk assessment model for birds of prey, on which planning decisions are based (Ecological Associates 2006).

Group	Number of species				Total species
	Very Low Risk	Low Risk	Moderate Risk	High Risk	
Birds of Prey	0	1 (7.1%)	9 (64.3%)	4 (28.6%)	14

December 2015 / February 2016 survey – summary

Three raptor species were recorded with heights that were considered at-risk with colliding with wind turbines: Wedge-tailed Eagle, Brown Falcon and Nankeen Kestrel (*Falco cenchroides*) (Table 8). The minimum flight height of all three raptor species was recorded when they were flying low, starting off perched in a tree. Maximum flight height was recorded high above ridgelines, using thermal updrafts and high winds to hunt across the Lincoln Gap site.

Table 8. Flight details of birds observed as flying at ‘at-risk’ flight heights (EBS 2016a).

Common name	Scientific name	Total no. of birds	Total movements	Min height (in metres)	Max height (in metres)	At-risk flights recorded (Y/N)
Wedge-tailed Eagle	<i>Aquila audax</i>	15	6	5	150	Y
Brown Falcon	<i>Falco berigora</i>	8	3	2	50	Y
Nankeen Kestrel	<i>Falco cenchroides</i>	20	10	5	80	Y

January 2017 – summary

The flight height data of bird species recorded during regional field surveys (carried out by EBS Ecology, with a sample size of 14,433 observations) was analysed to determine the risk to groups of species, of which raptors was one of them (EBS Ecology 2016a).

Raptors were considered one of the most at-risk groups of birds with regards to windfarm construction, due to their prevalence of flight within rotor swept areas, matched with their low fecundity and long lifespans (Beston *et al.* 2016). Increasing the hub height of Lincoln Gap turbines from 80 m to 110 m, reduced the percentage of at-risk flights by raptors from 94.1% to 51.0% (n = 680 flights) (Table 9). The Wedge-tailed Eagle is expected to fly within the at-risk zone more often than other raptor species, based on data collected within the Project Area and regional observations (Table 8).

Table 9. Percentage of at-risk flights performed by raptor species (total observations n = 680) (EBS 2017).

Previous Dimensions (80 m hub height)			Current Dimensions (110 m hub height)		
Height	# of flights	% of flights	Height (in metres)	# of flights	% of flights
0-10 m	22	3.2%	0-40 m	316	46.4%
10-150 m	640	94.1%	40-180 m	347	51.0%
>150 m	18	2.6%	>180 m	17	2.5%

April 2020 – updated risk assessment

An updated risk assessment matrix has been undertaken in 2020 to determine the likelihood and significance of bird mortality associated with wind turbine collision (Table 10). The model used is similar to that used by Ecological Associates in Table 5 and Table 6, with updated definitions listed below Table 10. The raptor species listed in Table 4 have been used in the updated risk assessment; only two out of the 14 listed species have not been recorded on site by either EBS Ecology or local Ornithologist Peter Langdon. All 14 raptor species were assumed to have flight heights considered at-risk of colliding with turbines (for the purposes of the updated risk assessment and worst-case scenario if all species were to occur within Lincoln Gap Stage 3).

The following factors should be noted as part of this updated risk assessment:

- Relevant data was not available for all species listed in Table 10, i.e. total movements, minimum height, maximum height and at-risk flights – Table 8 summarises this data for three of the raptor species.
- As of June 2020, three models were being considered as part the updated risk assessment. The largest turbine under consideration has the following dimensions:
 - Max tip height of 206 metres (m);
 - Max hub height of 125 m (compared with the original 110 m);
 - Max rotor diameter of 162 m (compared with the original 140 m) ; and
 - Max blade length of 81 m.

Using the latest dimensions, the rotor swept area has been calculated at 37 m (previously it was 30 m).

The likelihood of an event causing mortality and consequence at a species/population level was determined using previous knowledge of raptor species at the Lincoln Gap site as well as previous knowledge and experience in bird mortality at other wind farm sites in South Australia.

If the level of risk to the species is determined as high to extreme, then resulting impact on an individual species and local population would be unacceptable. If the level of risk is categorised as medium, then all efforts should be made to mitigate against potential impact on the species. If the level of risk is low, then impact would be restricted to an individual level and impact on a species would be unlikely to affect the viability of a local population.

Results 2020 Risk Assessment

An overview of the updated risk analysis is presented in Table 10 below. Out of the 14 raptor species, the overall level of risk was determined as low for nine species. The overall level of risk was determined as medium for the remaining five species, which were: Australian Hobby (*Falco longipennis*), Brown Falcon, Nankeen Kestrel, Peregrine Falcon and Wedge-tailed Eagle.

For those raptor species that scored a medium risk, the likelihood of collision causing mortality was likely. The likelihood of collision causing mortality was determined as unlikely for six raptor species and rare for three species (Table 10).

The consequence of mortality at a species/population level was determined as minor for five species. The consequence of mortality may impact on the local population for these five species, however, will not impact on the overall species population. Consequence was determined as insignificant for nine species; individuals may be affected, but the viability of local populations will not be impacted upon.

Table 10. Updated 2020 risk assessment of the proposed Lincoln Gap Stage 3 Wind Farm on the 14 raptor species. Bird species with a level of medium risk are shaded.

Common name	Scientific name	Aus status	SA status	Likelihood of utilising Project Area	Likelihood of an event causing mortality	Consequence at a species / population level	Level of risk
Australian Hobby	<i>Falco longipennis</i>			Known	Likely	Minor	Medium
Black Falcon	<i>Falco subniger</i>			Known	Rarely	Nil/Insignificant	Low
Black Kite	<i>Milvus migrans</i>			Known	Unlikely	Nil/Insignificant	Low
Black-shouldered Kite	<i>Elanus axillaris</i>			Known	Unlikely	Nil/Insignificant	Low
Brown Falcon	<i>Falco berigora</i>			Known	Likely	Minor	Medium
Brown Goshawk	<i>Accipiter fasciatus</i>			Known	Unlikely	Nil/Insignificant	Low
Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>			Known	Unlikely	Nil/Insignificant	Low
Little Eagle	<i>Hieraaetus morphnoides</i>			Known	Unlikely	Nil/Insignificant	Low
Nankeen Kestrel	<i>Falco cenchroides</i>			Known	Likely	Minor	Medium
Peregrine Falcon	<i>Falco peregrinus</i>		R	Known	Likely	Minor	Medium
Spotted Harrier	<i>Circus assimilis</i>			Known	Unlikely	Nil/Insignificant	Low
Wedge-tailed Eagle	<i>Aquila audax</i>			Known	Likely	Minor	Medium
Whistling Kite*	<i>Haliastur sphenurus</i>			Unlikely	Rarely	Nil/Insignificant	Low
White-bellied Sea Eagle*	<i>Haliaeetus leucogaster</i>	Mi	V	Unlikely	Rarely	Nil/Insignificant	Low

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare. **Mi:** Migratory. *denotes species previously not recorded on site by EBS Ecology or local Ornithologist Peter Langdon.

Likelihood definitions (how likely is it that mortality from collision occurs):

Chronic – the event is expected to occur in most circumstance
 Frequent – the event probably will occur in most circumstances
 Likely – the event should occur at some time
 Unlikely – the event could occur at some time
 Rarely – the event may occur only in exceptional circumstances

Consequence definitions (what is the significance of associated impact on species viability):

Catastrophic disaster – the event has the potential to lead to collapse of species
 Major – critical event, very likely to have significant impact on species
 Moderate – likely to have impact on population, potential to impact on long term viability under some scenarios
 Minor – the event may impact on local population, no impact on species
 Nil/Insignificant – individuals may be affected, but viability of local population not impacted

Management and mitigation measures

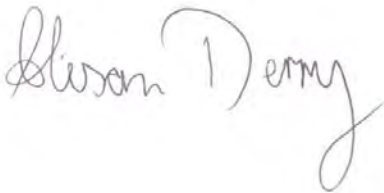
The Lincoln Gap Stage 3 Wind Farm Development Application is currently making its way through the planning system. While birds were opportunely recorded over the Project Area, there were no targeted nest searches completed for the Wedge-tailed Eagle or other specific raptors, for Stage 3. The 2019 survey was conducted in June, and therefore was outside of the optimal pairing and nesting season for the Wedge-tailed Eagle.

It was and is EBS Ecology's recommendation to undertake a targeted spring 2020 survey, which is the optimal survey time to better determine raptor activity levels and potential breeding locations within Lincoln Gap Stage 3. As was the case with Stages 1 and 2, any new nest locations should incur a 500 m exclusion buffer to reduce the risk of bird collision and mitigate disturbance to nests.

The Native Vegetation Assessment Panel (NVAP) assessed the application for native vegetation removal for Stage 1 and 2 (2017/3036/010) and concluded that *due to the relatively low numbers of birds that are likely to be impacted by bird strike in the area, a formal bird strike monitoring program was not recommended as a condition of endorsement*. At this stage, EBS Ecology would envisage the same would be likely for Lincoln Gap Stage 3, and that no further management is required for the site, pending the outcome of NVAP and SCAP.

If you have any questions in relation to the above information, please do not hesitate to contact me.

Yours sincerely,

A handwritten signature in cursive script that reads "Alison Derry". The signature is written in a light grey or blue ink.

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MEMO

TO: SCAP
FROM: WSP
SUBJECT: Additional information for ancillary infrastructure for LGWF Stage 3
OUR REF: PS113707-ENV-MEM- RevA
DATE: 9 October 2020

The following memo provides additional information for the proposed ancillary infrastructure for DA 010/V070/19, as referenced in Section 4.2 of the report 'Lincoln Gap Wind Farm Stage 3: Development Application Report – dated November 2019'.

Please be aware that drawings provided are for example only, generally being based on infrastructure approved under the earlier stages of the Lincoln Gap Wind Farm (LGWF). These designs will be updated and refined by the Engineering, Procurement and Construction (EPC) contractor engaged to complete construction of the project.

ACCESS TRACKS, LAYDOWN AREAS AND TURBINE HARDSTANDS

- Access tracks will broadly follow the 'Indicative Stage 3 Access Tracks' path, as displayed in Appendix A. This was provided as Figure 1.2 in the development application report.
- Access tracks are likely to be 5 to 6m wide.
- It is expected that there will be 42 turbine hardstands located adjoined to each proposed turbine location. These will consist of an area of approximately 45m x 28m of compacted earth and site-won gravel.
- Laydown areas are expected to be approximately 60m x 15m. These are likely to be located adjacent to access tracks. The amount and location of these are still to be determined.

33 KV OVERHEAD POWERLINE, 275 KV OVERHEAD POWERLINE AND ASSOCIATED POLES.

- Transmission overhead powerlines and poles are likely to be a similar design to the existing LGWF overhead lines, with a total height of approximately 30m. Please see Appendix B for an example. The final design and location of poles is yet to be determined.
- Powerlines will follow the 'Proposed 275 kV' and 'Proposed 33 kV' routes as shown in Appendix A, connecting the turbines and internal substation to the existing Corraberra Hill substation.

33/275 KV SUBSTATION

- The substation is currently proposed to be located near WP10 and WP11, as shown in Appendix A. The substation is likely to require an area of approximately 6500m². The detailed design of the substation is still to be developed, however please refer to Appendix C for an example substation design, based on the earlier stages of the LGWF.

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- The switchroom, operations and maintenance buildings and BESS and/or Synchronous Condenser units will be grouped with or in close proximity to the proposed substation.

33 KV UNDERGROUND CABLES

- Underground cables are will likely follow a similar alignment to the internal access tracks.

SWITCHROOM

- The switchroom will be located within or adjacent to the new substation and is likely to be a single-storey building containing switchgear and SCADA equipment.
- An example layout has been provided in Appendix D. The actual design will vary based on the needs of the EPC contractor.

OPERATIONS AND MAINTENANCE BUILDINGS

- The operations and maintenance buildings will be in close proximity to the substation and are likely to consist of one to two single-storey buildings. These buildings will contain a storage area for equipment and materials required for the ongoing operational maintenance of the site as well as facilities for operational staff; including offices and meeting spaces, kitchen facilities, toilet facilities, and adjacent car parking.
- An example layout has been provided in Appendix E. The actual design will vary based on the needs of the EPC contractor.

STORAGE SHED

- The storage shed will be located near WP40 as shown in Appendix A. The storage shed will likely be comprised of metal clad in colourbond (or similar) with a concrete floor. The shed will have a minimum area of 290m². Internal clearance will be sufficient for pallet racking.
- The design is likely to be similar to the maintenance building shown in Appendix E.

SECURITY FENCING

- It is anticipated that security fencing will be constructed only around the perimeter of the substation, switchroom, operations and maintenance buildings, storage shed, BESS and/or Synchronous Condenser units.
- Fencing is likely to be constructed to match the existing security fencing on site. This will consist of a chainwire fence topped with barbed wire, with a total height of 3m, as shown in Appendix F. The exact details and location of fencing is still to be determined.

TEMPORARY CONSTRUCTION FACILITIES INCLUDING A SITE OFFICE, CONCRETE BATCHING PLANT AND PARKING

- A concrete batching plant will be required on site for the construction of turbine foundations. These foundations required a large volume of concrete and generally need to be completed in a single pour. Situating a temporarily concrete batching plant on site will help to minimise truck movements from the site.
- Temporary construction facilities will be required on site until the completion of construction. The location of these facilities are still to be finalised. The EPC contractor will finalise these details based on the best location for the turbine layouts and their machinery requirements. Though, it is likely they will be close to the operations and maintenance facility.

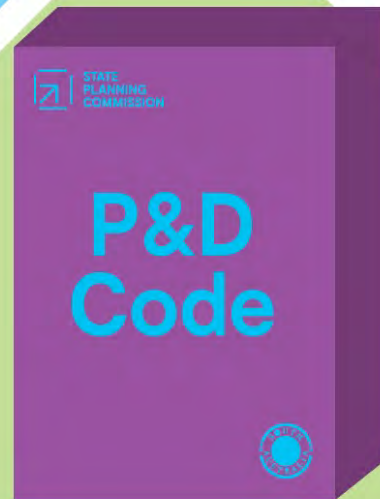


BESS AND/OR SYNCHRONOUS CONDENSER UNITS AND ASSOCIATED EQUIPMENT (INCLUDING FOUNDATION WORKS AND STRUCTURES TO HOUSE THE EQUIPMENT) OR ANY OTHER TECHNOLOGY THAT ARE ABLE TO DELIVER COMPLIANCE WITH THE OTR'S TECHNICAL REQUIREMENTS.

- The final design of this technology will be determined by the EPC contractor. This is due to the nature of the turbine suppliers having different capabilities and preference. This enables the EPC contractor to development the most appropriate solution based on the turbine technology.
- For reference, an example of each the BESS and synchronous condenser units have been provided in Appendix G.



STATE
PLANNING
COMMISSION



PLANNING AND DESIGN CODE AS APPLYING TO LAND NOT WITHIN A COUNCIL AREA

July 2019

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Part 1—Rules of Interpretation

This Part 1 forms part of the Planning and Design Code. It sets out how the Code implements the requirements of section 66 of the *Planning Development and Infrastructure Act 2016* and instructs the user on how the Code is to be read and applied to development assessed under the *Planning Development and Infrastructure Act 2016*.

Introduction

This is the Planning and Design Code under the *Planning, Development and Infrastructure Act 2016* (the Act). As provided by section 65 of the Act, the State Planning Commission (the Commission) is responsible for preparing and maintaining the Planning and Design Code as a statutory instrument under the Act. The Planning and Design Code, and any amendments to the Code, as published on the SA planning portal, have been adopted by the Minister.

As provided by section 66 of the Act, the primary purpose of the Planning and Design Code is to set out a comprehensive set of policies, rules and classifications which may be selected and applied in the various parts of the State through the operation of the Planning and Design Code and the SA planning database for the purposes of development assessment and related matters within the State.

The Planning and Design Code also provides for other matters envisaged by the Act, and regulations made under the Act in Parts 6-8.

Commencement

The commencement date for the Planning and Design Code is 1 July 2019.

Information about amendments to the Planning and Design Code is set out in Appendix 1.

Preliminary

1. Library of classification criteria (Deemed-to-Satisfy criteria), policies and rules
 - 1.1. In addition to the classification of development, the Planning and Design Code sets out a comprehensive set of policies and rules that may be selected and applied in the various parts of the State for the purposes of the assessment of performance assessed and restricted development.
 - 1.2. The policies and rules are collated and organised into Zones, Subzones, Overlays and General Development Policies. Together they form a library of policies (“the Code Library”). The policies that make up the library have no application in their own right, but apply according to the scheme outlined in the following paragraphs.
 - 1.3. The policies are applied to development by reference to classes of development, and spatial location.
 - 1.4. Zones, Subzones and Overlays are assigned spatial boundaries in the various parts of the State as identified using maps in Part 5 of the Code. From 1 July 2019 the Code will apply to Out of Council areas but no other parts of the State.

Classification of Development

- 1.5. The Planning and Design Code classifies various classes of development as:
 - (a) accepted development (see section 104(1) of the Act); and

Planning and Design Code
Part 1 – Rules of Interpretation

- (b) deemed-to-satisfy development (see section 105(a) of the Act); and
 - (c) restricted development (see section 108(1)(a) of the Act).
- 1.6. All development is classified firstly by reference to its location and the Zone, Subzone and Overlays that are applicable to the location. Classification tables applicable to each zone identify accepted development, deemed-to-satisfy development and restricted development.

Accepted Development

- 1.7. The Code classifies development as accepted development in an Accepted Development Classification Table relative to a particular Zone.
- 1.8. An Accepted Development Classification Table for each Zone specifies criteria which must be met in order for specified classes of development to be classified as accepted development within the Zone. For a development to be accepted development all criteria applicable to a class of development must be satisfied.

Deemed-to-Satisfy Development

- 1.9. The Code classifies development as deemed-to-satisfy development in a Deemed-to-Satisfy Development Classification Table relative to a particular Zone.
- 1.10. A Deemed-to-Satisfy Classification Table for each Zone specifies criteria which must be met in order for specified classes of development to be classified as deemed-to-satisfy development within the Zone. For a development to be deemed-to-satisfy development all criteria applicable to a class of development must be satisfied.
- 1.11. A deemed-to-satisfy development does not require assessment against the policies and rules applicable to performance assessed development, and must be granted a consent subject to the requirements of section 106 of the Act.

Restricted Development

- 1.12. The Code classifies development as restricted development in a Restricted Development Table relative to each Zone. Restricted development is a form of impact assessed development for the purposes of assessment under the Act.
2. Performance Assessed Development - Application of Policies to Govern Performance Assessed Development
- 2.1. All development not classified as accepted, deemed-to-satisfy, restricted or impact assessed is to be assessed on its merits against the Planning and Design Code, as contemplated by section 107 of the Act. This is referred to as performance assessed development.

Application of Policies to Classes of Development

- 2.2. The Code applies policies to classes of development through an Applicable Policies for Performance Assessed Development Table relative to each Zone.
- 2.3. An Applicable Policies for Performance Assessed Development Table for each Zone specifies the policies and rules (selected from the Code library) that apply to classes of development within the zone, including by the application of policies within Sub-zones and Overlays, together with the relevant General Development Policies. The Applicable Policies for Performance Assessed Development Tables also contain rules for application of the policies under the heading "Applicable Policies" including rules relating to the application of Desired Outcome policies

and Designated Performance Features. The policies specified in the Applicable Policies for Performance Assessed Development Table constitute the policies applicable to the class of development within the Zone to the exclusion of all other policies within the Code library, and no other policies are applicable.

- 2.4. Development that does not fall within one of the specified classes of development in an Applicable Policies for Performance Assessed Development Table is designated in the Table as “All Other Development”. In respect of all other development, all policies from the Zone and Subzone, and all policies in Overlays that have application to the spatial location of the development, and all general development policies, are selected and applied for the purpose of assessment.

Relevant Provisions

- 2.5. For the purposes of section 102 of the Act the relevant authority must assess the development against the applicable policies specified by the zone Applicable Policies for Performance Assessed Development Table that are relevant to the particular development. For the avoidance of doubt, the relevant authority may determine that one or more applicable policies is not relevant to a particular development.

Policies – Desired Outcomes and Performance Outcomes

- 2.6. Zone, Subzone, Overlay and General Development policies are comprised of desired outcomes and performance outcomes. These are applicable to performance assessed development and to restricted development.
- 2.7. Desired outcomes are policies designed to aid the interpretation of performance outcomes by setting a general policy agenda for a Zone, Subzone, Overlay or General Development module. Where a relevant authority is uncertain as to whether or how a performance outcome applies to a development, the desired outcome(s) may inform its consideration of the relevance and application of a performance outcome, or in assessing the merits of the development against the applicable performance outcomes collectively.
- 2.8. Performance outcomes are policies designed to facilitate assessment according to specified factors, including land use, site dimensions and land division, built form and character and hazard risk minimisation.
- 2.9. In order to assist a relevant authority to interpret the performance outcomes, in some cases the policy includes a standard outcome which will generally meet the corresponding performance outcome (a *designated performance feature* or DPF). Without derogating from the need to assess development on its merits against all relevant policies, a DPF provides a guide to the relevant authority as to what is generally considered to satisfy the corresponding performance outcome but does not derogate from the discretion to determine that the outcome is met in another way.

Restricted Development

- 2.10. For the purpose of restricted development in all zones, all policies and rules relative to the spatial location of the development together with all General Development Policies are applicable and may be determined by the Commission to be relevant for the purposes of a particular restricted development pursuant to s110(10) of the Act.

Planning and Design Code
Part 1 – Rules of Interpretation

3. Part 5 of the Code - Maps/Spatial Information
 - 3.1. Part 5 of the Code is a series of maps identifying spatial boundaries of Zones, Subzones and Overlays in relation to the parts of the State to which the Planning and Design Code applies.
 - 3.2. The classifications, rules and policies applicable to a particular class of Zone, or to a Subzone or Overlay determined in the manner set out in this Introduction are applied to the various parts of the State by reference to the correspondingly named Zones, Subzones and Overlays identified in the Part 5 maps.
4. Hierarchy of policies/Modification of Provisions
 - 4.1. Where there is an inconsistency between provisions in the library of policies, and for the purpose of section 66(3)(b) of the Act, the following rules will apply to the extent of any inconsistency between policies:
 - (a) the provisions of an Overlay will prevail over all other policies applying in the particular case;
 - (b) a Subzone policy will prevail over a Zone policy or a General Development policy; and
 - (c) a Zone policy will prevail over a General Development policy.
5. Procedural Matters – Referrals
 - 5.1. The Code also interacts with Schedule 9 of the *Planning, Development and Infrastructure (General) Regulations 2017* for the purposes of section 122 of the Act. Schedule 9 prescribes development that, by reference to location, class or other features as specified in each item in the table in clause 3 of Schedule 9, and class as specified by the Code, must be referred to a body prescribed in Schedule 9. For the purposes of the specified items in the table in clause 3 of Schedule 9, the Code contains Referral Tables relative to Overlays, Zones and General Development modules. Referral Tables specify classes of development requiring referral to a prescribed body by the mechanism described in paragraph 6.2.
 - 5.2. Referral Tables specify classes of development to which an item in the table in clause 3 of Schedule 9, identified by reference to the prescribed referral body, applies. In addition, Referral Tables identify the purpose of the referral (that being a matter that is considered by the Commission under section 66(2)(e)(ii) of the Act as being appropriate to include in the Code). Development that is within a class specified by the Referral Table, and otherwise within the corresponding item in the table in clause 3 of Schedule 9 must be referred to the prescribed referral body pursuant to s122 of the Act.
6. Interpretation

Definitions and other rules of interpretation

 - 6.1. A term used in the Planning and Design Code may have a meaning specifically assigned to that term by one of the following:
 - (a) the *Planning Development and Infrastructure Act 2016* (the Act);
 - (b) the *Acts Interpretation Act 1915* (South Australia);
 - (c) the definitions in Parts 6 and 7 of the Planning and Design Code.
 - 6.2. In the event a term has been assigned a meaning in more than one of the Code's parts (ie. a Zone, Subzone, Overlay or General Development Policy module), the

meaning contained in the part that sits highest in the hierarchy of polices under clause 4 in Part 1 will prevail.

- 6.3. A reference in the Planning and Design Code to an Act includes a reference to any regulations or instrument made under the Act, and where an Act, regulation or instrument has been amended or replaced, if the context permits, includes a reference to the amended or replaced Act, regulations or instrument.
- 6.4. A reference in the Planning and Design Code to a specific resource document or standard, means the latest version of the resource document or standard.
- 6.5. Unless otherwise indicated, a reference in the Planning and Design Code to a Part, section or table is a reference to a Part, section or table of the Code.

Part 2—Zones and Subzones

2.1 Preliminary

- 1 Zones organise the planning outcomes in a way that facilitates the location of preferred or acceptable land uses, intensity of development, and built form and character.
- 2 Each zone contains the following:
 - (a) assessment provisions that include the desired outcomes, performance outcomes and deemed-to-satisfy criteria;
 - (b) development that is classified as accepted, deemed-to-satisfy and restricted;
 - (c) criteria for accepted development and deemed-to-satisfy development;
 - (d) applicable policies for performance assessed development.
- 3 Subzones vary the policy that applies in the parent zone to reflect a local characteristic or circumstance.
- 4 The Library of Zones and Subzones is identified in Table Z1.
- 5 Zones and Subzones are mapped. Mapping is contained in **Part 5 – Maps/Spatial Information** of the Planning and Design Code.

2.2 Zones and Subzones

Table Z1 – Index of Zones and Subzones

Zone	Subzone
Coastal Waters Zone	None
Conservation Zone	None
Local Infrastructure (Airfield) Zone	None
Remote Areas Zone	None
Settlement Zone	None
Specific Use (Tourism Development) Zone	None
Township Zone	None

Remote Areas Zone

Contents

1. Remote Areas Zone Table 1 – Accepted Development Classification
2. Remote Areas Zone Table 2 – Deemed-to-Satisfy Development Classification
3. Remote Areas Zone Table 3 –Applicable Policies for Performance Assessed Development
4. Remote Areas Zone Table 4 – Restricted Development Classification
5. Assessment Provisions
6. Procedural Matters

1. Remote Areas Zone Table 1 – Accepted Development Classification

Class of Development The following Classes of Development are classified as Accepted Development subject to meeting the 'Accepted Development Classification Criteria'	Accepted Development Classification Criteria
Building work on railway land	1 Building work is associated with a railway 2 It is situated (or to be situated) on railway land 3 It is required for the conduct or maintenance of railway activities.
Demolition Except where any of the following apply: <ul style="list-style-type: none"> • State Heritage Area Overlay • State Heritage Place Overlay. 	None
Internal building work Except where any of the following apply: <ul style="list-style-type: none"> • State Heritage Area Overlay • State Heritage Place Overlay. 	1 There will be no increase in the total floor area of the building 2 There will be no alteration to the external appearance of the building.
Private bushfire shelters Except where any of the following apply: <ul style="list-style-type: none"> • Coastal Areas Overlay • Hazards (Acid Sulfate soils) overlay • Historic Shipwrecks Overlay 	1 The development will not be built, or encroach, on an area that is, or will be, required for a sewerage system or waste control system 2 The development would not be contrary to the regulations prescribed for the purposes of section 86 of the <i>Electricity Act 1996</i> 3 Primary street setback – at least as far back as the building to which it is ancillary 4 Secondary street setback – at least 900mm from the boundary of the allotment

<p>Class of Development</p> <p>The following Classes of Development are classified as Accepted Development subject to meeting the 'Accepted Development Classification Criteria'</p>	<p>Accepted Development Classification Criteria</p>
<ul style="list-style-type: none"> • Ramsar Wetlands Overlay • River Murray Flood Plain Overlay • Significant Landscape Protection Overlay • Sloping Land Overlay • State Heritage Area Overlay • State Heritage Place Overlay • Water Resources Overlay. 	<p>5 At least 6m from the corner of an allotment which abuts the intersection of two or more roads (other than where a 4m x 4m allotment cut-off is already in place).</p>
<p>Protective tree netting structure</p> <p>Except where any of the following apply:</p> <ul style="list-style-type: none"> • Coastal Areas Overlay • Hazards (Acid Sulfate soils) Overlay • Historic Shipwrecks Overlay • Ramsar Wetlands Overlay • River Murray Flood Plain Overlay • Significant Landscape Protection Overlay • State Heritage Area Overlay • State Heritage Place Overlay. 	<p>1 The development will not be built, or encroach, on an area that is, or will be, required for a sewerage system or waste control system</p> <p>2 The development would not be contrary to the regulations prescribed for the purposes of section 86 of the <i>Electricity Act 1996</i></p> <p>3 No part of the protective tree netting structure will be more than 6m above natural ground level (depending on where it is situated)</p> <p>4 Netting visible from the outside of the protective tree netting structure is of a low light-reflective nature, and, in the case of a structure that has side netting, the side netting is of a dark colour</p> <p>5 In the case of a development on a site that is within a Hazards (Bushfire - Outback) Overlay, the protective tree netting structure provides for access to the site in accordance with the following:</p> <ul style="list-style-type: none"> (a) no part of the protective tree netting structure (including cables and points of attachment of cables (known as "auger" or "anchor" points) will be within 5m of any boundary of the site; or (b) does not prevent access or movement of vehicles of 4m height and 3.5m width (or less) on any access road or track (including fire tracks) on the site

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Remote Areas Zone Table 1 –Accepted Development Classification

Class of Development The following Classes of Development are classified as Accepted Development subject to meeting the 'Accepted Development Classification Criteria'	Accepted Development Classification Criteria
	<p>6 No part of the netting canopy of the protective tree netting structure:</p> <p>(a) will cover native vegetation; or</p> <p>(b) will be within 5m of a road (including any road reserve)</p> <p>7 The points of attachment of any cables will not be located:</p> <p>(a) outside the boundaries of the site; or</p> <p>(b) within a watercourse (within the meaning of the <i>Natural Resources Management Act 2004</i>)</p> <p>8 In relation to a dwelling located on an allotment adjoining the site on which the protective tree netting structure is located, the protective tree netting structure complies with the following:</p> <p>(a) if the netting canopy nearest the dwelling on the adjoining allotment is 4m or less above ground level (depending on where it is situated), no part of the netting canopy is within 10m of the dwelling</p> <p>(b) in any other case, no part of the netting canopy is within 15m of the dwelling.</p>
<p>Shade sail</p> <p>Except where any of the following apply:</p> <ul style="list-style-type: none"> • Coastal Areas Overlay • Hazards (Acid Sulfate soils) overlay • Historic Shipwrecks Overlay • Ramsar Wetlands Overlay • River Murray Flood Plain Overlay 	<p>1 The development will not be built, or encroach, on an area that is, or will be, required for a sewerage system or waste control system</p> <p>2 The development would not be contrary to the regulations prescribed for the purposes of section 86 of the <i>Electricity Act 1996</i></p> <p>3 Shade sail consists of permeable material</p> <p>4 The total area of the sail - does not exceed 40m²</p> <p>5 No part of the shade sail will be:</p> <p>(a) 3m above ground or floor level (depending on where it is situated) at any place within 900mm of a boundary of the allotment</p>

<p>Class of Development</p> <p>The following Classes of Development are classified as Accepted Development subject to meeting the 'Accepted Development Classification Criteria'</p>	<p>Accepted Development Classification Criteria</p>
<ul style="list-style-type: none"> • Significant Landscape Protection Overlay • Sloping Land Overlay • State Heritage Area Overlay • State Heritage Place Overlay. 	<p>(b) 5m above ground or floor level (depending on where it is situated) within any other part of the allotment</p> <p>6 Primary street setback – at least as far back as the building line of the building to which it is ancillary</p> <p>7 if any part of the sail will be situated on a boundary of the allotment, the length of sail along a boundary does not exceed 8m</p> <p>8 in a case where any part of the sail or a supporting structure will be situated on a side boundary of the allotment — the length of the sail and any such supporting structure together with all relevant walls or structures located along the boundary will not exceed 45% of the length of the boundary.</p>
<p>Solar photovoltaic panels (roof mounted)</p> <p>Except where any of the following apply:</p> <ul style="list-style-type: none"> • State Heritage Area Overlay • State Heritage Place Overlay 	<p>1 The development would not be contrary to the regulations prescribed for the purposes of section 86 of the Electricity Act 1996</p> <p>2 Panels are installed parallel to the roof of a building and with the underside surface of the panel not being more than 100mm above the surface of the roof</p> <p>3 Panels and associated components do not overhang any part of the roof</p> <p>4 Does not apply to system with a generating capacity of more than 5MW that is to be connected to the State's power system.</p>
<p>Spa pool</p> <p>Swimming pool</p> <p>Except where any of the following apply:</p> <ul style="list-style-type: none"> • Coastal Areas Overlay • Hazards (Acid Sulfate soils) overlay 	<p>1 The development will not be built, or encroach, on an area that is, or will be, required for a sewerage system or waste control system</p> <p>2 The development would not be contrary to the regulations prescribed for the purposes of section 86 of the <i>Electricity Act 1996</i></p> <p>3 It is detached from and ancillary to a dwelling erected on the site or a dwelling to be erected on the site in accordance with a development authorisation which has been granted</p>

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Remote Areas Zone Table 1 –Accepted Development Classification

<p>Class of Development</p> <p>The following Classes of Development are classified as Accepted Development subject to meeting the 'Accepted Development Classification Criteria'</p>	<p>Accepted Development Classification Criteria</p>
<ul style="list-style-type: none"> • Historic Shipwrecks Overlay • Ramsar Wetlands Overlay • River Murray Flood Plain Overlay • Significant Landscape Protection Overlay • Sloping Land Overlay • State Heritage Area Overlay • State Heritage Place Overlay • Water Resources Overlay. 	<p>4 Allotment boundary setback – not less than 1m</p> <p>5 Primary street setback – at least as far back as the building line of the building to which it is ancillary</p> <p>6 Location of filtration system from a dwelling on an adjoining allotment:</p> <p>(a) not less than 5m where the filtration system is located inside a solid structure that will have material impact on the transmission of noise</p> <p>(b) not less than 12m in any other case.</p>
<p>Water tank (underground)</p> <p>Except where any of the following apply:</p> <ul style="list-style-type: none"> • Coastal Areas Overlay • Hazards (Acid Sulfate soils) overlay • Historic Shipwrecks Overlay • Ramsar Wetlands Overlay • River Murray Flood Plain Overlay • Significant Landscape Protection Overlay • Sloping Land Overlay • State Heritage Area Overlay • State Heritage Place Overlay • Water Resources Overlay. 	<p>1 The development will not be built, or encroach, on an area that is, or will be, required for a sewerage system or waste control system</p> <p>2 The tank is ancillary to a dwelling erected on the site</p> <p>3 The tank (including any associated pump) is located wholly below the level of the ground.</p>

Class of Development	Accepted Development Classification Criteria
<p>The following Classes of Development are classified as Accepted Development subject to meeting the 'Accepted Development Classification Criteria'</p>	
<p>Any of the following where it is located within the boundary of a mining settlement associated with an approved mining lease that has been granted final development approval:</p> <ul style="list-style-type: none"> • Accommodation units • Building or building work • Bus terminal • Car parking area • Commercial development • Community facility • Industry • Infrastructure • Office • Recreation facilities • Shop or group of shops • Site works • Tavern / club • Warehouse 	<p>None</p>

2. Remote Areas Zone Table 2 – Deemed-to-Satisfy Development Classification

Class of Development	Deemed-to-Satisfy Development Classification Criteria			
	Zone	General Development Policies	Subzone	Overlay
<p>The following Classes of Development are classified as Deemed-to-Satisfy Development subject to meeting the 'Deemed-to-Satisfy Development Classification Criteria'</p>	<p>Provisions referred to are Deemed-to-Satisfy Criteria</p> <p>Where a development comprises more than one Class of Development the relevant criteria will be taken to be the sum of the criteria for each Class of Development.</p>			
			(applies only in the area affected by the Subzone)	(applies only in the area affected by the Overlay)
<p>Advertisement</p> <p>Except where any of the following apply:</p> <ul style="list-style-type: none"> • Airport Building Heights (Regulated) Overlay • Coastal Areas Overlay • Ramsar Wetlands Overlay • River Murray Flood Plain Overlay • Significant Landscape Protection Overlay • Sloping Land Overlay • State Heritage Area Overlay • State Heritage Place Overlay • Water Resources Overlay. 	None	<p>Clearance from Overhead Powerlines: DTS 1.1</p> <p>Advertisements [Appearance]: DTS 1.1, 1.2</p> <p>Advertisements [Proliferation of Advertisements]: DTS 2.1, 2.2</p> <p>Advertisements [Advertising Content]: DTS 3.1</p> <p>Advertisements [Amenity Impacts]: DTS 4.1</p> <p>Advertisements [Safety]: DTS 5.1, 5.2, 5.3, 5.4, 5.5</p>	None	<p>Airport Building Heights (Aircraft Landing Area): DTS 1.1</p> <p>Building Near Airfields: DTS 1.1</p> <p>Hazards (Acid Sulfate Soils): DTS 1.1</p> <p>Historic Shipwrecks: DTS 1.1, 1.2</p>
<p>Carpport</p> <p>Outbuilding (in the form of a garage)</p> <p>Except where any of the following apply:</p> <ul style="list-style-type: none"> • Airport Building Heights (Regulated) Overlay • Coastal Areas Overlay • Ramsar Wetlands Overlay • River Murray Flood Plain Overlay • Significant Landscape Protection Overlay • Sloping Land Overlay • State Heritage Areas Overlay • State Heritage Place Overlay • Water Resources Overlay. 	None	<p>Clearance from Overhead Powerlines: DTS 1.1</p> <p>Infrastructure and Renewable Energy Facilities [Wastewater Services]: DTS 12.2</p> <p>Residential Liveability [Ancillary Buildings and Structures]: DTS 6.1, 6.2</p> <p>Transport, Access and Parking [Vehicle Access]: DTS 3.1, 3.4, 3.5</p>	None	<p>Airport Building Heights (Aircraft Landing Area): DTS 1.1</p> <p>Building Near Airfields: DTS 1.1</p> <p>Hazards (Acid Sulfate Soils): DTS 1.1</p> <p>Historic Shipwrecks: DTS 1.1, 1.2</p> <p>Key Outback and Rural Routes: All</p> <p>Key Railway Crossings: DTS 1.1</p>
<p>Detached dwelling</p> <p>Except where any of the following apply:</p> <ul style="list-style-type: none"> • Airport Building Heights (Regulated) Overlay • Building Near Airfields Overlay 	[Built Form and Character]: DTS 1.2	<p>Clearance from Overhead Powerlines: DTS 1.1</p> <p>Design and Siting [On-site Wastewater Treatment Systems]: DTS 16.1</p> <p>Infrastructure and Renewable Facilities [Water Supply]: DTS 11.1</p>	None	<p>Airport Building Heights (Aircraft Landing Areas): All</p> <p>Hazards (Acid Sulfate Soils): DTS 1.1</p> <p>Hazards (Bushfire - Outback): All</p> <p>Historic Shipwrecks: DTS 1.1, 1.2</p> <p>Key Outback and Rural Routes: All</p>

Remote Areas Zone Table 2 –Deemed-to-Satisfy Development Classification

Class of Development The following Classes of Development are classified as Deemed-to-Satisfy Development subject to meeting the 'Deemed-to-Satisfy Development Classification Criteria'	Deemed-to-Satisfy Development Classification Criteria			
	Provisions referred to are Deemed-to-Satisfy Criteria Where a development comprises more than one Class of Development the relevant criteria will be taken to be the sum of the criteria for each Class of Development.			
	Zone	General Development Policies	Subzone <small>(applies only in the area affected by the Subzone)</small>	Overlay <small>(applies only in the area affected by the Overlay)</small>
<ul style="list-style-type: none"> Coastal Areas Overlay Ramsar Wetlands Overlay River Murray Flood Plain Overlay Significant Landscape Protection Overlay Sloping Land Overlay State Heritage Area Overlay State Heritage Place Overlay Water Protection Area Overlay Water Resources Overlay. 		Infrastructure and Renewable Facilities [Wastewater Services]: DTS 12.1, 12.2 Interface between Land Uses [Interface with Mines and Quarries (Rural and Remote Areas)]: DTS 10.1 Transport, Access and Parking [Vehicle Access]: DTS 3.1, 3.4, 3.5 Transport, Access and Parking [Vehicle Parking Rates]: DTS 5.1 Site Contamination DTS 1.1		Key Railway Crossings: DTS 1.1
Dwelling addition Except where any of the following apply: <ul style="list-style-type: none"> Airport Building Heights (Regulated) Overlay Building Near Airfields Overlay Coastal Areas Overlay Hazards (Acid Sulfate Soil) Overlay Historic Shipwrecks Overlay Ramsar Wetlands Overlay River Murray Flood Plain Overlay Significant Landscape Protection Overlay Sloping Land Overlay State Heritage Area Overlay State Heritage Place Overlay Water Resources Overlay. 	[Built Form and Character]: DTS 1.2	Clearance from Overhead Powerlines: DTS 1.1 Infrastructure and Renewable Facilities [On-site Water Supply and Wastewater Services]: DTS 12.2	None	Airport Building Heights (Aircraft Landing Area): DTS 1.1 Hazards (Acid Sulfate Soils): DTS 1.1 Hazards (Bushfire - Outback): DTS 1.1 Historic Shipwrecks: DTS 1.1, 1.2
Essential infrastructure, where it is required to service development within the Local Infrastructure (Airfield) Zone located on the Andamooka Road (11km east of the eastern most boundary of Roxby Downs [Municipality]) and / or the site of Olympic Dam mining settlement (as per the approved Olympic Dam mining lease) provided it is sited within 150m north, and 50m south, of the existing road alignment of Andamooka Road, between the eastern boundary of the Roxby Downs (Municipality)	None	None	None	None

Class of Development The following Classes of Development are classified as Deemed-to-Satisfy Development subject to meeting the 'Deemed-to-Satisfy Development Classification Criteria'	Deemed-to-Satisfy Development Classification Criteria			
	Provisions referred to are Deemed-to-Satisfy Criteria Where a development comprises more than one Class of Development the relevant criteria will be taken to be the sum of the criteria for each Class of Development.			
	Zone	General Development Policies	Subzone <small>(applies only in the area affected by the Subzone)</small>	Overlay <small>(applies only in the area affected by the Overlay)</small>
and the eastern zone boundary of the Local Infrastructure (Airfield) Zone				
Excavation and filling Except where any of the following apply: <ul style="list-style-type: none"> • Coastal Areas Overlay • Ramsar Wetlands Overlay • River Murray Flood Plain Overlay • Significant Landscape Protection Overlay • State Heritage Area Overlay • State Heritage Place Overlay • Water Resources Overlay. 	None	Design and Siting [Site Earthworks]: DTS 12.1	None	Hazards (Acid Sulfate Soils): DTS 1.1. Historic Shipwrecks: DTS 1.1, 1.2 Sloping Land: DTS 3.1
Outbuilding (not being a garage) Verandah Except where any of the following apply: <ul style="list-style-type: none"> • Airport Building Heights (Regulated) Overlay • Coastal Areas Overlay • Ramsar Wetlands Overlay • River Murray Flood Plain Overlay • Significant Landscape Protection Overlay • Sloping Land Overlay • State Heritage Areas Overlay • State Heritage Place Overlay • Water Resources Overlay. 	None	Clearance from Overhead Powerlines: DTS 1.1 Infrastructure and Renewable Energy Facilities [Wastewater Services]: DTS 12.2 Residential Liveability [Ancillary Buildings and Structures]: DTS 6.1, 6.2	None	Airport Building Heights (Aircraft Landing Area): DTS 1.1 Building Near Airfields: DTS 1.1 Hazards (Acid Sulfate Soils): DTS 1.1 Historic Shipwrecks: DTS 1.1, DTS 1.2

3. Remote Areas Zone Table 3 – Applicable Policies for Performance Assessed Development

Class of Development	Applicable Policies			
	Zone	General Development Policies	Subzone (applies only in the area affected by the Subzone)	Overlay (applies only in the area affected by the Overlay)
	<p>The following policies are applicable to the assessment of the identified Class of Development.</p> <p>Policies referred to are Performance Outcome policies, and any associated Designated Performance Features. Relevant Desired Outcomes are not listed, but automatically apply in relation to a Performance Assessed Development.</p> <p>Where a development comprises more than one Class of Development the relevant policies will be taken to be the sum of the applicable policies for each Class of Development.</p>			
Advertisement	None	Clearance from Overhead Powerlines: PO 1.1 Advertisements [Appearance]: PO 1.1, 1.2 Advertisements [Proliferation of Advertisements]: PO 2.1, 2.2 Advertisements [Advertising Content]: PO 3.1 Advertisements [Amenity Impacts]: PO 4.1 Advertisements [Safety]: PO 5.1, 5.2, 5.3, 5.4, 5.5	None	Airport Building Heights (Aircraft Landing Areas): All Airport Building Heights (Regulated): PO 1.1 Building Near Airfields: PO 1.1 Coastal Areas: All Hazards (Acid Sulfate Soils): PO 1.1 Historic Shipwrecks: PO 1.1, 1.2 Ramsar Wetlands: All River Murray Floodplain: All Significant Landscape Protection: All Sloping Land: All State Heritage Area: All State Heritage Place: All Water Resources: All
Agricultural building	[Built Form and Character]: PO 1.1, 1.2	Clearance from Overhead Powerlines: PO 1.1 Design and Siting [Environmental and Cultural Context]: PO 1.1 Interface between Land Uses [Overshadowing]: PO3.1, PO3.2, PO3.3	None	Airport Building Heights (Aircraft Landing Areas): All Airport Building Heights (Regulated): All Building Near Airfields: PO 1.1 Coastal Areas: All Hazards (Acid Sulfate Soils): All Historic Shipwrecks: All Key Outback and Rural Routes: All Key Railway Crossings: All Ramsar Wetlands: All River Murray Flood Plain: All Significant Landscape Protection: All

Remote Areas Zone Table 3 –Applicable Policies for Performance Assessed Development

Class of Development	Applicable Policies			
	Zone	General Development Policies	Subzone (applies only in the area affected by the Subzone)	Overlay (applies only in the area affected by the Overlay)
				Sloping Land: All State Heritage Area: All State Heritage Place: All Water Resources: All
Carport Outbuilding (in the form of a garage)	None	Clearance from Overhead Powerlines: PO 1.1 Infrastructure and Renewable Energy Facilities [Wastewater Services]: PO 12.2 Residential Liveability [Ancillary Buildings and Structures]: PO 6.1, 6.2 Transport, Access and Parking [Vehicle Access]: PO 3.1, 3.5, 3.6	None	Airport Building Heights (Aircraft Landing Areas): All Airport Building Heights (Regulated): All Building Near Airfields: PO 1.1 Coastal Areas: All Hazards (Acid Sulfate Soils): PO 1.1 Historic Shipwrecks: PO 1.1, PO 1.2 Key Outback and Rural Routes: All Key Railway Crossings: PO 1.1 Ramsar Wetlands: All River Murray Floodplain: All Significant Landscape Protection: All Sloping Land: All State Heritage Area: All State Heritage Place: All Water Resources: All
Demolition	None	None	None	State Heritage Area: All State Heritage Place: All
Detached dwelling	All	Clearance from Overhead Powerlines: PO 1.1 Design and Siting [Transportable Buildings]: PO 11.1 Design and Siting [On-site Wastewater Treatment Systems]: PO 16.1 Infrastructure and Renewable Facilities [Water Supply]: PO 11.1	None	Airport Building Heights (Aircraft Landing Areas): All Airport Building Heights (Regulated): All Building Near Airfields: All Coastal Areas: All Hazards (Acid Sulfate Soils): All

Remote Areas Zone Table 3 –Applicable Policies for Performance Assessed Development

Class of Development	Applicable Policies			
	Zone	General Development Policies	Subzone (applies only in the area affected by the Subzone)	Overlay (applies only in the area affected by the Overlay)
		<p>The following policies are applicable to the assessment of the identified Class of Development.</p> <p>Policies referred to are Performance Outcome policies, and any associated Designated Performance Features. Relevant Desired Outcomes are not listed, but automatically apply in relation to a Performance Assessed Development.</p> <p>Where a development comprises more than one Class of Development the relevant policies will be taken to be the sum of the applicable policies for each Class of Development.</p> <p>Infrastructure and Renewable Facilities [Wastewater Services]: PO 12.1, 12.2 Interface between Land Uses [General Land Use Compatibility]: PO 1.1 Interface between Land Uses [Interface with Mines and Quarries (Rural and Remote Areas)]: PO 10.1 Residential Liveability [Amenity]: PO 1.1 Site Contamination: PO 1.1 Transport, Access and Parking [Vehicle Access]: PO 3.1, 3.3, 3.4, 3.5 Transport, Access and Parking [Vehicle Parking Rates]: PO 5.1</p>		Hazards (Bushfire - Outback): All Historic Shipwrecks: All Key Outback and Rural Routes: All Key Railway Crossings: All Ramsar Wetlands: All River Murray Flood Plain: All Significant Landscape Protection: All Sloping Land: All State Heritage Area: All State Heritage Place: All Water Protection Area: All Water Resources: All
Dwelling addition	[Built Form and Character]: PO 1.2	Clearance from Overhead Powerlines: PO 1.1 Infrastructure and Renewable Facilities [Wastewater Services]: PO 12.2	None	Airport Building Heights (Aircraft Landing Areas): All Airport Building Heights (Regulated): All Building Near Airfields: PO 1.1 Coastal Areas Overlay: All Hazards (Acid Sulfate Soils): PO 1.1 Hazards (Bushfire – Outback): PO 1.1 Historic Shipwrecks: PO 1.1, PO 1.2 Ramsar Wetlands: All River Murray Flood Plain: All Significant Landscape Protection: All Sloping Land: All State Heritage Area: All State Heritage Place: All Water Resources: All
Excavation and filling	None	Design and Siting [Site Earthworks]: PO 12.1	None	Coastal Areas Overlay: All

Class of Development	Applicable Policies			
	Zone	General Development Policies	Subzone (applies only in the area affected by the Subzone)	Overlay (applies only in the area affected by the Overlay)
				Hazards (Acid Sulfate Soils): PO 1.1. Historic Shipwrecks: PO 1.1, 1.2 Ramsar Wetlands: All River Murray Flood Plain: All Significant Landscape Protection: All Sloping Land: PO 3.1. State Heritage Area Overlay: All State Heritage Place Overlay: All Water Resources: All
Farming	None	Interface Between Land Uses [General Land Use Compatibility]: PO 1.2	None	Coastal Areas: All Ramsar Wetlands: All Water Protection Area: All Water Resources: All
Fence	None	Design and Siting [Fences, Walls and Retaining Walls]: PO 8.1	None	Airport Building Heights (Aircraft Landing Areas): All Airport Building Heights (Regulated): All Coastal Areas: All Hazards (Acid Sulfate Soils) All Historic Shipwrecks: All Ramsar Wetlands: All River Murray Flood Plain: All Significant Landscape Protection: All Sloping Land: All State Heritage Place: All State Heritage Area: All Water Resources: All
Outbuilding (not being a garage)	None	Clearance from Overhead Powerlines: PO 1.1	None	Airport Building Heights (Aircraft Landing Areas): All

Remote Areas Zone Table 3 –Applicable Policies for Performance Assessed Development

Class of Development	Applicable Policies			
	Zone	General Development Policies	Subzone (applies only in the area affected by the Subzone)	Overlay (applies only in the area affected by the Overlay)
Verandah	The following policies are applicable to the assessment of the identified Class of Development. Policies referred to are Performance Outcome policies, and any associated Designated Performance Features. Relevant Desired Outcomes are not listed, but automatically apply in relation to a Performance Assessed Development. Where a development comprises more than one Class of Development the relevant policies will be taken to be the sum of the applicable policies for each Class of Development.			
		Infrastructure and Renewable Energy Facilities [Wastewater Services]: PO 12.2 Residential Liveability [Ancillary Buildings and Structures]: PO 6.1, 6.2		Airport Building Heights (Regulated): All Building Near Airfields: PO 1.1 Coastal Areas: All Hazards (Acid Sulfate Soils): PO 1.1 Historic Shipwrecks: PO 1.1, 1.2 Ramsar Wetlands: All River Murray Floodplain: All Significant Landscape Protection: All Sloping Land: All State Heritage Area: All State Heritage Place: All Water Resources: All
Solar farm	All	Clearance from Overhead Powerlines: PO 1.1 Infrastructure and Renewable Energy Facilities [General]: PO 1.1 Infrastructure and Renewable Energy Facilities [Visual Amenity]: PO 2.1, 2.2, 2.3 Infrastructure and Renewable Energy Facilities [Rehabilitation]: PO 3.1 Infrastructure and Renewable Energy Facilities [Hazard Management]: PO 4.1, 4.2, 4.3 Infrastructure and Renewable Energy Facilities [Electricity Infrastructure and Battery Storage Facilities]: PO 5.1 Infrastructure and Renewable Energy Facilities [Renewable Energy Facilities]: PO 7.1 Infrastructure and Renewable Energy Facilities [Renewable Energy Facilities (Solar Power)]: PO 9.1, 9.2 Infrastructure and Renewable Energy Facilities [Temporary Facilities]: PO 13.1, 13.2	None	Airport Building Heights (Aircraft Landing Areas): All Airport Building Heights (Regulated): All Building Near Airfields: All Coastal Areas: All Hazards (Acid Sulfate Soils): All Historic Shipwrecks Overlay: All Key Outback and Rural Routes: All Key Railway Crossings: All Ramsar Wetlands: All River Murray Flood Plain: All Significant Landscape Protection: All Sloping Land: All State Heritage Area: All State Heritage Place: All Water Resources: All

Class of Development	Applicable Policies			
	Zone	General Development Policies	Subzone (applies only in the area affected by the Subzone)	Overlay (applies only in the area affected by the Overlay)
		<p>The following policies are applicable to the assessment of the identified Class of Development.</p> <p>Policies referred to are Performance Outcome policies, and any associated Designated Performance Features. Relevant Desired Outcomes are not listed, but automatically apply in relation to a Performance Assessed Development.</p> <p>Where a development comprises more than one Class of Development the relevant policies will be taken to be the sum of the applicable policies for each Class of Development.</p> <p>Design and Siting [Environmental and Cultural Context]: PO 1.1</p> <p>Interface Between Land Uses [General land use compatibility]: PO 1.2</p> <p>Interface Between Land Uses [Activities Generating Noise or Vibration]: PO 4.1</p> <p>Interface Between Land Uses [Solar Reflectivity / Glare]: PO 7.1</p> <p>Interface Between Land Uses [Electrical Interference]: PO 8.1</p> <p>Transport, Access and Parking [Movement Systems]: PO 1.1, 1.4</p> <p>Transport, Access and Parking [Sightlines]: PO 2.1</p> <p>Transport, Access and Parking [Vehicle Access]: PO 3.1, 3.2, 3.7</p>		
Wind farm	All	<p>Clearance from Overhead Powerlines: PO 1.1</p> <p>Design and Siting [Environmental and Cultural Context]: PO 1.1</p> <p>Infrastructure and Renewable Energy Facilities [Electricity Infrastructure and Battery Storage Facilities]: PO 5.1</p> <p>Infrastructure and Renewable Energy Facilities [General]: PO 1.1, PO 1.2</p> <p>Infrastructure and Renewable Energy Facilities [Hazard Management]: PO 4.1, PO 4.3</p> <p>Infrastructure and Renewable Energy Facilities [Rehabilitation]: PO 3.1</p> <p>Infrastructure and Renewable Energy Facilities [Renewable Energy Facilities]: PO 7.1</p> <p>Infrastructure and Renewable Energy Facilities [Renewable Energy Facilities (Wind Farms)]: PO 8.1, PO 8.2, PO 8.3, PO 8.4, PO 8.5, PO 8.6</p>	None	<p>Airport Building Heights (Aircraft Landing Areas): All</p> <p>Airport Building Heights (Regulated): All</p> <p>Building Near Airfields: All</p> <p>Coastal Areas: All</p> <p>Hazards (Acid Sulfate Soils): All</p> <p>Historic Shipwrecks Overlay: All</p> <p>Key Outback and Rural Routes: All</p> <p>Key Railway Crossings: All</p> <p>Ramsar Wetlands: All</p> <p>River Murray Flood Plain: All</p> <p>Significant Landscape Protection: All</p> <p>Sloping Land: All</p> <p>State Heritage Area: All</p> <p>State Heritage Place: All</p>

Remote Areas Zone Table 3 –Applicable Policies for Performance Assessed Development

Class of Development	Applicable Policies			
	Zone	General Development Policies	Subzone (applies only in the area affected by the Subzone)	Overlay (applies only in the area affected by the Overlay)
		<p>The following policies are applicable to the assessment of the identified Class of Development.</p> <p>Policies referred to are Performance Outcome policies, and any associated Designated Performance Features. Relevant Desired Outcomes are not listed, but automatically apply in relation to a Performance Assessed Development.</p> <p>Where a development comprises more than one Class of Development the relevant policies will be taken to be the sum of the applicable policies for each Class of Development.</p> <p>Infrastructure and Renewable Energy Facilities [Temporary Facilities]: PO 12.1, PO 12.2</p> <p>Infrastructure and Renewable Energy Facilities [Visual Amenity]: PO 2.1, PO 2.2, PO 2.3</p> <p>Interface Between Land Uses [Activities Generating Noise or Vibration]: PO 4.1</p> <p>Interface Between Land Uses [Electrical Interference]: PO 8.1</p> <p>Interface Between Land Uses [General land use compatibility]: PO 1.2</p> <p>Interface Between Land Uses [Light Spill]: PO 6.1</p> <p>Interface Between Land Uses [Overshadowing]: PO 3.4</p> <p>Interface Between Land Uses [Solar Reflectivity / Glare]: PO 7.1</p> <p>Transport, Access and Parking [Movement Systems]: PO 1.1, 1.4</p> <p>Transport, Access and Parking [Sightlines]: PO 2.1, PO 2.2</p> <p>Transport, Access and Parking [Vehicle Access]: PO 3.1, PO 3.3</p>		Water Resources: All
All other Code Assessed Development	All	All	None	Any Relevant Overlay: All

4. Remote Areas Zone Table 4 –Restricted Development Classification

Class of Development

The following Classes of Development are classified as Restricted

None Specified

5. Assessment Provisions

Desired Outcome (DO)	
<p>DO 1</p> <p>A diverse range of activities from pastoral, grazing and farming activities, agricultural processing and transportation, mining and petroleum (and associated settlement activities), the generation and storage of energy, pipelines or infrastructure, aerospace and defence related facilities (and associated settlement activities), tourism, remote settlements, Aboriginal lands and related rural land activities.</p>	
Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Built Form and Character	
<p>PO 1.1</p> <p>Development sited and designed to protect natural features and the conservation value of the area.</p>	None are applicable.
<p>PO 1.2</p> <p>Large buildings designed and sited to reduce impacts on scenic and rural vistas by:</p> <ul style="list-style-type: none"> (a) having substantial setbacks from boundaries and adjacent public roads (b) using low reflective materials and finishes that blend with the surrounding landscape; and (c) being located below ridgelines where practicable. 	<p>DTS/DPF 1.2</p> <p>Buildings are:</p> <ul style="list-style-type: none"> (a) of a height no greater than 2 building levels and 9m; and (b) setback at least 40m from any allotment boundary or public road.
Hazard Risk Minimisation	
<p>PO 2.1</p> <p>Habitable buildings designed and sited to manage the risks of natural hazards on personal and public safety and property.</p>	None are applicable.

6. Procedural Matters (PM)

Notification

All classes of performance assessed development are excluded from notification except where they involve any of the following:

- (a) the site of the development is adjacent land to land in a different zone
- (b) development identified as “all other code assessed development” in Remote Areas Zone Table 3
- (c) wind farm and ancillary development including electricity substation, maintenance sheds, access roads, and connecting power-lines where the base of any wind turbine is 2,000m or less from:
 - (i) an existing dwelling or tourist accommodation that is not associated with the wind farm;
 - (ii) a proposed dwelling or tourist accommodation for which an operable planning consent exists;
 - (iii) the boundaries of any airfield, airport, Local Infrastructure (Airfield) Zone, Settlement Zone, Township Zone or any State Heritage Area Overlay;
- (d) wind monitoring mast and ancillary development.

Part 3—Overlays

3.1 Preliminary

- 1 Overlays identify areas where policy in relation to a particular issue applies, usually in relation to a state interest.
- 2 The Library of Overlays is identified in Table O1.
- 3 Overlays are mapped. Mapping is contained in **Part 5 – Maps/Spatial Information** of the Planning and Design Code.

Table O1 – Index of Overlays

Overlays
Airports Building Height (Aircraft Landing Areas) Overlay
Airports Building Heights (Regulated) Overlay
Building Near Airfields Overlay
Coastal Areas Overlay
Hazards (Acid Sulfate Soils) Overlay
Hazards (Bushfire Protection) Overlay
Hazards (Flooding) Overlay
Historic Shipwrecks Overlay
Key Outback and Rural Roads Overlay
Key Railway Crossings Overlay
Marine Park (Managed Use) Overlay
Prescribed Watercourses Overlay
Prescribed Wells Area Overlay
Marine Park (Restricted Use)
RAMSAR Wetlands Overlay
River Murray Flood Plain Overlay
Significant Landscape Overlay
Sloping Land Overlay
State Heritage Areas Overlay
State Heritage Places Overlay
Water Protection Area Overlay
Water Resources Overlay

Airport Building Heights (Aircraft Landing Areas) Overlay

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Development is of an appropriate height to ensure the long-term operational and safety requirements of Aircraft Landing Areas (airports, airstrips and helicopter landing sites) continue to be met.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Built Form	
<p>PO 1.1</p> <p>The height of buildings and structures does not pose a hazard to aircraft operations of Aircraft Landing Areas.</p>	<p>DTS/DPF 1.1</p> <p>The distance from any part of the runway centreline to the closest point of the building is greater than 30 times the height of the building.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Airport Building Heights (Regulated) Overlay

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Development is of an appropriate height to ensure that the long-term operational and safety requirements of commercial and military airfields (airports, airstrips and helicopter landing sites) continue to be met.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Built Form	
<p>PO 1.1</p> <p>The height of buildings and structures does not pose a hazard to aircraft operations.</p>	None are applicable.
<p>PO 1.2</p> <p>Development is adequately separated from airfields to minimise the potential for building generated turbulence and windshear.</p>	<p>DTS/DPF 1.2</p> <p>The distance from any part of the runway centreline to the closest point of the building is greater than 35 times the height of the building.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Building Near Airfields Overlay

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Ensure the long-term operational and safety requirements of commercial and military airfields (airports, airstrips and helicopter landing sites) continue to be met.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.1</p> <p>Outdoor lighting does not pose a hazard to commercial or military aircraft operations.</p>	<p>DTS/DPF 1.1</p> <p>Development does not include outdoor lighting</p>
<p>PO 1.2</p> <p>Development that is likely to increase the attraction of birds is adequately separated from airfields to minimise the potential for aircraft bird strike.</p>	<p>DTS/DPF 1.2</p> <p>Development incorporating one or more of the following land uses is located not less than 3km of an airport used by commercial or military aircraft:</p> <ul style="list-style-type: none"> (a) horticulture; (b) food Packing/processing plant; (c) intensive animal husbandry; (d) showground; (e) wildlife sanctuary; (f) wetland; (g) waste management facility; or (h) waste transfer station.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.3</p> <p>Buildings and structures that are sensitive to aircraft noise designed to minimise aircraft noise intrusion and provide appropriate interior amenity.</p>	<p>None are applicable.</p>

Procedural Matters

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Coastal Areas Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)

DO 1
 Conservation and enhancement of the natural coastal environment, provision for natural coastal processes and recognition of current and future coastal hazards including sea level rise, flooding erosion and dune drift to avoid the need, now or in the future, for public expenditure on protection of the environment and development.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Land Division	
<p>PO 1.1</p> <p>Land divided only if it or the subsequent development and use of the land will not adversely affect environmental values or the ability of the land or adjoining land to adapt to changing coastal processes.</p>	<p>DTS/DPF 1.1</p> <p>Land division for minor adjustment of allotment boundaries to remove an anomaly in the current boundaries with respect to the location of existing buildings or structures.</p>
<p>PO 1.2</p> <p>Land is not divided unless a layout is achieved whereby roads, parking areas and development sites for each allotment are at least 0.3m above the standard sea flood risk level, unless the land is, or can be provided with appropriate and acceptable coastal protection measures.</p>	<p>None are applicable.</p>
<p>PO 1.3</p> <p>Other than small-scale infill land division in a predominantly urban zone, land division adjacent to the coast incorporates an existing or proposed public reserve (not including a road or erosion buffer) of a size adequate to provide for natural coastal processes, public access and recreation.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Hazard Risk Minimisation	
<p>PO 2.1</p> <p>Development and its site are protected against the standard sea flood risk level.</p>	<p>DTS/DPF 2.1</p> <p>Development:</p> <ul style="list-style-type: none"> (a) is located outside of the 1% AEP flood extreme sea level (tide, stormwater and associated wave effects combined); and (b) includes an allowance to accommodate 100 years of land subsidence.
<p>PO 2.2</p> <p>Buildings sited over tidal water, or that are not capable of being raised or protected by flood protection measures in future, are protected against the standard sea flood risk level and sea level rise.</p>	<p>DTS/DPF 2.2</p> <p>Building floor levels are at least 1.25m above the standard sea flood risk level.</p>
<p>PO 2.3</p> <p>Development, including associated roads and parking areas, but not minor structures unlikely to be adversely affected by flooding, protected from sea level rise.</p>	<p>DTS/DPF 2.3</p> <p>Development where:</p> <ul style="list-style-type: none"> (a) site levels are at least 0.3m above the standard sea flood risk level; (b) building floor levels are at least 0.55m above the standard sea flood risk level; and (c) practical measures to provide protection against an additional sea level rise of 0.7m plus an allowance to accommodate 100 years of land subsidence are incorporated.
<p>PO 2.4</p> <p>Development will not create or aggravate coastal erosion or require coast protection works that cause or aggravate coastal erosion.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 2.5</p> <p>Development set back a sufficient distance from the coast to provide an erosion buffer in addition to a public reserve that will allow for at least 100 years of coastal retreat for single buildings or small-scale developments, or 200 years of coastal retreat for large scale developments unless:</p> <p>(a) the development incorporates appropriate private coastal protection measures to protect it from anticipated erosion; or</p> <p>(b) there are formal commitments to protect the existing or proposed public reserve and development from anticipated coastal erosion.</p>	<p>None are applicable.</p>
<p>Coast Protection Works</p>	
<p>PO 3.1</p> <p>Development avoids the need for coast protection works through measures such as setbacks to protect development from coastal erosion, sea or stormwater flooding, sand drift or other coastal processes.</p>	<p>None are applicable.</p>
<p>PO 3.2</p> <p>Development does not compromise the structural integrity of any sea wall or levee bank or the ability to maintain, modify or upgrade any sea wall of levee bank.</p>	<p>None are applicable.</p>
<p>PO 3.3</p> <p>Unavoidable coast protection works are the subject of binding agreements to cover the cost of future construction, operation, maintenance and management measures and will not:</p> <p>(a) have an adverse effect on coastal ecology, processes, conservation, public access and amenity;</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
(b) require commitment of public resources including land; and (c) present an unacceptable risk of failure relative to potential hazard resulting from failure.	
Environment Protection	
PO 4.1 Development will not unreasonably affect the marine and onshore coastal environment by pollution, erosion, damage or depletion of physical or biological resources, interference with natural coastal processes, introduction of and spread of marine pests or any other means.	None are applicable.
PO 4.2 Development avoids delicate or environmentally-sensitive coastal areas such as sand dunes, cliff tops, estuaries, wetlands or substantially intact strata of native vegetation.	None are applicable.
PO 4.3 Development allows for ecological and natural landform adjustment to changing climatic conditions and sea levels, by allowing landward migration of dunes, coastal wetlands, mangrove and samphire areas.	None are applicable.
PO 4.4 Development designed so that solid and fluid wastes and stormwater runoff are disposed of in a manner that avoids pollution or other detrimental impacts on the marine and on-shore environment of coastal areas.	None are applicable.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 4.5</p> <p>Development involving the removal of shell grit, cobbles or sand, other than for coastal protection works purposes, is not undertaken.</p>	<p>DTS/DPF 4.5</p> <p>Development does not involve the removal of shell grit, cobbles or sand.</p>
Access	
<p>PO 6.1</p> <p>Development maintains or enhances appropriate public access to and along the foreshore.</p>	<p>None are applicable.</p>
<p>PO 6.2</p> <p>Public access through sensitive coastal landforms, particularly sand dunes, wetlands and cliffs, is restricted to defined pedestrian paths and constructed to minimise adverse environmental impact.</p>	<p>None are applicable.</p>
<p>PO 6.3</p> <p>Access roads to the coast, lookouts and places of interest:</p> <ul style="list-style-type: none"> (a) do not detract from the amenity or the environment; (b) are designed for slow moving traffic; and (c) are minimised in number. 	<p>None are applicable.</p>
<p>PO 6.4</p> <p>Development on land adjoining a coastal reserve should be sited and designed to be compatible with the purpose, management and amenity of the reserve, as well as to prevent inappropriate access to or use of the reserve.</p>	<p>None are applicable.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>Other than where the development is in the opinion of the relevant authority minor in nature and would not warrant a referral when considering the purpose of the referral outlined in Schedule 9 of the Planning, Development and Infrastructure Regulations 2019, the following:</p> <p>(a) excavation or filling where the total volume of material excavated or filled exceeds 9m³;</p> <p>(b) dwellings and habitable buildings that</p> <p style="padding-left: 20px;">(i) do not meet site and building floor level requirements set out in the DTS/DPF 2.1, 2.2 and 2.3 of the Coastal Areas Overlay; or</p> <p style="padding-left: 20px;">(ii) are within 100m of the mean high water mark;</p> <p>(c) other than within a Settlement Zone:</p> <p style="padding-left: 20px;">(i) buildings with a floor area greater than 60m²;</p> <p style="padding-left: 20px;">(ii) tourist accommodation, including a caravan park; or</p> <p style="padding-left: 20px;">(iii) development that involves a division of land that would create 1 or more additional allotments;</p> <p>(d) off shore structures;</p> <p>(e) coast protection works; or</p> <p>(f) infrastructure within 100m landward of the mean high water mark.</p>	<p>Where not located in the River Murray Flood Plain Overlay – The Coast Protection Board</p> <p>Where located in the River Murray Flood Plain Overlay – The Minister for the time being administering the <i>River Murray Act 2003</i>.</p>	<p>To provide expert assessment and direction to the relevant authority on:</p> <ul style="list-style-type: none"> • the risk to development from current and future coastal hazards (including sea-level rise, coastal flooding, erosion, dune drift and acid sulfate soils) • coast protection works • potential impacts from development on public access and the coastal environment (including important coastal features)

Hazards (Acid Sulfate Soils) Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>Protection of the environment and development from the release of acid water resulting from the disturbance of acid sulfate soils.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Land Use and Intensity	
<p>PO 1.1</p> <p>Excavation or change to a water table is managed in a way that effectively avoids potential harm or damage to any of the following from release of acid sulfate soils:</p> <ul style="list-style-type: none"> (a) the marine and estuarine environment; (b) natural water bodies and wetlands; (c) agricultural or aquaculture activities; (d) buildings, structures and infrastructure; or (e) public health. 	<p>DTS/DPF 1.1</p> <p>Development does not involve or cause:</p> <ul style="list-style-type: none"> (a) excavation of land; or (b) change to a water table.

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Hazards (Bushfire – Outback) Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)

DO 1

Development is located to minimise the threat and impact of bushfires on life and property.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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Habitable Buildings

<p>PO 1.1</p> <p>Residential, tourist accommodation and other habitable buildings sited to avoid, narrow gullies, steep slopes (especially slopes with a northerly or westerly aspect) and vegetated areas that pose an unacceptable bushfire risk.</p>	<p>DTS/DPF 1.1</p> <p>Development meets the following requirements:</p> <ul style="list-style-type: none"> (a) an asset protection zone with a minimum width of 50m is created and maintained around residential, tourist accommodation and other habitable buildings; and (b) the asset protection zone is contained wholly within the allotment of the development.
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Vehicle Access –Roads and Driveways

<p>PO 2.1</p> <p>Roads are designed and constructed to facilitate the safe and effective:</p> <ul style="list-style-type: none"> (a) use, operation and evacuation of fire-fighting and emergency personnel; and (b) evacuation of residents. 	<p>DTS/DPF 2.1</p> <p>Roads:</p> <ul style="list-style-type: none"> (a) are designed in accordance with Figure 1; (b) are constructed with a formed, all-weather surface; and
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Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
	<ul style="list-style-type: none"> (c) have a gradient of not more than 16 degrees (1-in-3.5) at any point along the road; (d) have a minimum formed road width of 6m; (e) provide overhead clearance of not less than 4.5m between the road surface and overhanging branches or other obstructions; (f) allow fire-fighting services (personnel and vehicles) to travel in a continuous forward movement around road curves by constructing the curves with a minimum external radius of 12.5m; (g) incorporating use of cul-de-sac endings or dead end roads to not exceed 200m in length and the end of the road to have either: <ul style="list-style-type: none"> (i) a turning area with a minimum formed surface radius of 12.5m; or (ii) a 'T' or 'Y' shaped turning area with a minimum formed surface length of 11m and minimum internal radii of 9.5m; and (h) incorporate solid, all-weather crossings that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes, over any watercourse.
<p>PO 2.2</p> <p>Driveways are designed and constructed to facilitate the safe and effective:</p> <ul style="list-style-type: none"> (a) use, operation and evacuation of fire-fighting and emergency personnel; and (b) evacuation of residents. 	<p>DTS/DPF 2.2</p> <p>Where the furthest point of the building from the nearest public road is greater than 30m, driveways:</p> <ul style="list-style-type: none"> (a) are designed in accordance with Figure 2; (b) are constructed with a formed, all-weather surface;

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
	<ul style="list-style-type: none"> (c) be connected to a formed, all-weather public road; (d) have a <i>gradient</i> of not more than 16 degrees (1-in-3.5) at any point along the road or driveway; (e) have a minimum formed width of 3m and incorporate passing bays with a minimum width of 6m and length of 17m every 200m; (f) provide overhead clearance of not less than 4.5m between the road surface and overhanging branches or other obstructions; (g) allow fire-fighting vehicles to travel in a continuous forward movement by constructing curved roads and driveways with curves that have a minimum external radius of 12.5m; (h) allow fire-fighting vehicles to safely enter and exit an allotment in a forward direction by incorporating either: <ul style="list-style-type: none"> (i) a loop road around the building; or (ii) a turning area with a minimum radius of 12.5m; or (iii) a 'T' or 'Y' shaped turning area with a minimum formed length of 11m and minimum internal radii of 9.5m.

Procedural Matters (PM)

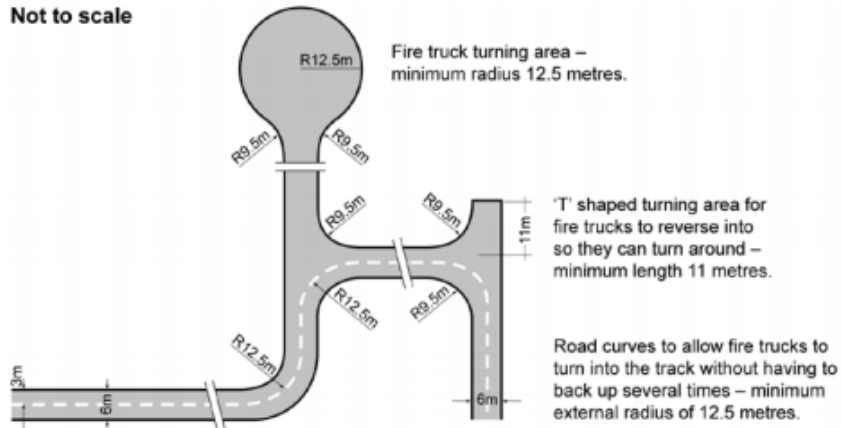
Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Figures and Diagrams

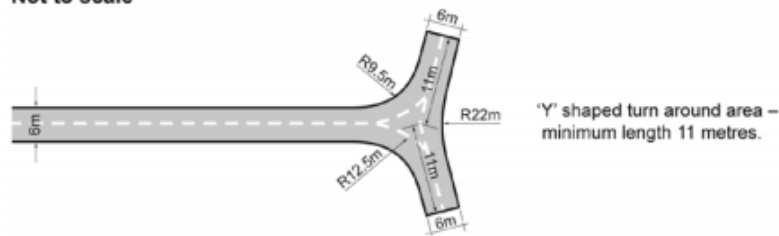
Roads

Figure 1 – Roads

Not to scale

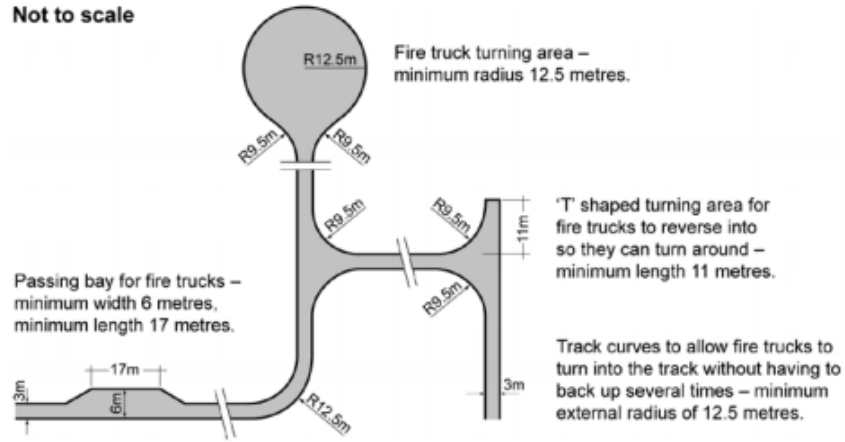


Not to scale



Driveways

Figure 2 – Driveways



Historic Shipwrecks Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

DO 1
 Historic shipwrecks and historic relics are protected from encroaching development.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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General

<p>PO 1.1</p> <p>Development is designed and located to avoid potential impacts on un-located historic shipwrecks and historic relics.</p>	<p>DTS/DPF 1.1</p> <p>Development involving impact to the surface or subsoil of land or sea/river floor is not:</p> <ul style="list-style-type: none"> (a) located within 500m of an un-located historic shipwreck or relic; or (b) seaward of the limits of existing land based settlements, or zones/areas which enable urban development (e.g. excludes rural zones, conservation zones, coastal zones or other similar zones in which urban development is secondary); or (c) within 15m landward of the existing banks of the River Murray.
<p>PO 1.2</p> <p>Development is designed and located to avoid potential impacts on located historic shipwrecks and historic relics.</p>	<p>DTS/DPF 1.2</p> <p>Development involving impact to the surface or subsoil of land or sea/river floor but is not:</p> <ul style="list-style-type: none"> (a) located within 150m of a located historic shipwreck or relic; or (b) seaward of the limits of existing land based settlements, or zones/areas which enable urban development (e.g.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
	<p>excludes rural zones, conservation zones, coastal zones or other similar zones in which urban development is secondary); or</p> <p>(c) within 15m landward of the current banks of the River Murray.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
Development that may involve impact to the surface or subsoil of land or the floor of a sea, lake or river, where located partly or fully within the 'adjacent area' of a historic shipwreck of historic relic within the meaning of the Historic Shipwrecks Act 1981 as shown on the Historic Shipwrecks Overlay	<p>Where not located in the River Murray Flood Plain Overlay – The Minister for the time being administering the <i>Historic Shipwrecks Act 1981</i></p> <p>Where located in the River Murray Flood Plain Overlay – Minister for the time being administering the <i>River Murray Act 2003</i>.</p>	To provide expert assessment and direction to the relevant authority on the potential impacts of development on, or in proximity to, historic shipwrecks or relics protected under the relevant Act.
Development that may involve impact to the surface or subsoil of land or sea floor, where located partly or fully within the 'adjacent area' of a historic shipwreck of historic relic within the meaning of the <i>Historic Shipwrecks Act 1976</i> (Commonwealth) as shown on the Historic Shipwrecks Overlay	Commonwealth Minister responsible for administering the <i>Historic Shipwrecks Act 1976</i> (Commonwealth)	To provide expert assessment and direction to the relevant authority on the potential impacts of development on, or in proximity to, historic shipwrecks or relics protected under the relevant Act.

Key Outback and Rural Routes Overlay

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>The safe and efficient movement of vehicle and freight traffic on key outback and rural roads.</p>
<p>DO 2</p> <p>Provision of safe and efficient vehicular access to and from key outback and rural roads.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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Access Design and Function	
<p>PO 1.1</p> <p>An access point is designed to allow safe entry and exit to and from a site to meet the needs of the development, to ensure traffic flow interference associated with access movements is minimised.</p>	<p>DTS/DPF 1.1</p> <p>An access point is located outside of a Township Zone and is designed to ensure:</p> <ul style="list-style-type: none"> (a) the following for the largest vehicle expected to access the site: <ul style="list-style-type: none"> (i) entry and exit movements are left turn only; (ii) access to and from the site is in a forward direction, with on-site manoeuvring available through circulation around the site or no more than a 3-point turn; (iii) vehicles cross the property boundary at an angle between 70 and 90 degrees; and (iv) access to and from the site using the kerbside lane of the road; and (b) where the access point serves:

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
	<ul style="list-style-type: none"> (i) a single dwelling, the access point has a width of no more than 4m (measured at the site boundary); or (ii) development other than a single dwelling, the access point has: <ul style="list-style-type: none"> A. a width of at least 6.0 m (measured at the site boundary) where vehicles 12.5m or less in length are expected to access the site; or B. a width of at least 8.0m (measured at the site boundary) where vehicles over 12.5m in length are expected to access the site; and (c) The access point is located at least 10m from any roadside infrastructure or trees.
<p>PO 1.2</p> <p>Sufficient accessible on-site queuing adjacent to the access point is provided to meet the needs of the development so that all vehicle queues are contained fully within the boundaries of the development site, to minimise interruption on the functional performance of the road and safe vehicle movement.</p>	<p>DTS/DPF 1.2</p> <p>Where:</p> <ul style="list-style-type: none"> (a) vehicles no greater than 12.5m in length are expected to access the site and there are no internal intersections, car parking spaces, car park isles or any internal obstructions within 20m of the access point; or (b) the access point serves a single dwelling and there are no internal driveway intersections car parking spaces or gates within 6.0m of the access point
<p>PO 1.3</p> <p>An access point is constructed to minimise mud or other debris being carried or transferred onto the road, to ensure safe operating conditions are maintained on the road.</p>	<p>DTS/DPF 1.3</p> <p>The access way is spray sealed (except where the access point is for a single dwelling, or where the Key Outback or Rural Route is unsealed) from the road to a point not less than 10m into the site.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.4</p> <p>An access point is designed to minimise negative impact on roadside drainage of water.</p>	<p>DTS/DPF 1.4</p> <p>Development does not:</p> <ul style="list-style-type: none"> (a) decrease the capacity of an existing drainage point; or (b) restrict or prevent the flow of stormwater to an existing drainage point.
Location of New Access Points	
<p>PO 2.1</p> <p>A new access point is widely spaced apart from any existing access point or intersection to not impede traffic flow and ensure safe operating conditions are maintained on the road.</p>	<p>DTS/DPF 2.1</p> <p>Where access from an alternative road at least 25m from the Key Outback and Rural Route is not available, a new access point is:</p> <ul style="list-style-type: none"> (a) not located on a section affected by double barrier lines between either edge of the access point; and (b) at least the following distance from an intersection with another road or railway, or terminating / merging lane or another access point: <ul style="list-style-type: none"> (i) 110 km/h road – 325m (ii) 100 km/h road – 280m (iii) 90 km/h road – 240m (iv) 80 km/h road – 200m (v) 70 km/h road – 165m (vi) 60 km/h road – 135m (vii) 50km/h or less road – 105m

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 2.2</p> <p>New access points are located and designed to ensure an appropriate sight distance is provided so that drivers:</p> <p>(a) on the road approaching the access point are able to recognise the presence of the access point and/or see a vehicle turning into or out of the access point in time to slow down or stop in a safe and controlled manner; and</p> <p>(b) exiting the access point onto the road can see approaching vehicles to avoid potential conflict.</p>	<p>DTS/DPF 2.2</p> <p>Drivers approaching or exiting the access point have an unobstructed line of sight to or from the access point in accordance with the following distances:</p> <p>(a) 110 km/h road – 325m (b) 100 km/h road – 280m (c) 90 km/h road – 240m (d) 80 km/h road – 200m (e) 70 km/h road – 165m (f) 60 km/h road – 135m; and (g) 50km/h or less road – 105m.</p>

Procedural Matters

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>Development (including the division of land) that:</p> <p>(a) creates a new access; or</p> <p>(b) proposes either of the following (except where deemed to be minor in the opinion of the relevant authority):</p> <p style="margin-left: 20px;">(i) alters an existing access; or</p> <p style="margin-left: 20px;">(ii) may change the nature of vehicular movements or increase the number or frequency of movements through an existing access;</p> <p>on a Key Outback or Rural Routes road or within 25m of an intersection with such a road.</p>	<p>Commissioner of Highways</p>	<p>To provide expert technical assessment and direction to the Relevant Authority on the safe and efficient operation and management of all roads relevant to the Commissioner of Highways as described in the Planning and Design Code.</p>

Key Railway Crossings Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

DO 1
 The safe, efficient and uninterrupted operation of key railway crossings.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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Access Design and Function

<p>PO 1.1 Site access does not interfere or impact on the safe operation of a railway crossing.</p>	<p>DTS/DPF 1.1 Development:</p> <ul style="list-style-type: none"> (a) does not require a new railway crossing or only requires construction of a grade separated crossing; and (b) does not involve a new or modified access or an increase in traffic through an existing access that is located within the following distance from a railway crossing: <ul style="list-style-type: none"> (i) 110 km/h road – 325m (ii) 100 km/h road – 280m (iii) 90 km/h road – 240m (iv) 80 km/h road – 200m (v) 70 km/h road – 165m (vi) 60 km/h – 135m (vii) 50 km/h or less – 105m.
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Procedural Matters

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Marine Parks (Managed Use) Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>Protection of marine habitats and biodiversity through limiting development to coastal infrastructure (jetties, marinas, pontoons), aquaculture, tourism, recreation and renewable energy facilities.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Land Use	
<p>PO 1.1</p> <p>Development does not unduly harm marine habitats, biodiversity or the functioning of ecosystems.</p>	None are applicable.

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Marine Parks (Restricted Use) Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>Conservation of high value marine habitats and biological diversity.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Land Use	
<p>PO 1.1</p> <p>Development limited to that required to support the ongoing operation of ports and harbours.</p>	None are applicable.

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Murray-Darling Basin Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>Protection of the water resources of the Murray-Darling Basin area by ensuring the removal of water in such areas is undertaken in a sustainable manner.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.1</p> <p>All development, but in particular development involving:</p> <ul style="list-style-type: none"> (a) horticulture; (b) activities requiring irrigation; (c) aquaculture; (d) industry; (e) intensive animal husbandry; (f) horse keeping; (g) commercial forestry; <p>having a lawful, sustainable and reliable water supply that does not place undue strain on water resources in the Murray-Darling Basin.</p>	<p>None are applicable.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>Development involving:</p> <ul style="list-style-type: none"> (a) horticulture; (b) activities requiring irrigation; (c) aquaculture; (d) industry; (e) intensive animal husbandry; (f) horse keeping; (g) commercial forestry; <p>where the development may require water to be taken from the River Murray within the meaning of the <i>River Murray Act 2003</i> under a water license under the <i>Natural Resources Management Act 2004</i> and applied to land within the Murray-Darling Basin.</p>	<p>Minister for the time being administering the <i>River Murray Act 2003</i>.</p>	<p>To provide expert technical assessment and direction to the relevant authority on matters regarding the taking of water to ensure development is undertaken sustainably in the Murray-Darling Basin.</p>

Prescribed Watercourses Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>Protection of prescribed watercourses by ensuring the taking of water from such watercourses is avoided or is undertaken in a sustainable manner.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.1</p> <p>All development, but in particular involving:</p> <ul style="list-style-type: none"> (a) horticulture; (b) activities requiring irrigation; (c) aquaculture; (d) industry; (e) intensive animal husbandry; (f) commercial forestry <p>having a lawful, sustainable and reliable water supply that does not place undue strain on prescribed watercourses.</p>	<p>None are applicable.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
Development comprising the erection, construction, modification, enlargement or removal of a dam, wall or other structure that will collect or divert, or collects or diverts water flowing in a prescribed watercourse.	<p>Where not located in the River Murray Flood Plain Overlay – The Minister responsible for the administration of the <i>Natural Resources Management Act 2004</i></p> <p>Where located in the River Murray Flood Plain Overlay – The Minister for the time being administering the <i>River Murray Act 2003</i>.</p>	To provide expert assessment and direction to the relevant authority on potential impacts from development on the health, sustainability and/or natural flow paths of water resources.
<p>Development involving:</p> <ul style="list-style-type: none"> (a) horticulture; (b) activities requiring irrigation; (c) aquaculture; (d) industry; (e) intensive animal husbandry; <p>which may require water to be taken over and above any allocation that has already been granted under the <i>Natural Resources Management Act 2004</i>, or</p> <ul style="list-style-type: none"> (f) commercial forestry that requires a forest water licence under Chapter 7 Part 5A of the <i>Natural Resources Management Act 2004</i>. 	The Chief Executive of the Department of the Minister responsible for the administration of the <i>Natural Resources Management Act 2004</i>	To provide expert technical assessment and direction to the relevant authority on the taking of water to ensure development is undertaken sustainably.

Prescribed Wells Area Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>Protection of prescribed wells areas by ensuring the taking of water in such areas is avoided or is undertaken in a sustainable manner.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.1</p> <p>All development, but in particular involving:</p> <ul style="list-style-type: none"> (a) horticulture; (b) activities requiring irrigation; (c) aquaculture; (d) industry; (e) intensive animal husbandry; (f) commercial forestry <p>having a lawful, sustainable and reliable water supply that does not place undue strain on water resources in prescribed wells areas.</p>	<p>None are applicable.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>Development involving:</p> <ul style="list-style-type: none"> (a) horticulture; (b) activities requiring irrigation; (c) aquaculture; (d) industry; (e) intensive animal husbandry; <p>which may require water to be taken over and above any allocation that has already been granted under the <i>Natural Resources Management Act 2004</i>, or</p> <ul style="list-style-type: none"> (f) commercial forestry that requires a forest water licence under Chapter 7 Part 5A of the <i>Natural Resources Management Act 2004</i> 	<p>The Chief Executive of the Department of the Minister responsible for the administration of the <i>Natural Resources Management Act 2004</i></p>	<p>To provide expert technical assessment and direction to the relevant authority on the taking of water to ensure development is undertaken sustainably.</p>

Ramsar Wetlands Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)

<p>DO 1</p> <p>Protection of recognised Ramsar wetlands.</p>

<p>Performance Outcomes (PO)</p>	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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General	
<p>PO 1.1</p> <p>Development does not lead to significant negative impacts on Ramsar wetland and habitat areas.</p>	None are applicable.
<p>PO 1.2</p> <p>Development adjacent to Ramsar areas establishes landform and vegetated corridor links between Ramsar areas where possible.</p>	None are applicable.
<p>PO 1.3</p> <p>Development within designated 'Ramsar Reserves' does not adversely impact upon the wetland habitat.</p>	None are applicable.
<p>PO 1.4</p> <p>Buildings or structures not located on Ramsar Wetlands.</p>	None are applicable.

Performance Outcomes (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.5</p> <p>Development does not cause a significant change in the hydrological regime of the Ramsar wetland, including:</p> <p>(a) a change in volume, timing, duration and frequency of ground and surface water flows to and within the wetland; or</p> <p>(b) a change in the level of salinity, pollutants, nutrients or water temperature.</p>	None are applicable.
<p>PO 1.6</p> <p>Development designed to minimise the cumulative impacts on Ramsar Wetlands from frequent jetties, vegetation clearance and dredging.</p>	None are applicable.
<p>PO 1.7</p> <p>Development does not result in the disruption of the breeding, feeding, migration or resting behaviour of an ecologically significant proportion of the population of a migratory or resident species.</p>	None are applicable.
Land Division	
<p>PO 2.1</p> <p>Land division involving a boundary realignment to assist in the protection of habitation areas within the Ramsar Wetlands.</p>	None are applicable.

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

River Murray Flood Plain Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>The conservation and enhancement of water quality and the riverine environment, provision for environmental water flows, the protection of life and property against flood risk and recognition of the riverine environment as an important tourist and recreational resource.</p>
<p>DO 2</p> <p>Development for the purpose of recreation (e.g. landings, jetties, houseboat moorings) water extraction, wetland management and irrigation management (e.g. channel, pumping stand, flood gate).</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Dredging	
<p>PO 1.1</p> <p>Development is designed and sited in a manner that limits the need for dredging.</p>	None are applicable.
Land Division	
<p>PO 2.1</p> <p>Land division does not lead to intensification of development.</p>	<p>DTS/DPF 2.1</p> <p>Land division:</p> <ul style="list-style-type: none"> (a) is limited to the creation of a public road or a public reserve; or (b) is for adjustment of allotment boundaries to remove an anomaly in the current boundaries with respect to the location of existing buildings or structures and does not result in an additional allotment.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 2.2</p> <p>Boundary realignment for residential purposes preserves the integrity of public waterfront reserves.</p>	<p>DTS/DPF 2.2</p> <p>Boundary realignment for residential purposes:</p> <ul style="list-style-type: none"> (a) locate any new roads on the landward side of an existing dwelling (rather than between an existing dwelling and the public waterfront reserve); and (b) provide a reserve of 50m in width above pool level along the water frontage.
Built Form and Character	
<p>PO 3.1</p> <p>Buildings and structures are sited and designed to be unobtrusive when viewed from the River Murray and nearby public roads.</p>	<p>DTS/DPF 3.1</p> <p>Buildings / structures:</p> <ul style="list-style-type: none"> (a) do not exceed one building level in height (excluding elevation to minimise the potential for personal or property damage as a result of a flood); (b) have no floor level elevated more than 2.5m above ground level; (c) are not closer than 50m to the waterfront; and (d) have associated electricity and telecommunications lines installed underground.
<p>PO 3.2</p> <p>Retaining walls avoided in the 1956 River Murray Flood Plain and in highly visible locations that can be viewed from public roads or the main channel of the Murray River.</p>	<p>DTS/DPF 3.2</p> <p>Retaining walls:</p> <ul style="list-style-type: none"> (a) are for the repair or replacement of a lawful retaining wall; (b) are essential to provide safe public access to the waterfront on public land; (c) are necessary to protect structures and buildings of historic significance; (d) are necessary for the purpose of

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
	<p style="text-align: center;">protecting waterfront vegetation;</p> <p>(e) are ancillary to a dwelling and are essential for safe access to the waterfront from that dwelling; or</p> <p>(f) are necessary to protect a dwelling from material risk presented by erosion.</p>
Flood Resilience	
<p>PO 4.1</p> <p>Development does not cause, impede, or be subject to damage by floodwaters and fluctuating pool levels.</p>	None are applicable.
<p>PO 4.2</p> <p>Building levels of elevated dwellings do not impede floodwaters and fluctuating pool levels.</p>	<p>DTS/DPF 4.2</p> <p>Building levels of elevated dwellings:</p> <p>(a) when enclosed, are enclosed using roller doors, removable panels or other material that can easily be opened or removed during times of flood;</p> <p>(b) are not used for habitable rooms; and</p> <p>(c) have enclosed areas for a toilet, shower or laundry facilities not exceeding a combined maximum floor area of 10m².</p>
<p>PO 4.3</p> <p>Outbuildings do not impede floodwaters and fluctuating pool levels.</p>	<p>DTS/DPF 4.3</p> <p>Outbuildings are fitted with roller doors, removable panels or similar on two ends or sides (whichever elevations face the direction of the flow).</p>
<p>PO 4.4</p> <p>Fencing does not impede floodwaters and fluctuating pool levels.</p>	<p>DTS/DPF 4.4</p> <p>Fencing is of an open design such as post and wire strand construction.</p>

**Planning and Design Code
Overlay Section
River Murray Flood Plain Overlay**

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Environmental Protection	
<p>PO 5.1</p> <p>Adverse impacts on the natural features and stability of the waterfront are minimised.</p>	<p>None are applicable.</p>
<p>PO 5.2</p> <p>Outbuildings incorporate measures to prevent spills and leaks.</p>	<p>DTS/DPF 5.2</p> <p>Outbuildings are wholly located within a bund to confine spills and leaks to the confines of the outbuilding.</p>
<p>PO 5.3</p> <p>Fuel storage facilities and areas, including areas for the storage of mobile fuel trailers, sited and designed to prevent environmental harm.</p>	<p>DTS/DPF 5.3</p> <p>Fuel storage facilities and areas, including areas for the storage of mobile fuel trailers, are located:</p> <ul style="list-style-type: none"> (a) outside the 1956 Murray River Flood Plain; and (b) wholly within a bund that has storage capacity of not less than 133% of the volume of the largest fuel storage tank.
<p>PO 5.4</p> <p>Facilities for the collection of effluent from moored vessels sited and designed to prevent environmental harm.</p>	<p>DTS/DPF 5.4</p> <p>Facilities for the collection of effluent from moored vessels are not located within the 1956 Murray River Flood Plain.</p>
Access	
<p>PO 6.1</p> <p>Waterfront reserve area between buildings and the water is maximised to preserve the amenity of and view corridors along the riverine environment.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
PO 6.2 Public access routes to waterfront reserves are provided and maintained.	None are applicable.
PO 6.3 Driveways, access tracks and parking areas are designed and constructed to minimise excavation and filling.	DTS/DPF 6.3 No more than 100mm excavation and 100mm of fill is required in association with the construction of a driveway, access track or parking area.
River Structures	
PO 7.1 River structures located where they do not cause a hazard to safe navigation.	DTS/DPF 7.1 River structures are located: (a) wholly outside navigation channels as defined by navigational signs; (b) not less than 100m from either side of a ferry crossing; and (c) not less than 150m from a lock.
PO 7.2 River structures are located where they do not cause a hazard to a designated recreation area for water skiing and swimming.	DTS/DPF 7.2 River structures are located wholly outside designated recreation areas for water skiing and swimming.
PO 7.3 Proliferation of water pumps is avoided to limit impact on the riverine environment.	None are applicable.
PO 7.4 Water pumping infrastructure designed and constructed to limit impact on the riverine environment.	DTS/DPF 7.4 Water pumping infrastructure is designed and constructed in accordance with Figure 1.

**Planning and Design Code
Overlay Section
River Murray Flood Plain Overlay**

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 7.5</p> <p>Proliferation of jetties and floating pontoons is avoided to minimise impact on the riverine environment.</p>	<p>DTS/DPF 7.5</p> <p>A jetty or floating pontoon:</p> <ul style="list-style-type: none"> (a) is wholly located within the same allotment as an associated existing dwelling and will not result in more than one river structure constructed in association with that dwelling; or (b) is located on an allotment (or lease site) separated from the river front by a public reserve or a public road (but not both) and will not result in more than one river structure constructed in association with that dwelling; or (c) is for the repair, maintenance or replacement of an existing licensed river structure.
<p>PO 7.6</p> <p>Jetties and floating pontoons designed and constructed to limit impact on the riverine environment.</p>	<p>DTS/DPF 7.6</p> <p>Jetties and floating pontoons are designed and constructed in accordance with Figures 2 to 6 and:</p> <ul style="list-style-type: none"> (a) extend not more than 8m into the river measured from the riverbank at normal pool level; (b) have a width of not more than 1.4m in the case of a jetty (or gangway width in the case of a floating pontoon); (c) in the case of floating pontoons do not exceed the dimensions 3m by 6m; and (d) maintain a minimum of 3m between river structures including other jetties and pontoons
<p>PO 7.7</p> <p>Proliferation of boat ramps is avoided to minimise impact on the riverine environment.</p>	<p>DTS/DPF 7.7</p> <p>The repair, maintenance or replacement of an existing licensed boat ramp.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 7.8</p> <p>On-river mooring facilities developed only where:</p> <ul style="list-style-type: none"> (a) the mooring facility will not result in a mooring capacity exceeding one vessel per allotment; (b) where the allotment has a direct frontage to the river (or is only separated by a public road or public reserve, but not both) and the allotment contains an existing dwelling; and (c) the width of the river is greater than 100m at normal pool level. 	<p>None are applicable.</p>
<p>PO 7.9</p> <p>Moorings for vessels located to avoid interfering with the operation or function of a ferry crossing, lock or major pumping station.</p>	<p>DTS/DPF 7.9</p> <p>Moorings for vessels not be located within:</p> <ul style="list-style-type: none"> (a) 100m of either side of a ferry crossing; (b) 150m of a lock; or (c) 400m of a major pumping station.
<p>PO 7.10</p> <p>Development of structures designed for the mooring of more than one vessel are located off-channel in a marina.</p>	<p>None are applicable.</p>

Figures and Diagrams

Infrastructure

Figure 1 - Water extraction infrastructure (irrigation or water supply pump)

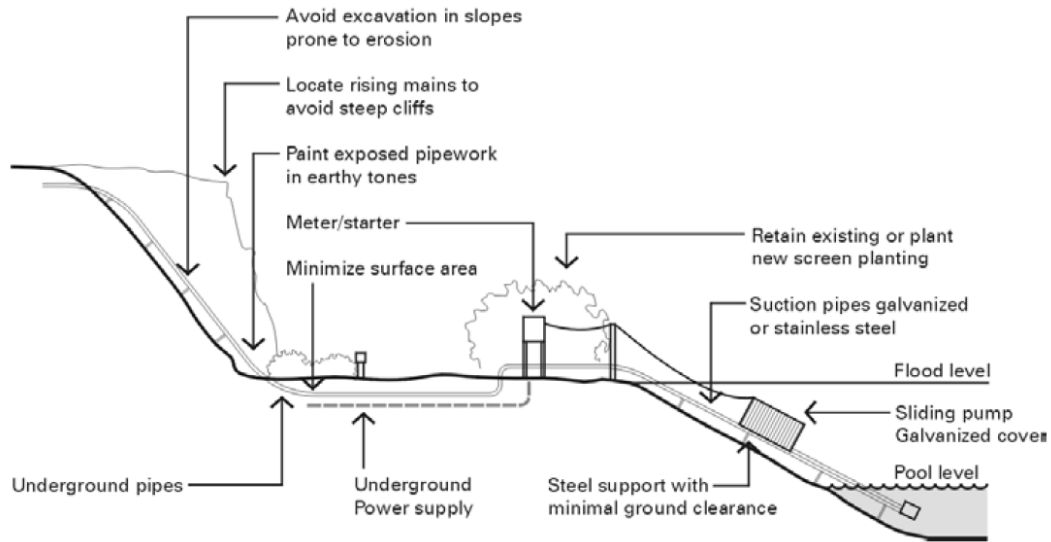
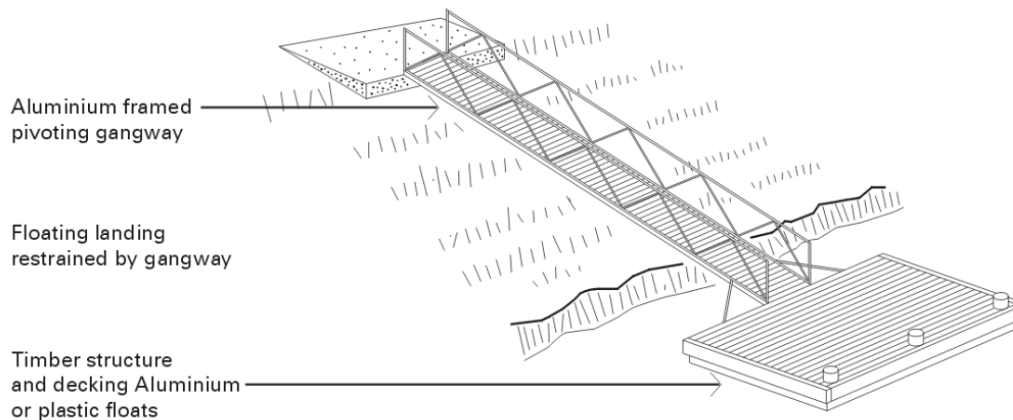


Figure 2 – Floating pontoon



Infrastructure

Figure 3 – Floating pontoon (cross-section)

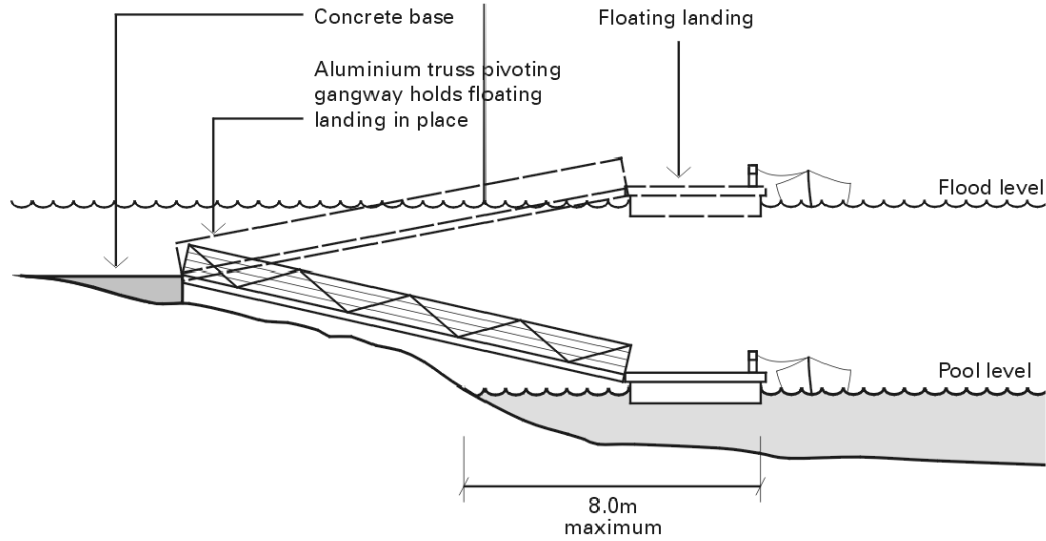
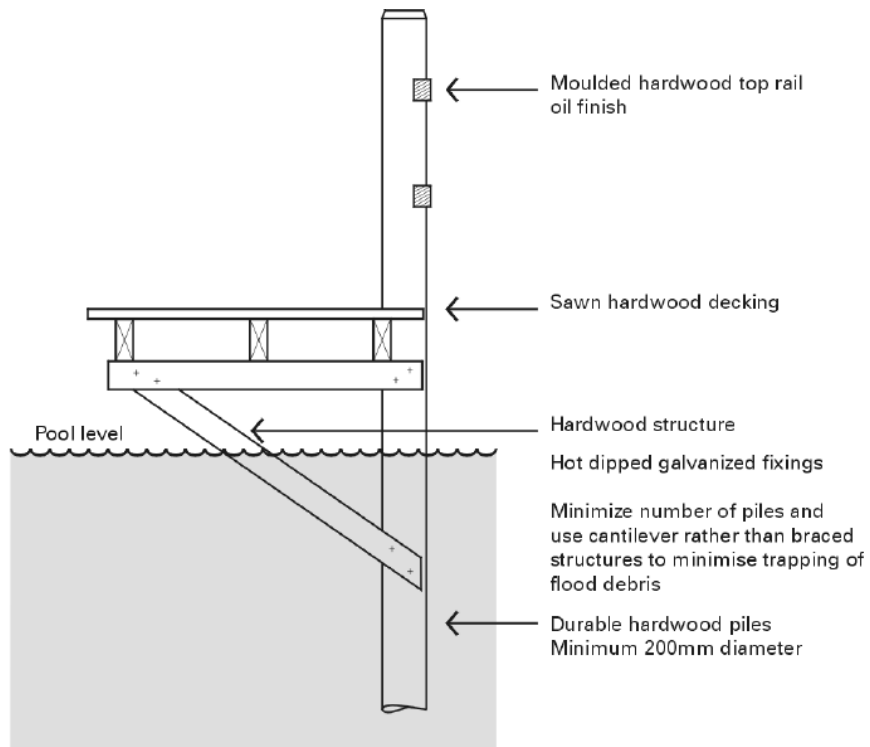


Figure 4 – Jetty



Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>The following:</p> <p>(a) development comprising the erection, construction, modification, enlargement or removal of a dam, wall or other structure that will collect or divert, or collects or diverts water flowing in a watercourse or surface water flowing over land; or</p> <p>(b) development that involves, or is for the purposes of, any of the following activities:</p> <p>(i) horticulture;</p> <p>(ii) activities requiring irrigation, other than irrigation used for domestic purposes;</p> <p>(iii) aquaculture;</p> <p>(iv) industry;</p> <p>(v) intensive animal husbandry;</p> <p>(vi) horse keeping;</p> <p>(vii) commercial forestry; or</p> <p>(c) development that is within the ambit of clause 7 of Schedule 3 of the <i>Planning, Development and Infrastructure (General) Regulations 2017</i>;</p> <p>(d) development that involves the construction of a building, or the undertaking of an act or activity specified in clause 3 of Schedule 3 of the <i>Planning, Development and Infrastructure (General) Regulations 2017</i>, other than where the development: -</p> <p>(i) is the construction of a fence not exceeding 2m in height; or</p> <p>(ii) is the construction of a carport, verandah, balcony, porch or other similar structure; or</p> <p>(iii) is the construction of an enclosed shed, garage or similar outbuilding—</p>	<p>Minister for the time being administering the <i>River Murray Act 2003</i>.</p>	<p>To provide expert assessment and direction to the relevant authority on:</p> <ul style="list-style-type: none"> the risk to development from flooding or other hazards potential impacts from development on the health and/or natural flow paths of the River Murray.

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<ul style="list-style-type: none"> (A) that is ancillary to an existing building; and (B) that will not have a total floor area of more than 60m²; and (C) that will have on opposite sides either removable panels or at least 2 doors so as not to impede flood waters; and (D) that will not be located closer to the River Murray than the building to which it is ancillary; or (viii) comprises an alteration or extension of an existing dwelling where the total floor area of the dwelling after the completion of the development will not exceed 94 square metres and any extension of the dwelling will not result in a part of the dwelling being closer to the River Murray; or (ix) is the construction of an aboveground or inflatable swimming pool, or a spa pool; or (e) development that involves the division of an allotment or allotments and is of a kind described as restricted development under the Planning and Design Code; or (f) development that involves the division of an allotment or allotments so as to result in— <ul style="list-style-type: none"> (i) an additional 4 or more allotments; or (ii) an additional 4 or more grants of occupancy (by the conferral or exercise of a right to occupy part only of an allotment); or (iii) a mix of 4 or more allotments and separate grants of occupancy; or 		

**Planning and Design Code
Overlay Section
River Murray Flood Plain Overlay**

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>(g) development that involves the creation of a new allotment or grant of occupancy through the division of an allotment where any part of the boundary of the new allotment or occupancy will have a frontage to a part of the River Murray system; or</p> <p>(h) development that involves the alteration of the boundaries of an allotment so as to result in—</p> <p>(i) the allotment having a frontage to a part of the River Murray system; or</p> <p>(ii) the allotment having an increase in its frontage to a part of the River Murray system; or</p> <p>(i) development that involves the creation of a caravan park, or the expansion or alteration of a caravan park so as to increase the capacity of the caravan park.</p>		
<p>Development that:</p> <p>(a) generates human wastewater from a population equivalent in excess of 40 persons and is not connected to a community wastewater management system or sewerage infrastructure; or</p> <p>(b) comprises pontoons, jetties, piers or other structures (whether on water or land) designed or used to provide moorings or dry storage for 5 or more vessels at any 1 time; or</p> <p>(c) comprises a vessel refuelling facility; or</p> <p>(d) comprises a vessel sewage pump-out facility.</p>	Environment Protection Authority (EPA)	To prioritise the protection of drinking water quality by ensuring pollutants are not discharged into any waters or onto land in a place in which it is reasonably likely to enter any waters within a water protection area.

Significant Landscape Protection Overlay

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Conserve the natural and rural character and scenic and cultural qualities of significant landscapes.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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Built Form and Character	
<p>PO 1.1</p> <p>Development carefully sited and designed to:</p> <ul style="list-style-type: none"> (a) minimise disruption to natural landforms; (b) avoid clearance of native vegetation; (c) minimise impacts on wildlife habitat; and (d) be visually unobtrusive by blending in with the surrounding area. 	<p>None are applicable</p>
<p>PO 1.2</p> <p>Buildings and structures limited to those that:</p> <ul style="list-style-type: none"> (a) are ancillary, adjacent to and of the same or lesser scale as existing buildings; (b) are essential in supporting existing pastoral or rural activities; (c) are used for the ancillary sale of produce associated with a pastoral or rural activity; 	<p>None are applicable.</p>

**Planning and Design Code
Overlay Section
Significant Landscape Protection Overlay**

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
(d) are in the form of high quality nature-based tourist accommodation; (e) are for rainwater storage; (f) are for research or education purposes; or (g) support conservation or the interpretation of the environment or cultural features.	
Native Vegetation	
PO 2.1 Development retains existing native vegetation and supports revegetation with plant species indigenous to the locality.	None are applicable.
Earthworks	
PO 3.1 Excavation and filling of land limited to that associated with: (a) minimising the visual impact of buildings or structures; or (b) construction of water storage facilities.	None are applicable

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Sloping Land Overlay

Assessment Provision (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>Development on sloping land designed to minimise environmental and visual impacts and protect soil stability and water quality.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Access Driveways	
<p>PO 1.1</p> <p>Access driveways are of a suitable gradient to allow safe and convenient access.</p>	None are applicable.
<p>PO 1.2</p> <p>Access driveways and tracks are sited and designed to integrate with the natural topography of the land and minimise the need for earthworks and retaining walls.</p>	None are applicable.
<p>PO 1.3</p> <p>Access driveways and tracks that are accessible and consists of a safe, all-weather trafficable surface.</p>	None are applicable.
Site Drainage	
<p>PO 2.1</p> <p>Development on steep land includes site drainage systems to minimise erosion and avoid adverse impacts on slope stability.</p>	None are applicable.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 2.2</p> <p>Steep sloping sites in un-sewered areas are not developed unless the physical characteristics of the allotments enable the proper siting and operation of an effluent disposal area suitable for the development intended.</p>	<p>None are applicable.</p>
Earthworks	
<p>PO 3.1</p> <p>Earthworks located outside townships and urban areas is limited and only undertaken to reduce the visual impact of buildings and structures and where it preserves the natural form of the land and native vegetation.</p>	<p>DTS/DPF 3.1</p> <p>Development does not involve either:</p> <ul style="list-style-type: none"> (a) excavation exceeding a vertical height of 0.75m; or (b) filling exceeding a vertical height of 0.75m; <p>and, if the development involves both excavation and filling, the total combined excavation and filling does not exceed a vertical height of 1.5m.</p>
Landslip	
<p>PO 4.1</p> <p>Land identified as being at risk from landslip should not be developed.</p>	<p>None are applicable.</p>
<p>PO 4.2</p> <p>Development that does not lead to an increased danger from land surface instability or to the potential of landslip occurring on the site or on surrounding land by:</p> <ul style="list-style-type: none"> (a) incorporating split level designs or other design approaches that minimise cutting into the slope; (b) ensuring that earthworks and heights of faces are minimised; 	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
(c) ensuring that earthworks are supported with engineered retaining walls or are battered to appropriate grades; (d) controlling any erosion that will increase the gradient of the slope and decrease stability; (e) ensuring the siting and operation of an effluent disposal area does not contribute to landslip; (f) providing drainage measures to ensure surface stability is not compromised; and (g) ensuring natural drainage lines are not obstructed.	
PO 4.3 Development on steep slopes that promotes the retention and replanting of vegetation as a means of stabilising and reducing the possibility of surface movement or disturbance.	None are applicable.

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

State Heritage Area Overlay

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Recognition of the major contribution that South Australia's State Heritage Areas make to South Australia's identity and economy through ongoing use, tourism, conservation and adaptive reuse opportunities.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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Compatible Development	
<p>PO 1.1</p> <p>Development maintaining the heritage value of a building or other feature of identified heritage value through respecting the context, by managing the following elements:</p> <ul style="list-style-type: none"> (a) massing and scale; (b) boundary setbacks and setting; (c) proportion and composition of design elements such as rooflines, windows and doors and façade width and modulation; and (d) type, colour and texture of external materials. 	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Demolition	
<p>PO 2.1</p> <p>Buildings and other features of identified heritage value within a State Heritage Area are not demolished, destroyed or removed in total or in part unless either of the following apply:</p> <p>(a) the portion of any building or other feature is determined to not contribute to the heritage value of the State Heritage Area; or</p> <p>(b) the structural condition of the building represents an unacceptable risk to public or private safety and results from actions and unforeseen events beyond the control of the owner and is irredeemably beyond repair.</p>	<p>None are applicable.</p>
Conservation Works (Heritage)	
<p>PO 3.1</p> <p>Conservation works to the exterior of buildings and other features of identified heritage value (including but not limited to wall repointing, timber and stone repairs, plaster repairs, façade cleaning and external paint stripping) that follow best conservation methods relating to materials and building techniques.</p>	<p>None are applicable.</p>
<p>PO 3.2</p> <p>Conservation works to the exterior of buildings and other features of identified heritage value match existing materials to be repaired and utilise traditional work methods typical to the period of the place, such works include:</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
(a) replacement of roof materials, guttering or downpipes with the same or substantially the same materials or items; (b) replacement of timber building elements (structural or decorative) with the same material, dimension and detailing; (c) brick and stone repair/ repointing to match original; and (d) painting of previously painted surfaces in the same colour.	
<p>PO 3.3</p> <p>Original unpainted plaster, brickwork, stonework or other masonry to the exterior of buildings and other features of identified heritage value is retained to conserve features of heritage value.</p>	<p>None are applicable.</p>
Landscape Context (Heritage)	
<p>PO 4.1</p> <p>Individually heritage listed trees, parks, historic gardens and memorial avenues within the State Heritage Area retained unless:</p> (a) trees / plantings are, or have the potential to be, a danger to life or property; or (b) trees / plantings are significantly diseased and their life expectancy is short.	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Additions / Alterations	
<p>PO 5.1</p> <p>Additions and alterations to buildings and other features of identified heritage value contribute to heritage values by utilising one or more of the following design techniques:</p> <ul style="list-style-type: none"> (a) extending into the existing roof space or to the rear of the building; (b) distinguishing between the existing and new portion of the building using compatible design techniques including (but not limited to) recessed facades, separate roof forms and linking structures; (c) providing sufficient setback of built additions and alterations where taller than the existing heritage structure. 	<p>None are applicable.</p>
Ancillary Development	
<p>PO 6.1</p> <p>Ancillary development (including carports, outbuildings and garages) does not diminish the heritage values by (but not limited to) locating the development behind the main face of the principal building(s) and of a scale relative to the heritage structure(s).</p>	<p>None are applicable.</p>
Advertisements	
<p>PO 7.1</p> <p>Advertisements, signage and fixing of advertisements are complementary to heritage values by:</p> <ul style="list-style-type: none"> (a) being placed on discrete elements of buildings, such as parapets and wall panels, below canopies, or within fascias infill end panels and windows, and be in 	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>the form of a separate flat wall sign or a free standing or pylon sign;</p> <p>(b) not concealing or obstructing architectural detailing; and</p> <p>(c) not form a dominant element of the subject building.</p>	
Land Division	
<p>PO 8.1</p> <p>Land division:</p> <p>(a) is compatible with the existing and surrounding pattern of subdivision of the State Heritage Area; and</p> <p>(b) creates allotments of a dimension to accommodate new development that reinforces and is compatible with the heritage values of the State Heritage Area.</p>	<p>None are applicable.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>Except where:</p> <p>(i) the development is to be undertaken in accordance with a Heritage Agreement under the Heritage Places Act 1993; or</p> <p>(ii) the development is, in the opinion of the relevant authority, minor in nature and would not warrant a referral when considering the purpose of the referral</p>	<p>Where not located in the River Murray Flood Plain Overlay – The Minister for the time being administering the <i>Heritage Places Act 1993</i></p> <p>Where located in the River Murray Flood Plain Overlay – The Minister for the time</p>	<p>To provide expert assessment and direction to the relevant authority on the potential impacts of development on State Heritage Areas.</p>

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>the following:</p> <ul style="list-style-type: none"> (a) demolition of external building fabric and other features of identified heritage value within the State Heritage Area; (b) freestanding advertisements, signs and associated structures that are visible from a public street, road or thoroughfare within the State Heritage Area; (c) alterations or additions to buildings and other features of identified heritage value that: <ul style="list-style-type: none"> (i) are visible from a public street, road or thoroughfare within the State Heritage Area; (i) are visually dominant within the State Heritage Area; or (ii) involve substantive physical impact to the fabric of significant buildings; (d) new buildings that: <ul style="list-style-type: none"> (i) are visible from a public street, road or thoroughfare within the State Heritage Area; or (ii) are visually dominant within the State Heritage Area; (e) conservation repair works that are not representative of 'like for like' maintenance; (f) solar panels that are visible from a public street, road or thoroughfare within the State Heritage Area; (g) land division; (h) the removal, alteration or installation of fencing where visible from a public street, road or thoroughfare within the State Heritage Area; or (i) the removal of an individual tree or a tree within a garden or park of identified heritage significance within the State Heritage Area. 	<p>being administering the <i>River Murray Act 2003</i>.</p>	

State Heritage Place Overlay

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Recognition of the major contribution that South Australia's State Heritage Places make to South Australia's identity and economy through ongoing use, conservation and adaptive reuse opportunities.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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Compatible Development	
<p>PO 1.1</p> <p>Development maintaining the heritage value of a State Heritage Place through respecting the context, by managing the following elements:</p> <ul style="list-style-type: none"> (a) massing and scale; (b) boundary setbacks and setting; (c) proportion and composition of design elements such as rooflines, windows and doors and façade width and modulation; and (d) type, colour and texture of external materials. 	None are applicable.
<p>PO 1.2</p> <p>New buildings are not placed or erected between the front street boundary and the façade of a State Heritage Place.</p>	None are applicable.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Demolition	
<p>PO 2.1</p> <p>State Heritage Places are not demolished, destroyed or removed in total or in part unless either of the following apply:</p> <p>(a) the portion of the place to be demolished, destroyed or removed is excluded from the extent of the place that is of heritage value; or</p> <p>(b) the structural condition of the place represents an unacceptable risk to public or private safety and results from actions and unforeseen events beyond the control of the owner and is irredeemably beyond repair.</p>	<p>None are applicable.</p>
Conservation Works (Heritage)	
<p>PO 3.1</p> <p>Conservation works to the exterior and interior of a State Heritage Place (including, but not limited to wall repointing, timber and stone repairs, plaster repairs, façade cleaning and external paint stripping) that follow best conservation methods relating to materials and building techniques.</p>	<p>None are applicable.</p>
<p>PO 3.2</p> <p>Conservation works to the exterior and interior of a State Heritage Place match existing materials to be repaired and utilise traditional work methods typical to the period of the place, such works include:</p> <p>(a) replacement of roof materials, guttering or downpipes with the same or substantially the same materials or items;</p>	<p>None are applicable.</p>

**Planning and Design Code
Overlay Section
State Heritage Place Overlay**

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<ul style="list-style-type: none"> (b) replacement of timber building elements (structural or decorative) with the same material, dimension and detailing; (c) brick and stone repair/ repointing to match original; and (d) painting of previously painted surfaces in the same colour. 	
<p>PO 3.3</p> <p>Original unpainted plaster, brickwork, stonework or other masonry to the exterior of a State Heritage Place is retained to conserve features of heritage value.</p>	<p>None are applicable.</p>
<p>PO 3.4</p> <p>Development of a State Heritage Place that retains those elements contributing to its heritage value, including (but not limited to) the:</p> <ul style="list-style-type: none"> (a) external form, interior spaces and fittings, outbuildings and walls of the State Heritage Place; (b) important vistas and views of the place; (c) setting, spatial character and setbacks; (d) building materials; (e) architectural treatments; and (f) any associated trees and other landscaping elements. 	<p>None are applicable.</p>
<p>Landscape Context (Heritage)</p>	
<p>PO 4.1</p> <p>Individually heritage listed trees, parks, historic gardens and memorial avenues retained unless:</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>(a) trees / plantings are, or have the potential to be, a danger to life or property; or</p> <p>(b) trees / plantings are significantly diseased and their life expectancy is short.</p>	
Additions / Alterations	
<p>PO 5.1</p> <p>Additions and alterations to a State Heritage Place contribute to heritage values by utilising one or more of the following design techniques:</p> <p>(a) extending into the existing roof space or to the rear of the building;</p> <p>(b) distinguishing between existing and new portions of buildings using compatible design techniques including (but not limited to) recessed facades, separate roof forms and linking structures; or</p> <p>(c) providing sufficient setback of built additions and alterations where taller than the existing heritage structure.</p>	None are applicable.
Ancillary Development	
<p>PO 6.1</p> <p>Ancillary development (including carports, outbuildings and garages) does not diminish heritage values by (but not limited to) locating the development behind the main face of the principal building(s) and of a scale relative to the heritage structure(s).</p>	None are applicable.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Advertisements	
<p>PO 7.1</p> <p>Advertisements, signage and fixing of advertisements are complementary to heritage values by:</p> <ul style="list-style-type: none"> (a) being placed on discrete elements of buildings of heritage value, such as parapets and wall panels, below canopies, or within fascias, infill end panels and windows, and be in the form of a separate flat wall sign or a free standing or pylon sign; (b) not concealing or obstructing architectural detailing of heritage value; and (c) not forming a dominant element of the place. 	<p>None are applicable.</p>
Trees, Swimming Pools and Underground Structures	
<p>PO 8.1</p> <p>Trees, swimming pools and underground structures are sited and / or designed to not detrimentally affect the structural condition of heritage places.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Land Division	
<p>PO 9.1</p> <p>Land division:</p> <p>(a) is compatible with the surrounding pattern of subdivision of the State Heritage Place; and</p> <p>(b) creates allotments of a dimension to accommodate new development that reinforces and is compatible with the heritage values of the State Heritage Place.</p>	<p>None are applicable.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>Except where:</p> <p>(i) the development is to be undertaken in accordance with a Heritage Agreement under the <i>Heritage Places Act 1993</i>; or</p> <p>(ii) the development is, in the opinion of the relevant authority, minor in nature and would not warrant a referral when considering the purpose of the referral</p> <p>the following:</p> <p>(a) demolition of internal or external significant building fabric;</p> <p>(b) freestanding advertisements, signs and associated structures that are visible from a public street, road or</p>	<p>Where not located in the River Murray Flood Plain Overlay – The Minister for the time being administering the <i>Heritage Places Act 1993</i></p> <p>Where located in the River Murray Flood Plain Overlay – Minister for the time being administering the <i>River Murray Act 2003</i>.</p>	<p>To provide expert assessment and direction to the relevant authority on the potential impacts of development on State Heritage Places.</p>

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
<p>thoroughfare that abuts the State Heritage Place;</p> <p>(c) alterations or additions to buildings that:</p> <p>(ii) are visible from a public street, road or thoroughfare that abuts the State Heritage Place;</p> <p>(iii) may materially affect the context of a State Heritage Place; or</p> <p>(iv) involve substantive physical impact to the fabric of significant buildings;</p> <p>(d) new buildings that:</p> <p>(i) are visible from a public street, road or thoroughfare that abuts the State Heritage Place; or</p> <p>(ii) may materially affect the context of the State Heritage Place;</p> <p>(e) conservation repair works that are not representative of 'like for like' maintenance;</p> <p>(f) solar panels that are visible from a public street, road or thoroughfare that abuts the State Heritage Place;</p> <p>(g) land division;</p> <p>(h) the removal, alteration or installation of fencing where visible from a public street, road or thoroughfare that abuts the State Heritage Place; or</p> <p>(i) the removal of an individual tree or a tree within a garden or park of identified heritage significance.</p>		

Water Protection Area Overlay

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>Safeguard South Australia’s public water supplies by protecting regionally and locally significant surface and underground water resources from pollution.</p> <p>DO 2</p> <p>Protect surface and underground water resources in ecologically significant Water Protection Areas.</p>

Performance Outcome Policies (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Groundwater	
<p>PO 1.1</p> <p>Groundwater resources are protected from pollution by ensuring development does not:</p> <p>(a) generate and dispose of waste in a manner that would pollute water resources; or</p> <p>(b) involve the storage or disposal of chemicals or hazardous substances in a manner that would pose an unsatisfactory risk to water supplies.</p>	None are applicable.
<p>PO 1.2</p> <p>Groundwater catchment and recharge characteristics are safeguarded by ensuring development:</p> <p>(a) retains and protects existing areas of native vegetation; and</p>	None are applicable.

<p>Performance Outcome Policies (PO)</p>	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>(b) does not inhibit the potential of an aquifer to recharge.</p>	
<p>Farming and Horticulture</p>	
<p>PO 2.1 Farming or horticulture operations only occur where:</p> <ul style="list-style-type: none"> (a) the activity will not result in any increase in salinity levels of groundwater; (b) the land and soil structure is capable of supporting the proposed activity and the likelihood of soil erosion is minimised; and (c) the depth to the water table is greater than 2 metres from the ground surface. 	<p>None are applicable.</p>
<p>Irrigation</p>	
<p>PO 3.1 Irrigated areas sited to ensure they:</p> <ul style="list-style-type: none"> (a) avoid any land prone to water logging or subject to flooding through irrigation; (b) avoid risk of the water table falling or rising significantly as a result of irrigation practices; and (c) minimise the risk of polluting surface and groundwater resources where wastewater is irrigated to land. 	<p>None are applicable.</p>

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
Composting works (excluding a prescribed approved activity) – being a depot, facility or works with the capacity to treat, during a 12 month period more than 200 tonnes of organic waste or matter.	Environment Protection Authority	To provide expert Technical assessment and direction to the Relevant authority on the assessment of the potential harm from pollution and waste aspects arising from activities of environmental significance and other activities that have the potential to cause serious environmental harm.
Wastewater treatment works – being sewage treatment works, a CWMS, winery wastewater treatment works or any other wastewater treatment works with the capacity to treat, during a 12 month period more than 2.5 ML of wastewater.		
Feedlots – being carrying on an operation for holding in confined yard or area and feeding principally by mechanical means or by hand not less than an average of 200 cattle or 1,600 sheep or goats per day over any period of 12 months, but excluding any such operation carried on at an abattoir, slaughterhouse or saleyard or for the purpose only of drought or other emergency feeding.		
Piggeries – being the conduct of a piggery (being premises having confined or roofed structures for keeping pigs) with a capacity of 130 or more standard pig units.		
Dairies – being the carrying on of a dairy with a total processing capacity exceeding more than 100 milking animals at any 1 time		

Water Resources Overlay

Assessment Provisions (AP)

Desired Outcome (DO)

DO 1
 Protection of the quality of South Australia's surface waters.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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Water Catchment	
<p>PO 1.1</p> <p>Development ensures watercourses and their beds, banks, wetlands and floodplains are not damaged or modified and are retained in their natural state, except where modification is required for essential access or maintenance purposes.</p>	<p>None are applicable.</p>
<p>PO 1.2</p> <p>Development does not occur where its proximity to a swamp or wetland will damage or interfere with the hydrology or water regime of the swamp or wetland.</p>	<p>None are applicable.</p>
<p>PO 1.3</p> <p>Wetlands or low-lying areas providing habitat for native flora and fauna are not drained, except temporarily for essential management purposes to enhance environmental values.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.4</p> <p>Along watercourses, areas of remnant native vegetation, or areas prone to erosion, that are capable of natural regeneration are fenced off to limit stock access.</p>	None are applicable.
<p>PO 1.5</p> <p>Development located adjacent to a watercourse, and which increases the amount of surface run-off, includes a suitably sized strip of land on each side of a watercourse that is free from development and revegetated to filter runoff so as to:</p> <ul style="list-style-type: none"> (a) reduce the impacts on native aquatic ecosystems; and (b) minimise soil loss eroding into the watercourse. 	<p>DTS/DPF 1.5</p> <p>The proposed development includes a strip of land not less than 20m wide measured from the top of existing banks on each side of the watercourse that is free from development, livestock use and revegetated with locally indigenous vegetation.</p>
<p>PO 1.6</p> <p>Development resulting in the depositing or placing of an object or solid material in a watercourse or lake only occurs where it involves:</p> <ul style="list-style-type: none"> (a) the construction of an erosion control structure; or (b) devices or structures used to extract or regulate water flowing in a watercourse; or (c) devices used for scientific purposes; or (d) the rehabilitation of watercourses. 	None are applicable.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.7</p> <p>Watercourses, floodplains and wetlands protected and enhanced by retaining and protecting existing native vegetation.</p>	None are applicable.
<p>PO 1.8</p> <p>Watercourses, floodplains and wetlands protected and enhanced by stabilising watercourse banks and reducing sediments and nutrients entering the watercourse.</p>	None are applicable.
<p>PO 1.9</p> <p>Watercourses, floodplains and wetlands protected and enhanced by enabling flows required to meet the needs of the environment.</p>	None are applicable.
<p>PO 1.10</p> <p>Dams, water tanks and diversion drains are appropriately located and constructed to maintain the quality and quantity of flows required to meet the needs of the environment as well as downstream users and land uses.</p>	None are applicable.

Procedural Matters (PM)

Referrals		
Class of Development / Activity	Referral Body	Purpose of Referral
None	None	None

Part 4—General Development Provisions

4.1 Preliminary

- 1 General Development Provisions are functional development policies that are used in association with a particular type of development, and are not mapped.
- 2 General Development Provisions are called up through a zone’s table of requirements for deemed-to-satisfy development or the table of applicable policies for performance assessed development, and apply to the relevant classes of development.
- 3 The General Development Provisions are identified based on thematic groupings by Module in Table G1.

Table G1 — Index of General Development Provisions

General Development Provisions
Advertisements
Animal Keeping and Horse Keeping
Aquaculture
Bulk Handling and Storage Facilities
Clearance from Overhead Powerlines
Design and Siting
Forestry
Infrastructure and Renewable Energy Facilities
Intensive Animal Husbandry and Dairies
Interface between Land Uses
Land Division
Marinas and On-Water Structures
Mineral Extraction
Open Space and Recreation
Residential Liveability (including outdoor open space table)
Site Contamination
Tourism Development
Transport, Access and Parking (including off-street car parking table)
Waste Treatment and Management Facilities
Workers Accommodation and Settlements

Clearance from Overhead Powerlines

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Protection of human health and safety when undertaking development in the vicinity of overhead transmission powerlines.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.1</p> <p>Development involving the construction of a building in proximity to above ground powerlines (excluding any line connecting the power network to the development) that is adequately separated from powerlines to minimise potential hazard to people and property.</p>	<p>DTS/DPF 1.1</p> <p>One of the following is satisfied:</p> <ul style="list-style-type: none"> (a) a declaration is provided by or on behalf of the applicant to the effect that the proposal would not be contrary to the regulations prescribed for the purposes of section 86 of the <i>Electricity Act 1996</i>; or (b) there are no above ground powerlines adjoining the site that is the subject of the proposed development.

Design and Siting

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Development that achieves high design quality by being:</p> <ul style="list-style-type: none"> (a) contextual – by considering, recognising and carefully responding to its surroundings and positively contributing to the character of the immediate area; (b) durable – fit for purpose, adaptable and long lasting; (c) inclusive – by integrating landscape design to optimise pedestrian and cyclist usability, privacy and equitable access, and also promote the provision of quality spaces integrated with the public realm that can be used for access and recreation and help optimise security and safety both internally and within the public realm, for occupants and visitors alike; and (d) sustainable – by integrating sustainable systems into new buildings and the surrounding landscape design to improve environmental performance and minimise energy consumption.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Environmental and Cultural Context	
<p>PO 1.1</p> <p>Development, including land division, is integrated with the natural and cultural landscape through preservation of environmental and cultural features and values of the site and locality.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Built Form Context	
<p>PO 2.1</p> <p>Development incorporates variation in the appearance of the facades of buildings that are repetitive (such as row dwellings) whilst maintaining an overall coherent expression.</p>	None are applicable.
<p>PO 2.2</p> <p>Buildings on corner sites reinforce corners through changes in setback, materials or colour, roof form or height.</p>	None are applicable.
<p>PO 2.3</p> <p>Structures that protrude beyond the roofline minimize the impact on local amenity by:</p> <ul style="list-style-type: none"> (a) integrating roof-top structures to house plant and equipment with the building design in relation to external finishes, form and colours; (b) positioning structures in unobtrusive locations to minimize views from public roads and spaces; and (c) when located on the roof of non-residential development, locating the structures as far as practicable from adjacent sensitive land uses. 	<p>DTS/DPF 2.3</p> <p>Development does not incorporate any structures that protrude beyond the roofline.</p>
<p>PO 2.4</p> <p>Minor buildings, structures and other ancillary forms of development are designed and sited to not detract from the amenity, streetscape and appearance of buildings on the site.</p>	None are applicable.

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General Section
Design and Siting

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 2.5</p> <p>The visual impact of outdoor storage, loading and service areas on the visual amenity of the site is minimised by screening from public view as appropriate, through the use of various design techniques such as fencing, landscaping and built form, taking into account the form of development contemplated in the relevant zone.</p>	<p>None are applicable.</p>
Amenity	
<p>PO 3.1</p> <p>Ground floor building levels designed to provide for opportunities to overlook adjacent public space.</p>	<p>None are applicable.</p>
Public Realm Interface	
<p>PO 4.1</p> <p>Where zero or minor setbacks are desirable, development incorporates shelter over footpaths to enhance the quality of the pedestrian environment.</p>	<p>None are applicable.</p>
<p>PO 4.2</p> <p>Buildings (other than ancillary buildings, group dwellings or buildings on a battle-axe allotment) designed so the main façade faces the primary street frontage of the land on which they are situated.</p>	<p>None are applicable.</p>
<p>PO 4.3</p> <p>Buildings designed with safe, perceptible and direct access from public street frontages and vehicle parking areas.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 4.4</p> <p>Vehicle parking areas and associated driveways landscaped to shade and enhance the appearance of the vehicle parking areas.</p>	<p>None are applicable.</p>
Crime Prevention	
<p>PO 5.1</p> <p>Development designed to maximise surveillance of public spaces by incorporating clear lines of sight, appropriate lighting and the use of visible permeable barriers wherever practicable.</p>	<p>None are applicable.</p>
<p>PO 5.2</p> <p>Development designed to differentiate public, communal and private areas.</p>	<p>None are applicable.</p>
Visual Privacy	
<p>PO 6.1</p> <p>Development mitigates direct overlooking of habitable rooms and private open spaces of dwellings.</p>	<p>DTS/DPF 6.1</p> <p>Upper building level windows and balconies facing side or rear boundaries shared with an allotment put to residential use:</p> <ul style="list-style-type: none"> (a) are permanently obscured to a height of 1.5m above finished floor level that is fixed or not capable of being opened more than 200mm; (b) have sill heights greater than or equal to 1.5m above finished floor level; or (c) incorporate screening to a height of 1.5m above finished floor level.

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General Section
Design and Siting

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Energy Efficient Design	
<p>PO 7.1</p> <p>Buildings sited, oriented and designed to maximise efficient solar access to main activity areas, living areas and open spaces.</p>	None are applicable.
<p>PO 7.2</p> <p>Buildings sited and designed to reduce the need for artificial heating and cooling by providing for passive solar design and natural ventilation.</p>	None are applicable.
Fences, Walls and Retaining Walls	
<p>PO 8.1</p> <p>Fences, walls and retaining walls along side and rear boundaries of sufficient height to maintain privacy and security without unreasonably impacting visual amenity and access to sunlight of adjoining land.</p>	None are applicable.
<p>PO 8.2</p> <p>Landscaping incorporated on the low side of retaining walls that are visible from public roads and public open space to minimise visual impacts.</p>	None are applicable.
Landscaping	
<p>PO 9.1</p> <p>Development incorporates landscaping that enhances the appearance of land and streetscapes.</p>	None are applicable.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 9.2</p> <p>Landscaped permeable open spaces incorporated to:</p> <ul style="list-style-type: none"> (a) minimise heat absorption and reflection; (b) maximise shade and shelter; and (c) maximise stormwater re-use. 	<p>None are applicable.</p>
Waste Storage	
<p>PO 10.1</p> <p>Development incorporates appropriate facilities for on-site storage and collection of refuse (including facilities to enable the separation of recyclable materials).</p>	<p>None are applicable.</p>
Transportable Buildings	
<p>PO 11.1</p> <p>The sub-floor space beneath transportable buildings enclosed to give the appearance of a permanent structure.</p>	<p>None are applicable.</p>
Site Earthworks	
<p>PO 12.1</p> <p>Development, including any associated driveways and access tracks, minimises the need for earthworks to limit disturbance to natural topography.</p>	<p>DTS/DPF 12.1</p> <p>Development does not involve either:</p> <ul style="list-style-type: none"> (a) excavation exceeding a vertical height of 1m; or (b) filling exceeding a vertical height of 1m; <p>and if the development involves both excavation and filling, the total combined excavation and filling not exceeding a vertical height of 2m.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Water Sensitive Design	
<p>PO 13.1</p> <p>Development sited and designed to maintain natural hydrological systems and not adversely affect:</p> <p>(a) the quantity and quality of surface and groundwater;</p> <p>(b) the depth and directional flow of surface and groundwater; or</p> <p>(c) the quality and function of natural springs.</p>	<p>None are applicable.</p>
<p>PO 13.2</p> <p>Development designed to capture and re-use stormwater (where practical) to maximise conservation of water resources.</p>	<p>None are applicable.</p>
<p>PO 13.3</p> <p>Development that includes stormwater management systems that minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system, watercourses or other water bodies.</p>	<p>None are applicable.</p>
Artificial Wetland Systems	
<p>PO 14.1</p> <p>Artificial wetland systems, including associated detention and retention basins, sited and designed to ensure public health and safety is protected including by minimising potential public health risks arising from the breeding of mosquitoes.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 14.2</p> <p>Artificial wetland systems, including associated detention and retention basins, sited and designed to allow sediments to settle prior to discharge into watercourses or the marine environment.</p>	<p>None are applicable.</p>
<p>PO 14.3</p> <p>Artificial wetland systems, including associated detention and retention basins, sited and designed to function as a landscape feature.</p>	<p>None are applicable.</p>
Wash-down and Waste Loading and Unloading	
<p>PO 15.1</p> <p>Areas for activities including loading and unloading, storage of waste refuse bins in commercial and industrial development or wash-down areas used for the cleaning of vehicles, plant or equipment that are:</p> <ul style="list-style-type: none"> (a) designed to contain all wastewater likely to pollute stormwater within a bunded and roofed area to exclude the entry of external surface stormwater run-off; (b) paved with an impervious material to facilitate wastewater collection; (c) of sufficient size to prevent 'splash-out' or 'over-spray' of wastewater from the wash-down area; and (d) designed to drain wastewater to either: <ul style="list-style-type: none"> (i) a treatment device such as a sediment trap and coalescing plate oil separator with subsequent disposal to a sewer, private or Community Wastewater Management Scheme; or 	<p>None are applicable.</p>

<p>Performance Outcome (PO)</p>	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>(ii) a holding tank and its subsequent removal off-site on a regular basis.</p>	
<p>On-site Wastewater Treatment Systems</p>	
<p>PO 16.1</p> <p>Dedicated on-site effluent disposal areas that do not include any areas to be used for, or could be reasonably foreseen to be used for, private open space, driveways or car parking.</p>	<p>DTS/DPF 16.1</p> <p>An effluent disposal drainage area does not:</p> <ul style="list-style-type: none"> (a) encroach within an area used as private open space where this would result in less private open space than that specified in Residential Liveability Table 1 - Private Open Space; (b) use an area also used as a driveway; (c) encroach within an area used for on-site car parking where this would result in less on-site car parking than that specified in Transport, Access and Parking Table 1 - Off-Street Car Parking Requirements

Infrastructure and Renewable Energy Facilities

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>The efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and that suitably manages adverse visual impacts on natural and rural landscapes and residential amenity.</p>

Performance Outcomes (PO)	<ul style="list-style-type: none"> Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
General	
<p>PO 1.1</p> <p>Development located and designed to minimise hazard or nuisance to adjacent development and land uses.</p>	None are applicable.
Visual Amenity	
<p>PO 2.1</p> <p>The visual impact of above ground infrastructure networks and services, renewable energy facilities, energy storage facilities and ancillary development from townships, scenic routes and public roads is minimised and managed by:</p> <ul style="list-style-type: none"> (a) utilising features of the natural landscape to obscure views where practicable; (b) siting development below ridgelines where practicable; (c) avoiding visually sensitive and significant landscapes; 	None are applicable.

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Infrastructure and Renewable Energy Facilities

Performance Outcomes (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>(d) using materials and finishes with low reflectivity and colours that complement the surroundings;</p> <p>(e) using existing vegetation to screen buildings; and</p> <p>(f) incorporating landscaping or landscaped mounding around the perimeter of a site and between adjacent allotments used for residential or other sensitive land uses.</p>	
<p>PO 2.2</p> <p>Substations, pumping stations, battery storage facilities, maintenance sheds and other ancillary structures incorporate vegetated buffers around the perimeter to reduce adverse visual impacts when viewed from adjacent land.</p>	<p>None are applicable.</p>
<p>PO 2.3</p> <p>The visual impact of excavation and earthworks for the installation of storage facilities, pipework, penstock, substations or the like is minimised through the reinstatement of exposed surfaces, revegetation and rehabilitation.</p>	<p>None are applicable.</p>
<p>Rehabilitation</p>	
<p>PO 3.1</p> <p>The progressive or future rehabilitation of disturbed areas ahead of, or upon, decommissioning of areas used for (or have been used for) renewable energy facilities and transmission corridors.</p>	<p>None are applicable.</p>

Performance Outcomes (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Hazard Management	
<p>PO 4.1</p> <p>Infrastructure and renewable energy facilities and ancillary development located and operated to not adversely impact maritime or air transport safety, including the operation of ports, airfields and landing strips.</p>	None are applicable.
<p>PO 4.2</p> <p>Facilities for energy generating, power storage and transmission separated from dwellings, tourist accommodation and frequently visited public places (such as viewing platforms / lookouts) to reduce risks to public safety from fire or equipment malfunction.</p>	None are applicable.
<p>PO 4.3</p> <p>Bushfire hazard risk minimised for renewable energy facilities by providing appropriate access tracks, safety equipment, and water tanks and establishing cleared areas around substations, battery storage and operations compounds.</p>	None are applicable.
Electricity Infrastructure and Battery Storage Facilities	
<p>PO 5.1</p> <p>Electricity infrastructure located to minimise visual impacts through techniques including:</p> <p>(a) siting utilities and services:</p> <ul style="list-style-type: none"> (i) on areas already cleared of native vegetation; or (ii) where there is minimal interference or disturbance to existing native vegetation or biodiversity; and 	None are applicable.

Planning and Design Code
General Section
Infrastructure and Renewable Energy Facilities

Performance Outcomes (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
(b) grouping utility buildings and structures with non-residential development, where practicable.	
<p>PO 5.2</p> <p>Electricity supply (excluding transmission lines) serving new development in urban areas and townships installed underground, excluding lines having a capacity exceeding or equal to 33kV.</p>	None are applicable.
<p>PO 5.3</p> <p>Battery storage facilities co-located with substation infrastructure where practicable to minimise the development footprint and reduce environmental impacts.</p>	None are applicable.
Telecommunication Facilities	
<p>PO 6.1</p> <p>Where technically feasible, telecommunications facilities minimise visual impact through techniques including:</p> <ul style="list-style-type: none"> (a) avoiding proliferation of facilities in a local area; (b) co-locating with other communications facilities; (c) locating antennae as close as practical to the support structure; and (d) screening using landscaping and existing vegetation, particularly for equipment shelters and huts. 	None are applicable.

Performance Outcomes (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 6.2</p> <p>Telecommunications facilities sited and designed to minimise visual impact having regard to:</p> <ul style="list-style-type: none"> (a) the size, scale, context and characteristics of existing structures, heritage, landforms and vegetation so as to be compatible with the local environment; (b) incorporating the facility within an existing structure that may serve another purpose; and (c) using existing buildings and vegetation for screening. 	<p>None are applicable.</p>
Renewable Energy Facilities	
<p>PO 7.1</p> <p>Renewable energy facilities located as close as practicable to existing transmission infrastructure to facilitate connections and minimise environmental impacts as a result of extending transmission infrastructure.</p>	<p>None are applicable.</p>
Renewable Energy Facilities (Wind Farm)	
<p>PO 8.1</p> <p>Visual intrusion of wind turbine generators on the amenity of residential and tourist development reduced through appropriate separation.</p>	<p>DTS/DPF 8.1</p> <p>Wind turbine generators are:</p> <ul style="list-style-type: none"> (a) setback at least 1,000m from the base of the turbine to non-associated (non-stakeholder) dwellings and tourist accommodation; (b) setback at least 2,000m from the base of a turbine to any of the following zones: <ul style="list-style-type: none"> (i) Settlement Zone (ii) Township Zone

Planning and Design Code
General Section
Infrastructure and Renewable Energy Facilities

Performance Outcomes (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 8.2</p> <p>The visual impact of wind turbine generators on natural landscapes managed by:</p> <ul style="list-style-type: none"> (a) designing wind turbine generators to be uniform in colour, size and shape; (b) coordinating blade rotation and direction; and (c) mounting wind turbine generators on tubular towers (as opposed to lattice towers). 	<p>None are applicable.</p>
<p>PO 8.3</p> <p>Wind turbine generators and ancillary development minimise potential for bird and bat strike.</p>	<p>None are applicable.</p>
<p>PO 8.4</p> <p>Wind turbine generators incorporate recognition systems or physical markers to minimise the risk to aircraft operations.</p>	<p>DTS/DPF 8.5</p> <p>No Commonwealth air safety (CASA / ASA) or Defence requirement.</p>
<p>PO 8.5</p> <p>Meteorological masts and guidewires identifiable to aircraft through the use of colour bands, marker balls, high visibility sleeves or flashing strobes.</p>	<p>None are applicable.</p>
<p>Renewable Energy Facilities (Solar Power)</p>	
<p>PO 9.1</p> <p>Solar power facilities generating 5MW or more are not located on land of high environmental, scenic or conservation value.</p>	<p>None are applicable.</p>

Performance Outcomes (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 9.2</p> <p>Solar power facilities that assist with the movement of wildlife by:</p> <ul style="list-style-type: none"> (a) incorporating wildlife corridors and habitat refuges; and (b) avoiding the use of extensive security or perimeter fencing; or (c) incorporating fencing that enables the passage of small animals without unreasonably compromising the security of the facility. 	None are applicable.
Hydropower / Pumped Hydropower Facilities	
<p>PO 10.1</p> <p>Hydropower / pumped hydropower facility storage designed and operated to minimise the risk of storage dam failure.</p>	None are applicable.
<p>PO 10.2</p> <p>Hydropower / pumped hydropower facility storage designed and operated to minimise water loss through increased evaporation or system leakage, with the incorporation of appropriate liners, dam covers, operational measures or detection systems.</p>	None are applicable.
<p>PO 10.3</p> <p>Hydropower / pumped hydropower facilities on existing or former mine sites minimise environmental impacts from site contamination, including from mine operations or water sources subject to such processes, now or in the future.</p>	None are applicable.

Performance Outcomes (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Water Supply	
<p>PO 11.1</p> <p>Development connected to an appropriate water supply to meet the ongoing requirements of the intended use.</p>	<p>DTS/DPF 11.1</p> <p>Development is connected, or will be connected, to a reticulated water scheme or mains water supply with the capacity to meet the on-going requirements of the development.</p>
<p>PO 11.2</p> <p>Dwellings connected to a reticulated water scheme or mains water supply with the capacity to meet the requirements of the intended use. Where this is not available an appropriate rainwater tank or storage system for domestic use is provided.</p>	<p>DTS/DPF 11.2</p> <p>A dwelling is connected, or will be connected, to a reticulated water scheme or mains water supply with the capacity to meet the requirements of the development. Where this is not available it is instead serviced by a rainwater tank or tanks capable of holding at least 50,000 litres of water which is:</p> <ul style="list-style-type: none"> (a) exclusively for domestic use; and (b) connected to the roof drainage system of the dwelling.
Wastewater Services	
<p>PO 12.1</p> <p>Development is connected to an approved common waste water disposal service with the capacity to meet the requirements of the intended use. Where this is not available an appropriate on-site service is provided to meet the on-going requirements of the intended use in accordance with the following:</p> <ul style="list-style-type: none"> (a) it is wholly located and contained within the allotment of the development they will service. (b) in areas where there is a high risk of contamination of surface, ground, or marine water resources from on-site disposal of liquid wastes are to include disposal systems that minimise the risk of pollution to those water resources 	<p>DTS/DPF 12.1</p> <p>Development is connected, or will be connected, to an approved common waste water disposal service with the capacity to meet the requirements of the development. Where this is not available it is instead serviced by an on-site waste water treatment system in accordance with the following:</p> <ul style="list-style-type: none"> (a) is wholly located and contained within the allotment of development it will service; and (b) ensures no part of a septic tank effluent drainage field or any other waste water disposal system is located: <ul style="list-style-type: none"> (i) within 50m of a watercourse, bore, well or dam;

Performance Outcomes (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
(c) ensures septic tank effluent drainage fields and other waste water disposal areas located away from watercourses and flood prone, sloping, saline or poorly drained land to minimise environmental harm.	<ul style="list-style-type: none"> (ii) on any land with a slope greater than 20% (1-in-5), or a depth to bedrock or seasonal or permanent water table less than 1.2m; and (iii) on land that is waterlogged, saline, part of a runway area or likely to be inundated by a 10% AEP flood event.
<p>PO 12.2</p> <p>Effluent drainage fields and other waste water disposal areas maintained to ensure the effective operation of waste systems and minimise risks to human health and environmental harm.</p>	<p>DTS/DPF 12.2</p> <p>Development is not built on, or encroaches within, an area that is, or will be, required for a sewerage system or waste control system.</p>
Temporary Facilities	
<p>PO 13.1</p> <p>In rural and remote locations, development that is likely to generate significant waste material during construction, including packaging waste, makes provision for a temporary on-site waste storage enclosure to minimise the incidence of wind-blown litter.</p>	<p>DTS/DPF 13.1</p> <p>A waste collection and disposal service will be used to dispose of the volume of waste and at a rate it is generated.</p>
<p>PO 13.2</p> <p>Temporary facilities to support the establishment of renewable energy facilities (including borrow pits, concrete batching plants, laydown, storage, access roads and worker amenity areas) are sited and operated to minimise environmental impact.</p>	<p>None are applicable.</p>

Interface between Land Uses

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Development located and designed to mitigate adverse effects on neighbouring and proximate land uses to reduce potential for conflict.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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General Land Use Compatibility

<p>PO 1.1</p> <p>Sensitive land uses designed and sited to protect residents and occupants from adverse impacts generated by lawfully existing land uses and land uses desired in the zone.</p>	<p>None are applicable.</p>
<p>PO 1.2</p> <p>Development adjacent to a site containing an existing sensitive land use or zone primarily intended to accommodate sensitive land uses designed to minimise adverse impacts.</p>	<p>None are applicable.</p>

Hours of Operation

<p>PO 2.1</p> <p>Non-residential development does not unreasonably impact the amenity of existing sensitive land uses or an adjacent zone primarily for sensitive land uses through hours of operation having regard to:</p> <p>(a) the nature of the development;</p> <p>(b) measures to mitigate off-site impacts;</p>	<p>DTS/DPF 2.1</p> <p>Consulting room, office and shop hours of operation are limited to 7am – 9pm Monday to Friday and 8am – 5pm Saturday inclusive.</p>
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<p>Performance Outcome (PO)</p>	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>(c) the extent to which the development is desired in the zone; and</p> <p>(d) measures that might be taken in an adjacent zone primarily for sensitive land uses that mitigate adverse impacts without unreasonably compromising the intended use of that land.</p>	
<p>Overshadowing</p>	
<p>PO 3.1</p> <p>Overshadowing of habitable room windows of adjacent residential land uses mitigated to provide access to direct winter sunlight.</p>	<p>DTS/DPF 3.1</p> <p>North-facing windows of habitable rooms of adjacent residential land uses receive at least 3 hours of direct sunlight over their entire surface between 9.00am and 3.00pm on 21 June.</p>
<p>PO 3.2</p> <p>Overshadowing of the primary area of private open space or communal open space of adjacent residential land uses mitigated to provide access to direct winter sunlight.</p>	<p>DTS/DPF 3.2</p> <p>Development maintains 2 hours direct sunlight between 9.00am and 3.00pm on 21 June to adjacent residential land uses in accordance with the following:</p> <ul style="list-style-type: none"> (a) for ground level private open space, the smaller of the following: <ul style="list-style-type: none"> (i) half of the existing ground level open space; or (ii) 35m² of the existing ground level open space (with at least one of the area's dimensions measuring 2.5m); (b) for ground level communal open space, at least half of the existing ground level open space.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 3.3</p> <p>Development does not unduly reduce the generating capacity of existing rooftop solar energy facilities taking into account:</p> <ul style="list-style-type: none"> (a) the form of development contemplated in the relevant zone; (b) the orientation of the solar energy facilities to operate effectively and efficiently; and (c) the extent to which the solar energy facilities are already overshadowed. 	None are applicable.
<p>PO 3.4</p> <p>Development that incorporates moving parts, including windmills and wind farms, located and operated to not cause unreasonable nuisance to nearby dwellings and tourist accommodation caused by shadow flicker.</p>	None are applicable.
Activities Generating Noise or Vibration	
<p>PO 4.1</p> <p>Development that emits noise (other than music noise) does not unreasonably impact acoustic amenity at the nearest existing sensitive land use.</p>	<p>DTS/DPF 4.1</p> <p>Predicted noise at the nearest existing sensitive land use achieves the relevant Environment Protection (Noise) Policy criteria.</p>
<p>PO 4.2</p> <p>Areas for the on-site manoeuvring of service and delivery vehicles, plant and equipment, outdoor work spaces (and the like) are designed and sited to not unreasonably impact the amenity of adjacent sensitive land uses and zones primarily intended to accommodate sensitive land uses due to noise and vibration by adopting techniques including:</p>	None are applicable.

Planning and Design Code
General Section
Interface between Land Uses

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<ul style="list-style-type: none"> (a) locating openings of buildings and associated services away from the interface with the adjacent sensitive land uses and zones primarily intended to accommodate sensitive land uses; (b) when sited outdoors, locating such areas as far as practicable from adjacent sensitive land uses and zones primarily intended to accommodate sensitive land uses; (c) housing plant and equipment within an enclosed structure or acoustic enclosure; and (d) providing a suitable acoustic barrier between the plant and / or equipment and the adjacent sensitive land use boundary or zone. 	
<p>PO 4.3</p> <p>Fixed plant and equipment in the form of pumps and/or filtration systems for a swimming pool or spa positioned and/or housed to not cause unreasonable noise nuisance to adjacent sensitive land uses.</p>	<p>DTS/DPF 4.3</p> <p>The pump and/or filtration system is ancillary to a dwelling erected on the same site and is:</p> <ul style="list-style-type: none"> (a) enclosed in a solid acoustic structure that is located at least 5m from the nearest habitable room located on an adjoining allotment; or (b) located at least 12m from the nearest habitable room located on an adjoining allotment.
<p>PO 4.4</p> <p>External noise into bedrooms minimised by separating or shielding these rooms from service equipment areas and fixed noise sources located on the same or an adjoining allotment.</p>	<p>DTS/DPF 4.4</p> <p>Adjacent land is used for residential purposes.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code) 				
<p>PO 4.5</p> <p>Outdoor areas associated with licensed premises (such as beer gardens or dining areas) designed and/or sited to not cause unreasonable noise impact on existing adjacent sensitive land uses.</p>	<p>None are applicable.</p>				
<p>PO 4.6</p> <p>Development incorporating music achieves suitable acoustic amenity when measured at the boundary of an adjacent sensitive land use or zone primarily intended to accommodate sensitive land uses.</p>	<p>DTS/DPF 4.6</p> <p>Development incorporating music includes noise attenuation measures that will achieve the following noise levels:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #e6f2ff;"> <th style="text-align: center; padding: 5px;">Assessment location</th> <th style="text-align: center; padding: 5px;">Music noise level</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Externally at the nearest existing noise sensitive location</td> <td style="padding: 5px;">Less than 8dB above the level of background noise (L_{90,15min}) in any octave band of the sound spectrum (LOCT_{10,15} < LOCT_{90,15} + 8dB)</td> </tr> </tbody> </table>	Assessment location	Music noise level	Externally at the nearest existing noise sensitive location	Less than 8dB above the level of background noise (L _{90,15min}) in any octave band of the sound spectrum (LOCT _{10,15} < LOCT _{90,15} + 8dB)
Assessment location	Music noise level				
Externally at the nearest existing noise sensitive location	Less than 8dB above the level of background noise (L _{90,15min}) in any octave band of the sound spectrum (LOCT _{10,15} < LOCT _{90,15} + 8dB)				
Air Quality					
<p>PO 5.1</p> <p>Development with the potential to emit harmful or nuisance-generating air pollution incorporates air pollution control measures to prevent harm to human health or unreasonably impact the amenity of existing sensitive land uses within the locality and zones primarily intended to accommodate sensitive land uses.</p>	<p>None are applicable.</p>				
<p>PO 5.2</p> <p>Development that includes chimneys or exhaust flues (including cafes, restaurants and fast food outlets) is designed to minimise nuisance or adverse health impacts to nearby sensitive land uses by:</p>	<p>None are applicable.</p>				

Planning and Design Code
General Section
Interface between Land Uses

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>(a) incorporating appropriate treatment technology before exhaust emissions are released; and</p> <p>(b) locating and designing chimneys or exhaust flues to maximise dispersion of exhaust emissions taking into account the location of nearby sensitive land uses.</p>	
Light Spill	
<p>PO 6.1</p> <p>External lighting positioned and designed to not cause unreasonable light spill impact on adjacent sensitive land uses or .</p>	None are applicable.
<p>PO 6.2</p> <p>External lighting is not hazardous to motorists and cyclists.</p>	None are applicable.
Solar Reflectivity / Glare	
<p>PO 7.1</p> <p>Development designed and comprised of materials and finishes that do not unreasonably cause a distraction to adjacent road users and pedestrian areas or unreasonably cause heat loading and micro-climatic impacts on adjacent buildings and land uses as a result of reflective solar glare.</p>	None are applicable.
Electrical Interference	
<p>PO 8.1</p> <p>Development in rural and remote areas does not unreasonably diminish or result in the loss of existing communication services due to electrical interference.</p>	<p>DTS/DPF 8.1</p> <p>The building or structure:</p> <p>(a) is no greater than 10m in height, measured from existing ground level; or</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
	(b) is not within a line of sight between an existing fixed transmitter and fixed receiver (antenna) other than where an alternative service is available (via a different fixed transmitter or cable).
Interface with Rural Activities	
<p>PO 9.1</p> <p>Sensitive land uses located and designed to mitigate impacts from lawfully existing horticultural and farming activities including chemical spray drift and noise.</p>	None are applicable.
<p>PO 9.2</p> <p>Sensitive land uses located and designed to mitigate potential impacts from lawfully existing intensive animal husbandry activities and not prejudice the continued operation of these activities.</p>	None are applicable.
<p>PO 9.3</p> <p>Sensitive land uses located and designed to mitigate potential impacts from lawfully existing land-based aquaculture activities and not prejudice the continued operation of these activities.</p>	<p>DTS/DPF 9.3</p> <p>Sensitive land uses are located at least 200m from the boundary of a site used for land-based aquaculture and associated components in other ownership.</p>
<p>PO 9.4</p> <p>Sensitive land uses located and designed to mitigate potential impacts from lawfully existing dairies including associated wastewater lagoons and liquid/solid waste storage and disposal facilities and not prejudice the continued operation of these activities.</p>	<p>DTS/DPF 9.4</p> <p>Sensitive land uses sited at least 500m from the boundary of a site used for a dairy and associated wastewater lagoon(s) and liquid/solid waste storage and disposal facilities in other ownership.</p>

Planning and Design Code
 General Section
Interface between Land Uses

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 9.5</p> <p>Sensitive land uses located and designed to mitigate potential impacts from lawfully existing facilities used for the handling, transportation and storage of bulk commodities (recognising the potential for extended hours of operation) and not prejudice the continued operation of these activities.</p>	<p>DTS/DPF 9.5</p> <p>Sensitive land uses are located at least 300m from the boundary of a site used for the handling, transportation and storage of bulk commodities in other ownership.</p>
Interface with Mines and Quarries (Rural and Remote Areas)	
<p>PO 10.1</p> <p>Sensitive land uses are separated from existing mines to minimise adverse impacts from noise, dust and vibration.</p>	<p>None are applicable.</p>

Mineral Extraction

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Mineral extraction activities developed in a manner that minimises human and environmental impacts.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Land Use and Intensity	
<p>PO 1.1</p> <p>Mineral extraction activities minimise damage to the landscape and provide for the progressive reclamation and betterment of disturbed areas.</p>	None are applicable.
<p>PO 1.2</p> <p>Mineral extraction activities avoid damage to cultural sites or artefacts within the site and adjacent land.</p>	None are applicable.
Water Quality	
<p>PO 2.1</p> <p>Stormwater and/or waste water from mineral extraction activities is diverted into appropriately sized treatment and retention systems to enable reuse on-site.</p>	None are applicable.

Separation Treatments, Buffers and Landscaping	
PO 3.1 Mineral extraction activities minimise adverse impacts upon sensitive land uses through incorporation of separation distances and/or mounding/vegetation.	None are applicable.
PO 3.2 Mineral extraction activities are screened from view from adjacent land by incorporating perimeter landscaping and/or mounding.	None are applicable.

Site Contamination

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>Protection of human health and the environment wherever site contamination has been identified or is suspected to have occurred.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.1</p> <p>Ensure land is suitable for sensitive land use and provides a safe environment.</p>	<p>DTS/DPF 1.1</p> <p>Development where:</p> <ul style="list-style-type: none"> (a) the previous use or activity on the allotment was for residential purposes; or (b) the applicant is able to furnish, or the relevant authority is in possession of, a site contamination audit report under Part 10A of the <i>Environment Protection Act 1993</i> to the effect: <ul style="list-style-type: none"> (i) that site contamination does not exist (or no longer exists) at the allotment; or (ii) that any site contamination at the allotment has been cleared or addressed to the extent necessary to enable the allotment to be suitable for unrestricted residential use; <p>in circumstances where:</p> <ul style="list-style-type: none"> (i) the applicant has indicated that the allotment is, or may have been, subject to site contamination as a result of a previous use of the land or a previous activity on the land or in

<p>Performance Outcome (PO)</p>	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
	<p>the vicinity of the land (other than if the previous use or activity was for residential purposes); or</p> <p>(ii) the relevant authority has reason to believe that the allotment is, or may have been, subject to site contamination as a result of a previous use of the land or a previous activity on the land or in the vicinity of the land (other than if the previous use or activity was for residential purposes); or</p> <p>(c) the allotment was the subject of consent granted under the <i>Development Act 1993</i> or the <i>Planning Development and Infrastructure Act 2016</i> on or after 1 September 2009 in relation the division of the land.</p>

Transport, Access and Parking

Assessment Provisions (AP)

Desired Outcome (DO)
<p>DO 1</p> <p>A comprehensive, integrated and connected transport system that is safe, sustainable, efficient, convenient and accessible to all users.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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Movement Systems	
<p>PO 1.1</p> <p>Development integrated with the existing transport system and designed to minimise its potential impact on the functional performance of the transport system.</p>	None are applicable.
<p>PO 1.2</p> <p>Development is designed to discourage commercial and industrial vehicle movements through residential streets and adjacent other sensitive land uses.</p>	None are applicable.
<p>PO 1.3</p> <p>Industrial, commercial and service vehicle movements, loading areas and designated parking spaces are separated from passenger vehicle car parking areas to ensure efficient and safe movement and minimise potential conflict.</p>	None are applicable.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 1.4</p> <p>Development sited and designed so that loading, unloading and turning of all traffic likely to be generated avoids interrupting the operation of and queuing on public roads and pedestrian paths.</p>	<p>DTS/DPF 1.4</p> <p>All vehicle manoeuvring occurs on-site.</p>
<p>PO 1.5</p> <p>Development designed to ensure vehicle movement between activity or parking areas within the site without the need to use public roads.</p>	<p>DTS/DPF 1.5</p> <p>Vehicle movement within the site can occur without the need to use a public road.</p>
Sightlines	
<p>PO 2.1</p> <p>Maintenance or enhancement of sightlines at intersections, pedestrian and cycle crossings, rail crossings and other crossovers to allotments for motorists, cyclists and pedestrians to ensure safety for all road users and pedestrians.</p>	<p>None are applicable.</p>
<p>PO 2.2</p> <p>Walls, fencing and landscaping adjacent to driveways and corner sites are designed to provide adequate sightlines between vehicles and pedestrians.</p>	<p>None are applicable.</p>
Vehicle Access	
<p>PO 3.1</p> <p>Safe and convenient access that ensures vehicles can enter and exit a site safely, and minimises impact on or interruption to the operation of public roads.</p>	<p>DTS/DPF 3.1</p> <p>Access is:</p> <p>(a) provided via a lawfully existing or authorised driveway or access point or an access point for which consent has been granted as part of an application for the division of land;</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
	<ul style="list-style-type: none"> (b) via a kerb that is designed to allow a vehicle to roll over it; (c) not located within 6m of an intersection of 2 or more roads or a pedestrian actuated crossing; and (d) does not involve a vehicular access ramp.
<p>PO 3.2</p> <p>Access points sited and designed to accommodate the type and volume of traffic likely to be generated by the development or land use.</p>	<p>None are applicable.</p>
<p>PO 3.3</p> <p>Access points sited and designed to minimise any adverse impacts on neighbouring properties.</p>	<p>None are applicable.</p>
<p>PO 3.4</p> <p>Access points located so as not to interfere with mature street trees, existing street furniture (including directional signs, lighting, seating and weather shelters) or infrastructure services as far as practicable, to maintain the appearance of the streetscape, preserve local amenity and minimise disruption to utility infrastructure assets.</p>	<p>DTS/DPF 3.4</p> <p>The access point does not involve the removal or relocation of street trees (any tree above 3m in height), street furniture or utility infrastructure services.</p>
<p>PO 3.5</p> <p>Driveways and access points are separated and minimised in number to optimise the provision of on-street visitor parking (where on-street parking is appropriate).</p>	<p>DTS/DPF 3.5</p> <p>Driveways and access points:</p> <ul style="list-style-type: none"> (a) for sites with a frontage to a public road of 20m or less, one access point no greater than: <ul style="list-style-type: none"> (i) 3.5m in width is provided where the driveway or access point is not shared;

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
	<ul style="list-style-type: none"> (ii) 6.0m in width is provided where the driveway or access point is shared; (b) for sites with a frontage to a public road greater than 20m: <ul style="list-style-type: none"> (i) a single access point no greater than 6m in width is provided; or (ii) not more than two access points with a width of 3.5m each are provided.
<p>PO 3.7</p> <p>Access points appropriately separated from level crossings to avoid interference and ensure their safe ongoing operation.</p>	None are applicable.
<p>PO 3.8</p> <p>Driveways, access points, access tracks and parking areas are designed and constructed to allow adequate movement and manoeuvrability having regard to the types of vehicles that are reasonably anticipated.</p>	None are applicable
Access for People with Disabilities	
<p>PO 4.1</p> <p>Development sited and designed to provide safe, dignified and convenient access for people with a disability.</p>	None are applicable.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Vehicle Parking Rates	
<p>PO 5.1</p> <p>Provide sufficient on-site vehicle parking and specifically marked accessible car parking places to meet the needs of the development or land use having regard to factors that may enable a reduced on-site rate such as:</p> <ul style="list-style-type: none"> (a) availability of on-street car parking; (b) shared usage of other parking areas; or (c) in relation to a mixed-use development, where the hours of operation of commercial activities complement the residential use of the site the provision of vehicle parking may be shared. 	<p>DTS/DPF 5.1</p> <p>On-site car parking provided at the rate set out in Transport, Access and Parking Table 1 – Off-Street Car Parking Requirements.</p>
Vehicle Parking Areas	
<p>PO 6.1</p> <p>Vehicle parking areas appropriately located, designed and constructed to minimise impacts on adjacent sensitive land uses through measures such as ensuring they are attractively developed and landscaped, screen fenced, placing and designing lighting to minimise light spill, and the like.</p>	<p>None are applicable.</p>
<p>PO 6.2</p> <p>Vehicle parking areas designed to provide opportunity for integration and shared-use of adjacent car parking areas to reduce the total extent of vehicle parking areas and access points.</p>	<p>None are applicable.</p>
<p>PO 6.3</p> <p>Pedestrian linkages between parking areas and the development are provided and are safe and convenient.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed-to-Satisfy (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 6.4</p> <p>Vehicle parking areas that are likely to be used during non-daylight hours are provided with floodlit entry and exit points to ensure clear visibility to users.</p>	None are applicable.
<p>PO 6.5</p> <p>Vehicle parking areas landscaped to provide shade, reduce heat absorption and absorb stormwater.</p>	None are applicable.
<p>PO 6.6</p> <p>Loading areas, designated parking spaces and manoeuvring areas for service vehicles provided within the boundary of the site.</p>	<p>DTS/DPF 6.7</p> <p>Loading areas, designated parking spaces and manoeuvring areas for service vehicles are wholly located within the site.</p>
<p>PO 6.7</p> <p>On-site visitor parking spaces are sited and designed to be accessible to all visitors at all times.</p>	None are applicable.

Transport, Access and Parking Table 1 – Off-Street Car Parking Requirements

Class of Development	Car Parking Rate
Dwelling	<p>For a 1 bedroom dwelling – a minimum of 1 covered car parking space is provided per dwelling.</p> <p>For a 2 or more bedroom dwelling – a minimum of 2 parking spaces per dwelling of which at least 1 is covered.</p>
Consulting room Office	4 spaces per 100m ² of gross leasable floor area.
Caravan and tourist park Residential park	<p>Parks with 100 sites or less: 1 space per 10 sites to be used for accommodation.</p> <p>Parks with more than 100 sites: 1 space per 15 sites used for accommodation.</p>
Shop	6 spaces per 100m ² of gross leasable floor area.
Tourist accommodation	1 space per accommodation unit / guest room.

Waste Treatment and Management Facilities

Assessment Provisions (AP)

Desired Outcomes (DO)
<p>DO 1</p> <p>Waste treatment and management facilities (including storage and disposal) developed in a manner to mitigate human and environmental impacts.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
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Siting

<p>PO 1.1</p> <p>Waste treatment and management facilities incorporate separation distances and attenuation measures within the site between the waste operations area(s) (including all closed, operating and future cells) and sensitive land uses and sensitive environmental features to mitigate off-site impacts from noise, air and dust emissions.</p>	None are applicable.
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Soil and Water Protection

<p>PO 2.1</p> <p>Soil, groundwater and surface water protected from contamination through measures such as:</p> <ul style="list-style-type: none"> (a) containing potential groundwater and surface water contaminants within the waste operations area; (b) diverting clean stormwater away from the waste and potentially contaminated areas; and/or 	None are applicable.
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Planning and Design Code
General Section
Waste Treatment and Management Facilities

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
(c) providing a leachate barrier between the operational areas and underlying soil and groundwater.	
<p>PO 2.2</p> <p>To minimise environmental harm and adverse effects on water resources, wastewater lagoons (including artificial systems for this purpose) are appropriately setback from a watercourse.</p>	<p>DTS/DPF 2.2</p> <p>Development setback at least 50m from a watercourse.</p>
<p>PO 2.3</p> <p>To minimise environmental harm and adverse impacts on water resources, winery waste management systems (including wastewater irrigation) are appropriately setback from a watercourse or domestic or stock water bore.</p>	<p>DTS/DPF 2.3</p> <p>Development setback at least 50m from a bore used for domestic or stock watering purposes or a watercourse.</p>
<p>PO 2.4</p> <p>To minimise environment harm and adverse impacts on water resources, the waste operations area of a landfill or organic waste processing facility are appropriately setback from the nearest watercourse.</p>	<p>DTS/DPF 2.4</p> <p>Development setback at least 100m from a watercourse.</p>
<p>Amenity</p>	
<p>PO 3.1</p> <p>Waste treatment and management facilities are screened, located and designed to minimise adverse visual impacts on surrounding areas.</p>	<p>None are applicable.</p>
<p>PO 3.2</p> <p>Access routes to waste treatment and management facilities via residential streets is avoided.</p>	<p>None are applicable.</p>

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>PO 3.3</p> <p>Litter control measures minimise the incidence of windblown litter.</p>	None are applicable.
<p>PO 3.4</p> <p>Waste treatment and management facilities are designed to minimise adverse impacts on both the site and surrounding areas from weed and vermin infestation.</p>	None are applicable.
Access	
<p>PO 4.1</p> <p>Traffic circulation movements within any waste treatment or management site designed to enable all vehicles expected to use the facility to enter and exit the site in a forward direction.</p>	None are applicable.
<p>PO 4.2</p> <p>Suitable access for emergency vehicles provided to and within waste treatment or management sites.</p>	None are applicable.
Fencing and Security	
<p>PO 5.1</p> <p>Security fencing provided around waste treatment and management facilities to prevent unauthorised access to operations and potential hazard to the public.</p>	<p>DTS/DPF 5.1</p> <p>Chain wire mesh or pre-coated painted metal fencing not less than 2m in height erected to the perimeter of the waste treatment or waste management facility site.</p>

Planning and Design Code
General Section
Waste Treatment and Management Facilities

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
Landfill	
<p>PO 6.1</p> <p>Landfill gas emissions managed in an environmentally acceptable manner.</p>	None are applicable.
<p>PO 6.2</p> <p>Landfill facilities separated from areas of environmental significance or land used for public recreation and enjoyment.</p>	<p>DTS/DPF 6.2</p> <p>Landfill facilities sited at least 250m from a public open space reserve, forest reserve, national park or conservation zone.</p>
<p>PO 6.3</p> <p>Landfill facilities located on land that is not subject to land slip.</p>	None are applicable.
Organic Waste Processing Facilities	
<p>PO 7.1</p> <p>Organic waste processing facilities located on land that is not subject to land slip.</p>	None are applicable.
<p>PO 7.2</p> <p>Organic waste processing facilities sited at least 500m from the coastal high water mark</p>	None are applicable.
<p>PO 7.3</p> <p>Organic waste processing facilities not located on land where the interface of the engineered liner and natural soils would be within any of the following:</p> <p>(a) 15m of unconfined aquifers bearing groundwater with less than 3,000mg per litre total dissolved salts; or</p>	None are applicable.

Performance Outcome (PO)	<ul style="list-style-type: none"> • Deemed to Satisfy Criteria (DTS) (required for development to be classified as Deemed-to-Satisfy) • Designated Performance Feature (DPF) (used for development to be assessed on its merits against the applicable policies of the Planning and Design Code)
<p>(b) 5m of groundwater with a water quality of 3,000mg to 12,000mg per litre total dissolved salts; or</p> <p>(c) 2m of groundwater with a water quality exceeding 12,000mg per litre total dissolved salts; and</p>	
<p>PO 7.4</p> <p>Organic waste processing facilities sited away from areas of environmental significance or used for public recreation and enjoyment.</p>	<p>DTS/DPF 7.4</p> <p>Organic waste processing facilities are sited at least 250m from a public open space reserve, forest reserve, national park or conservation zone.</p>
<p>PO 7.5</p> <p>Organic waste processing facilities located on land that is not subject to land slip.</p>	<p>None are applicable.</p>
Major Wastewater Treatment Facilities	
<p>PO 7.1</p> <p>Major wastewater treatment and disposal systems, including lagoons, separated from sensitive areas.</p>	<p>None are applicable.</p>
<p>PO 7.2</p> <p>Major wastewater treatment and disposal systems, including lagoons, designed to minimise potential adverse odour impacts on sensitive land uses.</p>	<p>None are applicable.</p>
<p>PO 7.3</p> <p>Artificial wetland systems for the storage of treated wastewater designed and sited to minimise potential public health risks arising from the breeding of mosquitoes.</p>	<p>None are applicable.</p>

Part 5—Maps / Spatial Information

Mapping and spatial information contained in this section identifies the spatial boundaries of Zones, Subzones and Overlays in relation to the parts of the State to which the Planning and Design Code applies.

Part 6—Land Use Definitions

Land Use Terms

The following table lists terms which may be used in this Planning and Design Code in relation to the use of land.

Meaning of Terms

A term listed in Column A has the meaning set out beside that term in Column B.

Inclusions and Exclusions

Land uses and activities set out in Column C are to be taken as being included in the meaning of the land use term set out in Column A.

Land uses and activities set out in Column D are to be taken as being excluded from the meaning of the land use term set out in Column A.

In the event of any inconsistency Column D prevails over Column C.

Ancillary and Subordinate

Unless stated to the contrary, a term set out in the following table which purports to define a form of land use will be taken to include a use which is ancillary and subordinate to that defined use.

No Definition

A term not defined in the following table will have its ordinary meaning unless the term is defined in the *Planning, Development and Infrastructure Act 2016* or its Regulations (or any relevant practice direction of practice guideline issued by the State Planning Commission) in which case that meaning will apply.

Land Use Definitions Table LUD

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
Agricultural building	Means a building used wholly or partly for purposes associated with farming, commercial forestry or horticulture, or to support the operations of that use, but is not used wholly or partly for the processing or packaging of commodities.	Farm shed; Horticultural shed; Hay shed; Implement shed; Pump shed.	Dairy; Dwelling; Industry; Intensive animal husbandry; Office; Outbuilding; Shop.
Animal keeping	Means the boarding (short or long term), keeping, breeding or training of animals, except horses and/or commercially kept livestock.	Dog kennelling Catteries	Aquaculture; Farming; Horse keeping; Intensive animal husbandry; Low intensity animal husbandry.
Aquaculture	Has the same meaning as in the <i>Aquaculture Act 2001</i> .		Intensive animal husbandry.
Bulky goods outlet	Means premises used primarily for the sale, rental, display or offer by retail of goods, other than foodstuffs, clothing, footwear or personal effects goods, unless the sale, rental, display or offer by retail of the foodstuffs, clothing, footwear or personal		

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
	<p>effects goods is incidental to the sale, rental, display or offer by retail of other goods.</p> <p>Examples— The following are examples of goods that may be available or on display at bulky goods outlets or retail showrooms:</p> <ul style="list-style-type: none"> (a) automotive parts and accessories; (b) furniture; (c) floor coverings; (d) window coverings; (e) appliances or electronic equipment; (f) home entertainment goods; (g) lighting and electric light fittings; (h) curtains and fabric; (i) bedding and manchester; (j) party supplies; (k) animal and pet supplies; (l) camping and outdoor recreation supplies; (m) hardware; (n) garden plants (primarily in an indoor setting); (o) office equipment and stationery supplies; (p) baby equipment and accessories; 		

Planning and Design Code
Land Use Definitions Table LUD

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
	(q) sporting, fitness and recreational equipment and accessories; (r) homewares; (s) children's play equipment.		
Commercial forestry	Means the practice of planting, managing, and caring for forests that are to be harvested (or intended to be harvested) or used for commercial purposes (including through the commercial exploitation of the carbon absorption capacity of the forest).		
Consulting room	Means a building or part of a building (not being a hospital) used in the practice of a profession by a medical, veterinary or dental practitioner, or a practitioner in any curative science, in the provision of medical services, mental, moral or family guidance, but does not involve any overnight accommodation other than for animals that are recovering from treatment or in for observation as part of a veterinary practice.		
Cropping	Means propagating, cultivating and/or harvesting of grains, cereals, oilseeds, lupins, legumes, hops, hemp, hay, lucerne or other similar plants or plant products for commercial production.		Commercial forestry; Horticulture; Mushroom production.
Dairy	Means a building or part of a building used for all or any of the operations of commercial milk production (whether mechanical or		

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
	otherwise) and includes a milking shed, milk room, wash room or engine room.		
Detached dwelling	Means a detached building comprising 1 dwelling on a site that is held exclusively with that dwelling and has a frontage to a public road, or to a road proposed in a plan of land division that is the subject of a current development authorisation.		
Dwelling	Means a building or part of a building used as a self-contained residence.		
Educational establishment	Means a primary school, secondary school, reception to year 12 school, college, university or technical institute, and includes an associated pre-school or institution for the care and maintenance of children.		
Electricity substation	Means— (a) works for the conversion, transformation or control of electricity by 1 or more transformers, or by any switchgear or other equipment; or (b) any equipment, building, structure or other works ancillary to or associated with works referred to in paragraph (a), other than any such works— (i) that are mounted on a pole; or		

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Land Use Definitions Table LUD

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
	<ul style="list-style-type: none"> (ii) that are wholly enclosed in a weather-proof enclosure not exceeding 8.5m³; or (iii) that are incidental to any lawful use of the land which the works are situated. 		
Farming	Means cropping, grazing or low intensity animal husbandry.	Cropping; Grazing; Low intensity animal husbandry.	Animal keeping; Commercial forestry; Horse keeping; Horticulture; Intensive animal husbandry; Mushroom production.
Fuel depot	Means land used primarily for the storage of petrol, gas, oils or other petroleum products and within or upon which no retail trade is conducted.		
General industry	Means any industry other than a light industry or special industry.		
Group dwelling	Means 1 of a group of 2 or more detached buildings, each of which is used as a dwelling and 1 or more of which has a site without a frontage to a public road or to a road proposed in a plan of land division that is the subject of a current development authorisation.		

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
Horse keeping	Means the keeping or husbandry of horses where more than 1 horse is kept per 3ha of land used for such purposes.		
Horticulture	Means the use of land for market gardening, viticulture, floriculture, orchards, wholesale plant nurseries or commercial turf growing.		Commercial forestry; Mushroom production.
Hotel	Means premises licensed, or proposed to be licensed, as a hotel under the <i>Liquor Licensing Act 1997</i> .		Motel.
Indoor recreation facility	Means a building designed or adapted primarily for recreation or fitness pursuits.	Bowling alley; Squash courts; Fitness centre; Gymnasium; Pilates Studio; Yoga Studio; Dance studio; Indoor swimming centre; Indoor trampoline centre; Indoor rock climbing centre; Indoor children's play centre.	

Planning and Design Code
Land Use Definitions Table LUD

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
Industry	<p>Means the carrying on, in the course of a trade or business, of any process (other than a process in the course of farming or mining) for, or incidental to:</p> <ul style="list-style-type: none"> (a) the making of any article, ship or vessel, or of part of any article, ship or vessel; or (b) the altering, repairing, ornamenting, finishing, assembling, cleaning, washing, packing, bottling, canning or adapting for sale, or the breaking up or demolition, of any article, ship or vessel; or (c) the getting, dressing or treatment of materials <p>The use may include:</p> <ul style="list-style-type: none"> (d) selling by wholesale of goods manufactured on site (e) selling by retail of goods manufactured on site provided the total floor area occupied for such sale does not exceed 250 square metres <p>(and <i>industrial</i> will be construed accordingly).</p>	<p>General industry; Light industry; Special industry.</p>	
Intensive animal husbandry	<p>Means the commercial production of animals or animal products where the animals are kept in enclosures or other confinement and their main food source is introduced from</p>	<p>Broiler shed; Feedlot; Poultry hatchery;</p>	<p>Animal keeping; Apiculture; Aquaculture;</p>

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
	outside the enclosures or area of confinement in which they are kept.	Piggery; Poultry battery.	Horse keeping; Low intensity animal husbandry; Stock sales yard.
Light industry	<p>Means an industry where the process carried on, the materials and machinery used, the transport of materials, goods or commodities to and from the land on or in which (wholly or in part) the industry is conducted and the scale of the industry does not:</p> <p>(a) detrimentally affect the amenity of the locality or the amenity within the vicinity of the locality by reason of the establishment or the bulk of any building or structure, the emission of noise, vibration, smell, fumes, smoke, vapour, steam, soot, ash, dust, waste water, waste products, grit, oil, spilled light, or otherwise howsoever; or</p> <p>(b) directly or indirectly, cause dangerous or congested traffic conditions in any nearby road.</p>		
Low intensity animal husbandry	Means the commercial production of animals or animal products (eg meat, wool) on either native or improved pastures or vegetation where the animal's main food source is obtained by grazing or foraging.	Grazing;	Animal keeping; Aquaculture; Horse keeping; Intensive animal husbandry.

Planning and Design Code
Land Use Definitions Table LUD

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
Motor repair station	Means any land or building used for carrying out repairs (other than panel beating or spray painting) to motor vehicles and / or farm machinery.		
Mushroom production	Means the commercial production of mushrooms or any other type of fungi.		
Office	Means any building used for administration or the practice of a profession.		Consulting room.
Pre-school	Means a place primarily for the care or instruction of children of less than primary school age not resident on the site.	Child care centre; Early learning centre; Kindergarten; Nursery.	
Private bushfire shelter	Means a building, associated with a Class 1a building under the Building Code, that may as a last resort provide shelter for occupants from the immediate life threatening effects of a bushfire event.		Outbuilding
Protective tree netting structure	Means netting and any associated structure: (a) that is designed to protect trees or plants grown for the purpose of commercial horticulture; and (b) that consists of a netting canopy attached to a structure (such as poles and cables).		

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
Public service depot	Means land used for storage and operations connected with the provision of public services (including gas, electricity, water supply, sewerage, drainage, roadworks or telecommunication services) by a body responsible for the provision of those services.		
Recreation area	Means any park, garden, children's playground or sports ground that is under the care, control and management of the Crown, or a council, and is open to the public without payment of a charge.	Outdoor public sports courts; Public ovals and fields.	Golf course.
Renewable energy facility	Means land and/or water used to generate electricity from a renewable source such as wind, solar, tidal, hydropower, biomass and/or geothermal. This use may also include: (a) any associated facility for the storage and/or transmission of the generated electricity; (b) any building or structure used in connection with the generation of electricity. The use does not include a renewable energy facility principally used to supply and/or store electricity to an existing use of land that has a generating capacity less than 5MW (e.g.,	Battery storage facility; Hydropower or pumped hydropower facility; Solar power facility; Wave power generator; Wind farm.	

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Land Use Definitions Table LUD

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
	domestic solar panels, domestic wind generators, domestic battery storage).		
Restaurant	Means land used primarily for the consumption of meals on the site.		
Retail fuel outlet	<p>Means land used for:</p> <ul style="list-style-type: none"> (a) the fuelling of motor vehicles involving the sale by retail of petrol, oil, liquid petroleum gas, automotive distillate and any other fuels; and (b) the sale by retail of food, drinks and other convenience goods for consumption on or off the land; and <p>both are operated as and constitute one integrated facility where on-site facilities, systems and processes, car parking and access and egress are all shared.</p> <p>The use may also include one or more of the following secondary activities:</p> <ul style="list-style-type: none"> (c) the washing and cleaning of motor vehicles; (d) the washing of other equipment or things including dogs and other pets; (e) the provision (on a paid or free basis) of facilities for charging electric vehicles; (f) the hiring of trailers; 		<p>Fuel depot; Motor repair station.</p>

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
	<ul style="list-style-type: none"> (g) selling of motor vehicle accessories and/or parts; and (h) the installation of motor vehicle accessories and/or parts. 		
Row dwelling	<p>Means a dwelling:</p> <ul style="list-style-type: none"> (a) occupying a site that is held exclusively with that dwelling and has a frontage to a public road or to a road proposed in a plan of land division that is the subject of a current development authorisation; and (b) comprising 1 of 3 or more dwellings erected side by side, joined together and forming, by themselves, a single building. 		
Semi-detached dwelling	<p>Means a dwelling:</p> <ul style="list-style-type: none"> (a) occupying a site that is held exclusively with that dwelling and has a frontage to a public road or to a road proposed in a plan of land division that is the subject of a current planning authorisation; and (b) comprising 1 of 2 dwellings erected side by side, joined together and forming, by themselves, a single building. 		
Service trade premises	Means premises used primarily for the sale, rental or display of:	Motor vehicle showroom; Used car yard.	Bulky goods outlet.

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Land Use Definitions Table LUD

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
	<ul style="list-style-type: none"> (a) basic plant, equipment or machinery used in agriculture or industry; or (b) boats; or (c) caravans and recreational vehicles (RVs); or (d) domestic garages; or (e) sheds; or (f) outbuildings; or (g) motor vehicles; or (h) marquees; or (i) trailers; or (j) swimming pools, equipment and accessories; or (k) building materials in bulk supply; or (l) landscaping materials; or (m) garden plants (primarily in an outdoor setting), or (n) agricultural supplies such as agricultural chemicals, fertilisers, seed and animal feed; or (o) rainwater tanks and irrigation supplies; or similar articles or merchandise. <p>The use may also include the servicing and repair of any of the listed items (but not vehicle panel beating or spray painting).</p>		

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
Shop	Means premises used primarily for the sale by retail, rental or display of goods, foodstuffs, merchandise or materials.	Bulky goods outlet; Personal services establishment; Restaurant.	Hotel; Motor repair station; Retail fuel outlet; Service trade premises; Wholesale plant nursery.
Special industry	Means an industry where the processes carried on, the methods of manufacture adopted or the particular materials or goods used, produced or stored, are likely: <ul style="list-style-type: none"> (a) to cause or create dust, fumes, vapours, smells or gases; or (b) to discharge foul liquid or blood or other substance or impurities liable to become foul, and thereby: (c) to endanger, injure or detrimentally affect the life, health or property of any person (other than any person employed or engaged in the industry); or (d) to produce conditions which are, or may become, offensive or repugnant to the occupiers or users of land in the locality of or within the vicinity of the locality of the land on which (whether wholly or partly) the industry is conducted. 		

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Land Use Definitions Table LUD

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
Stock slaughter works	Means a building or part of a building, or land, used primarily for slaughter of stock (including camels, goats and deer) or poultry, This use may also include: (a) the keeping of animals prior to slaughter on site (b) processing of animal products for human or animal consumption.		Retail butcher.
Stock sales yard	Means land or premises used for the commercial conduct of buying and selling of livestock.		Stock slaughter works.
Store	Means a building or enclosed land used for the storage of goods, and within or upon which no trade (whether wholesale or retail) or industry is carried on.		Junk yard; Outbuilding; Public service depot.
Telecommunications facility	Means a facility within the meaning of the <i>Telecommunications Act 1997</i> of the Commonwealth.		
Warehouse	Means a building or enclosed land used for the storage of goods and the carrying out of commercial transactions involving the sale of such goods, but does not include any land or building used for sale by retail.		Store.
Wind farm	Means land used to generate electricity from wind force with wind turbine generators.		

Land Use Term (Column A)	Definition (Column B)	Includes (Column C)	Excludes (Column D)
	<p>This use may also include:</p> <ul style="list-style-type: none"> (a) any associated facility for the storage and/or transmission of the generated electricity; (b) any building or structure used in connection with the generation of electricity including a wind turbine, substation, maintenance shed, access road or wind monitoring mast. <p>The use does not include a wind farm principally used to supply and/or store electricity to an existing use of land (e.g., domestic wind generator).</p>		

Part 7—Administrative Definitions

The following table lists terms which may be used to assist with the interpretation of policy used in the Planning and Design Code.


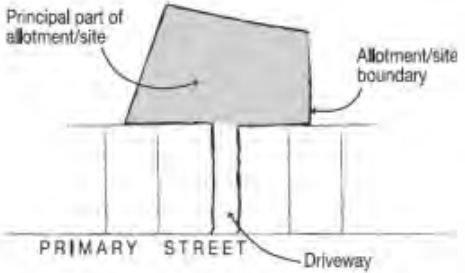
Meaning of Terms

A term listed in Column A has the meaning set out beside that term in Column B. Column C contains, where applicable, illustrations to assist with the interpretation of the meaning provided in Column B.

No Definition

A term not defined in the following table will have its ordinary meaning unless the term is defined in the *Planning, Development and Infrastructure Act 2016* or its Regulations (or any relevant practice direction of practice guideline issued by the State Planning Commission) in which case that meaning will apply.

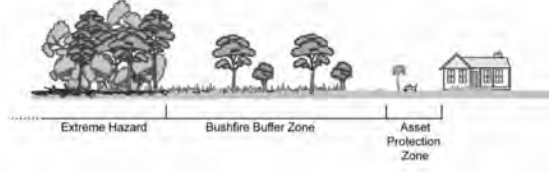
Administrative Definitions Table AD

Term (Column A)	Definition (Column B)	Illustrations (Column C)
AEP	Means annual exceedance probability	
AHD	Means Australian height datum.	
Asset protection zone	<p>In relation to bushfire protection, means an area clear of vegetation that is maintained to minimise the spread of fire between areas of hazardous vegetation and habitable buildings.</p> <p>Asset protection zones may incorporate features such as driveways, vegetable gardens or landscaped gardens incorporating deciduous trees and fire retardant plant species.</p>	
Battle-axe allotment	<p>Means an allotment or site that comprises—</p> <p>(a) a driveway or 'handle' (and any related open space) that leads back from a road to the balance of the allotment or site; and</p> <p>(b) a balance of the allotment or site that is the principal part of the allotment or site and that does not have a boundary with a road.</p>	 <p><i>Note: Battle-axe allotments are often referred to as 'hammerhead' or 'flagpole' allotments.</i></p>
Building height	Means the maximum vertical distance between the lower of the natural or finished ground level at any point of any part of a building and the finished roof height at its highest point, ignoring any antenna, aerial, chimney, flagpole or the like.	

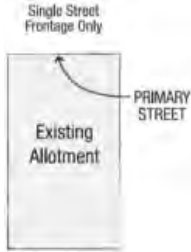
Planning and Design Code
Administrative Definitions Table AD

Term (Column A)	Definition (Column B)	Illustrations (Column C)
Building level	Means that portion of a building which is situated between the top of any floor and the top of the next floor above it, and if there is no floor above it, that portion between the top of the floor and the ceiling above it. It does not include a floor located 1.5 metres below finished ground level or any mezzanine.	
Building line	In relation to a building on a site, means a line drawn parallel to the wall on the building closest to the boundary of the site that faces the primary street (and any existing projection from the building such as a carport, verandah, porch or bay window is not to be taken to form part of the building for the purposes of determining the relevant wall of the building).	<p>The illustrations consist of two diagrams. The top diagram shows a building with a porch, verandah, or bay window extending towards a primary street. A dashed line labeled 'BUILDING LINE' is drawn parallel to the main wall of the building, excluding the porch area. The bottom diagram shows a similar building but with a different porch configuration, again showing the 'BUILDING LINE' as a dashed line parallel to the main wall. Labels include 'Existing Dwelling', 'Porch, verandah bay window or similar', 'BUILDING LINE', 'Site Boundary', and 'PRIMARY STREET'.</p>

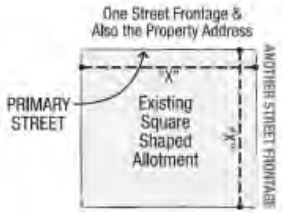
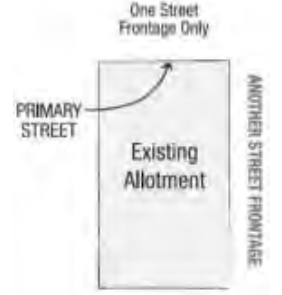
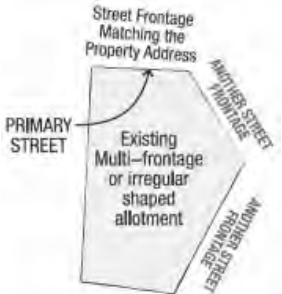
**Planning and Design Code
Administrative Definitions Table AD**

Term (Column A)	Definition (Column B)	Illustrations (Column C)
Bushfire buffer zone	In relation to bushfire protection, means an area of land designed to isolate residential allotments from areas that pose a bushfire risk such as areas with rugged terrain or hazardous vegetation.	
Density See also: <ul style="list-style-type: none"> • Low-density • Medium-density • High-density 	In relation to residential development, means the number of dwelling units in a given area. It is calculated by dividing the total number of dwellings by the area of residential land that they occupy (excluding other land uses, roads, public open space, and services).	
FFL	Means finished floor level.	
Gross leasable floor area	Means the total floor area of a building excluding public or common tenancy areas such as malls, hallways, verandahs, public or shared tenancy toilets, common storage areas and loading docks.	
Groundwater	Means water that is naturally contained beneath the surface of the ground.	
Habitable room	Means any room used for domestic purposes other than a bathroom, laundry, toilet, pantry, walk-in wardrobe, corridor, stair, hallway, lobby, clothes drying room or other space of a specialised nature occupied neither frequently nor for extended periods.	
Heritage agreement	In relation to State Heritage, is an agreement that is registered under section 34 of the <i>Heritage Places Act 1993</i> .	

Planning and Design Code
Administrative Definitions Table AD

Term (Column A)	Definition (Column B)	Illustrations (Column C)
High-density	Means greater than 70 dwelling units per hectare.	
Hours of operation	Means the hours that a land use is open to the public or conducting activities related to the land use, not including administration or routine activities normally associated with opening and closing or start up and shut down.	
Low-density	Means less than 35 dwelling units per hectare.	
Low rise	In relation to development, means up to and including 2 building levels.	
Medium-density	Means 35 to 70 dwelling units per hectare.	
Native vegetation	Has the same meaning as in the <i>Native Vegetation Act 1991</i> .	
Power system	Has the same meaning as in the <i>Electricity Act 1996</i> .	
Primary street	<p>In relation to an existing or proposed building on a site is—</p> <p>(a) in the case of a site that has a frontage to only 1 road - that road;</p> <p>(b) in the case of a site that has a frontage to 2 roads—</p> <p>(i) if the frontages are identical in length - the road that forms part of the street address of the building, as determined by the council for the relevant area when it is allocating numbers to building and allotments under section 220 of the <i>Local Government Act 1999</i>; or</p> <p>(ii) in any other case, the road in relation to which the site has a shorter frontage; or</p> <p>(c) in any other case, the road that forms part of the street address of the building, as determined by the council</p>	 <p>Example of (a)</p>

**Planning and Design Code
Administrative Definitions Table AD**

Term (Column A)	Definition (Column B)	Illustrations (Column C)
	<p>for the relevant area when it is allocated numbers to buildings and allotments under section 220 of the <i>Local Government Act 1999</i>.</p>	<div style="text-align: center;">  <p>One Street Frontage & Also the Property Address</p> <p>PRIMARY STREET</p> <p>Existing Square Shaped Allotment</p> <p>ANOTHER STREET FRONTAGE</p> </div> <p style="text-align: center;">Example of (b)(i)</p> <div style="text-align: center;">  <p>One Street Frontage Only</p> <p>PRIMARY STREET</p> <p>Existing Allotment</p> <p>ANOTHER STREET FRONTAGE</p> </div> <p style="text-align: center;">Example of (b)(ii)</p> <div style="text-align: center;">  <p>Street Frontage Matching the Property Address</p> <p>PRIMARY STREET</p> <p>Existing Multi-frontage or irregular shaped allotment</p> <p>ANOTHER STREET FRONTAGE</p> </div> <p style="text-align: center;">Example of (c)</p>

Planning and Design Code
Administrative Definitions Table AD

Term (Column A)	Definition (Column B)	Illustrations (Column C)
Private open space	<p>Means an outdoor area associated with a dwelling that:</p> <ul style="list-style-type: none"> (a) is for the exclusive use of the occupants of that dwelling; (b) has a minimum dimension of 1.8 metres; and (c) is not fully enclosed. <p>Private open space may include balconies, terraces, decks and areas between the dwelling and side boundaries but does not include areas used for bin storage, laundry drying, rainwater tanks, utilities, driveways and vehicle parking areas.</p>	
Proclaimed shipwreck	<p>Means—</p> <ul style="list-style-type: none"> (a) a historic shipwreck or historic relic within the meaning of the <i>Historic Shipwrecks Act 1981</i>; or (b) a historic shipwreck or historic relic within the meaning of the <i>Historic Shipwrecks Act 1976</i> (Commonwealth). 	
Secondary street	<p>In relation to a building is any road, other than the primary street, that shares a boundary with the allotment on which the building is situated (or to be situated).</p>	

**Planning and Design Code
Administrative Definitions Table AD**

Term (Column A)	Definition (Column B)	Illustrations (Column C)
Sensitive land use	Means: (a) any use for residential purposes or land zoned primarily for residential purposes (b) a pre-school (c) educational establishment (d) hospital (e) supported accommodation (f) tourist accommodation.	
Site	Means the area of land (whether or not comprising a separate or entire allotment) on which a building is built, or proposed to be built, including the curtilage of the building, or in the case of a building comprising more than 1 separate occupancy, the area of land (whether or not comprising a separate or entire allotment) on which each occupancy is built, or proposed to be built, together with its curtilage.	
South	Means—true south.	
South facing	In relation to building orientation, a side wall is south facing if the wall is orientated anywhere between E20°N/W20°S and E30°S/W30°N.	<p style="text-align: center;">Example of south facing walls.</p>

Planning and Design Code
Administrative Definitions Table AD

Term (Column A)	Definition (Column B)	Illustrations (Column C)
Wall height	Means the height of the wall measured from the top of its footings but excluding any part of the wall that is concealed behind an eave or similar roof structure and not visible external to the land.	
Waste	Means waste within the meaning of the <i>Environment Protection Act 1993</i> .	

Part 8—Referrals to other Authorities or Agencies

- 1 Schedule 9 of the *Planning Development and Infrastructure Regulations* prescribes classes of development that require referral to a prescribed body for the purposes of Section 122 of the *Planning, Development and Infrastructure Act 2016*.
- 2 The referrals in the following table are those which apply anywhere in the State (as opposed to specific geographical areas) and are additional to those specified within Overlays in the Planning and Design Code which relate to specific geographical areas.

Planning and Design Code
Referrals

Referral Body: Environment Protection Authority

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
Energy generation and storage facilities	Wind farms	Development that involves the establishment of a wind farm where 1 or more wind turbine generators (whether or not located on the same site) are used to generate electricity that is then supplied to another person for use at another place.	To provide expert technical assessment and direction to the relevant authority on the assessment of the potential harm from pollution and waste aspects arising from activities of environmental significance and other activities that have the potential to cause serious environmental harm.
	Energy recovery from waste	Development involving energy recovery from <i>waste</i> , including <i>anaerobic digestion</i> and thermal activities such as <i>direct combustion</i> , <i>pyrolysis</i> and <i>gasification</i> used to generate gas, heat, electricity or a combination.	
	Energy generation and storage	Development involving an <i>electricity generating plant</i> or <i>energy storage facility</i> (other than a <i>battery storage facility</i>) using any other energy source (excluding <i>fuel burning</i> and solar photovoltaic) with a capacity to generate or store 30 megawatts (MW) or more that is to be connected to the State's <i>power system</i> .	
Petroleum and Chemical	Chemical storage and warehousing facilities	The storage or warehousing of chemicals or chemical products that are, or are to be, stored or kept in bulk or in containers having a capacity exceeding 200 litres at facilities with a total storage capacity exceeding 1,000 cubic metres.	
	Chemical works	The conduct of: (a) works with a total processing capacity exceeding 10 tonnes per year, involving either or both of the following operations: (i) manufacture (through chemical reaction) of any inorganic chemical, including sulphuric acid,	

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		<p>inorganic fertilisers, soap, sodium silicate, lime or other calcium compound;</p> <p>(ii) manufacture (through chemical reaction) or processing of any organic chemical or chemical product or petrochemical, including the separation of such materials into different products by distillation or other means; or</p> <p>(b) works with a total processing capacity exceeding 5,000 tonnes per year involving operations for salt production.</p>	
	Coke works	The production, quenching, cutting, crushing and grading of coke.	
	Hydrocarbon storage or production works	<p>The conduct of works or a facility:</p> <p>(a) for the storage of hydrocarbon or hydrocarbon products in tanks that, in aggregate, have a storage capacity exceeding 100m³; or</p> <p>(b) for the production of hydrocarbon or hydrocarbon products, being works having a total capacity exceeding 20 tonnes per hour.</p>	
	Petrol stations	The conduct of a petrol station, being a facility for the storage and retail sale of petroleum products or other liquid organic chemical substances	
	Timber preservation works	The conduct of works for the preservation of timber by chemicals, but excluding the preservation by a primary producer of timber for use in the course of primary production carried on by the producer.	

Planning and Design Code
Referrals

Referral Body: Environment Protection Authority

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
Manufacturing and Mineral Processing	Abrasive blasting	The cleaning of materials by the abrasive action of any metal shot or mineral particulate propelled in a gaseous or liquid medium (otherwise than solely by using blast cleaning cabinets less than 5m ³ in volume or totally enclosed automatic blast cleaning units).	
	Hot mix asphalt preparation	The conduct of works at which crushed or ground rock aggregates are mixed with bituminous or asphaltic materials (by heating in a furnace, kiln or other fuel fired plant) for the purposes of producing road building mixtures.	
	Cement works	The conduct of works for the use of <i>argillaceous</i> and <i>calcareous</i> materials in the production of cement clinker or the grinding of cement clinker.	
	Ceramic works	The conduct of works for the production of any products such as bricks, tiles, pipes, pottery goods, refractories, or glass that are manufactured or are capable of being manufactured in furnaces or kilns fired by any fuel, being works with a total capacity for the production of such products exceeding 100 tonnes per year.	
	Concrete batching works	The conduct of works for the production of concrete or concrete products that are manufactured or are capable of being manufactured by the mixing of cement, sand, rock, aggregate or other similar materials, being works with a total capacity for production of such products exceeding 0.5m ³ per production cycle.	

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
	Drum reconditioning or treatment works	The conduct of works for the cleaning, repairing, reconditioning or other treatment of metal or plastic drums or containers for the purposes of their reuse, including any associated storage facility.	
	Ferrous and non-ferrous metal melting	the melting of ferrous or non-ferrous metal in a furnace or furnaces that alone or in aggregate have the capacity to melt- (a) in excess of 50 but not in excess of 500 kilograms of metal during the normal cycle of operation but excluding facilities more than 500m from residential premises not associated with the works; or (b) in excess of 500 kilograms of metal during the normal cycle of operation.	
	Metallurgical works	The conduct of works at which ores are smelted or reduced to produce metal.	
	Mineral works	The conduct of works for processing mineral ores, sands or earths to produce mineral concentrates.	
	Pulp or paper works	The conduct of works at which paper pulp or paper is manufactured or is capable of being manufactured, being works with a total capacity for production of such products exceeding 10 tonnes per year	
	Surface coating	The conduct of: (a) works for metal finishing, in which metal surfaces are prepared or finished by means of electroplating, electrolyse plating, anodising (chromating, phosphating and colouring), chemical etching or	

Planning and Design Code
Referrals

Referral Body: Environment Protection Authority

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		<p>milling, or printed circuit board manufacture, being works producing more than 5 kilolitres per day of effluent; or</p> <p>(b) works for hot dip galvanising; or</p> <p>(c) works for spray painting or powder coating with a capacity to use more than 100 litres per day of paint or 10kg per day of dry powder.</p>	
	Timber processing works	The conduct of works (other than works at a builders supply yard or a home improvement centre) at which timber is sawn, cut, chipped, compressed, milled or machined, being works with a total processing capacity exceeding 4,000m ³ per year.	
	Maritime construction works	The conduct of works for the construction or repair of ships, vessels or floating platforms or structures, being works with the capacity to construct or repair ships, vessels or floating platforms or structures of a mass exceeding 80 tonnes.	
	Vehicle production	The conduct of works for the production of motor vehicles, being works with a production capacity exceeding 2,000 motor vehicles per year.	
	Fibre-reinforced plastic manufacturing	The conduct of facilities for the purposes of manufacturing fibre-reinforced plastic products, but excluding facilities more than 300m from residential premises not associated with the facility.	
	Waste recovery (<i>excluding a prescribed approved activity</i>)		

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
Resource recovery, waste disposal and related activities	Waste recovery facility	The conduct of a <i>waste recovery facility</i> , being a depot, works or facility (including, but not limited to, a transfer station or material recovery facility) that, during a 12 month period, receives for <i>preliminary treatment</i> , or has the capacity for the <i>preliminary treatment</i> of: (a) more than 100 tonnes of solid waste or matter; or (b) more than 100 kilolitres of liquid waste or matter, prior to its transfer elsewhere for lawful reuse, further treatment or disposal but excluding a prescribed approved activity or an activity in respect of which the Environment Protection Authority is satisfied, having regard to prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority.	
	Waste reprocessing (<i>excluding a prescribed approved activity</i>)		
	Composting works	Being a depot, facility or works with the capacity to treat, during a 12 month period- (a) in the case of works located wholly or partly within a water protection area - more than 200 tonnes of organic waste or matter; or (b) in the case of works located wholly outside of a water protection area - more than 1,000 tonnes of organic waste or matter, for the production of compost, but excluding an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors, that a referral is not necessary	

Planning and Design Code
Referrals

Referral Body: Environment Protection Authority

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		and has provided written confirmation of this to the relevant authority.	
	Scrap metal treatment works	Being a depot, facility or works for the treatment of scrap metal (by processes involving electrically heated furnaces or other fuel burning equipment or by mechanical processes), but excluding an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority.	
	Waste lead acid battery treatment works	Being a depot, facility or works with the capacity to treat more than 500 waste lead acid batteries during a 12 month period, but excluding an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority.	
	Waste reprocessing facility	Being a depot, works or facility other than a depot, works or facility specified in a preceding paragraph) that, during a 12 month period, receives or has the capacity to treat: <ul style="list-style-type: none"> (a) more than 100 tonnes of solid waste or matter; or (b) more than 100 kilolitres of liquid waste or matter, for the production of energy or materials that are ready for use (without requiring further treatment), but excluding an activity in respect of which the Environment Protection Authority is satisfied, having 	

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		regard to the prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority.	
	<i>Waste disposal (excluding a prescribed approved activity)</i>		
	Landfill depot	Being a depot, facility or works for the disposal of waste to land, but excluding an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority.	
	Liquid waste depot	Being a depot, facility or works for the reception and disposal of liquid waste, or the reception, treatment and disposal of liquid waste, but excluding an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority.	
	Incineration depot	Being a depot, facility or works for the disposal, by incineration, pyrolysis or gasification by high temperature chemical decomposition, or thermal oxidation using fuel burning equipment, of solid waste, a listed waste or quarantine waste, but excluding: (a) facilities with a processing capacity not exceeding 100 kilograms per hour and more than 500m from residential premises not associated with the facility, or	

Planning and Design Code
Referrals

Referral Body: Environment Protection Authority

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		(b) an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority.	
	Wastewater treatment		
	Wastewater treatment works	Being sewage treatment works, a CWMS, winery wastewater treatment works or any other wastewater treatment works with the capacity to treat, during a 12 month period- (a) in the case of works located wholly or partly within a water protection area - more than 2.5 ML of wastewater; or (b) in the case of works located wholly outside of a water protection area - more than 12.5 ML of wastewater but excluding an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority.	
	Activities involving listed wastes		
	Activity producing listed waste	the conduct of an activity in which a <i>listed waste</i> is produced as waste or becomes waste, but excluding the following: (a) a domestic activity; (b) retail pharmacy;	

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		<ul style="list-style-type: none"> (c) medical practice (other than the practice of pathology); (d) nursing practice; (e) dental practice; (f) veterinary practice; (g) the conduct of a nursing home or other residential aged care facility; (h) the conduct of an immunisation clinic; (i) the conduct of a hospital with capacity of fewer than 40 beds; or (j) a prescribed industrial activity; (k) an activity in which the waste produced is lawfully disposed of to a sewer; (l) an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority. 	
	Reception or storage of listed waste	<p>The conduct of a depot, facility or works for the reception or storage of a <i>listed waste</i>, but excluding the following:</p> <ul style="list-style-type: none"> (a) the temporary on-site storage of such waste while awaiting transport to another place; (b) an activity consisting only of storing or distributing goods, in respect of which the Environment Protection Authority is satisfied, having regard to prescribed factors, that a referral is not necessary and has provided written confirmation of this to the relevant authority; 	

Planning and Design Code
Referrals

Referral Body: Environment Protection Authority

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		<ul style="list-style-type: none"> (c) the reception or storage by a council or hospital of medical waste produced in the course of a prescribed medical activity; (d) the reception or storage by a retail pharmacy of personal sharps waste, pharmaceutical waste or other medical waste, in connection with a return system for such waste. 	
	Treatment of listed waste	The conduct of a depot, facility or works for the treatment of a <i>listed waste</i> , or <i>wastewater</i> containing a listed waste, by immobilising, stabilising or sterilising the waste by any process (before its further treatment or disposal), but excluding an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors that a referral is not necessary and has provided written confirmation of this to the relevant authority.	
Activities in Specified Areas	Brukungu Mine Site	The management of the abandoned Brukungu mine site and associated acid neutralisation plant situated adjacent to Dawesley Creek in the Mount Lofty Ranges.	
	Discharge of stormwater to underground aquifer	<p>Discharge of stormwater from a catchment area exceeding 1 hectare to an underground aquifer by way of a well or other direct means where the stormwater drains to the aquifer from-</p> <ul style="list-style-type: none"> (a) land or premises on which a business is carried on in the council area of the City of Mount Gambier; or (b) a stormwater drainage system in the council area of the City of Mount Gambier; or 	

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		(c) a stormwater drainage system in Metropolitan Adelaide.	
Animal husbandry, Aquaculture and other activities	Feedlots	<p>carrying on an operation for holding in A confined yard or area and feeding principally by mechanical means or by hand-</p> <p>(a) not less than an average of 500 cattle, or 4,000 sheep or goats per day over any period of 12 months; or</p> <p>(b) where the yard or area is situated in a water protection area - not less than an average of 200 cattle, or 1,600 sheep or goats per day over any period of 12 months,</p> <p>but excluding any such operation carried on at an abattoir, slaughterhouse or saleyard or for the purpose only of drought or other emergency feeding.</p>	
	Aquaculture or Fish Farming	The land based propagation or rearing of marine, estuarine or fresh water fish or other marine or freshwater organisms that involves the discharge of wastewater into marine or inland waters, or onto land but excluding where wastewater is discharged to an approved wastewater management system.	
	Saleyards	The commercial conduct of yards at which cattle, sheep or other animals are gathered or confined for the purpose of their sale, auction or exchange, including associated transport loading facilities, being yards with a throughput exceeding 50,000 sheep equivalent units per year [sheep equivalent units: 1 sheep or goat = 1 unit, 1	

Planning and Design Code
Referrals

Referral Body: Environment Protection Authority

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		pig (< 40kg) = 1 unit, 1 pig (> 40kg) = 4 units, 1 cattle (< 40kg) = 3 units, 1 cattle (40—400kg) = 6 units, 1 cattle (> 400kg) = 8 units].	
	Piggeries	the conduct of a piggery (being premises having confined or roofed structures for keeping pigs) with a capacity of- (a) in the case of a piggery located wholly outside of a water protection area- 1,300 or more standard pig units; or (b) in the case of a piggery located wholly or partly within a <i>water protection area</i> - 130 or more standard pig units.	
	Poultry farms	The keeping of poultry in confined or roofed structure(s) exceeding 1,000m ² .	
	Dairies	Carrying on of a dairy with a total processing capacity exceeding more than 100 milking animals at any 1 time in a <i>water protection area</i> .	
Food production and animal and plant product processing	Meat processing works	The conduct of slaughtering works for commercial purposes for the production of meat or meat products for human or animal consumption, being works- (a) in the case of poultry or poultry meat products at a rate of production exceeding 100 tonnes per year; or (b) in the case of any other animal meat or animal meat production at a rate of production exceeding 50 tonnes per year.	

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
	Breweries and cideries	The conduct of works for the production of beer, cider or any other alcoholic beverage (excluding wine and spirits) by infusion, boiling or fermentation, being works with a production capacity exceeding 5,000 litres per day.	
	Fish processing	The conduct of works for scaling, gilling, gutting, filleting, freezing, chilling, packing or otherwise processing fish (as defined in the <i>Fisheries Management Act 2007</i>) for sale, but excluding: (a) works with a processing output of less than 100 tonnes per year where wastewater is disposed of to a sewer or CWMS; or (b) works with a processing output of less than 2 tonnes per year where wastewater is disposed of otherwise than to a sewer or CWMS; or (c) processing of fish only in the course of a business of selling fish by retail.	
	Milk processing works	The conduct of works at which milk is separated, evaporated or otherwise processed for the manufacture of evaporated or condensed milk, cheese, butter, ice cream or other similar dairy products, being works at which milk is processed at a rate exceeding 5ML per year.	
	Produce processing works	The conduct of works for processing any agricultural crop material being: (a) works for the processing of agricultural crop material by deep fat frying, roasting or drying	

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Referral Body: Environment Protection Authority

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Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		through the application of heat with a processing capacity exceeding 30kg per hour, or; (b) works at which more than 10ML of wastewater is generated per year and disposed of otherwise than to a sewer or CWMS.	
	Rendering and fat extraction works	The conduct of works at which animal, fish or grease trap wastes or other matter is processed or is capable of being processed by rendering or extraction or by some other means to produce tallow or fat or their derivatives or proteinaceous matter, being works with a total processing capacity exceeding 25 kg per hour.	
	Curing or drying works	the conduct of works at which meat, fish or other edible products are smoked, dried or cured by the application of heat or smoke: (a) with a total processing capacity exceeding 25 but not exceeding 250kg per hour excluding works more than 200m from residential premises not associated with the works; or (b) with a total processing capacity exceeding 250kg per hour.	
	Tanneries or fellmongeries	The conduct of works for the commercial preservation or treatment of animal skins or hides being works processing more than 5 tonnes of skins or hides per year, but excluding- (a) the processing of skins or hides by primary producers in the course of primary production activities outside township areas; or	

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Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		(b) the processing of skins or hides in the course of taxidermy.	
	Woolscouring or wool carbonising works	The conduct of works for the commercial cleaning or carbonising of wool, but excluding cleaning or carbonising of wool in the course of handicraft activities where the wool is further processed for sale by retail.	
	Wineries or Distilleries	The conduct of works for the processing of grapes or other produce to make wine or spirits, being works at which more than 50 tonnes of grapes or other produce are processed per year; but excluding—works for bottling only.	
Materials handling and transportation	Bulk shipping facilities	The conduct of facilities for bulk handling of agricultural crop products, rock, ores, minerals, petroleum products or chemicals to or from any wharf or wharf side facility (including sea-port grain terminals), being facilities handling or capable of handling these materials into or from vessels at a rate: (a) exceeding 10 but not exceeding 100 tonnes per day—excluding facilities more than 300m from residential premises not associated with the facility; or (b) exceeding 100 tonnes per day.	
	Bulk storage	The conduct of facilities for bulk handling of agricultural crop products, rock, ores, minerals, petroleum products or chemicals to or from any commercial storage facility at a rate exceeding 100 tonnes per day—excluding	

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Referral Body: Environment Protection Authority

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Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		facilities more than 300m from residential premises not associated with the facility.	
	Railway operations	<p>the conduct of any of the following activities associated with a railway:</p> <ul style="list-style-type: none"> (a) the construction or operation of rail infrastructure; and (b) the operation of rolling stock on a railway; (c) other activities conducted on railway land, (d) but excluding— (e) any activities associated with: <ul style="list-style-type: none"> (i) a railway with a track gauge that is less than 600mm; or (ii) a railway in a mine which is underground or predominantly underground and used in connection with the performance of mining operations; or (iii) a slipway; or (iv) a crane-type runway; or (v) a railway used solely for the purposes of horse-drawn trams; or (vi) a railway used solely for the purposes of static displays; or (vii) a railway at an amusement park used solely for the purposes of an amusement structure or (viii) the transfer of freight into or onto, and unloading of freight from, rolling stock (f) an activity in respect of which the Environment Protection Authority is satisfied, having regard to the prescribed factors, that a referral is not 	

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		necessary and has provided written confirmation of this to the relevant authority.	
	Crushing, grinding or milling	<p>Processing (by crushing, grinding, milling or separating into different sizes by sieving, air elutriation or in any other manner) of-</p> <p>(a) chemicals or rubber at a rate:</p> <p>(i) in excess of 1 but not in excess of 100 tonnes per year excluding facilities more than 500m from residential premises not associated with the facility; or</p> <p>(ii) in excess of 100 tonnes per year; or</p> <p>(b) agricultural crop products at a rate:</p> <p>(i) in excess of 50 but not in excess of 500 tonnes per year, but excluding facilities more than 300m from residential premises not associated with the facility; or</p> <p>(ii) in excess of 500 tonnes per year; but excluding non-commercial processing for on farm use; or</p> <p>(c) rock, ores or minerals at a rate:</p> <p>(i) in excess of 100 but not in excess of 1,000 tonnes per year, but excluding facilities more than 500m from residential premises not associated with the facility; or</p> <p>(ii) in excess of 1,000 tonnes per year; but excluding processing of wet sand.</p>	
	Dredging	The conduct of capital dredging being: the excavation of more than 10m ³ of material from the bed of any marine	

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Referral Body: Environment Protection Authority

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		<p>or inland waters by any digging, cutting, suction or any other means and any associated disposal of dredged material to land or waters, but excluding:</p> <ul style="list-style-type: none"> (a) maintenance dredging; (b) works associated with the establishment of a visual aid; or (c) any lawful fishing or recreational activity. 	
	Coal handling and storage	The handling of coal or carbonaceous material by any means or the storage of coal, coke or carbonaceous reject material at facilities with a total handling capacity exceeding 100 tonnes per day or a storage capacity exceeding 5,000 tonnes.	
	Extractive industries	The conduct of operations involving extraction, or extraction and processing (by crushing, grinding, milling or separating into different sizes by sieving, air elutriation or any other manner), of sand, gravel, stone, shell, shale, clay or soil, being operations with an extraction production rate exceeding 100,000 tonnes per year.	
Other	Aerodromes	<p>The conduct of facilities for commercial or charter aircraft take-off and landing, being facilities estimated to be used for:</p> <ul style="list-style-type: none"> (a) more than 200 flight movements per year but excluding facilities more than 3km from residential premises not associated with the facilities; or (b) more than 2 000 flight movements per year in any case. 	

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
	Fuel burning	The conduct of works or facilities involving the use of fuel burning equipment, including flaring (other than flaring at hydrocarbon storage or production works that do not have a total storage capacity or total production rate exceeding the levels respectively specified in 'Hydrocarbon storage or production works') or incineration, where the equipment alone or in aggregate is capable of burning combustible matter- (a) a rate of heat release exceeding 5MW; or (b) at a rate of heat release exceeding 500KW and the products of combustion are used: (i) to stove enamel; or (ii) to bake or dry any substance that on heating releases dust or air impurities.	
	Helicopter landing facilities	The conduct of facilities designed for the arrival and departure of helicopters, but excluding: (a) facilities that are situated more than 3km from residential premises not associated with the facilities; or (b) facilities at the site of an activity authorised under the <i>Mining Act 1971</i> , the <i>Petroleum Act 2000</i> , the <i>Petroleum (Submerged Lands) Act 1982</i> or the <i>Roxby Downs (Indenture Ratification) Act 1982</i> .	
	Marinas and boating facilities	The conduct of facilities comprising pontoons, jetties, piers or other structures (whether on water or land) designed or used to provide moorings or dry storage for: (a) 50 or more powered vessels at any 1 time; or	

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Referral Body: Environment Protection Authority

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
		(b) works for the repair or maintenance of vessels with the capacity to handle 5 or more vessels at any one time or vessels 12m or more in length.	
	Motor racing or testing venues	The conduct of facilities designed and used for motor vehicle competitions or motor vehicle speed or performance trials, but excluding facilities that are situated more than 3km from residential premises not associated with the facilities.	
	Shooting ranges	The conduct of facilities for shooting competitions, practice or instruction (being shooting involving the propulsion of projectiles by means of explosion), but excluding facilities that are situated more than 3km from residential premises not associated with the facilities.	
	Desalination plants	The conduct of a desalination plant.	
	Discharges to marine or inland waters	The conduct of operations, other than a desalination plant referred to in this table), involving discharges into marine waters or inland waters where- (a) the discharges: (i) raise the temperature of the receiving waters by more than 2 degrees Celsius at any time at a distance of 10m or more from the point of discharge; or (ii) contain antibiotic or chemical water treatments; and (b) the total volume of the discharges exceeds 50kl per day.	

Environment Protection Authority			
Referral Category (Activities of Environmental Significance)	Class of Development / Activity	Referral triggers	Purpose of referral
	Saline water discharge	An activity involving the discharge to land, surface water or underground water of more than 0.5ML of water per day containing more than 1 500mg of total dissolved solids per litre.	
	Cremation or incineration of human or animal remains	The conduct of a facility for the cremation or incineration of human or animal remains by means of thermal oxidation using fuel burning equipment.	

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Referral Body: The Minister responsible for the administration of the *Natural Resources Management Act 2004*

Minister responsible for the administration of the <i>Natural Resources Management Act 2004</i>		
Referral Category	Class of Development	Purpose of Referral
Dams	<p>Except where located within the River Murray Protection Area Overlay, development comprising the erection, construction, modification, enlargement or removal of a dam, wall or other structure that will collect or divert, or collects or diverts water:</p> <p>(a) flowing in a watercourse that is not in the Mount Lofty Ranges Water Protection Area Overlay, and</p> <p>(b) that is not prescribed or flowing over any other land that is not in a Prescribed Surface Water Area Overlay or in the Mount Lofty Ranges Water Protection Area Overlay, and where it is contrary to a Natural Resources Management Plan applying in the region of the development site.</p>	<p>To provide expert assessment and direction to the relevant authority on potential impacts from development on the health, sustainability and/or natural flow paths of water resources.</p>

Referral Body: Technical Regulator		
Referral Category	Class of Development	Purpose of Referral
Building Near Powerlines	Development that involves the construction of a building where a declaration has not been given under Schedule 8 - 11 of the <i>Planning, Development and Infrastructure Regulations 2019</i> , other than where the development is a building that is intended only to house, or that constitutes, electricity infrastructure (within the meaning of the <i>Electricity Act 1996</i>) or is limited to: (a) an internal alteration of a building; or (b) an alteration to the walls of a building but not so as to alter the shape of the building.	To provide expert technical assessment and direction to the relevant authority on: <ul style="list-style-type: none"> • potential impacts of development on electricity infrastructure, • potential safety issues relating to development in close proximity to electricity infrastructure.

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Referral Body: Minister for the time being administering the Aquaculture Act 2001

Referral Body: Minister for the time being administering the <i>Aquaculture Act 2001</i>		
Referral Category	Class of Development	Purpose of Referral
Aquaculture Development	Aquaculture development, other than development which involves an alteration to an existing or approved development which in the opinion of the relevant authority is minor in nature.	To provide expert technical assessment and direction to the relevant authority on matters which may impact upon the associated license required for aquaculture development under the Aquaculture Act 2001.

Part 9—Table of Amendments

Table P9—Table of Planning and Design Code Amendments

Date of adoption	Planning and Design Code version number	Amendment type	Summary of Amendments
1 July 2019	1	Commencement of operation	N/A

