Coopers Gap Wind Farm

Initial Advice Statement

Date: May 2016

Initial Advice Statement

Client: AGL Energy Limited

ABN: 74 115 061 375

Prepared by

AECOM Australia Pty Ltd
Level 8, 540 Wickham Street, PO Box 1307, Fortitude Valley QLD 4006, Australia
T +61 7 3553 2000 F +61 7 3553 2050 www.aecom.com
ABN 20 093 846 925

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Introduction

Coopers Gap Wind Farm Pty Ltd, a subsidiary company of AGL Energy Limited (AGL), proposes to develop the Coopers Gap Wind Farm (the Project) with an installed capacity of approximately 350 megawatts (MW) and a maximum of 115 wind turbines. The Project will connect to the Western Downs to Halys 275 kV transmission line, recently completed by Powerlink.

The Project is located approximately 180 km north-west of Brisbane, between Dalby and Kingaroy, near Cooranga North, and falls within the jurisdiction of the South Burnett Regional Council and the Western Downs Regional Council Local Government Areas.

AGL is seeking approval through the *State Development and Public Works Organisation Act 1971* (SDPWO Act) for which an Environmental Impact Statement (EIS) is required under section 26(1)(a) of the Act.

The purpose of this Initial Advice Statement (IAS) is to:

- Support an application to the Coordinator-General to declare a 'coordinated project for which an EIS is required' under the SDPWO Act
- Inform preparation of a terms of reference (TOR) for the EIS
- Inform stakeholders and the general public about the nature, scope and location of the Project and key environmental issues that will be investigated through the EIS process.

Project overview

The location of the wind turbines and associated wind farm infrastructure has been used as the basis for the Project Site. Once approved by the Coordinator-General, this Project Site will essentially be the bounds within which the wind turbines, access roads, transmission lines and other associated infrastructure will be located.

Key wind farm generation and turbine specifications are outlined below.

Project Feature	Statistic
Wind farm generation capacity	Approximately 350 MW
Turbine rating	2.5 - 4 MW
Number of turbines	Up to 115
Maximum blade tip height	180 m
Maximum rotator diameter	140 m

The maximum specifications listed in the table provides flexibility for any innovation in turbine design between now and the time of detailed design and construction.

The land available for development (the Study Area) covers approximately 10,200 ha (the combined areas of all involved properties), with the Project Site (land which the Project infrastructure will be located, allowing for miro siting) occupying a smaller area within the Study Area; approximately 1,960 ha.

The Project Site represents approximately 20% of the Study Area. However, the construction footprint of the Project will be much less (approximately 375 ha). The operational footprint will occupy approximately 115 ha. Land not occupied by infrastructure following the construction and rehabilitation period will continue to be used for rural and agricultural purposes.

Legislation and guidelines

As a renewable energy development, the Project is aligned with a number of international, national, state and regional/local agreements and policies that are based on responding to the threat of climate change and the forward development of renewable energy infrastructure.

Community consultation

A comprehensive community consultation program has been undertaken since 2011. This has included :

- regular meetings of the Community Consultative Committee formed for the Project;
- consultation with affected and interested parties, including neighbouring landholders (face to face communication);
- local, Queensland and Federal government agencies;
- Traditional Owners; and
- community groups.

Community feedback from earlier public consultation events has informed the layout and technical assessments.

Key environmental values

The IAS describes existing environmental characteristics of the Project, identifies potential impacts upon these characteristics, and provides mitigation measures to avoid or minimise potential impacts to an acceptable level. An overview of the potential environmental impacts and their mitigation measures have been provided for the following key environmental and social values relevant to the Project.

- Soils, geology and topography
- Surface water and groundwater
- Flora and fauna
- Aboriginal cultural heritage
- Historic (non-Aboriginal) cultural heritage
- Land Use and Planning
- Landscape and visual
- Noise and vibration
- Socio-economic
- Transport
- Aviation
- Shadow flicker
- Electromagnetic interference
- Bushfire risk
- Sustainability and climate change

Conclusion

The Project is a renewable energy development that, if constructed, would help achieve the goals and targets around renewable energy and ecologically sustainable development contained within international, Commonwealth and State legislation, policy and agreements. The Project is also aligned with regional and local planning initiatives.

Wind farm infrastructure is the least expensive form of renewable energy, and experience (both internationally and within Australia) shows that wind farms are compatible with existing land uses. The Project is unlikely to have any significant adverse impacts on the natural environment or surrounding land uses. Any potential impacts are expected to be minor in nature and manageable through appropriate mitigation strategies.

The Project is also expected to produce benefits for the local community, including financial benefits for landowners, creation of locally-sourced jobs during the construction and operational phases, potential for local contractors to be involved in the Project, opportunities for the local accommodation and service sectors, and tourism associated with an operational wind farm.

1.0 Introduction

1.1 Background

Coopers Gap Wind Farm Pty Ltd, a subsidiary company of AGL Energy Limited, proposes to develop the Coopers Gap Wind Farm (the Project) with an installed capacity of approximately 350 megawatts (MW) and a maximum of 115 wind turbines, although the final number of turbines will be dependent on the generation capacity of the particular wind turbine selected.

AGL Energy Limited acquired the Project from Investec Wind Holdings Pty Ltd, a subsidiary of Investec Bank Pty Ltd in December 2008. Prior to AGL Energy Limited acquiring the Project, Investec Wind Holdings Pty Ltd had commissioned a number of technical studies and investigations into the potential impacts of the wind farm.

In March 2011, AGL Energy Limited submitted an Initial Assessment Report in order to begin the process to achieve a designation for the Project as community infrastructure in accordance with Chapter 5 of the *Sustainable Planning Act 2009* (SP Act). The 2011 Initial Assessment Report collated the findings of a number of technical studies, including findings from the previous 2008 studies where relevant to the Project at the time. The 2011 Initial Assessment Report identified an initial turbine layout and corridor, and provided an analysis of potential environmental impacts and mitigation measures to minimise or prevent these impacts.

Consultation was subsequently undertaken in accordance with the Guidelines for Public Consultation Procedures for Designating Land for Community Infrastructure (DSDIP, 2006), with submissions invited on the content of the Initial Assessment Report.

Following the completion of the Initial Assessment Report submission period, submissions from Government agencies and stakeholders were received and informed the preparation of a draft Revised Assessment Report (RAR) for the Project. At this time, AGL Energy Limited decided not to progress the draft RAR for public consultation until a decision was made by the Australian Government on the Renewable Energy Target (RET).

In June 2015, a reduced 2020 large scale gigawatt hour (GWh) target of 33,000 GWh was legislated. The Project is now seeking approval through the *State Development and Public Works Organisation Act 1971* (SDPWO Act) for which an Environmental Impact Statement (EIS) is required under section 26(1)(a) of the Act.

1.2 Purpose and scope of the Initial Advice Statement

AGL Energy Limited is seeking a coordinated project declaration under the SDPWO Act based on the following key factors, as per section 27(2)(b) of this Act:

- The Project has complex local and State government approval requirements
- The Project is of strategic significance to Queensland
- The Project is expected to provide significant economic and social benefits, capital investment and employment opportunities
- The Project has significant infrastructure requirements.

The purpose of this Initial Advice Statement (IAS) is to:

- Support an application to the Coordinator-General to declare a ‘coordinated project for which an EIS is required’ under the SDPWO Act
- Inform preparation of a terms of reference (TOR) for the EIS
- Inform stakeholders and the general public about the nature, scope and location of the Project and key environmental issues that will be investigated through the EIS process.

2.0 The Proponent

Coopers Gap Wind Farm Pty Ltd, hereinafter referred to as AGL, is the Project proponent. AGL is one of Australia's leading integrated energy companies and is taking action toward creating a sustainable energy future for its investors, communities and customers. Drawing on over 170 years of experience, AGL operates retail, merchant energy businesses, and power generation assets. AGL has a diverse power generation portfolio

including base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources including hydro, wind, landfill gas and biomass. AGL is Australia's largest private owner and operator of renewable energy assets and is looking to further expand this position by exploring a suite of low emission and renewable energy generation development opportunities.

An investment strategy focused on renewable generation will assist in delivering Australia's Renewable Energy Target of 33,000 GWh. AGL has secured a range of prospective renewable and low emission gas generation development options. This pipeline of developments, including the Project, will sustain AGL's position as Australia's leading renewable energy company.

AGL currently operates the following wind farms across Australia:

- Hallett Wind Farms (1,2,4 and 5) – 350 MW (South Australia)
- Macarthur Wind Farm – 420 MW (Victoria)
- Oaklands Hill Wind Farm – 63 MW (Victoria).

3.0 Nature of the proposal

3.1 Scope of the Project

The overall scope of the Project is as follows:

- Development Approvals Process – Gain approval from the Coordinator-General under the SDPWO Act
- Detailed Design – Following financial commitment and receiving conditions of approval from the Coordinator-General's report on the EIS
- Construction – Construction of the Project is expected to take approximately two to two and a half years
- Operation – The Project is expected to have a design life of 20-25 years, after which time the site may be repowered or decommissioned
- Decommissioning and rehabilitation – The Project will be decommissioned and the site rehabilitated after wind farm operations cease.

The scope of the EIS will be to:

a) Identify land within which the wind farm turbines and associated infrastructure can be developed; and

b) Undertake environmental reporting and stakeholder engagement in accordance with the TOR for the Project and the Draft Queensland Wind Farm State Code and Planning Guideline (DILGP 2015).

There will also be a number of permits and licences required to be obtained prior to commencing construction of the Project. These permits and licences are external to the coordinated project process. Section 8 of this IAS identifies the likely permits and licences that are expected to be required for construction of the Project and associated infrastructure.

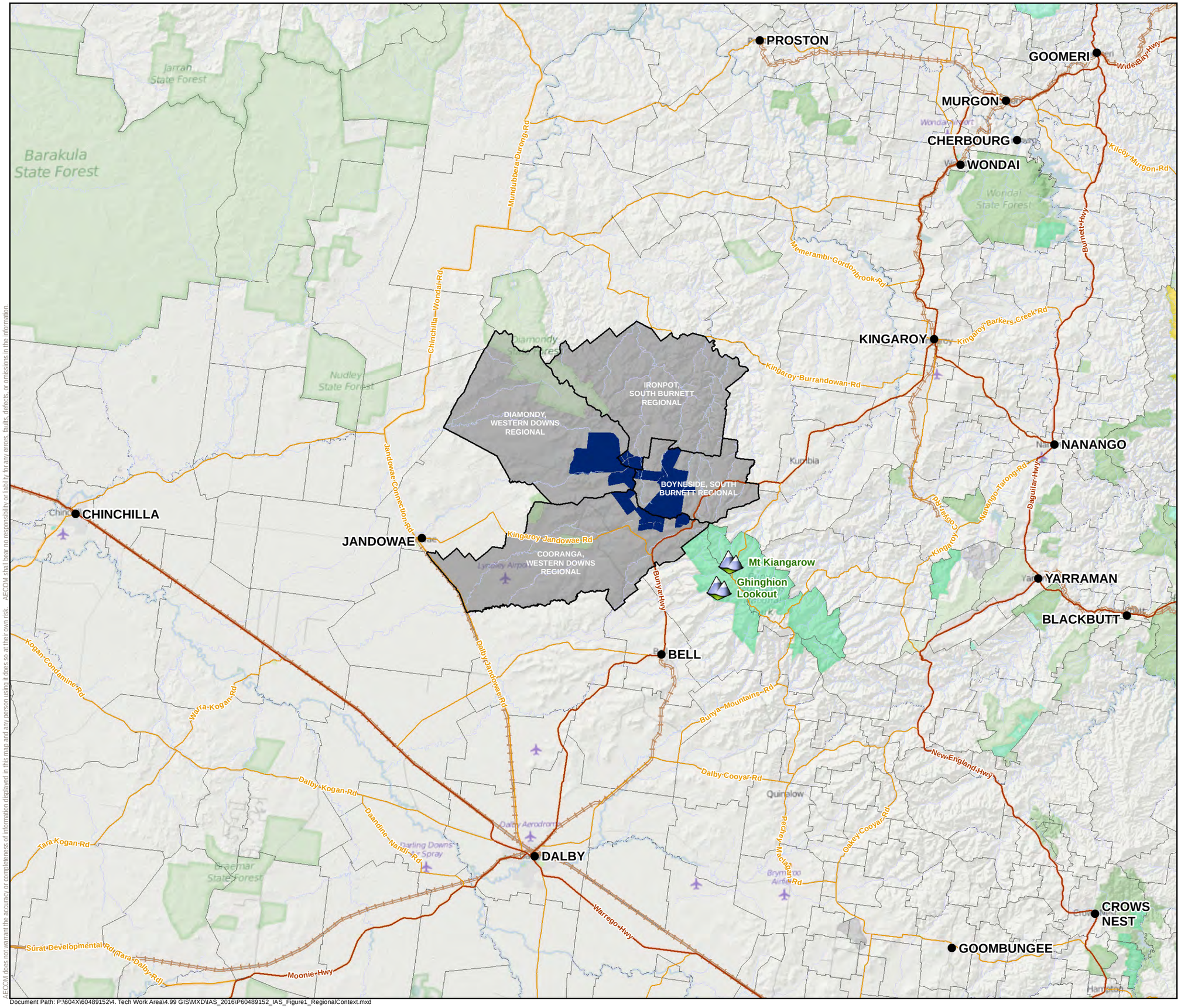
3.2 Land use

3.2.1 Existing land use

The Project is located approximately 180 km north-west of Brisbane and is situated approximately:

- 50 km south-west of Kingaroy
- 70 km east of Chinchilla
- 65 km north of Dalby.

The closest township to the Project is Bell, which is located approximately 19 km to the south. Refer to Figure 1 for the Project's location in a regional context.



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AGL Energy in action.

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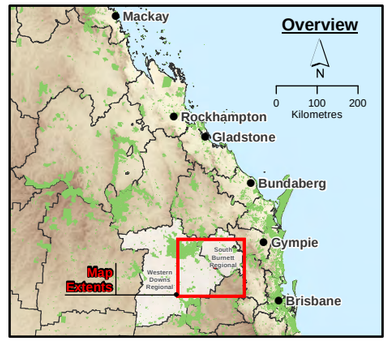
DATUM GDA 1994, PROJECTION MGA ZONE 56

0 5 10 Kilometres

1:500,000 (when printed at A3)

Legend

- Locality
- Watercourse (stream order 3 to 8)
- Highway; Freeway
- Main Road
- Suburb
- Suburb that intersects with the Study Area
- Study Area
- Forest Reserve
- National Park
- State Forest



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COOPERS GAP WIND FARM
INITIAL ADVICE STATEMENT

REGIONAL CONTEXT

PROJECT #:	60489152
CREATED BY:	BM
LAST MODIFIED:	BM: 23/05/2016
VERSION:	1

Figure 1

Document Path: P:\604X\60489152\4. Tech Work Area\4.99 GIS\MXD\IAS_2016\P60489152_IAS_Figure1_RegionalContext.mxd

A3 size

The existing land use within and around the Project Site is predominantly rural, characterised largely by cattle grazing within the localities of Cooranga North, Bilboa, Boyneside and Ironpot. The largest nearby townships include Kingaroy to the north-east (with a significant peanut and navy bean industry, and more recently, an expanding wine industry), Dalby to the south and Jandowae to the south-west (crops grown in this area include wheat, sorghum, oats and cotton). Small settlements are located throughout the region, including the towns of Bell to the south and Kumbia to the east of the Project site. Both towns will likely provide day-to-day services for the wind farm both during construction and operation. Services within these towns include a general store, primary school, entertainment venues and some overnight and short-stay accommodation.

The State's capital, Brisbane, is located approximately 180 km to the south-east and is the closest major city. Brisbane is directly accessible from the Project Site via the Bunya and Warrego Highways.

South-east of the Study Area is the Bunya Mountains National Park – Queensland's second-oldest National Park, containing the largest stand of Bunya Pines in the world. Other significant reserves in proximity to the Project include Jandowae State Forest and Mahen State Forest to the west, and Diamondy State Forest to the north-west.

The Project Site is bounded to the east by the Bunya Highway, between Cooranga North and Kingaroy. Local roads provide access to properties from the Highway, with major connecting roads including Niagara Road, Jarail Road and Red Tank Road.

The nature of land use in the general locality, and the Surat Basin area, has changed significantly over time and is likely to continue to change due to the increase in mining operations and other larger non-rural activities. This change has generally affected rural and agricultural activities and the nature of their supporting townships.

3.2.2 Mining licences and permits

Local Area Mining Permit Reports obtained for Western Downs Regional Council and South Burnett Regional Council in March 2014 indicates that there is one current permit within the Study Area:

- Coal Exploration Permit – **EPC 2056** (granted November 2010) held by Coalbank Ltd.

This coal project is located on the ridge line and the topography of the surrounding area indicates that it will not affect the wind turbines.

There are no other active licences or permits within close proximity to the Study Area.

3.2.3 Land tenure

The land tenure of the Study Area is predominantly freehold. Exceptions to this are:

- Road reserves throughout the site
- A stock route (unused) located within the road reserve of Ironpot Creek Road, north of the intersection with Niagara Road, until the intersection of Sarum Road, where the stock route follows the road reserve north out of the Study Area
- Easements for electricity transmission.

AGL has entered into agreements with all freehold landowners hosting turbines on their property.

3.3 Project need, justification and alternatives considered

3.3.1 Project need and justification

Renewable resources are defined as those which are not based on finite reserves stored within the earth. Renewable energy resources occur naturally and repeatedly in the environment and include sunlight, wind, water, waves and tides. One of the main advantages of renewable energy supplies over conventional fossil fuels is that they create virtually no carbon dioxide (CO_2) or other air pollutants during their operation and as such do not contribute to either global climate change or local air pollution. Renewable resources offer a contribution to the long term alternative energy supply.

The Project is aligned with a number of international, national, State and regional/local agreements and policies which provide for action on climate change and the development of renewable energy infrastructure, including:

- The Paris Agreement
- The Kyoto Protocol
- The Commonwealth Renewable Energy Target
- The National Strategy on Ecological Sustainable Development.

The United Nations Framework Convention on Climate Change (UNFCCC) provides the foundation for global action to prevent dangerous interference with the climate system, which has been detailed further through the Kyoto Protocol. Australia ratified the Kyoto Protocol on 3 December 2007. The Protocol's first commitment period started in 2008 and ended in 2012. A second commitment period was agreed on in 2012, known as the Doha Amendment to the protocol, in which 37 countries, including Australia, have binding targets.

The Project is consistent with the Australian Government's commitment to limit greenhouse gas emissions under this agreement.

The Project

In addition to their environmental benefits, wind farms offer other important advantages. Firstly, they contribute to a reduction in our dependence on the finite reserves of fossil fuels, which are being rapidly depleted. Secondly, they reduce dependence on oil and gas imports and increase self-sufficiency in energy production. Wind farm developments are also reversible. This key feature allows a site to be decommissioned to the extent that no visible trace of the wind farm is apparent, thus allowing a site to retain its environmental legacy.

The development of the Project will be a significant economic development within Queensland. The Project represents a significant investment in the construction of infrastructure and its development, in conjunction with the coal and gas sectors, will result in increasingly resilient energy supplies through infrastructure diversification.

Furthermore, in conjunction with the mining regions of Central Queensland and Eastern Downs, the Project presents opportunities for its sustained economic contribution to the region, especially in relation to maximising the wind asset of the region. Wind as a resource is only viable in certain locations and the area where the Project is to be located has a high wind resource, particularly when compared to other central and southern Queensland areas.

3.3.2 Alternatives considered

3.3.2.1 Technological alternatives

Wind turbines are one of the most established forms of renewable energy technology, with other technologies (such as tidal, wave and solar) less developed in generating potential and commercial terms. Under current Government policies, the financial cost of wind power is falling close to that of conventional sources of electricity. In addition, the life cycle carbon cost of wind power is significantly smaller than that of other forms of conventional and renewable energy production. Wind turbines are therefore considered to be the most suitable technological alternative.

3.3.2.2 Locational alternatives

Alternative locations for siting the Project are limited due to the following factors:

- Wind speeds need to be not only high but consistent
- Vegetation cover needs to be low and not sensitive
- Land needs to be rural/agricultural use
- Housing in the immediate vicinity should be relatively sparse
- High voltage transmission lines need to be available on or near site
- Reasonable road access needs to be available
- Landowners need to be interested in allowing wind turbines on their land.

The combination of these factors make siting a wind farm difficult. The proposed location of the Project meets these criteria and is therefore considered to be suitable.

3.3.2.3 Do nothing alternative

Should the Project not go ahead, private investment into the State of Queensland to the value of approximately $700 Million will not be recognised. Potential job opportunities and increased tourism to the region will also not be recognised.

The annual greenhouse gas emissions displaced by the Project is estimated to be approximately 930,224 tonnes CO_2-e. This estimate does not include any indirect greenhouse gas emissions saved from avoiding the extraction, production and transportation of coal or the electricity lost in delivery in the transmission and distribution network. Without the Project, the CO_2-e saving will not be recognised as households will continue to predominantly use traditional fossil fuel energy sources.

3.4 Components, developments, activities and infrastructure that constitute the Project to be declared coordinated

3.4.1 Wind turbines

The Project Site will accommodate turbines in the 2.5 MW to 4 MW range with a maximum height to blade tip of 180 metres (m) above the base of the wind turbine tower. The turbines will be of the horizontal axis type, with a rotor consisting of three blades with a maximum rotor diameter of 140 m. The blades will be mounted to the wind turbine hub at an appropriate height to allow for a maximum height to blade tip of 180 m. These maximum specifications are summarised in Table 3.1.

Table 3.1 Key generation and turbine specifications

Feature	Statistic
Project generation capacity	Approximately 350 MW
Turbine electrical output	2.5 - 4 MW
Number of turbines	Up to 115
Maximum tip height	180 m
Maximum rotor diameter	140 m

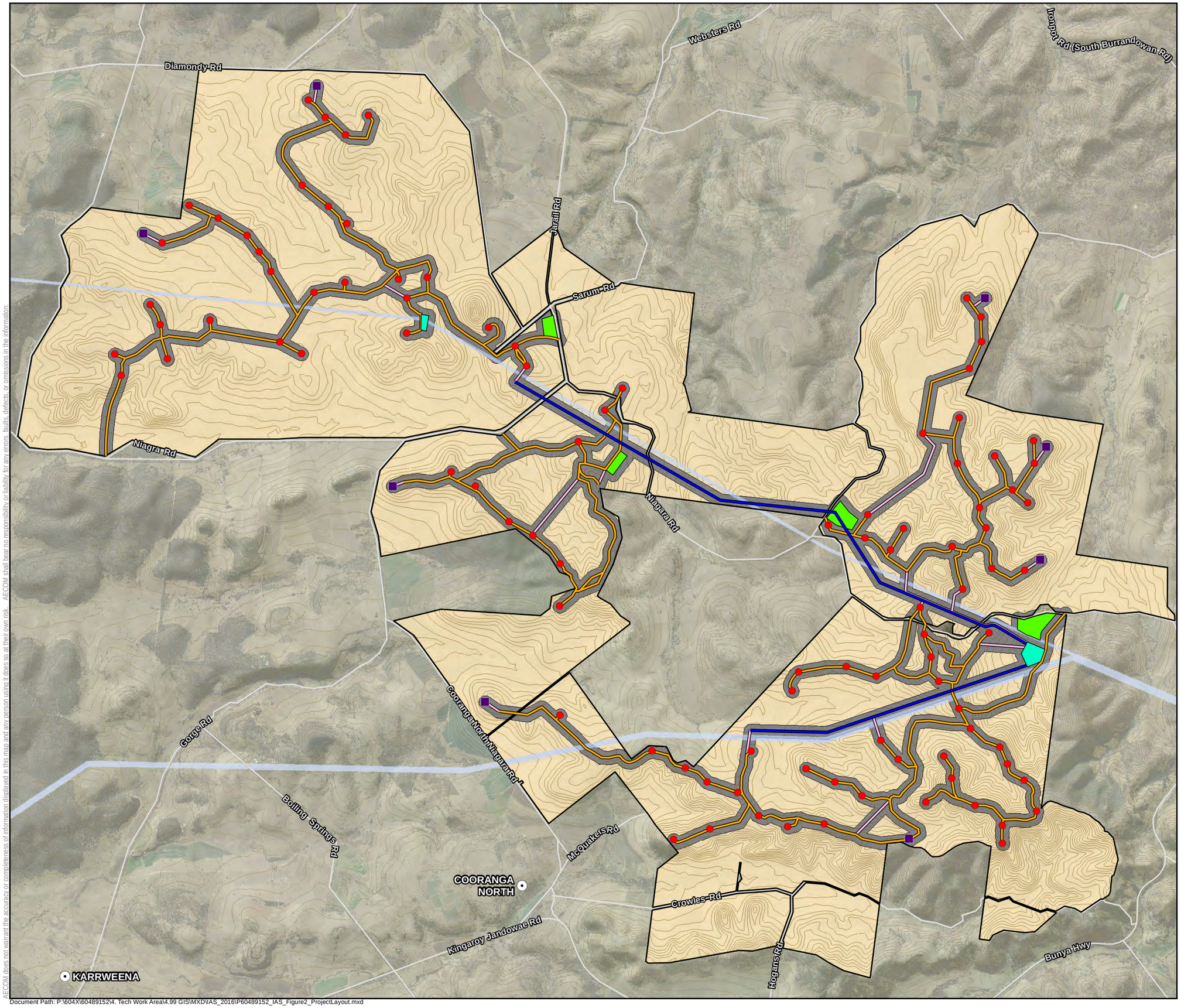
The turbines will be coloured light grey or white with a semi-matt finish to reduce their contrast with the background sky and minimise reflections. The turbines will be uniform in colour and will not contain any company logo.

The maximum turbine dimensions listed in Table 3.1 is based on estimated wind turbine dimensions to allow for future flexibility and innovation in wind turbine design and development. Generally, larger turbine models on higher towers will more efficiently harness the available wind resource. Furthermore, larger wind turbines are generally installed in lower numbers, thereby reducing the on-ground impacts for a given level of energy generation.

The final choice of turbine will be based on an assessment of the most suitable turbine available at the time of procurement taking the following criteria into account:

- Ability of the turbine to maximise power output based on the wind resource at the Project Site
- Aesthetics of the turbine based on subtle variations in the blades, motor, hub, etc. that vary across manufacturers and turbine models
- Availability of the turbine will also affect the final choice of turbines
- Turbine which provides the optimal financial outcome for the Project.

One of the key selection criteria for final turbine choice will be the ability to satisfy the environmental constraints and approval conditions. For example, the chosen turbine must achieve the determined noise criteria, shadow flicker hours and not exceed any of the maximum design specifications. The preliminary locations of the wind turbines and other wind farm infrastructure are illustrated in Figure 2.



AGL Energy in action.

AECOM

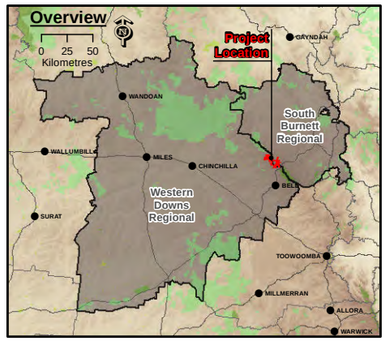
DATUM GDA 1994, PROJECTION MGA ZONE 56

0 1 2
Kilometres

1:55,000 (when printed at A3)

Legend

- Locality
- Met Masts
- Turbines
- Proposed Service Road / Cable
- Proposed Underground Cable
- Proposed 33kV Overhead Cable
- Contours 10m
- Road
- Existing High Voltage Transmission Line Easement
- Proposed Substations
- Proposed Laydown Areas
- Project Site
- Study Area



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COOPERS GAP WIND FARM
INITIAL ADVICE STATEMENT

PROJECT LAYOUT

PROJECT #:	60489152
CREATED BY:	BM
LAST MODIFIED:	BM: 23/05/2016
VERSION:	1

Figure 2

A3 size

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3.4.2 Turbine foundations

Each turbine foundation will comprise a reinforced concrete slab. Turbine foundations may vary in size depending on imposed loadings, ground conditions, construction methodology and the drainage design. Each turbine manufacturer has individual foundation requirements which will need to be adhered to.

The detailed design of the foundations will be undertaken following approval of the Project by the Coordinator-General and following the final selection of turbine model to be installed at the Project Site. The final design will also take account of the geotechnical conditions identified through detailed, micro-siting site investigation.

Foundations will be laid at sufficient depth so the top of the foundation is flush with the highest surrounding ground level.

Much of the excavated material will be reinstated following construction; however each turbine foundation is likely to result in surplus material. It is envisaged this surplus material will be reused on site for landscaping. Any necessary approvals will be obtained for excavating material at the Project Site.

Concrete will either be imported from a local batching plant or sourced from two site based concrete batching plants established at separate locations within the Project Site. The final choice will depend on the chosen contractor, geotechnical considerations and the availability of local concrete. If site based batching plants are required, the necessary approvals will be obtained prior to commencement of use.

3.4.3 On-site access tracks

The onsite access track layout will be designed to utilise the existing topography of the land, avoiding steep areas where possible and minimising the amount of land required. It is likely that approximately 80 km of access track will be required.

The following design criteria and mitigation measures were applied to the access track layout to mitigate potential impacts:

- The access tracks will typically be 6 m wide, which may be expanded to 12 m to accommodate crane and delivery vehicle requirements during construction, and subsequently rehabilitated to a 6 m width for operation
- Regular passing places and turning areas
- Tracks will be non-metalled and constructed from locally sourced aggregate
- Tracks will be flush with the ground level
- The number of water course crossings will be minimised
- Track margins will be vegetated to reduce potential sediment-laden run-off.

The construction of access tracks will vary depending on localised ground conditions. Conditions impacting construction include the existing vegetation, nature of the topsoil, level of moisture in the ground, geotechnical base and localised topography.

Once the Project has been commissioned, access tracks greater than 6 m will be reduced with the edges dressed back and the margins re-vegetated.

The number of water course crossings will be minimised. The exact requirement and design of the water course crossings will be agreed during the detailed design and will be based on the detailed geotechnical site investigation and through discussions with the relevant State authorities.

3.4.4 Temporary construction laydown areas

There are four potential locations for temporary construction laydown areas, namely:

1) At the north western area of the Project Site, situated at the intersection of Jarail Road and Sarum Road
2) At the eastern area of the Project Site, where it intersects Bilboa Road (approximately 400 m north of the intersection of Bilboa Road and Niagara Road)
3) At the centre of the Project Site, approximately 1.1 km south east of the intersection between Jarail Road and Niagara Road
4) At the eastern extent of the Project Site, adjoining Niagara Road.

The temporary construction laydown areas are likely to be no larger than 440 m by 340 m and will accommodate portacabins (site offices, welfare facilities, toilets); storage containers for tools and equipment; storage areas for plant, material and components; wash down facilities; and sufficient parking for the workforce, deliveries and visitors. The temporary construction laydown areas will be formed into hardstand. Prior to forming the hardstand area, the topsoil will be removed and stockpiled adjacent to the hardstand area. Following the completion of the construction phase, the temporary construction laydown area will be reinstated using the stockpiled topsoil and reseeded in accordance with the landowner requirements.

The exact locations and nature of the temporary construction laydown will be established in consultation with the relevant landowners when a full construction methodology is determined.

Additionally, turbine locations will require an area of hardstand adjacent to the turbine foundation, (approximately 60 m by 60 m, depending on turbine type). This hardstand is intended to provide a stable base on which to place turbine components ready for assembly and erection, and to locate the crane necessary to lift the turbine components into place.

The crane pads will be left in place following construction to allow for the use of similar plant should major components need replacing during the life of the Project, and for use during decommissioning at the end of the operational period. The crane pad area may be dressed back with topsoil and landscaped into the surrounding area upon completion of turbine erection.

3.4.5 Permeant meteorological masts

Locations for permanent meteorological monitoring masts at the Project Site have been assessed primarily in order to establish measurement of the free stream wind from all directions, and where possible to meet the criteria in the International Electrotechnical Commission (IEC) 61400-12-1 for power performance testing. These requirements include restrictions on the distance between mast and turbine, complexity of the terrain around the test site and the influence of obstacles and other turbines on the wind.

It is likely that lattice masts with concrete footings at mast base and guy wire anchor points will be used for the Project. Full engineering design and certification will be carried out during detailed design once the turbine type and layout of the wind farm has been confirmed. Figure 2 provides the indicative position of the permanent meteorological masts for the Project.

3.4.6 Electrical connections, substation and grid connection

The wind turbines will be connected to cable marshalling points and the onsite substation through underground and some overhead cabling.

The underground cables will be laid in cable trenches of approximately 0.5 m to 1.5 m in width and a minimum fill of 800 mm to allow for continued agricultural activities. The majority of the cable trenches will be located adjacent to the onsite access tracks, though in some limited cases the underground cabling may be required to be independent of the access tracks. Approximately 90 km of cable trenches will be required, but will be dependent on the final layout. Once the trenched areas have been backfilled, the disturbed area will be reinstated to promote the establishment of vegetation of the same species and density of cover to that of the surrounding undisturbed areas.

In addition to the underground cabling, there is likely to be overhead conductors connecting the cable marshalling points to the main switchboard and the substation. These will be of sufficient height to allow for site vehicles to pass beneath.

The substation is likely to be located on the eastern edge of the Project Site, though its exact location will be determined during detailed design. It is possible that there will be a second substation on the western side of the Project Site. The precise details of the substation cannot be defined at this stage as they are dependent on the turbine model and high voltage electrical design which will not be known until the completion of the detailed design and tender process. However, it will be an area measuring approximately 200 m by 150 m and it will include the main transformer, switchgear, protection, metering, associated electrical infrastructure and the operation and maintenance buildings.

The substation(s) will connect the Project to a Powerlink substation, which will be the point of connection to the National Electricity Market (NEM) via Powerlink's 132 kV or 275 kV transmission lines.

3.4.7 Borrow pits

During construction of the Project there will be a need to source materials for the onsite production of concrete as well as aggregates for the on-site access tracks. Subject to suitable materials being available, borrow pits within the Study Area may be a feasible alternative to using established quarries in the region. This would result in less disturbance to the external road network from the transportation of the materials to the Project Site. Further consideration on the use of borrow pits within the Study Area will be provided in the EIS.

3.5 External infrastructure requirements and implications

A preliminary assessment of the infrastructure services required for the development has been undertaken and will be updated as part of the EIS process.

Potential external infrastructure requirements that will be investigated through the EIS process include:

- upgrade of external road networks to cater for anticipated transport needs
- transport/access associated with the construction process and disposal of waste.

3.6 Timeframes for the Project

The construction period for the Project will be agreed between the EPC contractor and AGL and will be subject to change depending on the weather conditions, availability of materials and construction speeds. However, it is assumed that the construction period will be approximately two to two and a half years.

During the construction phase, works could potentially occur for six days during each week, 12 hours per day. Under such a scenario, materials would be transported to the Project Site for up to 24 days per month (assuming a four week month). This assumption will be revisited and modified as necessary during detailed design.

Some enabling works will be required between approval of the Project and commencement of construction. This will include:

- Detailed site investigations for the purposes of micro-siting the turbines
- Obtaining all necessary consents for construction.

For the construction of the Project, the following activities are expected to occur:

- Site establishment (temporary site facilities, lay down areas, equipment and materials)
- Earthworks for access roads and wind turbine hardstands
- Excavation for the foundations
- Construction of wind turbine foundations (bolt cage, reinforcement and concrete)
- Installation of electrical and communications cabling and equipment (including overhead feeders from cable marshalling points to the substation)
- Installation of wind turbine transformers, in parallel with electrical reticulation works
- Installation of towers for the wind turbines, delivery of the wind turbine components to the Project Site
- Erection of wind turbines, using high-level mobile cranes
- Construction of the Project substation and Powerlink substation (progressed in parallel with the construction of the Project)
- Commissioning of wind turbines, followed by reliability testing
- Rehabilitation and restoration of the Project Site following commissioning.

The activities listed above will predominately occur in the order listed, however some of these activities will be carried out concurrently to minimise the overall length of the construction programme.

3.7 Construction and operational processes

3.7.1 Equipment and machinery

The major equipment and machinery that is likely to be used in the construction of the Project includes:

- Site mobilisation – track loader, grader, backhoe, trucks, small crane and generators
- Access roads and hardstands – track loaders, excavators, graders, trucks (with trailer), water carts and rollers
- Wind turbines – excavators, rock breaker, concrete trucks, trucks (with trailer and vacuum), larger crawlers cranes, medium crawler cranes, small crawler cranes and generators
- Electrical reticulation works – trencher, backhoe, excavator, grader, tractor and small terrain crane
- Concrete batching plant.

Other equipment and machinery may be required, depending on the nominated construction techniques.

3.7.2 Construction water supply

The provision of water is essential for the construction of the Project. The construction activities likely to require water are:

- Bulk earthworks and material conditioning
- Stripping
- Dust suppression
- Concrete batching.

Water demand will vary over time, depending on the stages of the work. The total expected water requirement over the assumed two to two and a half year construction period by construction activity is estimated to be approximately 164 ML. This requirement will be further refined during the detailed design of the Project.

Water demands for the Project will require different water quality standards. Potable water fit for human consumption will be required at the site offices, while both medium (suitable for use in the concrete batching) and low quality raw water (for earthworks and dust suppression) may be used for construction purposes.

A water sourcing strategy will be developed so that water used during the construction phase does not cause issues to adjacent landowners or other stakeholders. Generally, potable water will be obtained from the local government water reticulation network while the proposed source of raw water (medium and low quality) is likely to be sourced from either:

- Groundwater – to include artesian and sub-artesian
- Surface water – to include watercourses, springs and overland flow.

Discussions were held with the Queensland Department of Natural Resources and Mines (DNRM) in Bundaberg and Toowoomba with regard to gaining access to water from surface water streams within the Burnett River and Condamine River catchments respectively.

DNRM (Bundaberg and Toowoomba Offices) advised in 2016 that under the current climate conditions groundwater was the preferred water supply resource for construction.

Stock dams may also be considered a potential water supply point. No Water Permit is required for the use of water from stock dams, with supply and access granted through negotiation with the landholder. It is noted that stock dams may not provide a sustainable supply of water for the construction period as water availability in stock dams is dependent on factors such as catchment area, consistent rainfall, farm use requirements and groundwater recharge. Construction of new dams will require relevant planning and environmental approvals.

Based on the available information it is considered that using groundwater (under a Water Permit) will be the most appropriate option for the construction period. Construction water supply options will be determined during the detailed design of the Project and confirmed prior to construction.

3.7.3 Operational water supply

Long term operational water requirements will be subject to the availability of water and the successful application for a Water License. There will be a limited amount of water required during operation, which can be adequately supplied through rain water tanks, on-site dam/s or water-truck deliveries to the site. Operational water supply options will be determined during the detailed design of the Project and confirmed prior to construction.

Any construction and/or operation of on-site dam/s would be subject to relevant approvals under the SP Act and the Water Act which regulate the taking, using or interference of overland flows and watercourses. It should be noted that the Moratorium Notice restricting new works which involve taking of or interfering with overland flow in the Condamine and Balonne catchment (which had effect from 12 December 2008) ceased to have effect from 12 December 2014.

3.8 Workforce requirements during construction and operation

3.8.1 Workforce

The Project is expected to create approximately 350 full-time jobs during the peak construction phase (although employment will follow a bell curve with fewer people being employed at the start and end of the project). Typically these workers will be accommodated in local rental houses, hotels and motels in the surrounding localities and towns.

AGL is expected to be responsible for the operational phases of the Project. During operations, the Project will be managed by both on-site and off-site personnel, employed by, or contracted to AGL.

Aspects of the Project operation dealt with by on-site personnel include:

- Operations staff
- Safety management
- Environmental conditions
- Landowner management
- Malfunction rectification.

Those functions to be managed by the off-site personnel include:

- Australian Energy Market Operator (AEMO) coordination
- Performance monitoring
- Wind farm reporting
- Remote resetting.

Approximately 10-20 full-time jobs are likely to be created for the operational phase. AGL seeks to employ local people for the construction and operational jobs where possible, and is committed to ensuring these workers are skilled-up where necessary.

In order to assist the construction contractor to use local suppliers, contractors and employees and engage with local businesses, information about local business capabilities will be sourced and provided. AGL will also require the construction contractor to engage with local businesses and the local community to facilitate engagement between the construction contractor and local businesses and wider community. This aims to assist in matching available local skills and resources with opportunities during construction and operation of the Project.

The Advance Western Downs initiative is a partnership between the western Downs Regional Council, local chambers and commerce and key regional business leaders which aims to support economic development and business growth and investment throughout the region (Advance Western Downs, 2010). AGL will work with Advance Western Downs to assist in establishing local procurement processes and developing the necessary training programs to up-skill local employees where necessary.

Aleis Pty Ltd (Aleis) invent, design and manufacture radio frequency identification (RFID) readers for the livestock industry and maintains its head office in Jandowae, and a research and development operation at Niagara Road, Jandowae, at the property known as *Kincorra*. Aleis has local employees and conducts research and

development activities at *Kincorra*. The research and development activities will not be impacted by the Project and therefore there will be no impact to the research and development activities, and employees, of Aleis.

3.9 Economic indicators

The development of the Project will be a significant economic development within Queensland. The Project represents a significant investment of approximately $700 Million in the construction of infrastructure and its development. During construction, there will be up to 350 construction workers during peak construction and approximately 15-20 personnel during operations.

3.10 Financing requirements and implications

AGL Energy is an ASX top 50 company with a market capitalisation of $12.5Bn and a BBB credit rating.

Since 2006, AGL has developed and constructed over 1,000 MW of renewable projects and is therefore experienced in preparation and management of Environmental Impact Statement (EIS) processes as part of obtaining project approval for the following projects:

- Brown Hill Wind 95 MW
- Hallett Hill Wind 71 MW
- North Brown Hill Wind 132 MW
- The Bluff Wind 53 MW
- Oakland's Wind 63 MW
- Macarthur Wind 420 MW
- Bogong Hydro 150 MW
- Nyngan Solar PV 102 MW
- Broken Hill Solar PV 53 MW.

4.0 Location of key Project elements

4.1 Location

The Project is located within the Great Dividing Range, which extends along the eastern coast of Australia. The highest point in the vicinity of the Study Area is Mount Kiangarow (1,136 m AHD) which is located approximately 12 km south-east of the Project, in the Bunya Mountains National Park.

The Project is located approximately 180 km north-west of Brisbane and is situated approximately:

- 50 km south-west of Kingaroy
- 70 km east of Chinchilla
- 65 km north of Dalby.

The closest townships to the Project are Bell, which is located approximately 20 km to the south and Kumbia which is located approximately 20km to the east. Figure 1 provides the location of the Project in a regional context.

The Project is located within the local government areas of Western Downs and South Burnett Regional Councils and is bounded to the east by the Bunya Highway, between Cooranga North and Kingaroy. Local roads provide access to properties from the Highway, with major connecting roads including Niagara Road and Ironpot Creek Road.

The land available for development (the Study Area) covers approximately 10,200 ha (the combined areas of all involved properties), with the Project Site (land which the Project infrastructure will be located, allowing for miro siting) occupying a smaller area within the Study Area; approximately 1,960 ha (see Figure 2).

The Project Site represents approximately 20% of the Study Area. However, the construction footprint of the Project will be much less (approximately 375 ha). The operational footprint will occupy approximately 115 ha. Land not occupied by infrastructure following the construction and rehabilitation period will continue to be used for rural and agricultural purposes.

The Study Area involves 11 financially involved landowners and 36 properties. These properties are listed in Table 4.1 and are shown in Figure 3.

Table 4.1 Properties comprising the Study Area

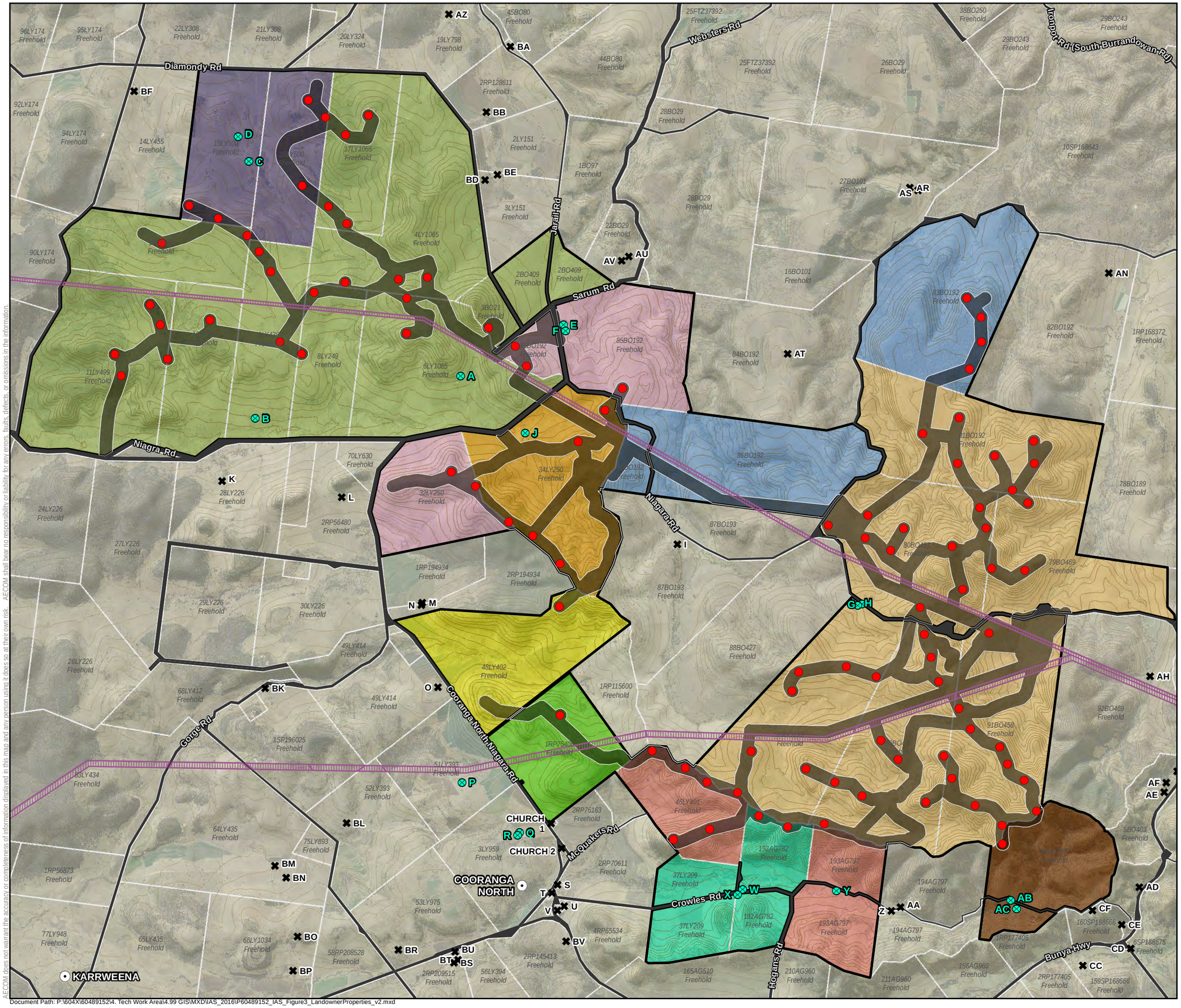
Lot	Plan	Area (ha)	Lot	Plan	Area (ha)
1	RP75408	261.23	48	LY402	381.27
2	BO409	51.03	79	BO469	355.96
3	BO21	50.49	80	BO457	476.16
4	LY1065	517.91	81	BO192	491.82
6	LY1065	485.07	83	BO192	501.04
8	LY249	214.39	85	BO192	324.82
9	LY436	288.34	85	BO192	57.21
10	LY355	261.06	86	BO192	439.60
11	LY499	526.72	86	BO192	53.01
13	LY500	258.37	89	BO193	510.44
15	LY500	258.85	90	BO470	476.09
16	LY500	255.68	91	BO458	513.32
17	LY1065	256.11	192	AG782	71.46
32	LY250	259.02	192	AG782	114.67
34	LY250	477.60	193	AG797	98.92
37	LY209	109.23	193	AG797	148.38
37	LY209	73.01	195	AG797	252.95
46	LY401	212.91	195	AG797	44.16

4.2 Tenure

The land tenure of the Study Area is predominantly freehold (see Figure 4). Exceptions to this are:

- Road reserves throughout the site
- A stock route (unused) located within the road reserve of Ironpot Creek Road, north of the intersection with Niagara Road, until the intersection of Sarum Road, where the stock route follows the road reserve north out of the study
- Easements for electricity transmission.

AGL has entered into agreements with all freehold landowners who are hosting turbines on their property.



AGL Energy in action.

AECOM

DATUM GDA 1994, PROJECTION MGA ZONE 56

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Kilometres

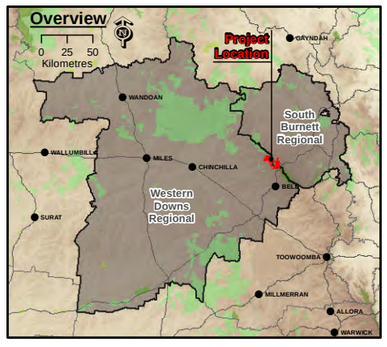
1:55,000 (when printed at A3)

Legend

- Locality
- Turbines
- Non-Financial Landowners
- Financial Landowners
- Contours 10m
- Road
- Easement
- Road Casement
- Project Site
- Study Area

Owners

- 46LY401, 193AG797
- 15LY500, 16LY500
- 86BO192, 83BO192
- 85BO192, 32LY250
- 48LY402
- 1RP75408
- 195AG797
- 192AG782, 37LY209
- 34LY250
- 80BO457,79BO469,90BO470,89BO193, 91BO458,81BO192
- 6LY1065, 2BO409, 3BO21, 4LY1065, 17LY1065, 9LY436, 8LY249, 11LY499, 13LY500, 10LY355



Data Sources:
1. Project Site, Turbine Layout © 2016 AECOM Australia Pty Ltd.
2. Surat Basin 40 cm Imagery © SISP, 2013
3. Service Road, Transmission Lines © AGL 2014
4. Locality, Roads © StreetPro 2011
5. Cadastral Data (DCDB) © State of Queensland (Department of Natural Resources and Mines) 2016
6. Contours 10m © Department of Natural Resources and Mines, 2013.
7. Hillshade, based on the 25m DEM covering the SEQ; DNRM 2005
8. Local Government Area (LGA) boundaries © Australia Bureau of Statistic (ABS), 2011.
9. Vegetation Management Watercourse and Drainage feature map (1:100 000 and 1:250 000) - version 1.4 dataset © State of Queensland (Department of Natural Resources and Mines) 2016
10.Background Image, Captured on 27/04/2011, Bing Maps.

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COOPERS GAP WIND FARM
INITIAL ADVICE STATEMENT

LANDOWNER PROPERTIES

PROJECT #:	60489152
CREATED BY:	BM
LAST MODIFIED:	BM: 23/05/2016
VERSION:	1

Figure 3

A3 size

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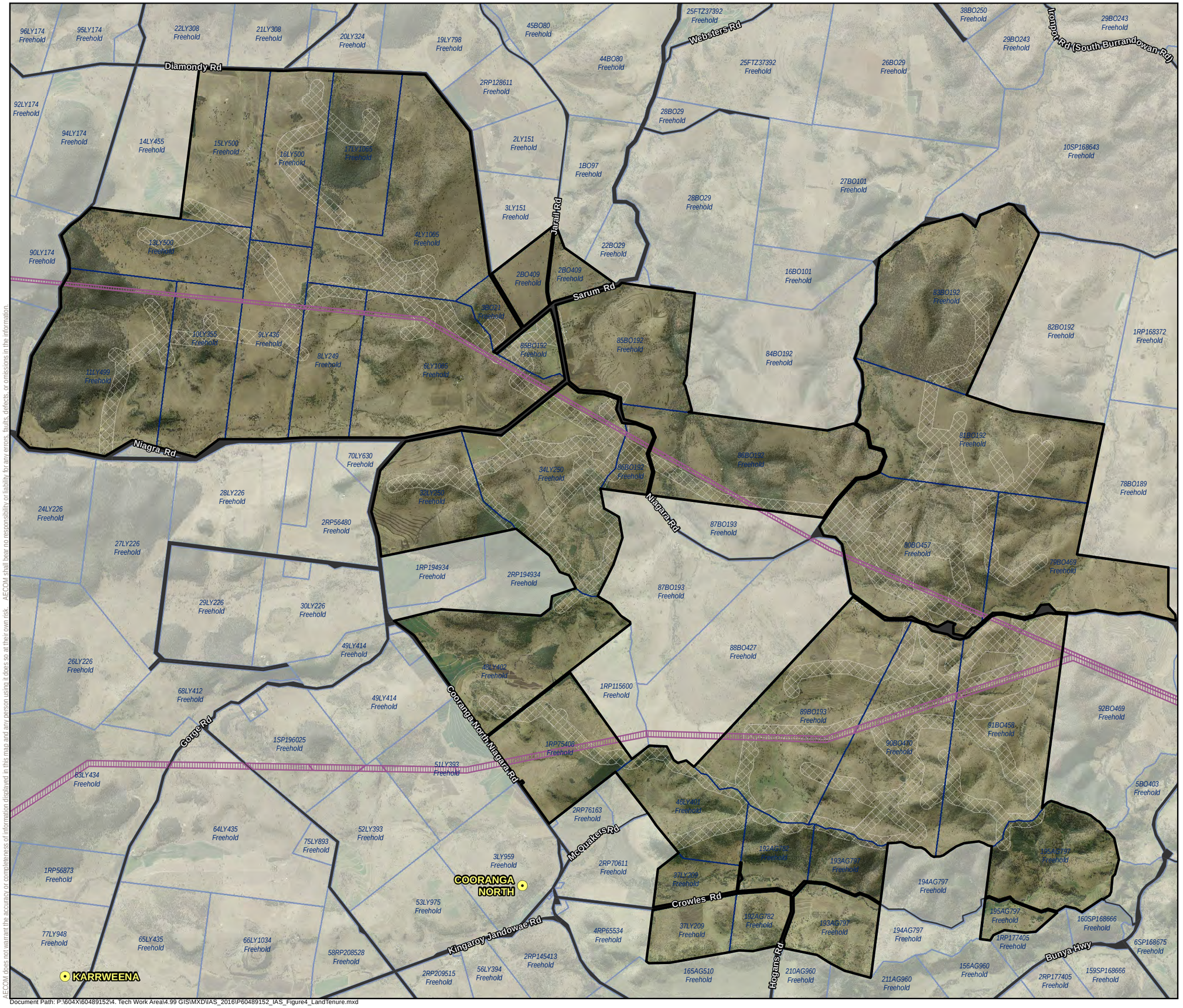


AGL Energy in action.

AECOM

DATUM GDA 1994, PROJECTION MGA ZONE 56

0 1 2 Kilometres

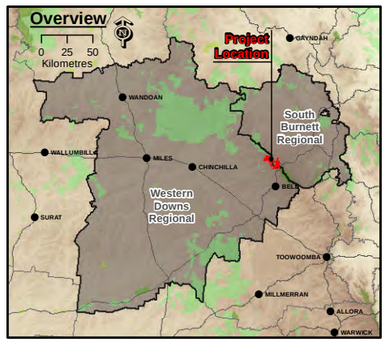
1:55,000 (when printed at A3)

Legend

- Locality
- Project Site
- Study Area

Cadastral Boundaries by Parcel Type

- Easement
- Parcel
- Road



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10.Background Image, Captured on 27/04/2011, Bing Maps.

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COOPERS GAP WIND FARM
INITIAL ADVICE STATEMENT

LAND TENURE

PROJECT #:	60489152
CREATED BY:	BM
LAST MODIFIED:	BM: 23/05/2016
VERSION:	1

Figure 4

A3 size

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4.3 Planning instruments

Planning instruments that are applicable to the Project include the Queensland State Planning Policy (SPP), the Wide Bay Burnett Regional Plan, and the Darling Downs Regional Plan. This section gives consideration to the requirements of these policies particularly in relation to the Project. It is noted that there are no State Planning Regulatory Provisions that are relevant to this Project.

4.3.1 State Planning Policy

As part of ongoing reforms to the Queensland planning system, a single SPP has been developed to address all state interests which must be reflected when preparing planning schemes, designating land for community infrastructure and undertaking development assessment. This single SPP came into force in December 2013 and replaces all previous SPPs. The most current version of the SPP was published in July 2014.

4.3.2 Regional plans

4.3.2.1 Wide Bay Burnett Regional Plan, 2011

The Wide Bay Burnett region consists of Bundaberg, Fraser Coast, Gympie, North Burnett and South Burnett Regional Councils, as well as Cherbourg Aboriginal Shire Council. The Project is situated partially within South Burnett Regional Council, and therefore is subject to any statutory regional planning processes for the Wide Bay Burnett region.

The Wide Bay Burnett Regional Plan 2011 (WBBRP) seeks to manage regional growth and change by shaping and supporting the future growth of communities in the region. Some of the major challenges identified in the WBBRP as being applicable to the region in the future include population growth (and an increasingly-ageing population), limited economic catalysts, responses to climate change, sustaining strong communities, and infrastructure and service delivery across a dispersed settlement pattern.

The South Burnett Regional Council local government area falls within the Wide Bay Burnett region. The South Burnett subregion has largely maintained settlement formations established during European habitation for early industries, including sheep grazing, dairying, timber and peanut farming. The rich soils of the subregion make the continuation and expansion of agricultural pursuits in the area a practical economic strategy, in conjunction with the intended broadening of the local economic and industrial activities for the area.

The desired regional outcomes in the WBBRP articulate the preferred direction for the development and land-use outcomes for the region, and include specific policies and programs to manage the growth of the region over the next two decades.

4.3.2.2 Darling Downs Regional Plan, 2013

The Darling Downs region includes the local government areas (LGAs) of Balonne Shire Council, Goondiwindi Regional Council, Maranoa Regional Council, Southern Downs Regional Council, Toowoomba Regional Council and Western Downs Regional Council.

The Darling Downs Regional Plan was released in October 2013 and provides strategic direction and policies to deliver regional outcomes which alignment with the State's interests in planning and development. As a statutory regional plan, it takes precedence over the previous non-statutory Surat Basin Regional Planning Framework which covered Maranoa Regional Council, Western Downs Regional Council and Toowoomba Regional Council.

The Darling Downs region has some of Queensland's most productive and resource rich terrain featuring prime agricultural land and extensive deposits of thermal coal, coal seam gas, petroleum and other minerals. The region has some of the state's best assets, with high value scenic and natural amenity, vibrant towns and strong communities underpinned by a diverse range of cultural values. The region encompasses a variety of regional landscapes, including urban and rural holdings, agricultural production, resource and mine sites, and national and state parks.

The plan provides policy responses to resolve the region's most important issues affecting its economy and the liveability of its towns. The plan specifically provides direction to resolve competing state interests relating to the agricultural and resources sectors, and to enable the growth potential of the regions towns.

4.3.3 Local plans

It is important to ensure that the Project complements the future planning intent for the local government areas of Western Downs Regional Council and South Burnett Regional Council. This is to be achieved by reviewing how the Project advances the outcomes sought by the planning schemes for the area, being the Kingaroy Shire

Planning Scheme (South Burnett Regional Council), Wambo Shire Planning Scheme and Draft Western Downs Planning Scheme (Western Downs Regional Council).The desired environmental outcomes and strategic outcomes expressed by the planning schemes are designed to advance the achievement of ecological sustainability within the local government area, and are the basis upon which all other aspects of the planning scheme are implemented.

5.0 Description of the existing environment

5.1 Natural environment

5.1.1 Land

5.1.1.1 Topography

The Study Area is characterised by a number of ridgelines, predominantly orientated in a north-west to westerly direction. Generally, the proposed wind turbines are located along these ridgelines to maximise exposure to the wind resource within the area. These ridgelines range in height from (855 m AHD) in the south-east of the Study Area, to (470 m AHD) in the north-west of the Study Area. Away from these ridgelines, properties within the Study Area are as low as 500 m AHD.

Slopes within the Study Area vary significantly, from very shallow to angles greater than 20°. Current access to some ridgelines within the Study Area requires traversing slopes of between 15% (to the south of the site) and 25% (in the central west of the site).

The topography of the site is compatible with the requirements of the Project.

5.1.1.2 Geology

Geological information for the Study Area shows that the Project site is predominantly underlain by Tertiary basalt bedrock. Basalt is a dark, fine-grained, volcanic rock that was deposited as distinct layers of lava, varying in thickness from a few metres to almost 100 m. Basalt, although normally very strong in its fresh state, weathers relatively quickly (in geological time scales) to form dark brown and red clay soils. Basalt weathering processes often leave “corestones” or boulders of strong rock within a soil matrix. The rapid weathering, together with the mode of deposition in successive layers, can mean that terrain formed in basalt can have relatively weak material underneath strong rock. This is a situation that is largely unique to basalt terrains (Coffey, 2008).

Some parts of the Study Area, particularly in the north-east, are noted to be underlain by sedimentary rocks. Access to these areas was not available at the time of the site investigation.

The wind turbines will be founded on either rock anchored foundations or gravity type foundations, depending on the suitability of the underlying bedrock. The anchored foundation design requires that the near-surface materials must have appropriate strength and stiffness, and there must be suitable rock at depth over the bond length of the anchors, which would be at depths of more than 10m below the base of the foundation (Coffey, 2008).

Challenges associated with basalt for anchored foundation systems relate to the potential for less-strong materials underlying the strong near-surface materials. Near-surface investigations undertaken by Coffey (2008) did not reveal these conditions, however there is still a possibility that these conditions exist in the Study Area.

Coffey (2008) states that suitable founding strata are likely to be present at most locations between 0.7 m and 1.5 m depth, and a gravity foundation could reasonably be designed for these ground conditions. The possible exceptions to this are deep clay soils on the ridge in the central-west portion of the Study Area, south of the intersection of Jarail Road and Niagara Road.

The geology of the site is considered to be compatible with the requirements of the Project.

5.1.1.3 Mineral resources and ore reserves

A search of the MinesOnline mapping tool shows that an Exploration Permit for Coal (EPC 2056) is located within the majority of the Project Site. The authorised holder of the EPC is COALBANK Limited. The EPC expired on the 25 November 2015; however, a renewal has been lodged.

5.1.1.4 Soils

Interrogation of soil and land mapping available from the Australian Soil Resource Information System (ASRIS) (CSIRO, 2016), the DNRM and the DAF showed that the Project Site is predominantly comprised of fine textured grey and brown cracking clay soils.

Cracking clay soils are common in the Darling Downs region and commonly form on basalt bedrock and characterise alluvium plains, which are predominant in the Study Area. These are commonly considered good agricultural soils, particularly for cropping land, and are also specific to the Brigalow Belt bioregion. Lower lying areas, valleys and plateaus in the sub-region are characterised with great alluvial qualities, and often gravelly sands and loams can be found interspersed with brown and grey cracking clays. Many cracking clays are also self-mulching enhancing their water-holding capacity, and increasing their value as good agricultural soils (CSIRO, 2009). Parts of the Project Site occur on Marburg subgroup stratigraphic units (Geoscience Australia, 2012). Soil profiles in these areas can have sodic characteristics which, if disturbed, can rapidly erode.

Test pitting conducted in 2008 confirmed the presence of weathered basalt bedrock across the majority of the Project Site with a hard gravelly clay or heavy clay B-horizon, and a medium to high plastic brown and red-brown clay A-horizon, characteristic of cracking clays.

5.1.2 Water

5.1.2.1 Catchments

The Study Area is located within two catchments; the Burnett River catchment in the north-east and the Condamine River catchment in the south-west.

The Burnett River catchment includes an area of over 33,000 km^2, starting south near the Bunya Mountains, and extending north to Burnett Heads and forms part of the larger Burnett Basin. The Condamine River catchment, bounded to the south by the Herries Ranges south-west of Warwick, and to the east by the Great Dividing Range, includes a catchment area of over 13,000 km^2. The Condamine River becomes the Balonne River near Glenmorgan and forms part of the wider Condamine and Balonne Basin. The Condamine and Balonne Basin covers approximately 13% of the Murray-Darling River System, which traverses four states within Australia.

5.1.2.2 Waterways

Waterways in the Study Area include Ironpot and Boughyard Creeks in the Burnett River catchment. These creeks flow to the Boyne River which discharges to the Burnett River. Mount, Jandowae, Downfall, Jingi Jingi, and Jimbour Creeks and their multiple tributaries intersect the Study Area within the Condamine River catchment. Climatic conditions within the Study Area cause the abovementioned creeks to be ephemeral in nature, flowing only in times of sufficient rainfall.

5.1.2.3 Flooding and drainage

The Queensland Reconstruction Authority (QRA), with the support of DNRM, has undertaken a State-wide mapping exercise to establish interim mapping of floodplains at a sub-basin level. This mapping exercise resulted in the development of the ‘Interim Floodplain Assessment Overlay’ (QRA, 2014). The mapping is not based on a particular flood event/magnitude, nor does it represent the Probable Maximum Flood (PMF) which is commonly derived through detailed flood studies to identify the extent of the floodplain. The mapping also does not include or specify a flood level or flood flow velocity. Instead, the mapping is generally based on various landform datasets that represent or indicate previous inundation. It is a spatial extent based on these datasets to determine an area of interest for potential flooding impacts.

To support the floodplain maps, a Model Code has been prepared to support the assessment of development on land wholly or partially within the area shown on the maps. Councils may decide on the types of development to which the Model Code applies. The purpose of the Code is to manage the presence of structures in the floodplain so that risks to life and property during future flood events are minimised and to ensure that future development does not increase the potential for flood damage on site or any other property (QRA 2014).

The Interim Floodplain Assessment Overlay for the Burnett and Condamine-Balonne sub-basins indicate that flooding is unlikely to occur within the Study Area. The Model Code is therefore unlikely to apply to any new development at the Project Site.

The Basin Flood Mapping provides catchment level understanding of flood behaviour during major flood events and complements the initial flood hazard assessment by providing an additional level of accuracy. Results are not appropriate for design of flood mitigation options, but do communicate flood risk to the community. The

methodology is generally considered conservative. The Project Site is located in catchment headwaters at the top of the Great Dividing Range, and therefore widespread inundation of the Project Site is not expected, even in extreme events. Localised runoff will follow gully contours down the range.

The DNRM Flood Information Report Database for the Project Site location indicates that a flood study has been undertaken for Beardmore Dam, 300 km west south-west of the Project. The study was undertaken during the dam design and does not appear to be publicly available on the internet.

BoM operates a flood warning system for the Condamine and Balonne and Burnett Basins based on rainfall and river height observations. The BoM Flood Warning Centre issues flood warnings, which include the river height predictions and river height bulletins for the catchments during flood events. The flood warning system is useful to assess riverine flooding in middle to lower reaches of the catchments. As the Project Site is in catchment headwaters and not considered at risk of riverine flooding, the BoM flood warning system provides limited use to assess the Project Site flood risk.

The information identified via the desktop review detailed above provides a high level understanding of the context for flooding within the Study Area. The site specific information available indicates that the Study Area is not subject to riverine flooding.

5.1.2.4 Water supply options

Construction water supply

The Project's construction water supply requirements are estimated to be approximately 164 ML over a two year period. This is subject to confirmation during detailed design of the Project.

Discussions were held with DNRM in Bundaberg and Toowoomba with regard to gaining access to water from surface water streams within the Burnett River and Condamine River catchments respectively.

DNRM (Bundaberg and Toowoomba Offices) advised in 2016 that under the current climate conditions groundwater was the preferred water supply resource for construction.

Stock dams may also be considered a potential water supply point. A Water Permit is not required for the use of water from stock dams, with supply and access granted through negotiation with the landholder. It is noted that stock dams may not provide a sustainable supply of water for the construction period as water availability in stock dams is dependent on factors such as catchment area, consistent rainfall, farm use requirements and groundwater recharge. Construction of new dams will require relevant planning and environmental approvals.

Based on the available information it is considered that using groundwater (under a Water Permit) would be the most appropriate option for the construction period. Construction water supply options will be determined during the detailed design of the Project and confirmed prior to construction.

Operational water supply

Long term operational water requirements will be subject to the availability of water and the successful application for a Water License. There will be a limited amount of water required during operation, which can be adequately supplied through rain water tanks, on-site dam/s or water-truck deliveries to the site. Operational water supply options will be determined during the detailed design of the Project and confirmed prior to construction.

Any construction and/or operation of on-site dam/s would be subject to relevant approvals under the SP Act and the Water Act which regulate the taking, using or interference of overland flows and watercourses. It should be noted that the Moratorium Notice restricting new works which involve taking of or interfering with overland flow in the Condamine and Balonne catchment (which had effect from 12 December 2008) ceased to have effect from 12 December 2014.

5.1.2.5 Published Environmental Values

Environmental Values (EVs) are the qualities that make water suitable for supporting aquatic ecosystems and human uses. EVs are being progressively determined for areas of Queensland by the Department of Environment and Heritage Protection (DEHP). As EVs are defined for Queensland waters, they are added to Schedule 1 of the EPP (Water). The suite of EVs that can be chosen for protection, along with definitions, are provided in Table 5..

EVs for sub-catchments relevant to the Study Area are presented in Table 5.2. Associated descriptions for sub-catchments in the Condamine catchment are presented in Table 5.3.

Table 5.1 Suite of surface water EVs that can be chosen for protection

EV	Definition
Aquatic ecosystem	A community of organisms living within or adjacent to water, including riparian or foreshore area. (EPP Water, Schedule 2). The intrinsic value of aquatic ecosystems, habitat and wildlife in waterways and riparian areas, for example, biodiversity, ecological interactions, plants, animals, key species (such as turtles, platypus, seagrass and dugongs) and their habitat, food and drinking water. Waterways include perennial and intermittent surface waters, groundwater, tidal and non-tidal waters, lakes, storages, reservoirs, dams, wetlands, swamps, marshes, lagoons, canals, natural and artificial channels and the bed and banks of waterways.
Irrigation	Suitability of water supply for irrigation, for example, irrigation of crops, pastures, parks, gardens and recreational areas.
Farm water supply/use	Suitability of domestic farm water supply, other than drinking water. For example, water used for laundry and produce preparation.
Stock watering	Suitability of water supply for production of healthy livestock.
Aquaculture	Health of aquaculture species and humans consuming aquatic foods (such as fish, molluscs and crustaceans) from commercial ventures.
Human consumption of aquatic foods	Health of humans consuming aquatic foods, such as fish, crustaceans and shellfish from natural waterways.
Primary Recreation	Health of humans during recreation which involves direct contact and a high probability of water being swallowed, for example, swimming, surfing, windsurfing, diving and water-skiing. Primary recreational use, of water, means full body contact with the water, including, for example, diving, swimming, surfing, water-skiing and windsurfing. (EPP (Water), clause 6).
Secondary recreation	Health of humans during recreation which involves indirect contact and a low probability of water being swallowed, for example, wading, boating, rowing and fishing. Secondary recreational use, of water, means contact other than full body contact with the water, including, for example, boating and fishing. (EPP (Water), clause 6).
Visual recreation	Amenity of waterways for recreation which does not involve any contact with water - for example, walking and picnicking adjacent to a waterway. Visual recreational use, of water, means viewing the water without contact with it. (EPP (Water), clause 6).
Drinking water supply	Suitability of raw drinking water supply. This assumes minimal treatment of water is required, for example, coarse screening and/or disinfection.
Industrial use	Suitability of water supply for industrial use, for example, food, beverage, paper, petroleum and power industries. Industries usually treat water supplies to meet their needs.
Cultural and spiritual values	Indigenous and non-indigenous cultural heritage, for example: - Custodial, spiritual, cultural and traditional heritage, hunting, gathering and ritual responsibilities - Symbols, landmarks and icons (such as waterways, turtles and frogs) - Lifestyles (such as agriculture and fishing). Cultural and spiritual values, of water, means its aesthetic, historical, scientific, social or other significance, to the present generation or past or future generations. (EPP (Water), clause 6).

Source: Adapted from EPP (Water). Dawson River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Dawson River Sub-basin except the Callide Creek Catchment (DEHP 2011).

Table 5.2 Published draft surface water EVs for the Study Area

EV	Condamine Balonne Catchment		Burnett Catchment
	Jandowae and Upper Charleys Creeks[A]	Jimbour Creek[A]	Boyne River above Boondooma Dam Storage[B]
Aquaculture	×	×	×
Aquatic ecosystems (incorporating Habitat value)	✓	✓	✓
Cultural and spiritual values	✓	✓	✓[C]
Drinking water (raw water supplies taken for drinking)	×	✓	✓
Farm supply (e.g. fruit washing, milking sheds, intensive livestock yards)	✓	✓	?
Human consumption (e.g. of wild or stocked fish)	✓	×	✓
Industrial use (e.g. power generation, manufacturing, road maintenance)	✓	×	×
Irrigation	✓	✓	✓
Primary recreation (fully immersed in water e.g. swimming)	×	×	✓
Secondary recreation (possibly splashed with water, e.g. sailing)	×	×	✓
Stock watering (e.g. grazing cattle)	✓	✓	✓
Visual appreciation (no contact with water, e.g. picnics)	×	✓	✓

[A] Condamine Alliance (2012)
[B] Burnett Mary Regional Group (undated)
[C] Indigenous and non-indigenous
× = EV not applicable
✓ = Applicable EV
? = Unknown

Table 5.3 EV description for Condamine sub-catchments

Sub-catchment	Values description
Jandowae & Upper Charlies Creeks	Contains sub-catchments with: - >20% irrigation by area and irrigation extraction licences (irrigation environmental value) - Intensive livestock extraction licence and associated cropping farm use (farm supply environmental value) - >75% grazing use and moderate-high density horses (stock watering environmental value) - 1-10 mining wells (industrial use environmental value) - Fishing (stocked) (human consumption environmental value) - Natural, mostly permanent freshwater wetland (aquatic ecosystem and cultural and spiritual environmental values)
Jimbour Creek	Contains sub-catchments with: - Associated cropping farm use (farm supply environmental value) - 50-75% grazing use and moderate-high density horses (stock watering environmental value) - Bunya Mountains National Park, Jimbour House and Natural, mostly permanent freshwater wetland (aquatic ecosystem, visual appreciation and cultural and spiritual environmental values) - Cattle Creek weir, 10-20% irrigation by area and irrigation extraction licences (irrigation environmental value)

Source: Adapted from the draft surface water EVs for the Condamine catchment (Condamine Alliance 2012)

5.1.2.6 Groundwater

The Great Artesian Basin (GAB) and any associated groundwater dependent ecosystems (GDE) are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Matters of National Environmental Significance (MNES), particularly the GDEs associated with springs and aquifers. There are no springs located within the Study Area; however several derived surface expression GDEs associated with the Tertiary basalts and alluvial aquifers are within the Study Area.

Additionally, it is considered that there is the potential for groundwater supported semi-permanent pools along the surface water features; however, none have been identified as a result of the desktop assessment.

Suitability for recreational use (primary recreation)

This category of environmental values is not considered relevant in relation to groundwater of the Study Area as it applies to surface water features which are either accessible for recreational use or visual interaction.

Suitability for minimal treatment before supply as drinking water

Hydrochemistry results compiled from bores in the Study Area included the DNRM registered groundwater bore database indicate the groundwater quality is variable. Aquifers are recognised to have areas of brackish groundwater quality. This groundwater may require complex and expensive water treatment, such as reverse osmosis, to achieve drinking water quality which satisfies the Queensland Water Quality Guidelines 2009 of the Australian Drinking Water Guidelines 2011.

Issues of salinity and the ease to obtain a rainwater tank supply are factors which preclude the potential usage of the groundwater as a drinking water source. However, groundwater within the Study Area is recognised to also include areas of fresh, potable groundwater. Groundwater within the Study Area is understood to generally be utilised for stock watering, irrigation, and domestic use based on the available data from the Queensland Government water license database and the water quality data included in the DNRM registered groundwater bore database.

Suitability for use in agriculture, aquaculture, aquatic food for human consumption

The majority of groundwater bores within the Study Area are reportedly utilised for irrigation, stock watering and domestic uses. Comparison to the National Water Quality Management Strategy - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000), groundwater present within the bores indicates that the majority of the groundwater is suitable for livestock watering, irrigation and domestic uses.

The water quality salinity data indicates groundwater is within or above the range recommended for irrigation of crops. The groundwater is considered to have some potential use in terms of irrigation, dependant on crop type, soil type, and irrigation regime.

The GAB aquifers are recognised to have good quality groundwater, which could potentially be utilised for aquaculture and/or the production of aquatic food for human consumption.

Suitability for industrial use

Available groundwater data reviewed from public datasets (DNRM groundwater bore database and water license attributes) indicates that the groundwater quality and availability within the Study Area is considered suitable for industrial processes, inclusive of but not limited to, cooling water, process water, utility water, and wash water. A specific industry is considered to have particular water quality requirements and constraints which will determine the suitability of the use of groundwater resources.

Maintenance of cultural and spiritual values

No specific groundwater resources of cultural or spiritual values are recognised within the Study Area. However, groundwater that discharges into springs or water courses, which result in permanent pools, may have important cultural significance. Consultation with the relevant Aboriginal Parties is required to identify the cultural and/or spiritual values within the Study Area.

Summary of Project scale groundwater environmental values

Groundwater related environmental values relevant to the Study Area include domestic use, aquatic ecosystems, agricultural purposes, and GAB aquifers. There is also the potential for cultural and spiritual environmental values and GDEs to be present within the Study Area.

5.1.3 Air

The Project Site is located within the south east Queensland airshed. Primary contributors to emissions generated within the Study Area are private vehicles and agricultural operations. Neither of these sources are considered to be significant.

5.1.4 Ecosystems

5.1.4.1 Bioregional context

The Study Area is located in the Eastern Darling Downs province of the Brigalow Belt Bioregion (the Bioregion). The bioregion is dominated by eucalypt woodlands and *Acacia* spp. forests, especially Brigalow (*Acacia harpophylla*). Several of the bioregion's vegetation types have been heavily cleared, and are now listed as Threatened Ecological Communities (TEC's) under the EPBC Act or as endangered regional ecosystems under the VM Act. Extensive past tree clearing, exotic species and high grazing pressure are key issues that threaten conservation in the bioregion (Sattler & William, 1999).

The Eastern Darling Downs province is comprised of tertiary basalts in the extreme east and Jurassic sediments in the south-east. Vegetation occurring on the basalt is predominately narrow-leaved red ironbark (*Eucalyptus crebra*), yellow box (*E. melliodora*), forest red gum (*E. tereticornis*) and white box (*E. albens*) or mountain coolibah (*E. orgadophila*). Vegetation occurring on sandstone hills supports E. crebra, with *E. moluccana/microcarpa* and poplar box (*E. populnea*) on lower slopes and valley. Areas of semi-evergreen vine thicket/araucarian microphyll rainforest are also present, particularly in the south-east (Sattler & William, 1999).

The Study Area is comprised of highly cleared landscapes characteristic of the broader locality. Low intensity grazing on mixed native / exotic pasture is the predominant land use, but there is improved pasture on some lower slopes and cropping on fertile valley floors.

Remnant vegetation comprises 9.2% of the Study Area and includes sclerophyll and vine thicket communities. The Project Site intersects remnant vegetation in only a limited number of areas. The remainder of the Study Area consists of regrowth vegetation, scattered trees and shrubs amongst pasture.

5.1.5 Flora and fauna

5.1.5.1 Flora

Regional ecosystems

The DNRM Vegetation Management Supporting Map shows that there are 12 regional ecosystems (RE) (many in 'mixed polygon' REs, containing a mosaic of RE's too small to map individually) mapped within the Study Area, a description of the RE's is provided in Table 5.4.

Seven of these coincide with the Project Site, those with the greatest conservation significance are:

- RE 11.8.3: (i) listed as a component of the 'Endangered' TEC, *Semi-evergreen vine thicket of the Brigalow Belt (North and South) and Nandewar Bioregions* (a MNES under the EPBC Act); and (ii) 'Of Concern' VM Act status and Biodiversity status
- RE 11.9.4a: (i) listed as a component of the 'Endangered' Threatened Ecological Community (TEC) *Semi-evergreen vine thicket of the Brigalow Belt (North and South) and Nandewar Bioregions* (a MNES under the EPBC Act); and (ii) 'Of Concern' VM Act status and 'Endangered' Biodiversity status
- RE 12.8.6: (i) can form a small component of the 'Critically Endangered' TEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands* (a MNES under the EPBC Act); and 'Of Concern' VM Act status and Biodiversity status
- RE 11.3.25: (i) has an 'Of Concern' Biodiversity status
- To a lesser extent the regrowth examples of these RE's, which may not achieve the condition thresholds to be identified as examples of the TEC or RE.

Other RE's of conservation significance in the broader Study Area are:

- RE 11.9.5: (i) listed as a component of the 'Endangered' TEC *Brigalow (Acacia harpophylla dominant and co-dominant)* (a MNES under the EPBC Act); and (ii) 'Endangered' VM Act status and Biodiversity status
- RE's 11.3.4, 11.9.7 and 12.9-10.7 (i) all have an 'Of Concern' VM Act and Biodiversity status
- To a lesser extent the regrowth examples of these RE's, which may not achieve the condition thresholds to be identified as examples of the TEC or RE.

RE 12.8.16 and 12.9-10.7 are outliers of the Southeast Queensland bioregion. Outliers are REs that are spatially within one bioregion but have the RE code from an adjacent bioregion. They occur when a RE that is found mainly within one bioregion 'extends' slightly into adjacent parts of an adjoining bioregion. An area may be assigned as an outlier RE if:

- it does not match the description (in terms of dominant species and land zone) of an RE from the bioregion it occurs in, but does match the description from an adjacent bioregion; and
- occupies an area in the bioregion of less than 1,000 ha, or if more than 1,000 ha, does not occur more than 50 km from the bioregion boundary.

Table 5.4 List and description of the REs with the Study Area and their conservation status

RE	Description	Conservation status			REs that coincide with the Project Site
		VM Act	Biodiversity Status[1]	EPBC Act	
11.3.4	*Eucalyptus tereticornis* and / or *Eucalyptus* spp. tall woodland on alluvial plains	OC	OC	-	No
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	LC	OC	-	Yes. Sub-dominant RE within a mixed polygon RE.
11.8.3	Semi-evergreen vine thicket on Cainozoic igneous rocks. Steep hillsides	OC	OC	E	Yes. Both a single RE and as a sub-dominant within a mixed polygon RE.
11.8.5	*Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks	LC	NC	-	Yes. Dominant RE within mixed polygon RE.
11.8.5	*Eucalyptus orgadophila open woodland on Cainozoic igneous rocks*	LC	NC	-	No
*11.8.8	*Eucalyptus albens, E. crebra* woodland on Cainozoic igneous rocks.	LC	NC	CE	No
11.9.2	*Eucalyptus melanophloia* +/- *E. orgadophila* woodland on fine-grained sedimentary rocks.	LC	NC	-	Yes. Sub-dominant RE within a mixed polygon RE.
11.9.4a.	Semi-evergreen vine thicket on fine grained sedimentary rocks, generally dominated by a low tree layer (5-10m high), which is floristically diverse and variable. Common co-dominant species include *Croton insularis, Denhamia oleaster*. There is also a tall and low shrub layer.	OC	E	E	Yes Sub-dominant RE within a mixed polygon RE.
11.9.5	*Acacia harpophylla* and / or *Casuarina cristata* open forest on fine-grained	E	E	E	No

RE	Description	Conservation status			REs that coincide with the Project Site
		VM Act	Biodiversity Status[1]	EPBC Act	
	sedimentary rocks.				
11.9.7	*Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks.	OC	OC	-	No
11.10.1	*Corymbia citriodora* open forest on coarse-grained sedimentary rocks	LC	NC	-	Yes. Dominant RE within mixed polygon RE.
12.9-10.7	*Eucalyptus crebra* woodland on sedimentary rocks.	OC	OC	-	No
**12.8.16	*Eucalyptus crebra*, *E. tereticornis* woodland on Cainozoic igneous rocks.	OC	OC	CE	Yes Both dominant and subdominant component within mixed polygon RE.

[1]The biodiversity status is based on an assessment of the condition of remnant vegetation and is used for a range of planning and management applications including Biodiversity Planning Assessments and to determine environmentally sensitive areas.

*Represents a primary component of this RE

**the TEC can represents a small component of this RE

Verified Regional Ecosystems

A field assessment and subsequent mapping verified the occurrence of six remnant REs across the Study Area. These are described below, grouped by geology and land zone. Species Latin names with an asterisk (*) denotes an introduced species.

Main Range Volcanics (Tertiary Basalt, Land Zone 8)

Plant Community 1 - EcEm: Woodland to open-forest of narrow-leaved ironbark (*Eucalyptus crebra*), with secondary occurrence of yellow box (*Eucalyptus melliodora*) and Queensland blue gum (*Eucalyptus tereticornis* subsp. *tereticornis*). Occurs over a shrubland of *Xanthorrhoea glauca* and a groundcover of tussock to closed tussock grassland. This community occurs on upper slopes and crests of tertiary basalt across the central and south-eastern parts of the Study Area (Figure 5).

RE: 12.8.16

Conservation Status: 'Of Concern' under the VM Act, 'Of Concern' Biodiversity Status.

Canopy: The canopy is dominated by *Eucalyptus crebra,* with secondary occurrence of *Eucalyptus melliodora* and *Eucalyptus tereticornis* subsp. *tereticornis* ranging in height from 6-15 m with a FPC percentage of 25-55%.

Midstorey: The midstorey is generally sparse (although patches of shrubby mid-storey were observed across the range) and dominated by *Xanthorrhoea glauca* ranging in FPC percentage of 15-30% or absent. Other shrub species recorded included *Leucopogon biflorus, Solanum nemophilum* and **Lantana camara*.

Ground: the ground layer is dominated by grasses, with greater than 50% FPC. The dominant grasses are *Poa sieberiana* var. *sieberiana* 20-60%, *Cymbopogon refractus* (5-15%), *Sarga leiocladum* (7-10% or absent), *Bothriochloa bladhii* subsp. *bladhii, Dichanthium sericeum* subsp. *sericeum* and *Scleria mackaviensis*. Sparse herbs of *Glycine* sp., *Hybanthus stellarioides* and *Lepidium pseudohyssopifolium* are also present.

Vegetation Condition: The vegetation condition of this community is 'Fair to Good'.

Plant Community 2 - BaAc: Open scrub of *Backhousia angustifolia, Alstonia constricta*, *Canthium odoratum* forma *subnitida* and *Geijera salicifolia var. salicifolia* over shrubland of *Carissa ovata, Croton insularis, Breynia oblongifolia* and *Alectryon diversifolius* over spare grasses and forbs on upper slopes and crests of tertiary basalt. This community occurs in patches within the southern and western portions of the Study Area (Figure 5). Regrowth vine thicket species scattered throughout paddocks across the Study Area indicate that this community was once much more widespread. However due to clearing for agriculture, these vine thicket patches are restricted to the rockier ridgelines and slopes.

RE: 11.8.3

Conservation status: 'Of Concern' VM Act Status, 'Of Concern' Biodiversity Status. This community is a component of the 'Endangered' TEC *Semi-evergreen vine thicket of the Brigalow Belt (North and South) and Nandewar Bioregions.*

Emergent: Emergent canopy species include *Eucalyptus orgadophila*, *Brachychiton rupestris* and/or *Ficus oblique.*

Canopy: The canopy is 5-8 m height with a FPC percentage from 45-75%. Dominant species include *Backhousia angustifolium*, *Alstonia constricta*, *Canthium odoratum* forma *subnitida, Elaeodendron australe* subsp. *integrifolia* and *Geijera salicifolia* var. *salicifolia.* Emergent tree species include *Brachychiton rupestris*, *Ficus obliqua* or *Eucalyptus orgadophila*.

Midstorey: The midstorey ranges in height from 1.5-3 m with a FPC percentage from 5-20%. Dominant species include *Alectryon diversifolius, Pittosporum viscidum, Croton insularis* and *Breynia oblongifolia*.

Ground: The ground layer is generally sparse in the good quality vine thicket. In the poor condition vine thicket, where the canopy is open, the grass species **Megathyrsus maximus* and **Cynodon dactylon* have become dominant ground cover species.

Climbers: Common vine species are *Eustrephus latifolius, Jasminum simplicifolium* subsp. *australiensis* and *Geitonoplesium cymosum*.

Vegetation Condition: Vegetation condition ranges from 'Poor' to 'Very Good to Excellent'.

Marburg Formation (Land Zone 9 and 10)

Plant community 3 - CcEc: Open forest to woodland of spotted gum (*Corymbia citriodora* var. *variegata*) with gum-topped ironbark (*Eucalyptus decorticans*) or narrow-leaved ironbark (*Eucalyptus crebra*) over tall open shrubland of *Acacia leiocalyx* subsp. *leiocalyx* over open tussock grassland of *Ancistrachne uncinulata* and *Aristida personata* on coarse-grained sedimentary rocks (Marburg formation). This spotted gum community occurs on the sedimentary formations in the west and northwest portions of the Study Area (Figure 5).

RE: 11.10.1

Conservation significance: 'Least Concern' VM Act status, 'No concern at present' Biodiversity Status.

Canopy: The canopy is dominated by *Corymbia citriodora* var. *variegata* (15-20 m, FPC 15-50%) and either *Eucalyptus decorticans* (15 m, FPC 15-20%) or *Eucalyptus crebra* (10 m, 5-15%).

Midstorey: The midstory ranges in height from 4-6 m, is generally sparse (generally <10% FPC) and consists mostly of *Acacia leiocalyx* subsp. *leiocalyx*. *Exocarpos cupressiformis* was recorded at one site.

Ground: The ground layer cover varies from 20-55% FPC, with areas recently burnt (3-5 yrs) having a greater ground cover (up to 55% cover). This layer is dominated by tussock grasses of the species *Ancistrachne uncinulata, Aristida personata, Aristida caput-medusa* and *Cymbopogon refractus*. Sparse forb species included *Lomandra multiflora* subspecies *multiflora* and *Hybanthus stellarioides*.

Vegetation Condition: Vegetation condition is in a 'Fair to Good' condition.

Plant Community 4 - FcSa: Open scrub of leopard ash (*Flindersia collina*), Ivory wood (*Siphonodon australis*), scrub cherry (*Exocarpos latifolius*) *and* shiny leaved canthium (*Canthium odoratum* forma *subnitida*) over shrubland of *Alectryon diversifolius, Breynia oblongifolia* and *Leucopogon biflorus* on sedimentary rocks (Marburg formation) on midslopes surrounding creeklines. This community occurs on sedimentary rocks and was located in one location in the central portion of the Study Area occurring on the mid to lower slopes surrounding a creekline (Figure 5).

RE: 11.9.4

Conservation status: 'Of Concern' VM Act status, 'Endangered' Biodiversity status. This community is a component of the 'Endangered' TEC *Semi-evergreen vine thicket of the Brigalow Belt (North and South) and Nandewar Bioregions*

Emergent: Emergent canopy species include *Eucalyptus crebra, Brachychiton rupestris* and *Ficus obliqua*

Canopy: The canopy forms an open scrub (5-7 m, 30-70% FPC) with a mixture of species including *Flindersia collina*, *Siphonodon australis, Exocarpos latifolius, Elaeodendron australe* subsp. *integrifolia* and *Canthium odoratum* forma *subnitida*.

Midstorey: The midstorey species make up a FPC percentage of up to 25% and include species *Breynia oblongifolia*, *Leucopogon biflorus, Olearia canescens* and *Alectryon diversifolius.*

Ground: The ground cover is generally sparse (> 25% FPC) and includes a mixture of tussock grasses and forbs including *Austrostipa ramosissima, Enneapogon lindleyanus, Cyperus gracilis*, *Lobelia purpurascens* and *Lomandra multiflora* subsp. *multiflora*.

Climbers: Vine species include *Sarcostemma viminale* subsp. *brunonianus, Jasminum simplicifolium* subsp. australiensis, *Geitonoplesium cymosum* and *Marsdenia* spp.

Vegetation condition: vegetation is in a 'Very Good to Excellent' condition.

Plant Community 5 - AhCc: Open forest of Brigalow *(Acacia harpophylla*) and/or *Casuarina cristata* on fine-grained sedimentary rocks. *Casuarina cristata* dominates patches of previously larger remnants in the south-western sections of the Study Area, while *Acacia harpophylla* dominates several small patches in the north-western sections of the Study Area. The small patches of this community were associated with roadside vegetation.

RE: 11.9.5

Conservation status: 'Endangered' VM Act status, 'Endangered' Biodiversity status. RE 11.9.5 is a component of the 'Endangered' TEC *Brigalow (Acacia harpophylla dominant and co-dominant)*.

Canopy: The height of the canopy ranges from 10-20 m with a FPC of 20-40% generally occurring as an open forest. The canopy is almost exclusively dominated by *Acacia harpophylla* and *Casuarina cristata*.

Midstorey: Generally dominated by juvenile *Acacia harpophylla* and *Casuarina cristata*.

Ground: The ground cover is predominately very sparse and generally dominated by exotic grasses.

Vegetation Condition: The vegetation condition of this community is 'Fair to Good'.

Alluvium (Land Zone 3)

Plant Community 6 - EtAf: Open forest to woodland to open woodland of Queensland blue-gum (*Eucalyptus tereticornis* subsp. *tereticornis*) over low woodland of rough-barked crab apple (*Angophora floribunda*), Moreton bay ash (*Corymbia tessellaris*) and Sally wattle (*Acacia salicina*) over tussock grassland of Poa sieberiana var. sieberiana, *Melinis repens, Cyperus gracilis and Swainsona sp. on alluvium surrounding creeklines.

This community occurs on the alluvium surrounding a number of streamlines in the northern sections of the Study Area (Figure 5).

RE: 11.3.25

Conservation status: 'Least Concern' VM Act status, 'Of Concern' Biodiversity status

Canopy: The upper canopy is composed of *Eucalyptus tereticornis* subsp. *tereticornis* (15-25 m, 20% FPC), with a lower tree canopy of *Angophora floribunda*, *Corymbia tessellaris* and *Acacia salicina* (8-10 m, 15-20% FPC).

Midstorey: The midstorey in this community is generally lacking. A few scattered midstorey species include *Alectryon diversifolius, Pimelea neoanglica, *Gomphocarpus fruticosus*, *Opuntia* sp., *Lantana camara.*

Ground: The ground layer in this community has been degraded due to grazing practices, and consists of a tussock grassland including *Poa sieberiana* var. *sieberiana*, *Melinis repens*, *Sporobolus elongatus* and *Eragrostis curvula.* Forbs include *Verbena aristigera, Swainsonia sp., and Lobelia purpurascens.

Regrowth and Non-remnant cleared paddocks

Much of the Study Area is comprised of regrowth vegetation and non-remnant cleared paddocks.

Areas of regrowth semi-evergreen vine thicket occur across the Study Area where slopes and crests of basalt have been cleared. Woodland of *Eucalyptus crebra* over closed tussock grassland of *Poaceae* sp., *Cymbopogon refractus and Sporobolus elongates* occurs across the eastern half of the Study Area. Scattered *Eucalyptus orgadophila* over scattered shrubs of *Canthium odoratum* forma *subnitida* and *Acacia leiocalyx* subsp. *leiocalyx* and *Opuntia* sp., over *Cynodon dactylon*, *Cyperus rotundus*, *Verbena aristigera* and *Sida hackettiana* occurs throughout the central and western sections of the Study Area.

In the cleared paddocks there are scattered native trees present including *Eucalyptus crebra, Eucalyptus orgadophila, Brachychiton rupestris* and *Ficus obliqua*, over scattered shrubs of *Acacia implexa, Elaeodendron australe* subsp. *integrifolia, Alectryon diversifolius, Opuntia* spp., *Lantana camara, Pimelea neoanglica, Sida hackettiana* and *Solanum ellipticum* over grasses and herbs of *Poa sieberiana* var. *sieberiana, Austrostipa scabra, Cymbopogon refractus, *Cynodon dactylon, *Megathyrsus maximus, *Cenchrus ciliaris, *Verbena aristigera* and *Verbena bonariensis*.

Threatened Ecological Communities

An ecological community (EC) is a group of native plants, animals and other organisms that naturally occur together and interact in a unique habitat. In Australia, three categories exist for listing TECs under the EPBC Act: Critically Endangered, Endangered and Vulnerable

The EPBC Act protected matters search tool (PMST) identified the potential occurrence of six TEC's in the locality. However, field surveys identified only two:

- Semi-evergreen vine thickets (SEVT) of the Brigalow Belt (North and South) and Nandewar Bioregions; 'Endangered', represented by RE 11.8.3 and RE 11.9.4
- Brigalow (*Acacia harpophylla* dominant and co-dominant); 'Endangered', represented by RE 11.9.5 and regrowth of 11.9.5.

The extent of these TECs in the Study Area is shown on Figure 5. Further analysis is provided below.

Semi-evergreen vine thickets

The SEVT of the Brigalow Belt (North and South) and Nandewar Bioregions TEC is listed as 'Endangered' under the EPBC Act. The SEVT TEC is represented by fifteen REs within Queensland, two of which, RE 11.8.3 and RE 11.9.4, have been identified and field-verified within the Study Area.

Brigalow, (*Acacia harpophylla* dominant and co-dominant)

The Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC is listed as 'Endangered' under the EPBC Act. Within the Study Area, this TEC is represented by RE 11.9.5. This RE is identified by the DNRM mapping and the 2008 field survey as occurring within the Study Area, but outside of the Project Site. The 2013 field survey did not cover this area of vegetation as it is well removed from the Project Site. An area of regrowth *Acacia harpophylla* was recorded in closer proximity to the Project Site, but again is well-removed from any potential impact .

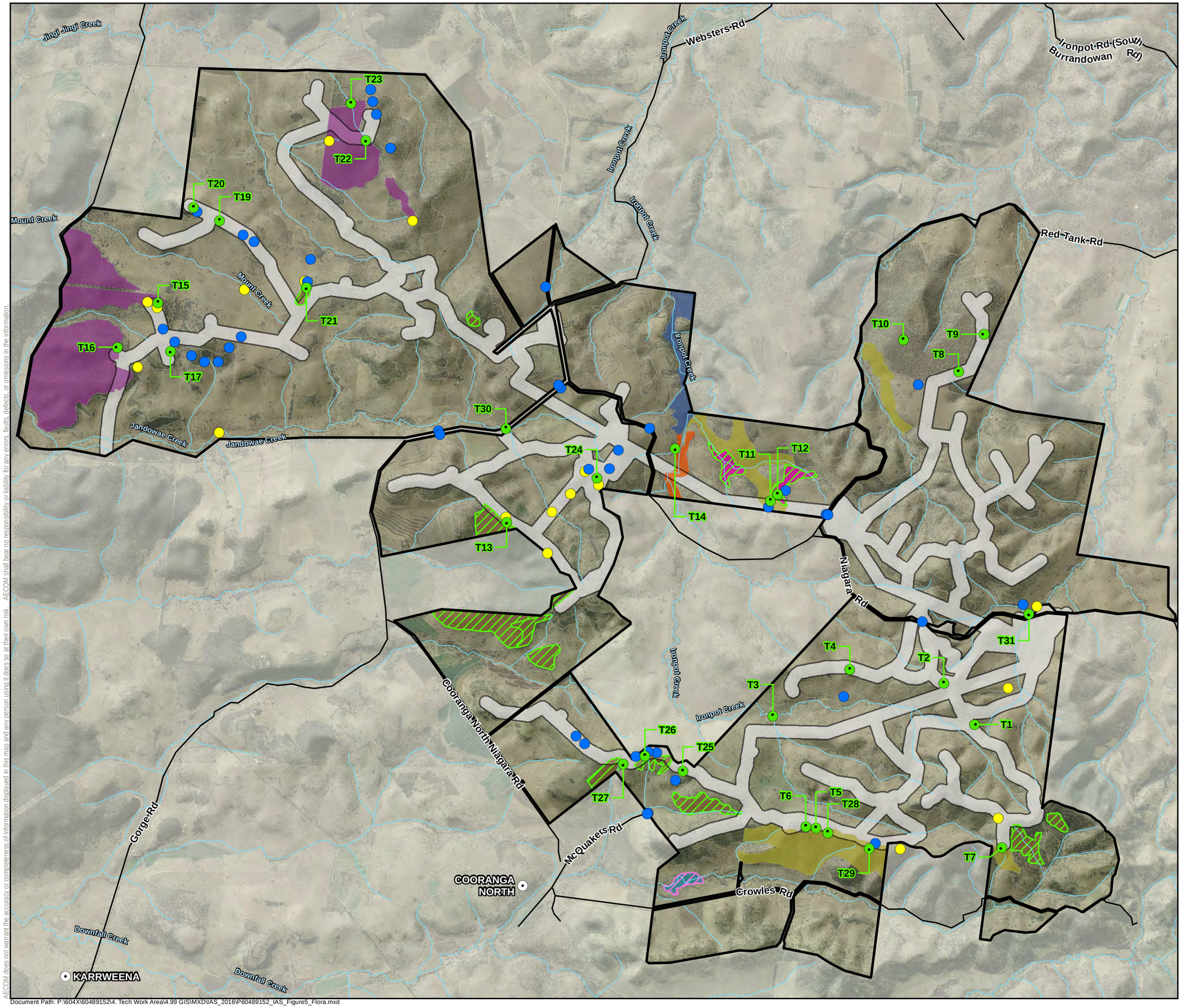
Vegetation condition

Vegetation condition across the Study Area ranges from 'Very Poor' to 'Very Good to Excellent'. Most of the Study Area is in a 'Very Poor' vegetative condition, associated with areas of cleared paddocks. High value regrowth vegetation is in a 'Very Poor' to 'Poor' condition, indicating communities where the vegetation structure has been destroyed or completely modified, where native flora composition is between 1 to 50%, where the cover abundance of weed species can be between 20 to <100% and disturbance incidence is high.

Remnant vegetation ranged in condition from 'Fair to Good' to 'Very Good to Excellent'. Plant communities EcEm, CcEc and EtAf were in a 'Fair to Good' condition, indicating a community where the structure has been modified (or nearly so), vegetation composition consists of 50 to 80% native species and a cover abundance of weed species is 5 to 20%, with minor signs of disturbance. These communities are woodland to open forest communities where grazing, weed invasion and fire have been the main disturbance factors.

The SEVT communities (Plant communities BaAc and FcSa) ranged in condition from 'Fair to Good' to 'Very Good to Excellent'. In areas where grazing pressure was reduced or excluded the vegetation condition was 'Very Good' to 'Excellent', indicating a community where the vegetation structure is intact or nearly so, with minimal disturbance, and the native vegetation composition is 80 to 100% and native weed cover is <5%. Areas where grazing pressure has opened up the structure of the community and allowed weeds to invade, the condition is in a 'Fair to Good' condition.

The vegetation condition across the Study Area is illustrated in Figure 6.



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Kilometres

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Legend

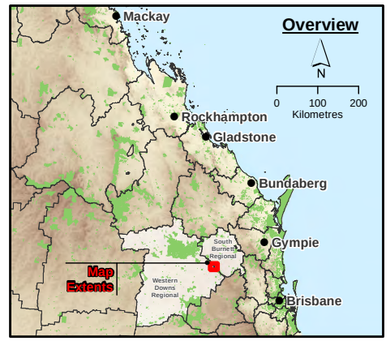
- Locality
- Observation Sites (2010)
- Quaternary Sites (2013)
- Tertiary Sites (2013)
- Road
- Vegetation Management Watercourse
- Project Site
- Study Area

Plant Communities

- AhCc
- BaAc
- CcEc
- EcEm
- EcEm/BaAc/EtAf
- EcEm/EtAf
- FcSa
- Non-remnant paddocks

Threatened Ecological Communities

- Brigalow Acacia harpophylla dominant and co-dominant
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions



Data Sources:
1. Project Site, Turbine Layout © 2016 AECOM Australia Pty Ltd.
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6. Hillshade, based on the 25m DEM covering the SEQ; DNRM 2005
7. Vegetation Management Watercourse and Drainage feature map (1:100 000 and 1:250 000) - version 1.4 dataset © State of Queensland (Department of Natural Resources and Mines) 2016
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12. Flora Observation Sites @ AECOM, 2010
13. Quaternary and Tertiary Sites @AECOM, 2013

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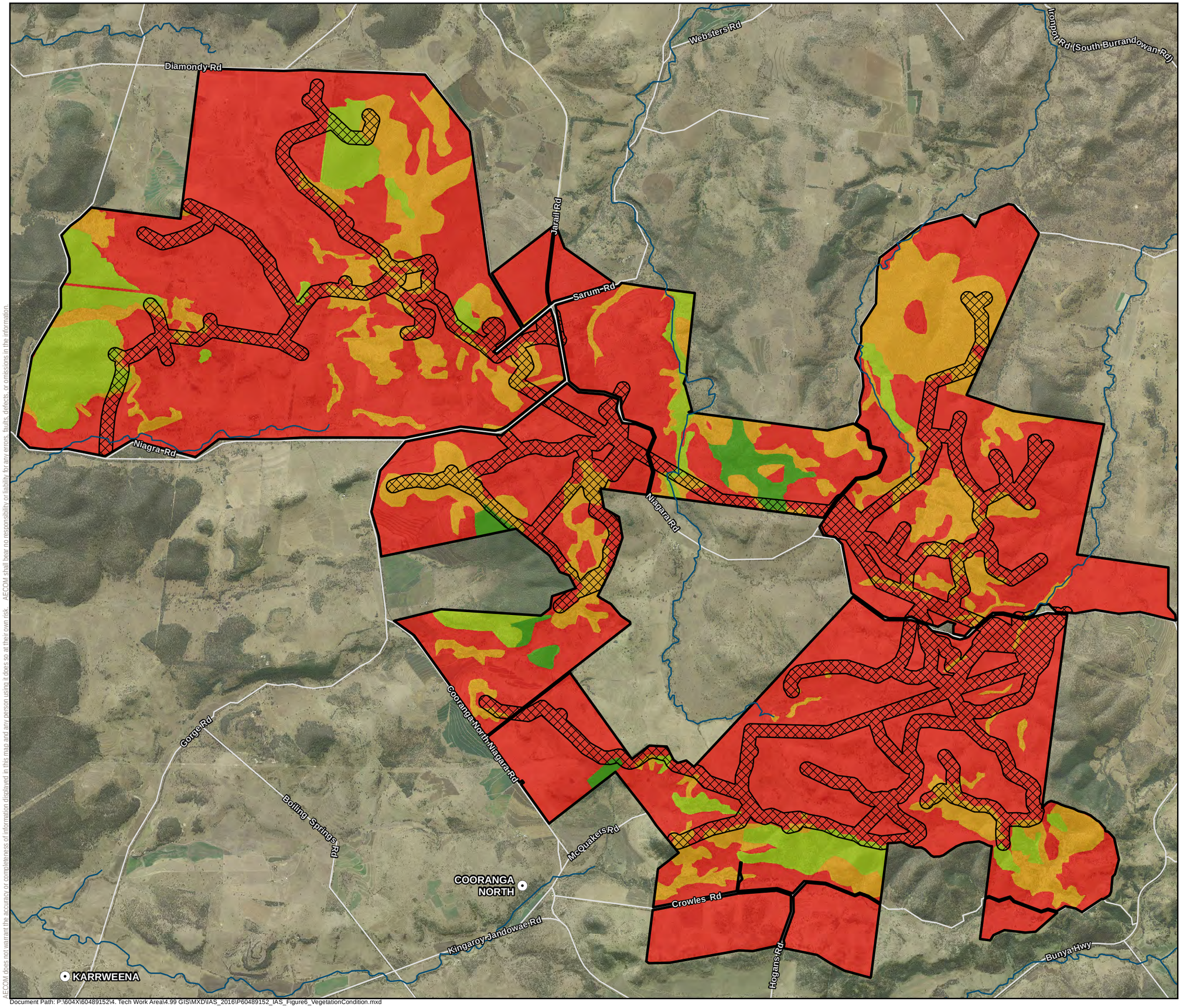
COOPERS GAP WIND FARM
INITIAL ADVICE STATEMENT

PLANT COMMUNITY MAPPING AND THREATENED ECOLOGICAL COMMUNITIES

PROJECT #:	60489152
CREATED BY:	BM
LAST MODIFIED:	BM: 23/05/2016
VERSION:	1

Figure 5

A3 size



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0 1 2
Kilometres

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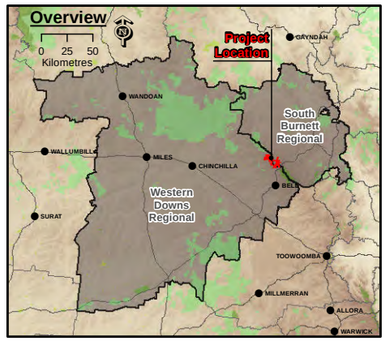
Legend

- Locality
- Road
- Project Site
- Study Area

Vegetation Management Watercourse
- Stream order 3 to 8

Vegetation Condition
- Very Poor
- Poor
- Fair to Good
- Very Good to Excellent



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COOPERS GAP WIND FARM
INITIAL ADVICE STATEMENT

VEGETATION CONDITION WITHIN STUDY AREA

PROJECT #:	60489152
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LAST MODIFIED:	BM: 23/05/2016
VERSION:	1

Figure 6

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A3 size

Flora species

Surveys identified 134 plant taxa from 103 genera and 45 families. Of the 134 taxa, 23 were introduced flora, representing 17% of the total flora recorded.

The dominant families were Poaceae (26 taxa), Myrtaceae (12 taxa), Asteraceae (9 taxa) and Mimosaceae (7 taxa). Common native tree species across the site were *Eucalyptus crebra, Eucalyptus tereticornis* subsp. *tereticornis, Canthium odoratum* forma *subnitida* and *Brachychiton* spp. Common native shrubs were *Acacia leiocalyx* subsp*. leiocalyx, Alectryon diversifolius*, *Pimelea neoanglica* and *Xanthorrhoea glauca*. Common native grass species were *Poa sieberi* subsp. *sieberi, Cymbopogon refractus, Panicum* sp., and *Dichanthium sericeum*.

The most common introduced taxa were **Opuntia* spp., **Lantana camara, *Gomphocarpus fruticosus, *Verbena aristigera*, **Cynodon dactylon, *Cyperus rotundus* and **Megathyrsus maximus*.

Threatened flora

Twenty-four threatened flora species were identified through database searches as occurring or potentially occurring within, or in close proximity to the Study Area. Of these, sixteen were considered 'Likely' or 'Possible' to occur within the Study Area based on a 'likelihood of occurrence' assessment. The likelihood of occurrence assessment used the following rating scale:

- *Known* – species positively recorded by this survey or other survey in the Study Area by qualified ecologist during the past 30 years
- *Likely* – based on the presence of suitable habitat and recent database records from the Study Area or proximity
- *Possible* – suitable habitat present for the species, but no recent database record from the Study Area or proximity
- *Unlikely* – based on a lack of suitable habitat and/or lack of proximate records.

The 16 species identified as 'likely' or 'possible' occurrences are listed in Table 5.5. No threatened flora species are known to occur within the Study Area and field surveys have not identified any threatened flora species. The DEHP Protected Plants Trigger Map does not identify the Project Site as being within a High Risk area.

Table 5.5 Likelihood of occurrence of threatened flora species

Family name	Species	Status (NC Act, EPBC Act)	Preferred habitat	Life strategy	Records	Likelihood
Asteraceae	*Rhaponticum australe* Austral cornflower, native thistle	V, V	Grows in open eucalypt forest with a grassy understorey, and along roadsides, growing in association with **Chloris gayana, *Cirsium vulgare, Eucalyptus tereticornis* and *Angophora floribunda*. Occurs on black clay soils (TSSC, 2008).	Perennial	EPBC Act search, Wildlife online	**Possible.** Suitable habitat is present within the Study Area; however limited proximal records exist for this species.
Celastraceae	*Denhamia parvifolia* Small-leaved Denhamia	V, V	"*Denhamia parvifolia is known from Eidsvold to Chinchilla and east of Kingaroy in Queensland. It occurs in roadside remnants of semi-evergreen microphyll vine thickets on red soil*" (TSSC, 2008).	Perennial	EPBC Act search	**Possible.** No proximal records exist for this species, however SEVT (RE 11.8.3) does occur within the Study Area.
Cupressaceae	*Callitris baileyi* Bailey's cypress pine	NT, -	Occurs in hilly or mountainous areas of the Moreton, Darling Downs and Burnett districts (Stanley & Ross, 1983). This species is known to occur within vine-thicket communities, specifically RE 11.8.3 (MacDonald, 2010) and also within eucalypt woodlands (CHAH, 2013).	Perennial	Herbrecs, Wildlife Online	**Possible.** Proximal records of this species to the Study Area exist, and suitable habitat (RE 11.8.3) occurs within the Study Area.
Cyperaceae	*Cyperus clarus*	V, -	Grows in grassland or open woodland, on heavy soils derived from basalt. Found from the Port Curtis, Burnett, Darling Downs, Leichardt, Maranoa and Warrego districts in Queensland (Wilson, 1993).	Perennial	Herbrecs, Wildlife online	**Possible.** Proximal records exist and appropriate habitat occurs within the Study Area, especially in areas that have not been heavily grazed.
Lauraceae	*Cryptocarya floydii* Gorge laurel	NT, -	*Cryptocarya floydii* grows in dry rainforest areas on dry rocky slopes or sides of gorges. In Queensland this species has been recorded from the Bunya Mountains (Stanley & Ross, 1983a).	Perennial	Wildlife online	**Possible.** While proximal records exist for this species, it is likely the

Family name	Species	Status (NC Act, EPBC Act)	Preferred habitat	Life strategy	Records	Likelihood
						records are from the adjacent Bunya Mountains. Suitable habitat is not considered to occur within the Study Area.
Orchidaceae	*Diuris parvipetala* Slender purple donkey orchid	V, -	*Diuris parvipetala* grows among grass in open forest, on ridges and gentle to steep slopes, amongst basalt boulders and on granite pavements (Stanley & Ross, 1983). In Qld, occurs from Mt Moffatt to Toowoomba, at 700-900 m altitude.	Geophyte	Wildlife online	**Possible.** Limited proximal records, although suitable habitat does exist within the Study Area.
Orchidaceae	*Pterostylis cobarensis* Cobar greenhood orchid	-, V	In Queensland, *Pterostylis cobarensis* has been recorded within the Darling Downs district. It grows in eucalypt woodland, open mallee, or *Callitris* shrubland on low stony ridges and slopes with skeletal sandy-loam soils (TSSC, 2008).	Geophyte	EPBC Act search	**Possible.** No proximal records, however, suitable habitat exists within the Study Area
Poaceae	*Bothriochloa bunyensis* Satin-top grass	V, V	*B. bunyensis* is endemic to south-east Queensland occurring along the Great Dividing Range from Bunya Mountains to Mt Mistake, at altitudes above 600 m. This species grows in woodland or grassland on upper slopes in fertile soils derived from basalt (Halford, 1998).	Perennial	Herbrecs, Wildlife online	**Possible.** Recorded at Bunya Mountains, and suitable habitat present. However, the site is used for grazing; therefore the condition of the habitat may not be appropriate.
Poaceae	*Dichanthium queenslandicum* King blue-grass	V, V	*Dichanthium queenslandicum* is endemic to central and southern Queensland. It occurs on black cracking clay soils around Emerald and more rarely the Darling Downs (Simon & Alfonso, 2011).	Perennial	EPBC Act search	**Possible.** While no proximal records exist, appropriate habitat does exist in the Study Area, if grazing pressure is not too high.
Poaceae	*Digitaria porrecta*	NT, -	Finger panic grass generally grows in grasslands occurring on basaltic plains, and in woodland and	Perennial	EPBC Act search	**Possible.**

Family name	Species	Status (NC Act, EPBC Act)	Preferred habitat	Life strategy	Records	Likelihood
	Finger panic grass		open forest on undulating hills underlain by basalt (TSSC 2008d). The soil generally consists of fine textured soils with some degree of seasonal cracking (TSSC, 2008).			While no proximal records exist, appropriate habitat does exist in the Study Area, if grazing pressure is not too high.
Poaceae	*Homopholis belsonii* Belson's panic	E, V	*Homopholis belsonii* occurs within the Brigalow Belt south in Queensland. It is known to occur in dry woodland habitats on poor soils, such as those derived from basalt. Occurs at elevations ranging from 200 to 520 m. Occurs on rocky hills supporting White Box (*Eucalyptus albens*) and in Wilga (*Geijera parviflora*) woodland, flat to gently undulating alluvial areas supporting Belah (*Casuarina cristata*) forest, and soils and plant communities of Poplar Box woodlands (TSSC, 2008).	Perennial	EPBC Act search	**Possible.** No proximal records, however, suitable habitat exists within the Study Area
Ranunculaceae	*Clematis fawcettii* Stream clematis	V, V	*Clematis fawcettii* inhabits canopy gaps in dry rainforest, complex notophyll vine forest, semi-evergreen vine thickets, and eucalypt open forest on loam soils derived from basalt and mixed volcanic rocks usually near streams (TSSC, 2008).	Perennial	EPBC Act search, Wildlife online	**Possible.** Proximal records of this species to the Study Area exist, and suitable habitat (RE 11.8.3) occurs within the Study Area.
Rhamnaceae	*Polianthion minutiflorum*	V, V	*Polianthion minutiflorum* is usually found in forest and woodland on sandstone slopes and gullies with skeletal soil, or deeper soils adjacent to deeply weathered laterite. It is known from five locations in Queensland from Redcliffe Vale south to Kingaroy (Kellerman, Rye, & Thiele, 2006).	Perennial	Wildlife online	**Possible.**
Rutaceae	*Phebalium distans* Mt Berryman	E. CE	*Phebalium distans* is endemic to south-east Queensland. It always grows in semi-evergreen vine thicket on red volcanic soils, or in communities	Perennial	EPBC Act search	**Possible.** While suitable habitat occurs

Family name	Species	Status (NC Act, EPBC Act)	Preferred habitat	Life strategy	Records	Likelihood
	phebalium		adjacent to this vegetation type. Populations are only known from near Mt Berryman and Mt Jones Plateau, near Kingaroy (TSSC, 2008).			within the Study Area, there is a lack of proximal records for this species.
Santalaceae	*Thesium australe* Austral toadflax, toadflax	V, V	*Thesium australe* is largely confined to moist grasslands, grassy woodlands or sub-alpine grassy heathlands, occurring in association with Kangaroo grass (*Themeda triandra*) and Poa spp. (DSE, 2003). *Thesium australe* is hemi-parasitic and often is parasitic on *Themeda triandra*.	Perennial	EPBC Act search, Wildlife online	**Possible.** Suitable habitat is present within the Study Area.
Surianaceae	*Cadellia pentastylis* Ooline	V, V	"*Ooline grows in dry rainforest, semi-evergreen vine thickets and sclerophyll ecological communities, often locally dominant or as an emergent*" (TSSC, 2008).It ranges in distribution from Mt Black Jack near Gunnadah to west of Tenterfield in NSW, and extend into Queensland to Carnarvon Range and the Callide Valley, south-west of Rockhampton (TSSC, 2008).	Perennial	EPBC Act search	**Possible.** Suitable habitat is present within the Study Area, however, there is a lack of proximal records.

Introduced flora

Three 'Declared' flora species listed under LP Act were recorded by the survey:

- *Opuntia spp. (**Opuntia tomentosa* and **O. stricta*) (Class 2); and
- Lantana (**Lantana camara*) (Class 3).

Non-declared weeds that were recorded across the Study Area include: Buffel Grass (**Cenchrus ciliare*), Couch (**Cynodon dactylon*) and Green Panic (**Megathyrsus maximus*). While these species are not declared plants, they still pose a significant risk to biodiversity through altering the structure and composition of native vegetation communities. Weed invasion is one of the dominant threats to the SEVT TEC.

5.1.5.2 Fauna

Fauna habitat

The Study Area contains five broad habitat types:

1) Fringing riparian woodlands
2) Vine thickets
3) Eucalypt woodland or open forest
4) Non-eucalypt open forest
5) Non-remnant open grassland pasture.

A broad description of their characters is provided in Table 5.6, and their extent is shown on Figure 7.

Table 5.6 Broad habitat types identified within the Study Area

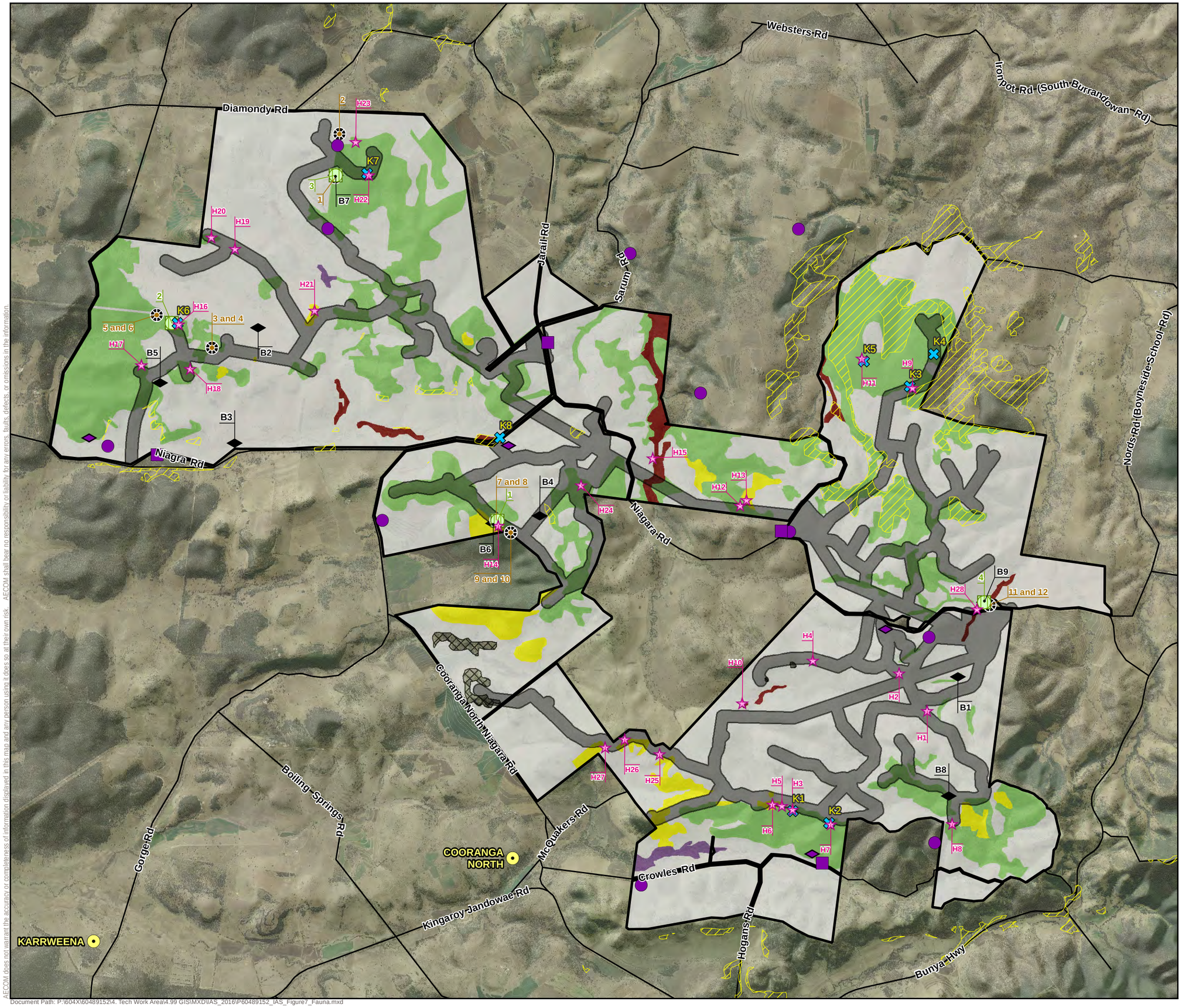
Habitat type	RE	Habitat description	Habitat values and condition	Vegetation condition	Area of habitat within the Study Area (ha)	Threatened fauna that could occur within the habitat type
Fringing riparian woodlands	11.3.25 Regrowth of 11.3.25	Open woodland to open forest associated with stream channels and ephemeral tributaries. Upper canopy dominated by eucalypt species (*Eucalyptus tereticornis* subsp. *tereticornis* and *E. camaldulensis*). Lower tree stratum species include *Angophora floribunda*, *Corymbia tessellaris, Acacia salicina*, *Melaleuca bracteata*, and *Casuarina cunninghamiana*. The shrub layer is generally is sparse, with a dense ground layer of grass species, including *Dichanthium sericeum*, *Sporobolus elongatus*, *Panicum* spp. and on the more disturbed sites **Megathyrsus maximus* and **Chloris gayana.*	Provides habitat to a range of forest and woodland-dependent and generalist species as well as species specialising in riparian habitats or requiring access to water. Dense ground layer can provide cover for reptiles and ground-dwelling mammals. Numerous hollow-bearing trees were present in this habitat providing nesting and denning sites for arboreal fauna. Fringing riparian woodlands also provides wildlife corridors for fauna species.	Remnant vegetation is in a 'Fair to Good' condition. Regrowth is in a 'Very Poor' to 'Poor' condition.	109.48	- Regent honeyeater - South-eastern long eared bat - Koala - Grey-headed flying-fox - Northern quoll - Spotted-tailed quoll (s. ssp) - Collared delma
Vine thickets	11.8.3 11.9.4 Regrowth of 11.8.3 Regrowth of 11.9.4	Occurs primarily on steeper hillsides. The canopy has emergent *Brachychiton rupestris*, *Ficus obliqua* and eucalypt species (*E. crebra* and *E. orgadophila*). The shrub layer is approximately 5-8 m tall and dense (up to 70% cover where not disturbed), consisting of wide variety dry rainforest species including *Backhousia angustifolium*, *Canthium odoratum* forma *subnitida, Alphitonia*	Provides habitat for rainforest and closed forest species. High structural complexity and species diversity can provide foraging and shelter resources across a range of strata. The habitat differs from the other open Eucalypt communities which occur more commonly in the broader landscape. Small hollow bearing trees are rare, but where available provide habitat for smaller hollow-nesting species. Occasional dead	Remnant vegetation in a 'Fair to Good' to 'Very Good to Excellent' condition. Regrowth in a 'Poor' condition.	231.7	- Black-breasted Button-quail - South-eastern long eared bat - Grey-headed flying-fox - Coxen's fig-parrot - Northern quoll - Spotted-tailed quoll (s. ssp)

Habitat type	RE	Habitat description	Habitat values and condition	Vegetation condition	Area of habitat within the Study Area (ha)	Threatened fauna that could occur within the habitat type
		excelsa and Alectryon diversifolius. The ground layer is sparse due to the dense shrub layer, and consists of scattered grasses and herbs.	stags, peeling bark suitable for roosting microbats and skinks. Rocky debris provides cover for reptiles (although generally shaded) and ground-dwelling mammals. Rocky outcrops provide roosting, nesting and shelter sites for bats, ground-dwelling mammals and reptiles. Habitat suitable for birds of dense shrublands, shade-tolerant reptiles, small mammals, macropods, microbats and possibly woodland frogs.			
Eucalypt woodland or open forest	12.8.16 11.8.5 11.10.1 Regrowth of 12.8.16 Regrowth of 11.8.5 Regrowth of 11.10.1	Sparse to mid-dense woodland dominated by *Eucalyptus* or *Corymbia* species (*E. crebra*, *E. orgadophila*, *E. melanophloia*, *E. propinqua*, *C. citriodora*) although occasionally other species may be present (e.g. *Angophora woodsiana*). Shrub layer is generally absent or sparse consisting of *Xanthorrhoea glauca, Acacia* spp. or juvenile canopy species. Ground layer density varies from open to closed tussock grassland and is comprised of a mixture of native and exotic grasses (*Bothriochloa ewartiana*, *Dichanthium sericeum*, *Poa sieberi* subsp. *sieberi, Aristida caput-medusa, Sarga leiocladum* and **Chloris gayana*). Pasture weeds may also be present	Likely to provide habitat for a wide of range of woodland-dependent and generalist fauna. Flowering *Eucalyptus* and *Corymbia* species provide significant seasonal nectar resources. Stags and hollows in eucalypts provide habitat for bats, hollow nesting birds such as owls, and arboreal mammals. Grassy understorey, litter, logs and large rocks provide shelter and foraging resources for small vertebrate species, especially skinks, geckos, snakes and small-medium sized terrestrial/ semi-arboreal mammals.	Remnant vegetation in a 'Fair to Good' condition. Regrowth in a 'Very Poor' to 'Poor' condition.	2,415.1	- Squatter pigeon (southern) - Regent honeyeater - Large-eared pied bat - Northern quoll - Spotted-tailed quoll (s. ssp.) - South-eastern long eared bat - Koala - Grey-headed flying-fox - Collared delma - Yakka skink - Dunmall's snake

Habitat type	RE	Habitat description	Habitat values and condition	Vegetation condition	Area of habitat within the Study Area (ha)	Threatened fauna that could occur within the habitat type
		and include **Zinnia peruviana* and **Verbena bonariensis*.				
Non-eucalypt open forest	11.9.5 Regrowth of 11.9.5	Patches of this habitat are heavily dominated by *Casuarina cristata* or *Acacia harpophylla* (generally in small patches along roadsides). The shrub layer consists of juvenile canopy species. The ground layer is dominated by exotic grasses and is generally sparse.	Likely to provide limited habitat for a range of woodland-dependent species. Seeds of she-oaks (Casuarinaceae) can provide a food source for many seed eating species such as the glossy black-cockatoo (*Calyptorhynchus lathami*). Litter provides shelter and foraging resources for ground dwelling species such as reptiles at sites in good condition.	Condition not known[1].	31.2	- Glossy black-cockatoo - South-eastern long eared bat - Koala - Dunmall's snake - Yakka skink - Collared delma
Non-remnant pasture (closed tussock grassland)	NA	This is the dominant habitat type in the Study Area. It consists of closed tussock grassland of native and exotic pasture grasses (*Chloris gayana*, *Poa sieberi* subsp. *sieberi*, *Dichanthium sericeum, Cenchrus ciliaris*, *Eragrostis curvula* and *Panicum* spp.) There is a low density of scattered native trees including *Eucalyptus crebra, E. orgadophila, E. tereticornis*, *Brachychiton rupestris* and *Angophora floribunda* and a low density of scattered native regrowth shrubs	Reduced habitat values for most species. Paddock trees and small habitat patches may be used by species capable of crossing large open spaces. Extensive grasslands suitable for open grassland species. This broad habitat is most suitable for disturbance-tolerant species. It may be occasionally crossed by forest-dependent species moving between more intact forest remnant.	'Very Poor'	7,380.3	- Squatter pigeon (southern subspecies)

[1] This broad habitat type is well-removed from the Project Site and was not subject to detailed assessment.

Habitat type	RE	Habitat description	Habitat values and condition	Vegetation condition	Area of habitat within the Study Area (ha)	Threatened fauna that could occur within the habitat type
		include *Acacia leiocalyx, A. implexa, A. salicina, Canthium odoratum* forma *subnitida, Elaeodendron australe* and *Alectryon diversifolius*.				



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DATUM GDA 1994, PROJECTION MGA ZONE 56

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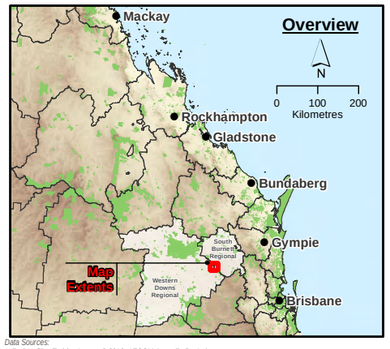
Legend

- Habitat Assessment (2013)
- Detailed Trap Sites (2012)
- Remote Camera / Hair Tube Sites (2012)
- Koala SAT sites (2013)
- Bat Detection (2010)
- Bat detection (2008)
- Bird utilisation survey (2008)
- Call playback for nocturnal birds (2008)
- Locality
- Road
- Project Site
- Study Area

Broad Habitat Types

- Eucalypt Woodland or Open Forest
- Fringing Riparian Woodlands
- Non-eucalypt Open Forest
- Vine Thickets
- Non-remnant (Open Grassland Pasture)
- Unknown / Unverified Habitat
- Essential Regrowth Habitat (Koala)



Data Sources:
1. Project Site, Turbine Layout © 2016 AECOM Australia Pty Ltd.
2. Surat Basin 40 cm imagery © SISP 2013
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COOPERS GAP WIND FARM
INITIAL ADVICE STATEMENT

FAUNA HABITAT, SURVEY LOCATIONS AND BROAD HABITAT TYPES

PROJECT #:	60489152
CREATED BY:	BM
LAST MODIFIED:	BM: 23/05/2016
VERSION:	1

Figure 7

A3 size

Document Path: P:\604X\60489152\4. Tech Work Area\4.99 GIS\MXD\IAS_2016\P60489152_IAS_Figure7_Fauna.mxd

Fauna species

Surveys conducted between 2008 and 2013 have recorded 146 fauna species, including: six species of amphibian; 10 species of reptile; 95 species of bird; and 35 species of mammal. The suite of species recorded is characteristic of the highly fragmented landscape in which the Study Area occurs. One species of conservation significance has been recorded by the surveys: koala (*Phascolarctos cinereus*) ('Vulnerable' EPBC Act).

Koala

To inform koala occurrence within the Study Area, targeted koala surveys were conducted during a 2013 Summer Survey. Locations for the SATs were determined by an assessment of the likely koala habitat within the Study Area, including mapping 'essential regrowth habitat' for koala. During the survey one koala was observed at SAT site K1. Broad canopy survey efforts conducted between 2008 and 2013 did not identify any additional individuals in the Study Area.

During the 2013 Summer Survey, koala scats were recorded from three SAT survey sites: K1, K2 and K5. Table 5.7 shows koala utilisation for each SAT site. At sites K2 and K5, the scat results returned both koala and possum scats, therefore the utilisation recorded for these sites represent the upper limits of koala utilisation.

Table 5.7 Koala utilisation

Koala site	Verified RE	Koala utilisation	Commentary	Utilisation category*
K1	RE 12.8.16	16.67%	-	High
K2	RE 12.8.16	20.00%	Scat analysis results for these sites returned both koala and possum scats, therefore the utilisation recorded at these sites is considered the upper limits of koala utilisation	High
K3	Regrowth of 12.8.16	0	-	No utilisation
K4	Regrowth of 12.8.16	0	-	No utilisation
K5	Regrowth of 12.8.16	30%	Scat analysis results for these sites returned both koala and possum scats, therefore the utilisation recorded at these sites is considered the upper limits of koala utilisation	High
K6	RE 11.10.1	0	-	No utilisation
K7	RE 11.10.1	0	-	No utilisation
K8	Regrowth of 11.3.25	0	-	No utilisation

* The utilisation category is based on the koala activity table in The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas (Phillips and Callaghan 2011). Scat strike rates of greater than 12.59% in low density habitat represents 'high' utilisation.

The SAT identified koala utilisation only within RE 12.8.16 and regrowth of 12.8.16 (a subset of Broad Habitat Type 3 – Eucalypt woodland and open forest). This RE contains Queensland blue gum (*E. tereticornis*), a species which is widely recognised as being of significance for koalas. Queensland blue gum is also common in the Broad Habitat Type 1 – Fringing Riparian Woodlands, and despite a lack of direct or indirect observation, it is considered likely that koalas will also preferentially use these parts of the Study Area.

Koala habitat is defined as any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. This can include remnant and non- remnant vegetation in natural, agricultural, urban and peri-urban environments. Koala habitat is defined by the vegetation community present and the vegetation structure; the koala does not necessarily have to be present (DOTE, 2014).

Koala food trees are species of tree whose leaves are consumed by koalas. Koala food trees can generally be considered to be those of the following genus: Angophora, Corymbia, Eucalyptus, Lophostemon and Melaleuca. It should be noted that food tree species may vary spatially and temporally and information specific to the local area

is likely to be most accurate. Also note that 'primary' and 'secondary' food trees (as defined by some resources) are all considered to be 'food trees' for the purposes of assessment using these guidelines.

The areas of RE 12.8.16 and regrowth of 12.8.16 contain koala food trees and are capable of supporting viable medium to low density koala populations. Despite a lack of direct or indirect koala observation, it is considered possible that the Study Area's Fringing Riparian Woodland Broad Habitat Type may also provide suitable food trees and habitat. The Study Area's remaining Eucalypt woodlands and Open Forest communities are capable of supporting low-density koala populations.

A habitat assessment tool is provided within the DOTE referral guidelines to assist in identifying whether an impact area contains habitat that is critical to the survival of the koala (DOTE, 2014), which has been applied to the Project in Table 5.8.

Table 5.8 Koala habitat assessment tool

Attribute	Score	Description/Commentary
Koala occurrence	+2 (high)	- The 2013 Summer Survey identified that there is evidence of one or more koalas occurring within the Study Area within the last five years. - The SAT survey sites indicated high utilisation in three areas of the Study Area. - The EPBC PMST, Wildlife Online and Living Atlas of Australia also indicate koala records in the Study Area.
Vegetation composition	+1 (medium)	- The Project Site has small pockets of remnant vegetation and regrowth vegetation with two or more known koala food tree species.
Habitat connectivity	0 (low)	- The vegetation within the Project Site is highly fragmented and not part of a contiguous landscape*. It forms small pockets of habitat within a predominantly rural/agricultural landscape. - There are limited forested riparian zones and other corridors connecting the larger patches. - There a small number of barriers to connectivity, including steep cliffs, cattle and roads.
Key existing threats	+1 (medium)	- There are no known data on koala mortality from vehicle strike or dog attack. However, field survey has confirmed the presence of feral dogs (predator scats) within the Study Area. This presence is considered an existing threat to the koalas within the Study Area.
Recovery value	0 (low)	- The habitat within the Project Site is unlikely to be important for achieving the interim recovery objectives as its connectivity to other areas of koala habitat and surrounding habitat refuges is limited by the use of the land (for predominantly grazing purposes). - The Project Site does not form part of the South East Queensland Koala Conservation Area

* Defined in the guidelines as an area of koala habitat that is greater than 500 ha in the inland context, which encompasses no barriers but is bounded by barriers.

The koala habitat assessment tool provides a total habitat score of +4 for the Project. This indicates that the impact area does not contain habitat critical to the survival of the koala; that the Project will not adversely affect habitat critical to the survival of the koala; and that the Project will not interfere substantially with the recovery of the koala (through the introduction or exacerbation of key threats).

Bats

During the 2010 Survey, calls from Microchiropteran bats in the *Nyctophilus* genera were recorded at seven of the nine Anabat locations. *Nyctophilus* species cannot be separated on calls alone. However, as the Study Area is

within the range of south-eastern long-eared bat (*Nyctophilus corbeni)* and contains suitable habitat, the *Nyctophilus* spp. is treated as *Nyctophilus corbeni* as a precautionary approach, which is listed as Vulnerable under the EPBC Act.

Based on the broad number of sites (and diversity of habitats) in which *Nyctophilus* spp. was encountered, the south-eastern long-eared bat is considered likely to be common and widespread in the Study Area and surrounding landscape. Within these areas it will preferentially occupy Eucalypt and vine thicket communities. Records from the farm dam (within the non-remnant grassland broad habitat) need to be interpreted with care. While dams of this nature will be frequently used as watering points by Microchiropteran bats, the broader open grassland habitats in which they occur will be of low habitat value.

Other species

In addition to the two threatened species known to occur within the Study Area, a further 24 species were identified through desktop assessment as “potential occurrences”. Based on a “likelihood of Occurrence” assessment a further 12 species were considered possible occurrences. Of this group, four were considered likely to occur (black-breasted button quail; spotted-tailed quoll; grey-headed flying fox; and collared delma). The remainder were considered possible occurrences.

The 14 species considered as ‘likely’, ‘possible’ or ‘confirmed’ occurrences in the Study Area are discussed further in Table 5.9.

Table 5.9 The likelihood of occurrence of threatened fauna species within the Study Area

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
Birds				
Coxen's fig-parrot *Cyclopsitta diophthalma coxeni*	E, E	The accepted core range of Coxen's fig parrot is from Gympie in South-east Queensland to the Richmond River in NSW, and as far west as the Bunya Mountains and the Koreelah Range (Coxen's fig parrot recovery team 2001). Recent records of Coxen's fig-parrots are from subtropical rainforest, dry rainforest, littoral and developing littoral rainforest, sub-littoral mixed scrub, riparian corridors in woodland, open woodland and otherwise cleared land, and urbanised and agricultural areas with fig trees. These sightings span a range of altitudes from sea level to about 900m above sea level. Areas with a high fig diversity, where fruiting is staggered along moisture and altitudinal gradients, may be favoured (ibid.).	Vine thickets	The Study Area is located slightly beyond the western limit of the species' current known range. It supports dry rainforest (an identified habitat for this species), but lacks areas with a high diversity of figs, where fruiting is staggered along moisture and altitudinal gradients (refer Coxen's fig parrot recovery team 2001). Coxen's fig parrot cannot be discounted as a **possible** occurrence, but use of the Study Area's dry rainforest habitats appears likely to be very uncommon. Suitable vine thicket habitat occurs within and adjacent to the Project Site, but its use appears likely to be very uncommon.
Regent honeyeater *Anthochaera phrygia*	E, CE	In Queensland, the regent honeyeater has been primarily recorded from the south-east corner, south of a line between Chinchilla and the Sunshine Coast. There are records from several State Forests, including breeding activity in suitable habitat, particularly in the Warwick-Stanthorpe districts (Qld EPA, 2008). Regent honeyeaters are strongly associated with box-ironbark eucalypt associations, and appear to prefer wetter more fertile areas, such as broad river valleys, creek flats and lower slopes, within this vegetation community (Menkhorst & Hynes, 2010). River she-oak (*Casuarina cunninghamiana*), and the associated mistletoe, also appears to be important, particularly in years when flowering is poor in the surrounding eucalypt woodlands (Oliver, 1998).	Fringing riparian woodlands Eucalypt woodland or open forest	The Study Area is located near the northern extent of the species' accepted range. The Project Site is primarily associated with upper slopes and ridge crests; areas removed from the preferred lower slopes and fertile river valleys. The regent honeyeater cannot be discounted as a **possible** occurrence, but use of the Study Area appears likely to be very uncommon. Suitable habitat occurs within and adjacent to the Project Site, but its use appears likely to be very uncommon.
Black-breasted	V, V	The black-breasted button quail occurs as scattered populations in eastern Queensland and NSW. Populations generally occur to the east of the Great Dividing Range, but there are records from Palm Grove	Vine thickets	Not recorded during targeted survey and passive observation over 5 year survey period, but suitable habitat is present. Considered to be a **possible**

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
Button-quail *Turnix melanogaster*		National Park and Barakula State Forest, 300km inland. (Mathieson & Smith, 2009; Garnett, Szabo, & Dutson, 2011). The black-breasted button-quail occurs in semi-evergreen vine thicket, low microphyll vine forest, Araucarian microphylll forest, Aruacarian notophyll vine forest, Brachychiton spp. scrubs, low thickets or woodlands with a dense understorey but with little ground cover, littoral situations, acacia thickets and areas densely covered in shrubs (Curtis, Dennis, McDonald, & Kyne, 2012)		occurrence. Suitable vine thicket habitat occurs within and adjacent to the Project Site.
Squatter pigeon (southern subspecies) *Geophaps scripta scripta*	V, V	The squatter pigeon is now largely (if not wholly) restricted to Queensland. Its range extends from the NSW border, north to Burdekin River, west to Charleville and Longreach, and east to the coast to Townsville and Proserpine (DSEWPAC, 2013m; Curtis, Dennis, McDonald, & Kyne, 2012). The squatter pigeon occurs in dry grassy woodland and open forest, mostly in sandy sites close to water (Curtis, Dennis, McDonald, & Kyne, 2012).	Eucalypt woodland or open forest Non-remnant (open grassland-pasture)	The squatter pigeon occurs in open grassy habitat, and is readily observed during site traverse. This species has not been observed during the 5 years survey period, but it cannot be discounted as a **possible** occurrence. Suitable open grassland and grassy woodland habitat occurs within and adjacent to the Project Site.
Glossy black-cockatoo *(Calyptorhynchus lathami)*	V, -	The glossy black-cockatoo prefers woodland dominated by she-oaks (Casuarinaceae) or open woodland with a middle storey dominated by she-oaks. In south east Queensland it is found in brigalow/she-oak woodlands, coastal lowlands and offshore islands. This species primarily feeds on black she-oak (*Allocasuarina littoralis*) and forest she-oak (*A. torulosa*) (Curtis, Dennis, McDonald, & Kyne, 2012). The range of the glossy-black cockatoo extends from Eungella in Queensland to Mallacoota in Victoria, and as far west as Morven in Queensland. It is thinly and patchily distributed within this range (Higgins, 1999; Garnett & Crowley, 2000).	Non-eucalypt open forest	The predominant feed trees of this species (*Allocasuarina littoralis* and *Allocasuarina torulosa*) were not recorded within the Study Area. Small stands of *Casuarina cristata* occur along creeklines and in paddocks. Feed tree density is considered too sparse to establish important forage habitat for this species. Suitable hollow-tree nest sites are available, but in the absence of forage habitat may remain unutilised. The glossy-back cockatoo is considered a **possible** occurrence. Suitable habitat does not occur within or adjacent to the Project Site.

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
Mammals				
Large-eared pied bat (*Chalinolobus dwyeri*)	V, V	The large-eared pied bat has a poorly known distribution. It is most commonly known from NSW where it occurs in association with the sandstone escarpments of the Sydney basin and north-west slopes. In Queensland the species is found in areas with extensive cliffs and caves, primarily in the central Queensland sandstone belt associated with the Carnarvon Ranges, Blackdown Tableland and Cania Gorge. Records from south-east Queensland suggest that high elevation areas of rhyolite, trachyte and basalt may be similarly important (Curtis, Dennis, McDonald, & Kyne, 2012; Churchill, 2008; DSEWPAC, 2013d). The large-eared pied bat is dependent on the presence of diurnal roosts for shelter. Roosts are utilised during the day and also at night when not feeding, as well as for the raising of young. This bat has been known to roost in disused mine shafts, caves, overhangs and abandoned fairy martin Hirundo ariel nests (Schulz 1998). The value of mine shafts and disused fairy martin nests as roost sites has not been evaluated to date. From the type locality it would appear that mines may offer important roost sites, particularly in areas where natural roosts are uncommon or absent. Fairy martin nests may also provide roosting resources in these areas, allowing the large-eared pied bat to penetrate otherwise unsuitable areas and enabling individuals to disperse across areas lacking cave roosts (DERM 2011c). Sandstone cliffs and fertile wooded valley habitat within close proximity of each other should be considered habitat critical to the survival of the large-eared pied bat (DECC 2007). Records from south-east Queensland suggest that rainforest and moist eucalypt forest habitats on other geological substrates (viz. rhyolite, trachyte and basalt) at high elevation are of similar importance for the species (DERM 2011c).	Eucalypt woodland or open forest	The Study Area is within the range of this species and contains habitat which is broadly suitable. However, the specific micro-habitat requirements identified as critical to the survival of this species (refer DERM 2011c) are absent. The large-eared pied bat cannot be discounted as a **possible** occurrence, but the Study Area does not provide critical habitat for this species. This may be reflected in the absence of survey records from the comprehensive Anabat survey. Suitable forage habitat occurs within and adjoining the Project Site.
Northern quoll (*Dasyurus*	-, E	The current distribution of the northern quoll is discontinuous across northern Australia, with core populations in rocky and/or high rainfall	Eucalypt woodland or	Historically the Study Area was close to the southern limit of the species' range. However, a

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
hallucatus)		areas. In Queensland, some populations of northern quolls have persisted following colonisation by cane toads. These areas include, but are not restricted to, upland rocky areas (Cape Cleveland/Mt Elliott, Mareeba, Crediton, Eungella, Clarke Range) and several coastal sites (Cleveland, Cape Upstart, Cape Gloucester, Condor Range) in north and central Queensland (Hill and Ward 2010). The Study Area is at the southern extent of the species' former known range, but there has been a range contraction to the north, and the northern quoll has not been recorded in the southern Queensland since 1999 (Ibid.). Northern quolls do not have highly specific habitat requirements. They occur in a variety of habitats across their range. They are opportunistic foragers that feed on a broad range of items switching dietary resources according to season and availability. Daytime den sites provide important shelter and protection for northern quolls from predators and weather. However, shelter sites are also non-specific; rocky outcrops, tree hollows, hollow logs, termite mounds, goanna burrows and human dwellings have all been recorded. Therefore habitat critical to survival is that where northern quolls are least exposed to threats or least likely to be in the future. Rocky areas provide prime habitat for northern quolls and many other declining animal species. Recent modelling of island populations in the Northern Territory established that occurrence of northern quolls was related to ruggedness or topographic complexity. Analyses show that northern quoll declines in Queensland have mainly been in lowland and flatter (less rugged) areas and a recent survey found the most abundant remnant populations on the Queensland coast were at sites with large boulders. Rocky areas retain water and have a diversity of microhabitats, so support higher floristic diversity and productivity and thus greater prey density and/or diversity compared to non-rocky adjacent country. In addition, cats forage less effectively in rocky areas. Their topographic complexity may also serve to ameliorate fire impacts,	open forest Vine thickets Fringing riparian	significant range contraction has occurred and the northern quoll may no longer occur in southern Queensland. Further, the Study does not support the rugged rocky habitat preferred by this species. While it is not possible to completely discount the occurrence of the northern quoll, the factors discussed above indicate that it is a **possible** (but probably very unlikely) occurrence. If present, suitable forage and denning habitat occurs within and adjacent to the Project Site.

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		and they are typically not used for livestock production (Hill and Ward 2010).		
Spotted-tailed quoll (s. ssp) (*Dasyurus maculatus maculatus*)	V, E	The Spotted-tailed quoll occurs in south-east Queensland: coastally from Bundaberg to the border and inland to Monto and Stanthorpe. Occurrences from five broad geographic areas are known: four from coastal ranges and the Great Dividing Range from the NSW border to Gladstone. The fifth is centred on the Eastern Darling Downs-Inglewood Sandstone provinces of the Brigalow Belt South Bioregion. Unconfirmed reports suggest the subspecies may occur in the Clarke and Conway Range areas, eastern Queensland (DSEWPaC 2013a). The spotted-tailed quoll is a forest dependent species. It has been recorded in rainforest, wet and dry sclerophyll forest and woodland habitats. The spotted-tailed quoll has been found on the margins of farmland and its preferred habitat includes escarpments, gullies, saddles and riparian habitat as well as rocky areas where it finds den sites. Highly disturbed forests and exotic plantations are unlikely to be important habitat. Individual spotted-tailed quolls can range over significant areas (up to 4km, and males can range more than 10 km in the winter mating season). The species is likely to occur across all land tenures (NSW NPWS 1999).	Vine thickets Eucalypt woodland or open forest Fringing riparian	ERM (2008) notes that landholders had recorded spotted-tailed quolls within the Study Area. The Study Area is within the range of a reported population (Eastern Darling Downs-Inglewood Sandstone provinces of the Brigalow Belt South Bioregion – refer DSEWPaC 2013a) and contains suitable habitat. In this regard it is considered appropriate to record the landholder observations as a **likely** (and possibly **confirmed**) occurrence of the species. The Project Site intersects suitable forage and denning habitat for this species.
South-eastern long eared bat (*Nyctophilus corbeni formerly Nyctophilus timoriensis)*	V, V	In Queensland, the South-eastern Long-eared Bat is mainly recorded in the Brigalow Belt South Bioregion, extending eastwards to the Bunya Mountains National Park. It has been recorded as far north as the Expedition Range and Dawson River areas. Its westerly range extends into the Mulgalands Bioregion and west of Bollon (DSEWPaC 2013b). The South-eastern Long-eared Bat occurs in a range of inland woodland vegetation types, including box, ironbark and cypress pine woodlands. The species also occurs in Buloke woodland, Brigalow woodland, Belah	Eucalypt woodland or open forest Fringing riparian woodlands Vine thickets	During the 2010 Survey, calls from Microchiropteran bats in the *Nyctophilus* genera were recorded at seven of the nine Anabat locations. *Nyctophilus* species cannot be separated on calls alone, so consideration needs to be given to the potential occurrence of the south-eastern long-eared bat (*Nyctophilus corbeni)* in the Study Area. Noting that the Study Area is within the range of this species

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		woodland, Smooth-barked Apple, *Angophora leiocarpa,* woodland; River Red Gum, *Eucalyptus camaldulensis,* forests lining watercourses and lakes, Black Box, *Eucalyptus largiflorens,* woodland, dry sclerophyll forest. Throughout inland Queensland, the species habitat is dominated by various eucalypt and bloodwood species, and various types of tree mallee with it being most abundant in vegetation with a distinct canopy and a dense cluttered shrub layer (DSEWPaC 2013b).	Non-eucalypt open forest	and contains suitable habitat, the *Nyctophilus* spp. record should[2] be treated as a **confirmed** record of *Nyctophilus corbeni*. The Project Site intersects suitable forage and roost habitat for this species.
Koala (*Phascolarctos cinereus*)	V, V	Koala populations occur in moist forests along the coast, sub humid woodlands in southern and central Queensland, and in some eucalypt woodlands along watercourses in the semiarid environments of the western part of the State. Koalas have also been found to occur in non-riverine communities in semiarid areas. Biogeographic regions of Queensland where koalas have been recorded include the Einasleigh Uplands, Wet Tropics, Desert Uplands, Central Mackay Coast, Mitchell Grass Downs, Mulga Lands, Brigalow Belt, South Eastern Queensland and Channel Country. The greatest density of koalas in the State occurs in south-east Queensland, and lower densities occur through central and eastern areas. For example, population densities range from moderately high in south-east Queensland and some parts of central Queensland (e.g. 1-3 koalas per hectare) to low in other parts of central Queensland (0.01 koalas per hectare) (TSSC 2012). Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus Eucalyptus. The distribution of koalas is also affected by altitude (limited to <800m ASL), temperature and, at the western and northern ends of the range, leaf moisture.	Eucalypt woodland or open forest Fringing riparian woodlands Non-eucalypt open forest	During the 2013 Summer Survey the koala was recorded from Eucalypt woodland and regrowth characteristic of RE 12.8.16. As such it is a **confirmed** occurrence in the Study Area. The Project Site intersects suitable forage and roost habitat for this species.

[2] Adopting the precautionary approach.

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		The koala is a leaf-eating specialist. Its diet is restricted mainly to foliage of Eucalyptus species. It may also consume foliage of related genera, including Corymbia, Angophora and Lophostemon and at times supplement its diet with other species, including species from the genera Leptospermum and Melaleuca. While koalas have been observed sitting in or eating up to 120 species of eucalypt, the diet of individual koalas is usually limited to obtaining most of their nutrition from one or a few species present at a site. Species-level preferences may also vary between regions or seasons. Consequently, assessment of habitat quality for koalas is usually based on the identification of local preferences for species and quantification of the availability of those species (TSSC 2012).		
Grey-headed flying-fox (*Pteropus poliocephalus*)	-, V	Grey-headed Flying-foxes occupy the coastal lowlands and slopes of southeastern Australia from Bundaberg to Geelong and are usually found at altitudes < 200 m. Areas of repeated occupation extend inland to the tablelands and western slopes in northern New South Wales and the tablelands in southern Queensland (DSEWPaC 2013c). The Study Area is approaching the western limit of the species' range. Grey-headed Flying-foxes require a continuous sequence of productive foraging habitats, the migration corridors or stopover habitats that link them, and suitable roosting habitat within nightly commuting distance of foraging areas. Areas supporting these characters are considered to be habitat critical to the survival of the grey-headed flying fox (DECCW 2009). On the basis of current knowledge, foraging habitat that meets at least one of the following criteria can be explicitly identified as habitat critical to survival, or essential habitat, for Grey headed Flying-foxes. Natural foraging habitat that is: 1. productive during winter and spring, when food bottlenecks have been identified; 2. known to support populations of > 30 000 individuals within an area of	Fringing riparian woodlands Eucalypt woodland or open forest Vine thickets	The Study Area is approaching the western limit of range for the Grey-headed flying fox, but camps occupied by this species are known from Dalby, Kingaroy and the Bunya Mountains. The Study Area is within the forage range of these camps. Flying fox roosts are readily detected by the raucous activity of resident animals. Significant survey effort since 2008 has failed to detect any roosts, providing conclusive evidence that no roost sites occur in the Study Area at this time. The Study Area is at the outer forage limit of the known Dalby, Kingaroy and Bunya Mountains roost sites, and despite a lack of survey records it is considered **likely** that the grey-headed flying fox uses the Study Area. Forage habitat occurs within and adjacent to the Project Site.

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		50 km radius (the maximum foraging distance of an adult); 3. productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (September to May); 4. productive during the final stages of fruit development and ripening in commercial crops affected by Grey-headed Flying-foxes (months vary between regions); 5. known to support a continuously occupied camp. Grey-headed Flying-foxes roost in large aggregations in the exposed branches of canopy trees. The locations of camps are generally stable through time, and several sites have documented histories that exceed 100 years. Camps provide resting habitat, sites of social interactions and refuge for animals during significant phases of their annual cycle, such as birth, lactation and conception. On the basis of current knowledge, roosting habitat that meets at least one of the following criteria can be explicitly identified as habitat critical to survival, or essential habitat, for Grey headed Flying-foxes. Roosting habitat that: 1. is used as a camp either continuously or seasonally in > 50% of years 2. has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 10 000 individuals, unless such habitat has been used only as a temporary refuge, and the use has been of limited duration (i.e. in the order of days rather than weeks or months) 3. has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 2 500 individuals, including reproductive females during the final stages of pregnancy, during lactation, or during the period of conception (i.e. September to May) (DSEWPaC 2013c).		
Collared delma (*Delma torquata*)	V, V	The Collared Delma is known from the western suburbs of Brisbane, Queensland, and the following sites: Bunya Mountains, Blackdown Tableland National Park (NP), Bullyard Conservation Park, D'Aguilar Range NP, Expedition NP, Naumgna and Lockyer Forest Reserves, Western Creek near Millmerran and the Toowoomba Range.	Eucalypt woodland or open forest Fringing	The Study Area is within the known range of the collared delma, and the Eucalypt woodland or open forest broad habitat type is considered **likely** to provide potential habitat for this species, particularly in the east where rocky slopes are common.

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		The Collared Delma normally inhabits eucalypt dominated woodland and open forest where it is associated with suitable micro-habitats (exposed rocky outcrops). The ground cover is predominantly native grasses, such as Kangaroo Grass (*Themeda triandra*), Barbed-wire Grass (*Cymbopogon refractus*), Wiregrass (*Aristida* sp.) and Lomandra (*Lomandra* sp.) (DSEWPaC 2013d)	riparian	
Yakka skink (*Egernia rugosa*)	V, V	Yakka skink occurs in dry eucalypt and acacia woodland and open woodlands (Curtis, Dennis, McDonald, & Kyne, 2012). Distribution extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. Within this area the species distribution is highly fragmented (DSEWPAC, 2013h; DSEWPAC, 2011a)	Eucalypt woodland or open forest Non-eucalypt open forest	The Study Area is within the known range of the yakka skink and contains suitable habitat. Since 2008, active searches in suitable habitat have failed to detect this species but this species is still considered a **possible** occurrence. Potential habitat occurs within the Project Site.
Dunmall's snake (*Furina dunmalli*)	V, V	Dunmall's Snake has been found in a broad range of habitats, including: forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow (*Acacia harpophylla*), other Wattles (A. burowii, A. deanii, A. leioclyx), native Cypress (Callitris spp.) or Bull-oak (Allocasuarina luehmannii). Various Spotted Gum (Corymbia citriodora), Ironbark (Eucalyptus crebra and E. melanophloia), White Cypress Pine (Callitris glaucophylla) and Bulloak open forest and woodland associations on sandstone derived soils. In other environments, one specimen was found on the edge of dry vine scrub near Tarong Power Station, Queensland, whilst another was found in hard ironstone country (Queensland Regional Ecosystem Land Zone 7) at Lake Broadwater near Dalby, Queensland. Little is known about the ecological requirements of Dunmall's Snake, however, the species has been found sheltering under fallen timber and ground litter. Records indicate the species prefers habitats between 200 to 500 m above sea level (DSEWPaC 2013e).	Eucalypt woodland or open forest Non-eucalypt open forest Vine thickets	The Study Area is within the known range of Dunmall's snake and contains suitable habitat. Since 2008, active searches in suitable habitat have failed to detect this species but it is known to be a very elusive species and seldom encountered. Dunmall's snake is considered a **possible** occurrence. Potential habitat occurs within the Project Site.

Migratory species

The EPBC Act PMST identified 11 migratory species as potentially occurring within the Study Area, including:

- Grey Teal (*Anas gracilis)*
- Pacific Black Duck *(Anas superciliosa)*
- Black-shouldered Kite (*Elanus axillaris*)
- Nankeen Kestrel (*Falco cenchroides*)
- Rainbow Bee-eater (*Merops ornatus*)
- Masked Lapwing (*Vanellus miles*)
- Wedge-tailed Eagle (*Aquila audax*)
- Plumed Whistling-Duck (*Dendrocygna eytoni*)
- Brown Falcon (*Falco berigora*)
- Peregrine Falcon (*Falco peregrines*)
- Little Eagle (*Hieraaetus morphnoides*).

Additionally, the following EPBC Act listed migratory species were identified in other desktop assessments (i.e. Wildlife online, Birds Australia).

- White-bellied Sea-Eagle (*Haliaeetus leucogaster)*
- White-throated Needletail (*Hirundapus caudacutus)*
- Black-faced Monarch (*Monarcha melanopsis)*
- Satin Flycatcher (*Myiagra cyanoleuca*)
- Rufous Fantail (*Rhipidura rufifrons)*
- Great Egret (*Ardea alba)*
- Cattle Egret (*Ardea ibis)*
- Latham's Snipe (*Gallinago hardwickii*)
- Painted Snipe (*Rostratula benghalensis s. lat).*

A number of these migratory species were identified during the field assessments: grey teal, Pacific black duck, wedge-tail eagle, cattle egret, plumed whistling duck, nankeen kestrel, little eagle, rainbow bee-eater and masked lapwing.

Introduced pest fauna

Four fauna species recorded within the Study Area are Declared 'Class 2' pest species under *Land Protection (Pest and Stock Route Management) Act 2002*

- Feral dog (Canis familiaris)
- Feral cat (*Felis catus*)
- European rabbit (*Oryctolagus cuniculus*)
- European fox (*Vulpes vulpes*).

Five introduced species (but not declared under state legislation) were identified within the Study Area:

- Cane Toad (*Bufo marinus*)
- domestic cow (*Bos taurus*)
- brown hare (*Lepus capensis*)
- house mouse (*Mus musculus*)

- black rat (*Rattus rattus*).

5.1.5.3 Essential habitat

Essential habitat is defined as habitat mapped by the State where threatened flora and/or fauna species are known to occur. Specifically it pertains to an area of vegetation that:

- Has at least three essential habitat factors for the protected wildlife that must include any essential factors stated as mandatory for the protected wildlife in the essential habitat database; or
- In which the protected wildlife, at any stage of its life cycle, is located.

No essential habitat has been mapped within the Study Area by DNRM. Essential regrowth habitat for the koala has been identified as part of the koala assessment.

5.1.5.4 Wetlands and watercourses

No referable or significant wetlands occur within the Study Area. Many small to medium sized watercourses (stream order 1, 2 and 3) occur within the Study Area and intersect the Project Site.

5.1.5.5 State biodiversity corridor

The Brigalow Belt Biodiversity Planning Assessment (BPA) has defined a 'State' biodiversity corridor between Diamondy State Forest to the northwest of the Study Area and Bunya Mountains to the southeast.

5.2 Social and economic environment

The Statistical Local Areas (SLA) encompassing the Study Area are Kingaroy and Wambo. Kingaroy is within the South Burnett Regional Council LGA. The former Shire of Kingaroy, to which the Kingaroy Planning Scheme still applies, including the townships of Kingaroy, Kumbia and Wooroolin. Peanut and navy bean industries are well-established in the area, in addition to a growing wine industry. Kingaroy is the primary service centre of the former shire, and the area includes a commercial aerodrome, hospital, aged care facilities, a number of shopping areas, government services and a public swimming pool.

The strategic direction within the Kingaroy Shire Planning Scheme encourages growth and development without compromising the current quality of life and rural character of the area.

In December 2011, the South Burnett Regional Council adopted the South Burnett Community Plan 2032. The Community Plan provides a vision to articulate the desired attributes of the local government area in the future and have identified a number of goals and actions around four themes – enhancing community life, enhancing the environment, building the economy and making decisions and implementation. The vision for the South Burnett Regional Council states that South Burnett will be a region of connected communities that celebrates its heritage and enjoys a country lifestyle with sustainable development and growth.

The Wambo district is within the Western Downs Regional Council Local Government Area (LGA). The former Shire of Wambo, to which the Wambo Shire Planning Scheme still applies, contained the townships of Jandowae, Bell, Kaimkillenbun, Warra, Jimbour, Macalister and Mowbullan. Agricultural uses predominantly include cattle grazing, cotton and grain growing.

The strategic direction contained within the Planning Scheme for Wambo Shire states that the desired direction of the Shire is to protect and enhance the unique natural features and ecological systems, enhance the economy through sustainable use of natural resources and that development in the area contributes to community well-being and the preservation of a high quality lifestyle.

Western Downs Regional Council has produced a Draft Western Downs Planning Scheme which will eventually replace the multiple planning schemes currently in existence for the local government area. The policy direction of the draft planning scheme is articulated by a strategic framework. This strategic framework seeks to promote a sustainable settlement pattern which is accessible and appropriately serviced by infrastructure, preservation of the natural environment and landscape character, reinforce community identity, promote sustainable economic development and use of natural resources.

Western Downs Regional Council released the Western Downs 2050 Community Plan in 2011 which provides a vision to articulate the desired attributes of the local government area in the future. The purpose of the Community Plan is to put into place a structure to deliver the vision for a community with world class physical attractions, a connected local community and a role for innovation and new industries.

5.2.1 Demographic profile

Table 5.10 demonstrates that when compared with Queensland and Australia, the Project Area is characterised by a relatively high proportion of people aged 0-14 and 50+, with a relatively low proportion of people aged 15-49. These population statistics suggest that the Kingaroy and Wambo areas are attractive areas for families with young children. This conclusion is demonstrated in the comparison between household characteristics of Kingaroy and Wambo areas with the State of Queensland and Australia, provided in Table 5.11.

The overall population of the area remained generally static between the two census dates, however the age profile has changed slightly, with an increase in the 60-69 age bracket of 1.44% and a decrease of 1.00% in the 35-49 age bracket.

Table 5.10 Age profile of the Study Area, Queensland and Australia

Age Group	2006 Census			2011 Census		
	Study Area	Queensland	Australia	Study Area	Queensland	Australia
0-4	7.2%	6.6%	6.3%	**7.6%**	6.9%	6.6%
5-14	15.8%	14.1%	13.5%	**15.5%**	13.3%	12.7%
15-24	11.5%	13.8%	13.7%	**11.8%**	13.6%	13.3%
25-34	11.1%	13.4%	13.5%	**10.7%**	13.6%	13.8%
35-49	21.2%	21.9%	22.1%	**20.2%**	21.3%	21.2%
50-59	13.8%	12.9%	12.8%	**12.9%**	12.6%	12.8%
60-69	9.4%	8.7%	8.6%	**10.8%**	9.9%	9.9%
70-84	8.2%	7.2%	7.9%	**8.5%**	7.2%	7.9%
85+	1.8%	1.4%	1.6%	**2.0%**	1.6%	1.9%
Total	100%	100%	100%	**100.0%**	100.0%	100.0%

Source: ABS 2011 and ABS 2006

5.2.1.1 Household characteristics

Table 5.11 shows that the area is characterised by comparably high property ownership, with a relatively lower proportion of residents owning a mortgage than within Queensland and Australia. The area also contains a higher proportion of family households, and fewer group households than both Queensland and Australia.

Table 5.11 Household characteristics of the Study Area, Queensland and Australia

Characteristic	Study Area	Queensland	Australia
Ownership			
Fully owned	35.51%	28.99%	32.06%
Being purchased	31.42%	34.50%	34.91%
Rented	29.38%	33.18%	29.61%
Occupancy			
Family household	72.84%	72.44%	71.53%
Lone person household	24.06%	22.85%	24.34%
Group household	3.09%	4.72%	4.14%

Source: ABS 2011 and ABS 2006

5.2.1.2 Employment and income

Table 5.12 demonstrates that the area contains a relatively high proportion of managers and labourers, but relatively low proportions of professionals and clerical workers when compared with Queensland and Australia.

Table 5.12 Occupation characteristics of the work force for the local area, Queensland and Australia

Occupation Characteristic	Study Area	Queensland	Australia
Managers	20.57%	12.27%	13.11%
Technicians and Trades Workers	14.57%	15.21%	14.44%
Labourers	14.44%	10.75%	9.60%
Professionals	13.84%	19.26%	21.74%
Clerical and Administrative Workers	10.25%	14.95%	15.03%
Sales Workers	12.65%	9.97%	9.55%
Machinery Operators and Drivers	1.85%	7.46%	6.68%
Community and Personal Service Workers	7.41%	10.14%	9.85%

Source: ABS 2011 and ABS 2006

5.2.2 Tourism

Tourism is a potential growth industry in the Western Downs Regional Council and South Burnett Regional Council areas. Presently, notable tourist destinations in the region include:

- Jandowae – an early timber town
- The Bunya Mountains National Park – attracting bush walkers, hikers and country market-goers
- More than 20 wineries and cellar doors.

5.2.3 Accommodation and housing

It is anticipated that all habitable residential dwellings within and adjacent to the Project will remain habitable during the construction and operational phases of the Project.

Construction workers are likely to be employed from local areas wherever possible, and any additional workers will be accommodated in local towns in proximity to the Project Site (such as Jandowae, Bell, Kumbia, Kingaroy or Dalby). During construction of the Project it is likely that the construction workforce will peak at 350 construction workers; comprising civil, electrical and wind turbine contractors. As local workers will be preferred for construction, it is not expected that the introduction of non-local construction workers will result in anything more than a temporary and minor local impact on the population for the duration of the wind farm construction. As the number of non-local construction workers will be limited, any non-local construction workers will stay within existing hotels, motels and rental accommodation in the community and not within construction workers camps.

Based on experience in South Australia for the Hallett Wind Farms (SKM, 2010), it is expected that during operation of the Project, it is likely that one full-time job will be required for every four to six wind turbines. Consequently, it is expected that the Project will generate approximately 10-20 full-time jobs throughout the operational life of the wind farm. These maintenance jobs will be generally offered to local people seeking employment and will be offered suitable training as needed.

5.2.4 Cultural heritage (Indigenous and non-Indigenous)

5.2.4.1 The first inhabitants

While there has been no detailed exploration of pre-colonial Aboriginal life in the Study Area itself, research at Maidenwell Rockshelter, approximately 15 km to the south east provides some insights. Excavations by Morwood in the 1980s indicate that low intensity use of the site began around 4,300 years Before Present (BP), intensifying around 2,800 years BP, and then decreasing again in the last 1,000 years. The small stone artefact assemblage at the site suggests transient usage by male hunting parties, with the small flakes and backed blades associated with hunting tool repair dominating the collection (Morwood 1983:96). The majority of these tools were made from quartz nodules, with a smaller number based on siltstone, basalt, chert, silcrete and mudstone, all of which are readily available in the local area (Morwood 1983:95).

In addition to the artefact assemblages, Maidenwell Rockshelter features several panels of painted rock art, with much of the back wall decorated with ochre figures. Morwood suggests that at least two major painting episodes

are represented in the art – the earliest represented by orange ochre one the newest by red ochre – although it is not clear how this art articulates with the other evidence at the site (Morwood 1983:91).

More broadly, Morwood situates the use of Maidenwell Rockshelter within the changing and intensifying socio-economic system that developed in south-east Queensland in the last 6,000 years. This system was based around the seasonal exploitation of certain 'glut' foods – fish in Moreton Bay and bunya nuts in the mountain ranges around Maidenwell – and the development of a new form of inter-group relationships to facilitate mobility across territorial boundaries (Morwood 1983:90-1). Morwood sees the art at Maidenwell as a part of the regional symbolic system that was used to convey information across the region (Morwood 1983:91).

The seasonal bunya harvest continued to play an important role in inter-group relations well into the colonial period. Thomas Petrie, one of the earliest colonists in the Bunya Mountains area, described these gatherings as 'like huge picnics, the Aborigines belonging to the districts sending messengers out to invite members from other tribes to come and have a feast' (Petrie 1904:11). As such, the gatherings were vital to trade and exchange networks, to the carrying out of ceremony, and to the negotiation of marriages and other alliances (Feary 2005: 9). The Bunya Mountains, the bunya nut food and the associated cultural meanings remain important to contemporary Aboriginal people (McKay, 2005: 59).

5.2.4.2 Exploring, surveying and mapping the land

The region in and around the Study Area – now part of the Darling Downs and the South Burnett regions of southern central Queensland – was first explored by botanist and surveyor Allan Cunningham and Charles Fraser in 1827. Cunningham returned in 1828 to seek a better route from the western inland regions to the coast (French, 1997). By the 1840s, colonial settlement in the Darling Downs had reached as far as Jimbour Station, approximately 25 km south west of the Study Area, and it was from here that Ludwig Leichhardt set out on his year long journey to find an overland route to Port Essington (near Darwin). Leichhardt's journey served not only to map heretofore unknown reaches of the New South Wales colony, but also to open up new areas to colonial occupation, with settlers gradually pushing further and further north.

Pastoral activities

The Study Area was initially opened for selection as a part of the New England pastoral district in 1839. In 1841 the run of Jimba (later Jimbour) – encompassing all of the land between the Bunya Mountains and the Condamine River – was of taken up, followed by the runs of Jingi Jingi and Cooranga, on which the Study Area is located. Along with much of the land through the expanding pastoral districts, these runs were used primarily for sheep grazing, supplying the demand for wool created by **'**British industrialisation nearly 14,000 miles away' (French**,** 1990: 92). However, with the spread of the sheep diseases, scab and catarrh, in northern New South Wales by 1856, combined with the spread of footrot in 1861, many pastoralists in the Darling Downs began to reconsider their activities (Elphinstone & DPI, 1973: 1-4). By 1860 pastoralists were turning to cattle, primarily dairy, as there was less chance of disease and they were generally 'more suitable to the area' (Nutting, 1974: 3).

From the 1880s, the colonial government began to actively encourage this shift, seeing dairying as promoting closer settlement and increased population, as well as boosting economic production (French, 1990). Subsequently, portions of the large pastoral runs were resumed and broken into smaller lots which could be leased to families as small dairy farms.

Exploiting natural resources

The primary natural resource to be exploited in and around the Study Area was timber, particularly the bunya pine (*Araucaria bidwillii*). Initially, the then Governor of New South Wales, George Gipps, declared a 'protectorate over the bunya lands north of Moreton Bay', possibly in recognition of the importance of these trees in Aboriginal life (Powell 1998:9), but this protection was revoked later the same year. Extensive clearing began almost immediately, at first to support the opening up of the land for pastoral purposes (Powell 1998:18), but later as a large scale timber industry was focused on the extraction of the highly valuable bunya pine (Powell 1998:19). This industry continued until the early part of the 20th century, ceasing when the Bunya Mountains was proclaimed a National Park in 1908 (Powell 1998:45), and the timber-getting areas were subsequently turned into recreation spaces.

Establishing settlements

During the second half of the 19th century, increasing numbers of settlers were arriving in the areas around the runs of Jingi Jingi and Cooranga, a trend that intensified with the expansion of the dairy industry and closer settlement in the 1880s. In response to this population growth, a number of small townships developed in the

region, including Cooranga North, which is located just outside of the Study Area. Named for the pastoral run on which it is located, Cooranga North was founded in the early years of the 20th century and by mid-century boasted the Cooranga North State School (1914), Mahan Hall (1922), Mt Mahen School 1922, Queensland Country Women's Association (1923), Catholic Church (1932), Presbyterian Church (1952), and the New Cooranga North Community Memorial Hall (1952) (Adair 1989).

Supported primarily by the surrounding dairy industry, the town established its own cheese factory, Cooranga North Co-operative Cheese Factory Company Limited in the 1930s (Hooper 1984), saving farmers from having to transport their produce by road to the railhead, and from there to the Dalby Butter Factory some 50 km to the south. The cheese factory remained in operation until the 1960s, when the expansion and deregulation of dairying saw the industry become uneconomical in the area around Cooranga North (Hooper, 1974).

The waning of the dairy industry also brought about a noticeable decline in the population of Cooranga North as families moved out of the area, eventually seeing the closure of the Cooranga North State School (Adair 1989). The town, however, survived these changes, and remains a small, vibrant rural community.

5.2.4.3 Register and database search results

DATSIP register and database

A search of the DATSIP database in March 2016 returned the following Aboriginal Parties for the Study Area:

- Barunggam People - Western portion of the Study Area
- Western Wakka Wakka People (Team McLeod) - North-western portion of Study Area
- Western Wakka Wakka People (Team Beattie) - North-western portion of Study Area
- Wulli Wulli People #2 - Eastern portion of Study Area.

In addition, four cultural heritage sites – a stone artefact scatter and three isolated finds – are recorded in the Study Area. A further nine recorded places, including grinding grooves and artefact scatters, are located within one kilometre of the Study Area.

Native title

The Study Area is currently subject to two active Native Title Claims (Table 5.13).

Table 5.13 Active Native Title Claims in the Study Area (National Native Title Tribunal).

Claimant	Date	Status	Tribunal Number	Federal Court Number
Wulli Wulli and Wakka Wakka Peoples	23/09/2011	Active	QC2011/005	QUD311/2011
Wakka Wakka People #3	12/12/2011	Active	QC2011/010	QUD621/2011

Spanning a number of allotments, the Study Area includes freehold, easement and reserve land. Land tenure and native title assessments will need to be conducted for each allotment, reserve or waterway. Any activities on allotments where native title has not been extinguished will need to be assessed as potential 'future acts' (that is, acts which may impact on native title holders' rights to land or water) and appropriate measures implemented if required.

Historical heritage

A search of Commonwealth, State and local heritage registers did not identify any recorded historical sites within the Study Area. The closest historical heritage site is the State and locally listed (South Burnett Regional Council) Wylarah Homestead, which is located approximately 10 km to the north of the Study Area.

5.3 Built environment

Many parts of the Project Study Area's landscapes have been shaped by settlement and use of the landscapes by people. Existing land use within and adjacent to the Project Study Area is predominantly rural, characterised by pastoral or grazing properties for livestock production (predominantly cattle), within the localities of Cooranga North, Bilboa, Boyneside and Ironpot. The main roads providing access to the Cooranga North region include the Bunya Highway, linking Kingaroy with Dalby. The majority of local roads within the Project Study Area are gravel /

unsealed roads, including Kingaroy Niagara Road, Ironpot Creek Road, Cooranga North-Niagara Road and Kingaroy-Jandowae Road (partly sealed).

There is little built infrastructure in the local area with the exception of electricity transmission lines. In the wider landscape, the presence of infrastructure is increasing as a result of road upgrades, liquefied natural gas projects with associated wells and new/upgraded electricity transmission facilities to service the growing region. This includes the new Western Downs Substation and associated 275 kV transmission line and Surat Basin to Halys 500 kV transmission line. While these types of infrastructure decrease the perceived naturalness of the landscape they are a familiar component of the Queensland rural landscape.

Coordinated Projects and Department of Transport and Main Roads (TMR) Projects (including significant developments currently in construction, approved developments, or developments currently undertaking or which have recently submitted an EIS) that have been considered in Table 5.14. In addition to the projects identified below, a number of other projects were identified and considered but have not been included as they are located more than 150 km from the Project so there is an extremely low likelihood of cumulative impacts to be experienced at this distance. These projects include the Wandoan Coal Project; Landsborough to Nambour Rail Project, Nathan Dam and Pipeline, D'Aguillar Highway Safety Improvements; Toowoomba Second Range Crossing.

Table 5.14 Significant projects

Project name	Location	Description	Distance & direction from site boundary	Potential for cumulative impacts
Tarong Northern Land Ash Emplacement Project	North-west of Yarraman (between Tarong and Yarraman State Forests).	Construction of an additional ash storage facility to service both the Tarong and Tarong North power stations. It will ultimately be approximately 50 m high with a moderate slope of 1:8 (height: width). The project is currently proceeding (due for completion by 2030).	Approximately 60 km east of the Project Site boundary	**No**: The operational impact of this development and the Project will be experienced separately, due to the large distance between; therefore cumulative impacts are not expected.
New Acland Coal Mine Stage 3	Expansion of the existing New Acland open-cut coal mine, from 4.8 million tonnes per annum (Mtpa) to up to 7.5 Mtpa.	The project is currently proceeding.	Acland, approximately 89 km south east of site	**No:** The operational impact of this development and the Project will be experienced separately, due to the large distance between; therefore cumulative impacts are not expected.
Wetalla Water Pipeline	A 45 km underground water pipeline to supply treated wastewater to the New Acland coal mine.	The project is currently proceeding and is due to be completed in 2017.	Kelvinhaugh , approximately 106 km south east of site	**No:** Pipeline is located underground so, after the initial construction phase (before the Project), will not meaningfully impact on landscape and visual values.
Australia Pacific LNG (Origin)	Between the Walloons gas fields (from Injune	Development of an integrated liquefied natural gas project in Queensland comprising three	Miles, Approximately 140 km west of	**No:** The operational impact of this

Project name	Location	Description	Distance & direction from site boundary	Potential for cumulative impacts
	to Millmerran) and Gladstone.	principal elements: - further development of its coal seam gas (CSG) resources in the Walloons gas fields stretching from Injune to Millmerran; - construction of a 450 km underground gas pipeline from the gasfields to Gladstone; and - development of an LNG processing plant and export terminal on Curtis Island near Gladstone comprising four gas trains with a total capacity of up to 18 million tonnes per annum of LNG. Project ongoing (due for completion 2035)	the Project Site boundary	development and the Project would be experienced separately due to the large distance between them; therefore cumulative impacts are not expected.
Surat Gas Project	Dalby, Chinchilla, Kogan, Jandowae, Miles	Ongoing development of an integrated liquefied natural gas project in Queensland comprising further development of its coal seam gas (CSG) resources with associated gas well and processing infrastructure.	Jandowae, Approximately 30 km west of the Project Site.	**No:** The operational impact of this development and the Project would be experienced separately due to the large distance between them; therefore cumulative impacts are not expected.
Queensland Curtis LNG	Between the Surat Basin and Gladstone	An integrated liquefied natural gas project in Queensland comprising: - expansion of coal seam gas operations in the Surat Basin to provide gas for two liquefied natural gas plants or trains and gas for domestic markets; - development of a gas and water pipeline network of approximately 800 km; and - development of the LNG processing and export facility on Curtis Island, near Gladstone. The Coordinator-General decided that the project can proceed subject to certain conditions contained in the report.	Approximately 40 km west of the Project Site boundary	**No:** The operational impact of this development and the Project would be experienced separately due to the large distance between them; therefore cumulative impacts are not expected.

Project name	Location	Description	Distance & direction from site boundary	Potential for cumulative impacts
Toowoomba Second Range Crossing	New highway north of Toowoomba	New second range crossing, with tunnel to bypass Toowoomba,	Toowoomba (130 km) south east of site.	**No:** Although this project will affect the landscape character and views in the vicinity of Toowoomba, it is considered too far to meaningfully affect the visual setting or views to the Project.
Warrego Highway Upgrades	Upgrades through sections of Toowoomba, Chinchilla and Dalby.	Various upgrades to the Warrego Highway are proposed in the vicinity of Toowoomba, Chinchilla and Dalby. This includes a number of duplication projects.	Toowoomba-Charlton (130 km); Chinchilla (90 km); Dalby (60 km)	**No**: The road widening schemes are too far from the Project to be experienced cumulatively or to open new views towards the Project.

5.4 Traffic and transport

This section provides a summary of the existing transport infrastructure in the vicinity of the Project, and transport infrastructure between the Project and the Port of Brisbane. In particular, it describes the road network and identifies the port, airport and rail infrastructure in the surrounding region.

5.4.1 Road network

The Darling Downs region of Queensland is serviced by a network of highways, State Controlled Roads (SCR) and Regional Council Roads (RCR) that function as the main transport routes in the vicinity of the Project. The highways and other SCRs provide links from the Project to Kingaroy and Gayndah to the north, Brisbane and Toowoomba to the east, Dalby to the south and Chinchilla and Miles to the west.

5.4.1.1 State controlled road network

The major SCRs intersected by the Project transport corridors include sections of the Gateway Arterial Road (U13A – Gateway Motorway South), Cunningham Highway/Ipswich Motorway (17A and 17B) which will be used to transport turbine materials from the Port of Brisbane. Closer to the Project Site, the key SCRs consist of the Warrego Highway (18A and 18B), the Bunya Highway (45A), Dalby-Jandowae Road (421) and Kingaroy-Jandowae Road (424). The key SCRs in the vicinity of the Project are summarised in Table 5.15. A brief description of these roads is also provided in the following discussion.

Table 5.15 Key existing State-controlled road

Road ID	Description	Classification
U13A	Gateway Arterial Road (Gateway Motorway South)	National Highway
17A	Cunningham Highway (Ipswich Motorway)	National Highway
17B	Cunningham Highway (Ipswich – Warwick)	National Highway
18A	Warrego Highway (Ipswich – Toowoomba)	National Highway
18B	Warrego Highway (Toowoomba – Dalby)	National Highway
45A	Bunya Highway	Regional Road

Road ID	Description	Classification
421	Dalby-Jandowae Road	Regional Road
424	Kingaroy-Jandowae Road	District Road

Gateway Arterial Road

The Gateway Arterial Road (Gateway Motorway) is an approximately 50 km long highway, stretching from Drewvale (Brisbane) to Bald Hills (Brisbane). It is a major motorway which bypasses Brisbane to provide easier access between the Gold Coast and the Sunshine Coast. The southern section of the Gateway Arterial Road (Gateway Motorway South) is a fully access controlled, six lane dual carriageway, with a speed limit ranging from 80 km/hr to 100 km/hr.

Cunningham Highway (Ipswich Motorway)

The Cunningham Highway is an approximately 340 km long highway, stretching from Brisbane (where it is called Ipswich Road and Ipswich Motorway) to Goondiwindi. The relevant section of the Cunningham Highway (Ipswich Motorway) is a motorway grade, fully access controlled, six-lane dual carriageway, with a speed limit of 100 km/hr. In 2012, the Cunningham Highway (Ipswich Motorway) was upgraded to six-lanes between Dinmore and Goodna as part of the wider Ipswich Motorway upgrade project.

Warrego Highway

The Warrego Highway is an approximately 710 km long highway, stretching from Ipswich to Charleville. The highway connects the coastal centres of Queensland to the south western areas of the State. The section of the Warrego Highway forming part of the Project transport corridors is approximately 180 km in length from Ipswich to Dalby (18A and 18B).

The first approximately 100 km of the highway between Ipswich and Toowoomba is an access-controlled, four lane dual-carriageway. This section of the highway is access controlled using motorway style on and off ramps and has a speed limit ranging between 80 km/hr to 100 km/hr dropping to 60 km/hr through the Great Dividing Range and through Toowoomba.

From Toowoomba to Charleville, the highway turns into a two-lane, single carriageway with a speed limit of 100 km/hr.

Bunya Highway

The Bunya Highway is an approximately 170 km long highway, stretching from Dalby to Goomeri. The highway begins at the Warrego Highway at Dalby and heads towards the Project Site at Cooranga North where it turns north east and eventually terminates at the Burnett Highway in Goomeri. The section of the Bunya Highway forming part of the Project transport corridors is approximately 110 km in length from Dalby to Kingaroy.

The highway is predominantly a two lane, single carriageway except for the section within Dalby which is a four-lane, dual carriageway. The speed limit along the majority of the highway is 100 km/hr except for sections within built up areas (such as within Dalby) where the speed limit is reduced to 60 km/hr.

Kingaroy-Jandowae Road

Kingaroy-Jandowae Road is an approximately 40 km long road, linking the community of Jandowae to the Bunya Highway. The road begins at Jandowae and continues east towards Cooranga North, where it turns south-east and eventually terminates at the Bunya Highway.

The road is predominantly a two lane, sealed, single carriageway with centre line marking along some sections. The speed limit along the road is generally 100 km/hr and reduces to 60 km/hr around populated areas.

Dalby-Jandowae Road

Kingaroy-Jandowae Road is an approximately 50 km long road, linking the community of Jandowae to the Warrego Highway. The road begins at an intersection with the Warrego Highway in the township of Dalby and continues north, passing through Jandowae and eventually terminates at an intersection with Wondai Road.

The road is predominantly a two lane, sealed, single carriageway with centre line marking along some sections. The speed limit along the road is generally 100 km/hr and reduces to 60 km/hr through Jandowae.

5.4.1.2 Regional council roads

There are several RCRs in the vicinity of the Project Site including some non-gazetted roads. These roads fall under the jurisdiction of either the South Burnet Regional Council (SBRC) or the Western Downs Regional Council (WDRC). For the Project related traffic, only Niagara Road is expected to be utilised as part of the proposed transport corridors during both the construction and operation phases.

Niagara Road

Niagara Road runs from a junction with Kingaroy-Jandowae Road east through the Project Site. It is sealed up to the intersection with Jarail Road. However, the road also runs in part as an unsealed access road through the site where it then joins the Bunya Highway south of Boyneside.

5.4.1.3 Privately owned/operated roads

In addition to publicly owned and operated roads, privately owned and operated toll roads also form part of the Project's transport corridors. A brief description of these roads is provided in the following discussion.

Logan Motorway

The Logan Motorway (210A) is an approximately 30 km long highway stretching from stretching from the Pacific Motorway in Loganholme to the Ipswich Motorway in Gailes. It provides a quick connection between several major highways including the Pacific Motorway, Gateway Motorway, Centenary Highway and the Ipswich Motorway. The Logan Motorway is currently privately owned and operated by Queensland Motorways Limited and there are two toll points along the motorway at Staplyton Road and Loganlea Road.

The section of the Logan Motorway forming part of the Project transport corridors is approximately 20 km in length from the Gateway Extension Motorway merge to the Cunningham Motorway (Ipswich Motorway) merge. This section of the Logan Motorway is a fully access controlled, four lane dual carriageway with a speed limit of 100 km/hr.

Gateway Extension Motorway

The Gateway Extension Motorway (N332) is the southern expansion of the Gateway Motorway from the Pacific Motorway to the Logan Motorway. Originally completed in 1997, it is an approximately 10 km long stretch of motorway which allows traffic originating from the Bruce Highway and Gateway Motorways (west bound traffic heading towards the Warrego Highway), to bypass much of South Brisbane and Logan. The Gateway Extension Motorway is currently privately owned and operated by Queensland Motorways Limited and there is a single toll point along the motorway at Kuraby, adjacent to the Persse Road onramp.

The entire length of the Gateway Extension Motorway forms part of the Project transport corridors and consists of a fully access controlled, dual-carriageway varying between four to six lanes. The speed limit along the majority of the motorway is 100 km/hr, reducing to 80 km/hr in some sections.

5.4.2 Stock routes

SBRC identifies, within Planning Scheme Policy (PSP) No. 8 of the former Kingaroy Shire Council (2006) Planning Scheme, a Stock Route that runs through the Project Site. This stock route is located within the road reserve of Ironpot Creek Road, north of the intersection with Niagara Road. The stock route follows north along the reserve of Ironpot Creek Road until the intersection of Ironpot Creek Road / Sarum Road, where the stock route follows Sarum Road north, out of the Project Site.

5.4.3 Port network

The closest commercial sea port to the Project Site is the Port of Brisbane. The port it is situated to the east of Brisbane City and is approximately 300 km (by road via the Warrego and Bunya Highways) to the south east of the Project Site. The Port of Brisbane is operated and managed by the Port of Brisbane Pty Ltd, under a 99 year lease from the Queensland Government.

5.4.4 Airport network

The closest major commercial airport to the Project Site is Toowoomba Airport (International Air Transport Association (IATA) Code: TWB). Toowoomba Airport is currently served by regional airlines such as Skytrans Airlines with direct flights from between Toowoomba and Brisbane, Sydney and Charleville.

There are also a number of smaller airports/aerodromes in the vicinity of the Project, within the WDRC and SBRC catchments including:

- Dalby Airport (IATA Code: DBY)
- Chinchilla Airport (IATA Code: CCL)
- Kingaroy Airport (IATA Code: KGY).

The risk to aviation operations in the vicinity of the Project is considered to be low. However, the potential height of the wind turbines is such that the tips of the blades will penetrate navigable airspace if they reach higher than 152.4 m above ground level. Further, there is some evidence that low-level military jet operations occur in the region.

As a consequence, obstacle lights may be required in accordance with the recommendations of the International Civil Aviation Organisation if turbine heights penetrate navigable airspace.

An essential risk mitigation feature is for the wind turbines to be identified on the relevant aeronautical charts (i.e. both the civil World Aeronautical Charts and the Royal Australian Air Force series). Pending such identification on maps, all potentially affected aviation operators will be made aware of the existence of the Project.

5.4.5 Rail network

The key existing rail infrastructure in the vicinity of the Project consists of the Western System rail-line, which is owned and operated by Queensland Rail (QR). The Western System is a 1067 mm, narrow gauge, east-west running rail line linking Brisbane (via the Ipswich and Rosewood lines) to its current terminus at Quilpie in south-west Queensland. At Westgate station, the rail line splits into a north-south section terminating at Cunnamulla and the east-west section continuing further west until Quilpie. The system currently caters for all types of traffic including passenger and freight services.

A number of branch lines also connect to the Western System, including the Jandowae branch terminating at Jandowae, the Wandoan Branch terminating at Wandoan and the Glenmorgan branch terminating at Glenmorgan. The nearest railway station within the vicinity of the Project is Jandowae Station, located along the Jandowae branch, approximately 40 km west of the Project Site.

5.5 Land use and tenures

5.5.1 Key local and regional land uses

The existing land use within and around the Project is predominantly rural, characterised largely by cattle grazing within the localities of Cooranga North, Bilboa, Boyneside and Ironpot. The largest nearby townships include Kingaroy to the north-east (with a significant peanut and navy bean industry, and more recently, an expanding wine industry), Dalby to the south and Jandowae to the south-west (crops grown in this area include wheat, sorghum, oats and cotton). Small settlements are located throughout the region, including the town of Bell which is the closest community to the site. Bell will likely provide day-to-day services for the wind farm both during construction and operation. Bell's services include a general store, primary school, entertainment venues and some overnight and short-stay accommodation.

The State's capital, Brisbane, is located approximately 180 km south-east from the Project Site and is the closest major city. Brisbane is directly accessible from the Project Site via the Bunya and Warrego Highways.

South-east of the Study Area is the Bunya Mountains National Park. Other significant reserves in proximity to the Project include Jandowae State Forest and Mahen State Forest to the west, and Diamondy State Forest to the north-west.

The Project Site is bounded to the east by the Bunya Highway, between Cooranga North and Kingaroy. Local roads provide access to properties from the Highway, with major connecting roads including Niagara Road, Jarail Road and Red Tank Road.

The nature of land use in the general locality, and the Surat Basin area, has changed significantly over time and is likely to continue to change due to the increase in mining operations and other larger non-rural activities. This change has generally affected rural and agricultural activities and the nature of their supporting townships.

5.5.2 Key local and regional land tenures

5.5.2.1 Land tenure

The land tenure of the Study Area is predominantly freehold (see Figure 4). Exceptions to this are:

- Road reserves throughout the site
- A stock route (unused) located within the road reserve of Ironpot Creek Road, north of the intersection with Niagara Road, until the intersection of Sarum Road, where the stock route follows the road reserve north out of the study
- Easements for electricity transmission.

AGL has entered into agreements with all freehold landowners. Consent to use land is yet to be obtained for easements and road reserves.

5.5.2.2 Mining licences and permits

Local Area Mining Permit Reports obtained for Western Downs Regional Council and South Burnett Regional Council in March 2014 indicates that there is one current permit within the Study Area:

- Coal Exploration Permit – EPC 2056 (granted November 2010) held by Coalbank Ltd;

This coal Project is located on the ridge line and the topography of the surrounding area indicates that it will not affect the wind turbines. There are no other active licences or permits within close proximity to the Study Area.

5.5.3 Native title

The Study Area is currently subject to two active Native Title Claims (refer Table 5.13).

5.6 Planning instruments and government policies

5.6.1 International policy

5.6.1.1 Kyoto Protocol

The United Nations Framework Convention on Climate Change (UNFCCC) provides the foundation for global action to prevent dangerous interference with the climate system, which has been detailed further through the Kyoto Protocol. Australia ratified the Kyoto Protocol on 3 December 2007. The Protocol's first commitment period started in 2008 and ended in 2012. A second commitment period was agreed on in 2012, known as the Doha Amendment to the protocol, in which 37 countries, including Australia, have binding targets.

The Project is consistent with the Australian Government's commitment to limit greenhouse gas emissions under this agreement.

5.6.1.2 Paris Agreement

At the Paris climate conference in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C. The agreement is due to enter into force in 2020.

5.6.2 Commonwealth policy and legislation

The NSESD was ratified by the Council of Australian Governments in 1992 in response to the signing of the Rio Declaration and Agenda 21 at the United National Commission on Economic Development. The NSESD has as its goal 'development that improves the total quality of life, both now and in the future, in a way that maintains ecological processes on which life depends'.

Additionally, in order to meet the 2020 target for emissions reduction arising from Australia's ratification of the Kyoto Protocol, the Australian Government established the RET, a national scheme designed to reduce emissions of greenhouse gases in the electricity sector and encourage the additional generation of electricity from sustainable and renewable sources. On 23 June 2015 the Australian Government settled on reforms to the RET.

The new target makes a commitment that 23.5% of Australia's electricity supply will come from renewable sources by 2020. The RET scheme also aims to stimulate investment in renewable energy across Australia with a target of 33,000 GWh of large-scale renewable energy generation by 2020.

The Project is consistent with the Australian Government's objective to increase the amount of Australia's energy supply derived from renewable sources.

5.6.2.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act establishes a process for environmental assessment and approval of proposed actions that have, will have or are likely to have a significant impact on MNES or on Commonwealth land.

MNES are outlined in the EPBC Act to include:

- The world heritage values of a declared World Heritage area
- Places of National Heritage
- The ecological character of Ramsar wetlands of international importance
- Listed migratory species
- Listed threatened species and ecological communities
- Nuclear actions
- Commonwealth marine areas
- Great Barrier Reef Marine Park
- Water resources – protection from coal seam gas development and large coal mining operations.

According to the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines (Department of the Environment 2013), a "significant impact" is an impact which is important, notable, or of consequence, having regard to its context or intensity. The likelihood of an action having a significant impact depends on the sensitivity, value, and quality of the environment affected, and on the intensity, duration, magnitude and geographic extent of the impacts. Further, a significant impact is considered "likely" if it is a real or not a remote possibility; it is not necessary for a significant impact to have greater than a 50% chance of happening.

Consideration of the potential impact of the Project on a range of MNES is provided in Section 6. This assessment relates primarily to listed threatened species, threatened ecological communities and listed migratory species. Given its location, the Project is unlikely to have any impact on World Heritage areas, places of National Heritage, Ramsar wetlands, Commonwealth Marine areas or the Great Barrier Reef Marine Park. Furthermore, it does not constitute a nuclear action, coal seam gas development or coal mining operation.

A development that is likely to have a significant impact on any MNES is defined as a "controlled action" for which an assessment must be prepared under the EPBC Act.

Previous advice from the former Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) relating to the Project (in response to three referrals submitted between 2008 – 2011) was that the Project did not constitute a controlled action. As some Project details have altered since 2011, the assessment of impacts has been revisited in this IAS and no significant impacts to matters of national state significance were identified.

It is noted that as a result of not being a controlled action the Commonwealth Environmental Offsets Policy (DSEWPAC, 2012) does not apply for MNES at this stage.

5.6.2.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) was introduced to address the implications of the Mabo High Court decision, which dismissed the notion of "terra nullius" and recognised the prior rights of indigenous Australians as being similar to those of indigenous groups in other parts of the world. The NT Act set up a process through which indigenous Australian groups can lay claim to pre-existing ownership (native title) rights over areas in Australia and the Torres Strait.

Native title claims are then assessed by the National Native Title Tribunal, which makes a decision on the merits of the claim, and (depending on the decision) may place the claim on the National Native Title Register. Successful native title claims are required to exhibit:

- That the indigenous group has maintained a traditional connection with the land since 1788
- That the interests of the indigenous group have not been "extinguished" by inconsistent acts (for example, the granting of freehold title).

5.6.3 State legislation

Development of the Project will be undertaken subject to the requirements of State legislation. The following sections describe the potential State triggers and approval requirements for the Project.

5.6.3.1 State Development and Public Works Organisation Act 1971

The SDPWO Act provides for state planning and development through a coordinated system of public works organisation, for environment coordination and of related purposes to facilitate large projects in Queensland. The Project seeks to be declared a 'coordinated project' by the Coordinator-General for which an EIS is required.

5.6.4 Electricity Act 1994

Section 12(3)(a) of the Electricity Act defines "operating works" for a generation entity as the generating plant, fuel stocks, electrical and other property used for generating electricity or connecting supply to a transmission grid or supply network.

Section 25 of the Electricity Act defines a generation entity as "…*a person who holds a generation authority*". A generation authority authorises its holder to connect its generating plant to a transmission grid or supply network.

Sections 178 to 185 the Electricity Act deal with the application, issue and surrender of generation authorities. Specifically, section 178 states that the regulator (that is the chief executive of the Department of Energy and Water Supply (DEWS)) can issue a generation authority for a particular generating plant (whether it is constructed or not). The Project will be the generating plant used for the generation of electricity and connection to the Western Downs to Halys 275 kV (kilovolt) transmission line that intersects the Project. AGL will obtain a generation authority from the DEWS prior to undertaking detailed design and commencing construction of the Project.

For the development of the Project, AGL is a generation entity and the wind farm is the generation plant.

5.6.5 Sustainable Planning Act 2009

The *Sustainable Planning Act 2009* (SP Act) was enacted in December 2009, and together with the Sustainable Planning Regulation 2009 (SP Regulation), is the primary piece of legislation that guides the planning approval process in Queensland. The SP Act oversees the preparation of local government planning schemes, structure and master plans and the designation of community infrastructure. The SP Act also directs the Integrated Development Assessment System (IDAS), which integrates a range of approval requirements previously dealt with under a variety of State legislation.

The Project will require approvals from the Western Downs and South Burnett Regional Councils and the Department of Local Government, Infrastructure and Planning (DILGP) under the SP Act.

As outlined above, the Project seeks to be declared a 'coordinated project' by the Coordinator-General for which an EIS is required. Where the Project is declared a 'coordinated project', the coordinated project process replaces the notification, information and referral stages of the IDAS process under the SP Act.

5.6.6 Aboriginal Cultural Heritage Act 2003 and Torres Strait Islander Cultural Heritage Act 2003

With reference to sections 23(1) of the *Aboriginal Cultural Heritage Act 2003* (ACH Act) and *Torres Strait Islander Cultural Heritage Act 2003*, a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal and Torres Strait Islander cultural heritage, which is implied to be the cultural heritage duty of care.

A search of the Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) database returned the following Aboriginal Parties for the Study Area:

- Barunggam People - Western portion of the Study Area
- Western Wakka Wakka People (Team McLeod) – North western portion of Study Area
- Western Wakka Wakka People (Team Beattie) – North western portion of Study Area
- Wulli Wulli People #2 - Eastern portion of Study Area.

A further search of the DATSIP database will be undertaken prior to construction to identify any changes to the relevant Aboriginal Parties for the Study Area. A voluntary Cultural Heritage Management Plan under Part 7 of the ACH Act will be prepared for the Project.

5.6.7 Other State legislation

It is important to note that in accordance with Schedule 3 of the SP Regulation, there may be State approvals required for a range of activities associated with the development of the Project. The exact details of these likely approvals cannot be determined until further Project information is available at the detailed design stage.

The Project Site is subject to a range of State Interests expressed in the Queensland State Planning Policy. The site is also subject to regional planning frameworks (such as the Wide Bay Burnett Regional Plan, Darling Downs Regional Plan and the Surat Basin Regional Planning Framework – Non-Statutory) and local planning schemes (Draft Western Downs Regional Council Planning Scheme, Wambo Shire Planning Scheme and Kingaroy Planning Scheme). These identify land use and planning objectives on a more site-specific basis.

These planning instruments contain objectives around ecologically sustainable development and the generation of renewable energy. The Project is generally consistent with these objectives and will facilitate the ongoing use of the land for rural purposes.

5.6.8 Draft Queensland Wind Farm Code and Planning Guideline

The draft Queensland Wind Farm State Code and Planning Guideline were released for a second round of public consultation from 16 October to 11 December 2015. The DILGP is in the process of reviewing all submissions and making any required amendments to the draft code and guideline. Upon completion, it is anticipated that the code and guideline will come into effect as a module in the State Development Assessment Provisions (SDAP) in mid-2016 and be given effect by necessary amendments to the Sustainable Planning Regulation 2009.

Under the proposed changes, the State Assessment and Referral Agency (SARA) will be responsible for all development applications for wind farms where the state has a jurisdiction under the SP Act. As a result, responsibility for assessing wind farm developments will shift from local governments to the State.

The Wind Farm State Code, once finalised and adopted, will be contained in the SDAP and is intended to regulate the development of new wind farms or the expansion of existing wind farms; and to mitigate potential adverse impacts on the community and environment during the construction and operation of a wind farm.

6.0 Potential Project impacts

6.1 Natural environment

6.1.1 Land

The Project Site is suitable for both the Project and agricultural uses, with the surrounding land use being predominately pastoral and associated light agricultural industry. It is anticipated that the Project can co-function with existing agricultural practices.

An assessment into erosion risks as a result of the Project's activities determined that residual risks were low following the application of suitable mitigation and control measures.

6.1.2 Water

The potential impacts of stormwater discharges from the Project on surface water quality and quantity arise from a range of activities associated with the construction, operation and decommissioning phases. Potential impacts associated with the Project could be appropriately managed by implementing a range of standard mitigation measures during the various phases of the Project.

With respect to statutory permits relating to surface water, the construction of the Project will require a Riverine Protection Permit. With respect to statutory permits relating to Operational works under the *Sustainable Planning Act 2009*, the construction of the Project will require an Operational Works Permit for the constructing or raising of a waterway barrier. All permits will be obtained prior to the construction and operational phases of the Project.

The Project is not expected to have an adverse impact on the overall condition of the Burnett and Condamine catchments. Any impacts associated with the Project will be localised, temporary and reversible.

6.1.3 Flora and fauna

The Project Site and Study Area have been assessed through desktop and on-site surveys to understand the likely impacts to flora and fauna and to determine the mitigation measures required to manage those impacts.

The Project is located in a highly cleared landscape where much of the original vegetation and habitat has been removed for grazing and cropping. The Project Site largely avoids areas of ecological significance, which has been achieved through a process of site verification and design refinement.

Decisions on the final location of infrastructure (micro-siting) during detailed design and construction will potentially allow for the further protection of species, habitat and features of localised conservation significance.

Impacts on threatened bat species and bird populations are not considered to be significant. However, there is the potential for occasional mortalities to occur. Ongoing monitoring during operation of the Project will help to determine whether further mitigation is required.

6.2 Amenity

6.2.1 Noise and vibration

A noise impact assessment was conducted for the operation of the Project in general accordance with the requirements of the draft Queensland Wind Farm State Code and Planning Guideline. Operational noise limits were defined from the acceptable outcomes of the draft Queensland Wind Farm State Code and background noise levels measured on site prior to construction of the Project.

A noise model of the Project Site was created to predict noise levels at the nearest sensitive receptors to the Project. A noise-compliant wind turbine layout was generated and has formed the basis of the Project Site. The noise predictions demonstrates the noise limits are expected to be complied with during operation of the Project. On this basis, the current 'noise-compliant' wind turbine layout can be considered to protect the existing environmental values in the area from impacts by noise and vibration from the Project.

6.2.2 Air quality

The construction period may last for two to two and a half years, from commencement of access track construction through to the installation and commissioning of the turbines, ending with reinstatement. The following activities could potentially give rise to impacts on air quality:

- Mobilisation, including construction of site laydown areas for off-loading materials and components and to accommodate site offices and mess facilities
- Construction of site tracks for access to turbine locations by civil engineering plant and other vehicles including the excavation of cable trenches and laying of electricity and communications cables
- Construction of turbine foundations
- The delivery and erection of turbine towers and installation of nacelles and blades
- Construction of the site office and grid connection building
- Site re-instatement
- Vehicular movements to the Project Site.

Atmospheric emissions resulting from construction activities will depend on a combination of a specific activity's potential for emission and the effectiveness of control measures that may be applied. In general terms, during construction of a wind farm there are two sources of emissions that will need to be controlled to minimise the potential for significant adverse environmental effects:

- Exhaust emissions from site plant, equipment and vehicles
- Fugitive dust emissions from site activities.

Exhaust emissions

Operation of vehicles and equipment powered by internal combustion engines results in the emission of waste exhaust gases containing the following pollutants:

- Mono-nitrogen oxides (NO_x)

- Particulate matter (PM_{10} and $PM_{2.5}$)
- Volatile organic compounds (VOC)
- Carbon monoxide (CO).

The quantities emitted depend on a range of factors including engine type, service history, pattern of usage and composition of the fuel used. Whilst the operation of site equipment, vehicles and machinery would result in emissions of exhaust gases, such emissions are not considered likely to result in a significant adverse impact, particularly in comparison with levels of similar emissions from road traffic sources.

The main air quality impact of vehicular emissions associated with the Project would be realised along the traffic routes employed by haulage vehicles, construction vehicles, employees and visitors. The effects of these traffic movements on the local air quality in the vicinity of the Project Site have been qualitatively assessed on the basis of the construction activities described above. Emissions from construction traffic are anticipated to have a minimal impact on nearby sensitive receptors provided standard mitigation measures are adopted within the overall site management procedures.

Operational maintenance requirements for the Project are not expected to be frequent and therefore significant effects on air quality from vehicular sources during the operational phase are expected to be minimal.

Fugitive dust

Fugitive dust emissions from construction activities are likely to be variable and will depend on the type and extent of the activity, soil conditions (soil type and moisture) road surface condition and weather conditions. Fugitive dust arising from construction activities is generally of particle size greater in size than the 10 micrometre (PM_{10}) fraction.

In assessing the impact of fugitive dust there are two different effects that need to be considered; the effects of dust nuisance and the effects on human health. The former relates to the amount of dust falling onto and soiling surfaces (or rate of dust deposition) and the latter relates to the concentration of dust in suspension in the atmosphere. If not effectively controlled, fugitive dust emissions can lead to dust nuisance. Furthermore, soils are inevitably drier during the summer period, and periods of dry weather combined with higher than average winds have the potential to generate the most dust.

Most of the dust emitting activities described above respond well to appropriate dust control measures. Furthermore, mitigation measures will be required within site control procedures and a Construction Environmental Management Plan (CEMP) to ensure that potential adverse effects are minimised or eliminated. Dust is therefore not expected to be a significant issue for properties in the vicinity of the Project. No fugitive dust effects are expected during the operational phase.

6.2.3 Lighting

The construction and operation of the project is unlikely to increase light spill at nearby residences surrounding the Project.

Although not a regulatory requirement, risk mitigation measures may be considered to manage the potential risk to aviation operations, including the installation of obstacle lighting. Consultation with CASA, AirServices Australia and the Department of Defence is ongoing to determine the potential risk to aviation operations and to identify appropriate risk mitigation (which could include obstacle lighting, marking of met masts and/ or other risk mitigation strategies as appropriate).

Risk mitigation will be developed having regard to the limited aviation operations which occur in the vicinity of the Project and the associated low risk rating.

6.2.4 Urban design and visual aesthetics

In undertaking the assessment of visual aesthetics, it is necessary to acknowledge that varying attitudes to wind energy developments are expressed by different individuals and constituencies.

A number of submissions were made in response to the 2011 Initial Assessment Report by residents and others who object to the Project on landscape and visual grounds (including general ‘rural amenity’), specifically:

- The submitters’ general dislike of the likely change to views that would be obtained from their properties associated with the presence of the proposed turbines

- The submitters' concerns related to the negative impact of the turbines on the picturesque rural character of the area.

This feedback is acknowledged and has been considered in the current assessments.

The Regional Landscape Values of the area as described in the Wide Bay Burnett Regional Plan (September 2011) are also acknowledged in relation to this issue; noting in particular the comment on page 153 that residents and visitors to the region value the extensive and diverse range of significant landscapes that are considered to be "…*some of the main reasons that people move to, and stay in, the region*."

Aesthetic perceptions have been identified as one of the strongest influences on these attitudes, particularly with respect to visual impacts, which can be positive or negative depending on individual attitudes to the principle and presence of wind generation.

There is also an increasing body of evidence that negative attitudes can reduce with time particularly for those living in proximity to wind farm sites, as they become familiar with the operational wind farm. Therefore, it is difficult to arrive at a collective view on the direction and duration of impact caused by a wind farm project, which is relevant for all visual receptors. Accordingly, this section provides an assessment based on the professional judgement of the assessment team and the methodology described herein.

The visual assessment has found that the introduction of new wind turbines and associated infrastructure (including access roads, substations and 33 kV overhead feeder lines) along with the necessary maintenance activity for the Project, will change the existing character and visual amenity of views experienced by people living, working and visiting the wind farm site and the surrounding landscape. The Project may be seen from fixed locations or as people move through the area on roads or paths (sequential views). However, the effect of a wind farm is a subjective issue and the effects or impacts may be perceived as adverse or beneficial, depending on individual attitudes to the principle and the presence of wind generation, noting that many of the affected community have expressed concern regarding the visual impact of the turbines in their submissions to the 2011 Initial Assessment Report. However, it is also recognised that attitudes may also reduce in intensity with time, as people become familiar with the operational site.

6.3 Social values

The Project is expected to have a positive economic stimulus within the region including employment, income, business development and tourism within the surrounding area. No long-term impacts on land values are anticipated to result from the construction or operation of the Project.

A literature review of scientific, peer-reviewed publications does not provide any evidence that noise, shadow flicker or electromagnetic interference from wind farms has an adverse effect on human health. Therefore, it is not anticipated that the operation of the Project will cause adverse health impacts.

Being a relatively significant project within the region and the State, there is opportunity for the wider community to benefit from the Project through up-skilling and employment during construction and operation. From a regional, State and national perspective, the Project will contribute to the achievement of legislation and policy around renewable energy generation and ecologically sustainable development.

6.4 Economic values

The Project will contribute approximately $4 million annually (2008 dollars) to the local economy throughout its lifetime. This figure is based on anticipated licence payments, rates, community support and employment salaries.

The capital cost value of the Project is estimated to be approximately $700 million, inclusive of turbine components, civil and electrical installation costs, and supply of equipment. Whilst wind turbines are imported from overseas, a significant proportion of the capital cost would be spent within the surrounding region.

A 2010 study for the Hallett Wind Farms (SKM, 2010) suggested that accommodation and food service providers experienced increased sales, local contractors have been employed, and overall business expenditure in the region was more buoyant with additional people and expenditure as a result of the wind farm development.

It is expected that the Project will have a positive impact on the local economy throughout construction and operational phases.

6.5 Built environment

Potential construction impacts caused by the Project are likely to consist of two elements:

- Impacts to pavement condition
- Impacts to traffic operation.

During the construction phase, the potential impacts under both elements are likely to be along four roads, the Bunya Highway, Dalby-Jandowae Road, Kingaroy-Jandowae Road and Niagara Road.

During the operational phase, as the wind turbines are largely self-operating once constructed, the only impact on the road network is expected to be due to from the maintenance workforce. A small number of inspection and maintenance workforce trips are expected on a regular basis during the operational phase. However, the volumes of these trips (and consequent traffic impacts) are expected to be significantly less than during the construction phase.

Any residual impacts which may remain after the implementation of agreed mitigation measures are expected to be negligible and not significant over the construction period.

6.6 Matters of National Environmental Significance

The EPBC Act Protected matters Search Tool identified the potential occurrence of six TECs in the locality. However, field surveys identified only two:

- SEVT of the Brigalow Belt (North and South) and Nandewar Bioregions; 'Endangered', represented by RE 11.8.3 and RE 11.9.4
- Brigalow (*Acacia harpophylla* dominant and co-dominant); 'Endangered', represented by RE 11.9.5 and regrowth of 11.9.5.

The extent of these TECs in the Study Area is shown on (Figure 5).

7.0 Environmental management and mitigation measures

7.1 Natural environment

7.1.1 Construction

AGL has committed to completing an environmental assessment as part of the approval process through which the impacts to the environment will be assessed and environmental outcomes determined.

Where impacts to the surrounding environment are identified, these impacts will be addressed in accordance with the following mitigation hierarchy:

- Avoid – measures taken to avoid creating impacts from the outset.
- Minimise – measures taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided.
- Rehabilitate / restore – measures taken to improve degraded or removed ecosystems following exposure to impacts that cannot be completely avoided or minimised
- Offset – measures taken to compensate for any residual, adverse impacts after full implementation of the previous three steps of the mitigation hierarchy.

Management plans, for both construction and operation, will be developed once environmental impacts have been determined including:

- Environmental Management Plan (EMP): After having identified the environmental issues that could arise as a consequence of the proposed development, detailed mitigation measures will be developed and presented in an EMP as part of the EIS process to ensure that environmental values are protected.
- Traffic management plan.
- Cultural heritage management plan.

- Waste management plan.
- Hazard, risk, health and safety management plan.

A site-specific Erosion and Sediment Control Plan (ESCP) will be prepared as part of an overarching CEMP prior to the commencement of construction. Particular issues that the ESCP will consider include:

- Surrounding terrain
- Scheduling of work activities to avoid, where possible, the exposure of soils during the wet season
- Temporary stockpiling of material within natural clearings until an on-site use is identified
- Stabilisation of exposed surfaces, post-construction and post-decommissioning
- Maintaining temporary erosion and sediment control measures in place, post-construction, until the site is stabilised.

Construction work activities within and/or adjacent to waterways would be minimised as much as feasibly possible to minimise disturbance to those waterways and adjacent riparian areas.

Any topsoil retained for rehabilitation activities will be stockpiled on site in a manner that conserves the native seedbank, soil structure and nutrient value. This will include instating a temporary cover crop on stockpiles that are to be stored for a significant period of time.

It is expected that implementation and maintenance of standard erosion and sediment controls would minimise the likelihood of material migrating off site.

On completion of construction activities, a land rehabilitation program will be established progressively to reinstate a suitable soil profile and vegetative cover in areas no longer required to be maintained as cleared as part of the operational footprint. Consideration will be given to the capability and co-land use opportunities for the Project Site. Operational monitoring of any erosion will be included as part of the overall site maintenance program.

A groundwater monitoring program will be developed for all Project stages which identifies suitable drawdown thresholds to allow for early identification of groundwater drawdown below the identified thresholds.

The following air quality mitigation measures reflect what is expected to be included within the CEMP:

- No bonfires on the Project Site
- Plan construction by locating dust activates away from sensitive receptors where possible
- Identify a responsible person in charge
- Regular cleaning of Project Site entrances
- Damping down of access tracks during prolonged dry periods
- Washing facilities to prevent mud from construction operations being transported on to adjacent public roads
- Restricting vehicle speeds on haul roads and other un-surfaced areas of the Project Site
- Vehicle engines to be switched off when not in use. Avoid idling vehicles where possible
- Ensuring that dusty materials are stored and handled appropriately (e.g. wind shielding or complete enclosure, storage is away from site boundaries, drop heights of materials are restricted, water sprays are used where practicable to reduce dust emissions)
- Ensuring that dusty materials are transported appropriately (e.g. sheeting of vehicles carrying spoil and other dusty materials)
- Minimise dust generating activities on windy and dry days
- Appropriate dust site monitoring included within the site management practices to inform site management of the success of dust control measures used.

7.2 Built environment

A preliminary Road Use Management Plan (RUMP) will be developed for the Project at the detailed design stage in consultation with the relevant authorities, including Department of Transport and Main Roads (DTMR) and

emergency services such as the Queensland Police Service. The assessments conducted for the Project will form the basis for the development of various strategies in managing the potential transport impacts from the construction phase of this Project, all of which will be documented in the preliminary RUMP. As the Project progresses, if any assessment is revised or additional assessment is undertaken (if required by DTMR or affected regional councils), the RUMP will be updated to effectively capture the changes.

The preliminary RUMP will also include strategies to deal with safe temporary access to/from public roads and construction sites as well as safe decommissioning of any stockpile sites over the construction phase of the Project. Temporary and permanent traffic arrangements will also be developed (if required) and included as part of the Traffic Management Plans (TMP) that will be implemented during the various stages of the Project. The framework for the preliminary RUMP will be in accordance with the 'Guideline for preparing a Road Use Management Plan' (DTMR, 2012).

7.3 Indigenous Cultural Heritage Management Plan

Given the extent of the Project Site, and the involvement of multiple Aboriginal Parties, a voluntary Cultural Heritage Management Plan (CHMP) under Section 7 of the *Aboriginal Cultural Heritage Act 2003* will be developed and negotiated for the Project prior to construction.

7.4 Non Indigenous cultural heritage management

7.4.1 Potential historically identified places

Should archaeological deposits be uncovered during construction, a 'Stop Works' process as outlined below will be followed:

- Relevant work will cease in the immediate area and the local site will be secured
- The identified material on site will not be removed or disturbed further (barriers or temporary fences may be erected as a buffer around the find if required)
- In accordance with the *Queensland Heritage Act 1992* (Sections 88-90), DEHP will be informed using the form 'Reporting a Discovery' that can be found on the department's website
- The find will be reported directly by the site supervisor (or other appropriate manager) or through an onsite cultural heritage specialist
- DEHP will determine the significance and future management of the find. This may involve the clearance of the site for development, recording and excavation, or protection.

7.4.2 Avoidance of sites

The preferred mitigation measure for known heritage places is to avoid impact wherever possible. At present, all known heritage places and places of high archaeological potential lie outside of the areas affected by Project activities and so are considered unlikely to be impacted.

7.4.3 Unexpected finds

Although historical and archival research has identified a number of places of heritage value or potential heritage value in the Study Area, there is still the possibility that further, currently unidentified places exist. This is particularly the case with archaeological places, which may relate to activities not recorded in written documents and which may no longer be easily discernible in the landscape.

In this area, historical archaeological places are likely to relate to the pastoral industry and as noted previously, are likely to be represented by items such as:

- Stumps from houses, outbuildings, yards and other structures
- Brick or stone fire bases from houses and other structures
- Refuse heaps; typified by broken bottles and crockery and most likely to occur in gullies around living sites.

If such remains are found, the same 'Stop Works' process outlined above will be implemented.

7.4.4 Cultural heritage induction

To facilitate the identification of historical cultural heritage, information on non–Indigenous cultural heritage would be incorporated into the general site induction. This document would be prepared by a qualified heritage specialist and include the following:

- Familiarisation material for work crews so that they are aware of what constitutes a cultural heritage find
- Clear instructions on what to do should such material be found.

This component would be integrated with the Indigenous cultural heritage inductions developed under the CHMP to provide a holistic overview of the heritage and archaeological resources which may exist within the Project Site.

Identified, practical mitigation and management measures will be negotiated with DEHP and form part of the CEMP for the Project.

7.5 Greenhouse gas management plan

Greenhouse gas emissions will be reduced from the construction phase of the Project by considering the actions in Table 7.1. It is likely that the greenhouse gas emissions produced in the maintenance phase of the Project will be minimal compared to the construction phase of the Project, and as a result, no mitigation actions are presented for the maintenance phase.

Table 7.1 Greenhouse gas mitigation actions for the Project

Measure	Potential action
Awareness	- Provision of a greenhouse gas reduction management plan for the construction phase - Greenhouse gas awareness training as part of site inductions - Periodic energy audits to progressively improve energy efficiency on site.
Targets and goals	- Develop a set of key performance indicators for emissions to track performance over time - Set an overall target and individual goals to provide clear direction to construction staff - Monitor key performance indicators on a monthly basis.
Energy efficiency	- Provision of passive solar design features in the site offices where possible - Install lights with daylight sensors or timers on the construction path so they do not operate unnecessarily - Install energy saving equipment and energy efficient lighting - Implement a switch off campaign to increase staff awareness of the unnecessary energy consumption of office equipment and construction camp facilities - Purchase of Green Power for the site offices and construction camp.
Fuel efficiency	- Lay down areas located to minimise the distance needed to travel - implementation of a travel behaviour program for construction staff that travel to and from site - Gather and record fuel data, including fuel type, fuel consumed, vehicle type, date of fuel purchased and distance travelled - Purchase/lease of more fuel efficient vehicles and/or machines - Analyse the potential to regularly purchase less carbon intensive fuels such as E10 or biodiesel
Material use	- Purchasing materials with lower embodied energy emissions or increased recycled content where possible - Ensure the site office has recycling bins in addition to general waste bins.

7.6 Waste management

Prior to the finalisation of a CEMP for the Project, a site visit will be undertaken to confirm the presence or absence of notifiable activities within the Study Area. Should any notifiable activity be identified in the Study Area through this site visit, the CEMP will ensure that potential issues associated with any waste management are appropriately dealt with for the Project.

The following measures would be in place to manage spills of contaminated fluids:

- Areas would be allocated for the storage of fuels, chemicals and other hazardous materials

- Facilities would be secured and bunded
- Spills or contaminated runoff would be captured and treated and / or disposed of at a licensed facility
- Re-fuelling, wash down and preparation of construction materials would be undertaken in bunded areas to mitigate risks in relation to spills or leaks of fuels / oils or other hazardous onsite construction material
- The application of good practice in the storage and handling of dangerous and hazardous goods would provide appropriate practical responses to manage impacts on occupational health and safety and minimise the risk of a spill occurring
- Captured contaminants resulting from spills or leaks would be treated and disposed of at a licensed facility
- Any soil which has been contaminated with fuel, oils or other chemicals would be disposed as contaminated soil by a waste subcontractor.

7.7 Hazard and risk, and health and safety

A detailed risk assessment and Bushfire Management Plan (BMP) will determine the hazards and risks of the Project and provide appropriate site specific mitigation measures.

A BMP will be completed prior to construction and will detail the design, appropriate emergency responses, and mitigation measures required to enable the Project to function effectively during and immediately after bushfire events. The BMP will further specify appropriate clearance distances and emergency service access requirements during construction and operation.

The development of the BMP will be undertaken in consultation with relevant authorities, stakeholders, property owners and neighbours and will include site assessments of fuel loads as well as determining where asset protection zones may be required to protect infrastructure and/or people. This will be undertaken during the detailed design stage.

The BMP will be prepared to satisfy the requirements of the SPP, Kingaroy Shire Planning Scheme Policy - 4 and Wambo Shire Planning Scheme Policy - 1.

7.8 Environmental management

Refer to Section 7.1.1 for management plans to be prepared for both construction and operational periods.

8.0 Approvals required for the Project

Table 8.1 provides a summary of potentially applicable State legislation including potential approvals, licensing and permit requirements for the Project.

Table 8.1 State legislation that may apply to the Project

Relevant Legislation	Administering Authority	Trigger	Application	Consideration
State Development and Public Works Organisation Act 1971 (SDPWO Act)	Department of State Development (DSD)	key factors, as per section 27(2) (b) - The Project has complex local and State government approval requirements - The Project is of strategic significance to Queensland - The Project is expected to provide significant economic and social benefits, capital investment and employment opportunities - The Project has significant infrastructure requirements.	The SDPWO Act provides for state planning and development through a coordinated system of public works organisation, for environment coordination and of related purposes to facilitate large projects in Queensland.	The Project seeks to be declared a 'coordinated project' by the Coordinator-General for which an EIS is required.
Sustainable Planning Act 2009 (SP Act)	Western Downs Regional Council South Burnett Regional Council Department of Local Government, Infrastructure and Planning (DILGP)	Development permits may be required for: - Material change of use - Operational works - Building Works - Plumbing and drainage works - Reconfiguring a	The SP Act is the primary piece of legislation that guides the planning approval process in Queensland. The SP Act oversees the preparation of local government planning schemes, structure and master plans and the designation of community infrastructure. The SP Act also directs the Integrated Development Assessment System (IDAS), which integrates a range of approval requirements previously dealt with under a variety of State legislation.	The Project will require the following approvals: - Material Change of Use - Operational works - Building Works Where the Project is declared a 'coordinated project', the coordinated project process replaces the information and referral stages of

Relevant Legislation	Administering Authority	Trigger	Application	Consideration
		lot		the IDAS process under the SP Act. The decision stage commences when the Coordinator-General's evaluation report on the IAR is provided to the relevant assessment.
Aboriginal Cultural Heritage Act 2003 (ACH Act)	DATSIP	Works that have potential to interfere with places, artefacts and landscapes of Aboriginal heritage or spiritual culture (i.e. vegetation clearance and earthworks)	The ACH Act binds all persons (including the State) to provide effective recognition, protection and conservation of Aboriginal cultural heritage. The main purpose of the ACH Act is to recognise, protect and conserve Aboriginal cultural heritage in Queensland. The Act aims to ensure that Aboriginal people are recognised as primary guardians, keepers and knowledge holders of Aboriginal cultural heritage and establishes timely and efficient processes for the management of activities that may harm Aboriginal cultural heritage. To ensure the Duty of Care Guidelines are implemented during the construction and operation of the Project and to minimise or avoid adverse impacts to sites or objects of Aboriginal cultural heritage, engagement in a formalised arrangement with the relevant Aboriginal Party(s) is recommended.	Given the extent of the Project Site and the involvement of multiple Aboriginal Parties, a voluntary Cultural Heritage Management Plan under Part 7 of the ACH Act will be undertaken.
Environmental Protection Act 1994 (EP Act) *Environmental Protection Regulation 2008* (EP Regulation) *Environmental*	Department of Environment and Heritage Protection (DEHP)	General Environmental Duty	Section 319 of the EP Act imposes a general environmental duty which specifies that a person must not undertake any activity that may harm the environment without taking reasonable and practical measures to prevent or minimise the harm. It is noted that the EP Act is primarily administered through a number of instruments, including regulations, guidelines, policies, objectives and standards. Policies relevant to this Project are:	A full assessment of potential construction and operational noise is to be provided as part of the EIS Consideration to be given to EPP Water as part of the EIS.

Relevant Legislation	Administering Authority	Trigger	Application	Consideration
Protection (Noise) Policy 2008 (EPP(Noise)) *Environmental Protection (Water) Policy 2009* (EPP(Water))			- EPP(Noise): The policy specifies that environmental values are to be enhanced or protected and Schedule 1 details acoustic quality objectives to be met at various types of sensitive receivers in order for these environmental values to be protected. The assessment of noise emissions from the Project has been carried out in accordance with the draft State Wind Farm Code and Planning Guideline. - EPP(Water): It is noted that it is not expected that the Project will have any significant impact on the overall condition of the surface water and groundwater basins of the area. Potential impacts associated with the project would be localised, and consist of the extraction of water supplies for construction and operational purposes, and mishandling of hazardous materials; both during the construction and operational phases of the project.	

Relevant Legislation	Administering Authority	Trigger	Application	Consideration
		Proposed undertaking of an Environmentally Relevant Activity (ERA)	The EP Act establishes a system that regulates more significant or higher risk activities. These are referred to as 'environmentally relevant activities' (ERA) that will, or have the potential to, release contaminants into the environment and that may cause environmental harm. Schedule 2 of the EP Regulation defines and lists these activities and their aggregate environmental score (based on the environmental activity and emissions profile). Approval to conduct an ERA may take the form of a Material Change of Use for a concurrence ERA under SP Act or an Environmental Authority (EA) granted under the EP Act. Activities that would require an ERA would ultimately depend on the final procurement of the constructing contractor. For example, materials for construction may fully use extracted on-site materials or fully use materials from registered off-site quarries or a combination of both. The relevant ERA for the Project may therefore be: - ERA 16 – Extractive and screening activities	It is noted that an application for relevant ERA's will be submitted by the constructing contractor prior to construction commencing.
Fisheries Act 1994 (Fisheries Act)	Department of Agriculture and Fisheries (DAF)	Waterway Barrier Works	The construction and raising of a waterway barrier is classed as operational works under the SP Act, thereby requiring development approval (unless deemed exempt or compliant with self-assessable codes). Included in the development approval process is an assessment under the Fisheries Act. Waterway barrier works have the potential to slow, limit or prevent fish movement along a waterway. Most native fish require movement along waterways as part of their lifecycle to access suitable habitats for feeding, shelter and breeding. Where a barrier limits or prevents fish movement major impacts on native fish populations and	It is likely that necessary access roads to accommodate construction and maintenance of plant machinery may traverse water features in the area. If some of the impacted features are determined to be waterways for waterway barrier works, a development approval will be necessary unless the development can be carried out in accordance with the relevant self-assessable codes (e.g. *Code for self-assessable development: Temporary waterway barrier works (WWBW02 April*

Relevant Legislation	Administering Authority	Trigger	Application	Consideration
			fisheries resources have occurred.	*2013)*). When assessing a development application for a fisheries development approval, the chief executive will consider the potential impact that structures for crossing various waterways may have on the management, use, development and protection of fisheries resources and fish habitats in the area.
Land Act 1994	Dependant on land tenure (Department of Natural Resources and Mines (DNRM), DEHP, DTMR)	Owner's consent	Under section 263 of the *Sustainable Planning Act 2009,* owner's consent is required in certain circumstances (material change of use, reconfiguring a lot, works below high-water mark and outside canal and works within rail corridor land) to support applications for assessable development. Where applicable types of assessable development will occur on State land, it will be necessary to apply to DNRM for owner's consent. Applications for assessable development within State Controlled Roads will require an application to be provided to DTMR to provide owner's consent.	Application forms would need to be submitted to DNRM, DEHP or DTMR to obtain owner's consent to support applications for applicable types of assessable development.
Nature Conservation Act 1992 (NC Act) *Nature Conservation (Wildlife Management) Regulation 2006* *Nature Conservation (Protected Plants) Conservation Plan*	DEHP	Clearing of protected plants Removing or relocating wildlife, including tampering with a breeding place	The NC Act and associated regulations provide for the conservation of nature, including declaration and management of protected areas, protection of wildlife and habitat, and the sustainable use of native wildlife and areas. The *Nature Conservation (Wildlife) Regulation 2006* lists the plants and animals considered 'extinct in the wild', 'endangered', 'vulnerable', 'near threatened', 'least concern', 'international' and 'prohibited'. The NC Act aims to conserve nature through an integrated and comprehensive conservation strategy for Queensland. Under the NC Act, all plants and most animals that are	The Project will require the taking of protected plants and will interfere with protected fauna including breeding places. Approvals that will be required under the NC Act and its regulations include: - Clearing of protected plants. - Damage mitigation permit and/or approval of a species management plan. These permits would be required prior to the commencement of construction and would be sought by the constructing contractor.

Relevant Legislation	Administering Authority	Trigger	Application	Consideration
2000			indigenous to Australia are protected. There is a strict requirement under the NC Act to obtain an authority when 'taking' a protected animal or plant, or for tampering with a breeding place. Under section 89 of the NC Act, a licence, permit or authority (issued under the NC Act) is required to 'take' protected plants. Exemptions or management plans can be approved for dealing with 'least concern' flora and fauna under various sections of the NC Act. Section 332(1) of the *Nature Conservation (Wildlife Management) Regulation 2006* states that a person "…*must not, without reasonable excuse, tamper with an animal breeding place that is being used by a protected animal to incubate or rear that animals offspring*". If the tampering with or removal of a breeding area is in accordance with an approved species management program or under a damage mitigation permit then section 332(1) does not apply (section 332(4)).	
Vegetation Management Act 1999 (VM Act) *Vegetation Management Regulation 2012*	DNRM	Clearing of Native Vegetation Subject to the VM Act	The Project may involve the clearing of native vegetation which is operational work under the SP Act. Schedule 3, Part 1, Table 4, Item 1 of the SP Regulation makes operational work for clearing of native vegetation assessable development unless the clearing is for an activity or matter mentioned in Schedule 24, Part 1 or 2 of the SP Regulation.	The Study Area contains mapped regional ecosystem and regrowth vegetation. Areas of this vegetation designated as regulated vegetation under the VM Act may be cleared as a result of the Project. Approval under Schedule 3 of the SP Act will be required for the clearing of mapped regional ecosystem vegetation.
Water Act 2000	DNRM	Water Licence for taking or interfering with water	An Operational Works Development Permit and/or Water Licence for taking and interfering with water may be required under Schedule 3, Table 4, Item 3 of the SP Regulation and Section 204 of the *Water Act* 2000 (Water Act) in order to undertake temporary and/or permanent	The Project Site contains watercourses which are likely to be affected by temporary and/or permanent works. Operational Works development applications will need to be submitted to the relevant local

Relevant Legislation	Administering Authority	Trigger	Application	Consideration
			works within a watercourse. A watercourse determination request can be lodged with DNRM to confirm the status of the water features affected by temporary and/or permanent works. If the features are determined to not be watercourses as per the Water Act, then the can be undertaken without the need for a notification, development approval or licence as it is outside DNRM's jurisdiction.	Council for assessment prior to the commencement of these works. Water Licence/Permits are required and are highly likely to be granted for access to surface water supplies for construction purposes. Stream access would be subject to negotiation with landholders or the relevant local Council.
Water Act 2000	DNRM	Riverine Protection Permit	A Riverine Protection Permit is required under Part 8, section 266 of the Water Act in order to destroy native vegetation, excavate or place fill in a watercourse, lake or spring. This includes all watercourses on public, leasehold and freehold property. No approval is required if the works are undertaken in accordance with the document entitled 'Riverine protection permit exemption requirements', produced by DNRM in 2013 (WSS/2013/726, Version 1.01). The exemption requirements apply to landholders and occupiers of the land. Qualification under these exemption requirements will depend on the tenure or sublease arrangements for the subject land. If access roads or underground electrical reticulation are to traverse watercourses in the project area and cannot meet the above exemption requirements, an approval for a Riverine Protection Permit will be necessary to clear vegetation and undertake works within the bed and banks of the stream. It is also noted that under Section 266(2A) of the Water Act: *The application must include the written consent of the registered owners of land—* *(a) wholly containing the length of the*	If not in accordance with the exemption requirements, a Riverine Protection Permit will be required prior to the commencement of construction activities within a watercourse. All permits will be obtained prior to the construction and operational phases of the Project.

Relevant Legislation	Administering Authority	Trigger	Application	Consideration
			watercourse in which the activity is to take place or the part of the lake or spring where the activity is to take place; or *(b) adjoining the watercourse, lake or spring where the activity is to take place.*	

9.0 Costs and benefits summary

9.1 Local, State and national economies

The Project is expected to have a positive economic stimulus within the region including employment, income, business development and tourism within the surrounding area. No long-term impacts on land values are anticipated to result from the construction or operation of the Project.

Being a relatively significant project within the region and the State, there is opportunity for the wider community to benefit from the Project through up-skilling and employment during construction and operation.

From a regional, State and national perspective, the Project will contribute to the achievement of legislation and policy around renewable energy generation and ecologically sustainable development.

9.2 Natural and social environments

The Project is located in a highly cleared landscape where much of the original vegetation and habitat has been removed for grazing and cropping. The Project Site largely avoids areas of ecological significance, which has been achieved through a process of site verification and design refinement. Decisions on the final location of infrastructure (micro-siting) during detailed design and construction will potentially allow for the further protection of species, habitat and features of localised conservation significance.

It is anticipated that all habitable residential dwellings within and adjacent to the Project will remain habitable during the construction and operational phases of the Project.

Construction workers are likely to be employed from local areas wherever possible, and any additional workers will be accommodated in local towns in proximity to the Project Site (such as Jandowae, Bell, Kingaroy or Dalby). During construction of the Project it is likely that the construction workforce will peak at 350 construction workers; comprising civil, electrical and wind turbine contractors. As local workers will be preferred for construction, it is not expected that the introduction of non-local construction workers will result in anything more than a temporary and minor local impact on the population for the duration of the wind farm construction. As the number of non-local construction workers will be limited, any non-local construction workers will stay within existing hotels, motels and rental accommodation in the community and not within construction workers camps.

Based on experience in South Australia for the Hallett Wind Farms (SKM, 2010), it is expected that during operation of the Project, it is likely that one full-time job will be required for every four to six wind turbines. Consequently, it is expected that the Project will generate approximately 10-20 full-time jobs throughout the operational life of the wind farm. These maintenance jobs will be generally offered to local people seeking employment and will be offered suitable training as needed.

The Project could supply power to service approximately 180,000 households (assuming an average household uses 6.3 megawatt hours) or would be the equivalent to taking approximately 214,832 petrol cars off the road each year (assuming an average petrol car produces approximately 4.33 tonnes of CO_2-e emissions annually).

10.0 Community and stakeholder consultation

10.1 Background

The following public consultation activities were undertaken to support the release of the 2011 Initial Assessment Report and will continue as part of the coordinated project approach.

The formal submission period for the 2011 Initial Assessment Report was between 24 March 2011 and 21 April 2011 and included the following activities.

10.1.1 Communication channels

The following Project communication channels were established:

- Community information line (1800 number)
- Postal address for submissions
- Online enquiry form on the AGL's website Project page.

10.1.2 Agency Reference Group briefings

The first Agency Reference Group briefing was held in November 2010, with the purpose of re-introducing the Project, outlining Project requirements and better understanding key agency expectations for delivery of the Project.

A second agency briefing was held in April 2011 following release of the 2011 Initial Assessment Report. The purpose of the briefing was to follow up on key issues previously raised, invite submissions on the 2011 Initial Assessment Report and to outline the next steps in terms of consulting with the broader community.

10.1.3 Council presentations

The Project team presented to Western Downs Regional Council and South Burnett Regional Council in March 2011 and April 2011, with the purpose of informing them of the Project. This included outlining information about the Project, the Study Area, the Project Site being sought for the works, the planning approvals process and timeframes and processes for the submission period on the 2011 Initial Assessment Report.

10.1.4 Landowner meetings

In March 2011, contact was made with more than 60 landowners within the area offering face-to-face meetings about the Project. The purpose of these meetings was to gain a level of understanding about their key issues and concerns. Approximately 30 landowners participated in these landowner meetings.

Whilst every effort was made to contact all landowners in this area, some did not respond to the initial offer. Approximately three landowners elected to not participate. These meetings were attended by a multi-disciplinary representation from within the Project team.

10.1.5 Community information day

A community information day to support the release of the 2011 Initial Assessment Report was held from 9 am until 1 pm on 2 April 2011. Approximately 60 community members visited the Project team at the Cooranga North Hall to discuss the Project and ask questions.

The community information day was attended by a number of technical specialists from within the Project team. The team present were able to discuss the Project, answer questions about the Project and advise interested parties on how they could make a formal submission on the Project.

A total of 27 Record of Contact (ROC) forms were completed on the day by Project team members to record issues and recurring themes raised by community members.

10.1.6 Exhibition and submission period

The 2011 Initial Assessment Report was placed on static exhibition from 24 March 2011 to 21 April 2011. Stakeholders and the broader community were informed of this exhibition period via newspaper advertisements.

The 2011 Initial Assessment Report was also available for viewing online via the AGL's Project webpage at http://www.agl.com.au/coopersgap.

10.1.7 Project newsletters

Between March 2011 and March 2012, three newsletters were distributed to 5,786 letterboxes. Newsletter #1 was distributed in March 2011, prior to the community information day. The purpose of Newsletter#1 was to inform the broader community about the release of the 2011 Initial Assessment Report, how to provide a submission, and to provide information about the community information day.

Newsletter #2 was distributed in December 2011, and provided an update on submissions made in relation to the 2011 Initial Assessment Report, site surveys and studies undertaken since the first update, and the status of the planning approval process.

Newsletter #3 was distributed in March 2012 and provided the broader community with an update of AGL's next steps in terms of further consulting on the Project. This newsletter also highlighted the establishment of a Community Consultative Committee (CCC) in response to feedback received during the earlier consultation phases.

10.2 Response to formal submissions

A total of 31 respondents made formal submissions as part of this initial round of public consultation. Submissions were received from a varying group of stakeholders including local government, state agencies and the local community.

Each formal submission was acknowledged via a written reply from the Project team. Items and issues raised via the formal submission process have been reviewed and will be addressed in the next stage of the coordinated project process.

10.3 Feedback summary

10.3.1 Key themes and issues

The following list is an overview of the key issues raised during the initial round of public consultation:

- Concern about over references to Victorian or South Australian wind farm projects
- Concern over the lack of transparency within the consultation process
- No public meeting held
- Request for more contact with the proponent
- Scientific evidence regarding noise, health and the overall effects of wind turbines is needed
- Concerns over conflicting information
- No faith in the community infrastructure designation process and response to submissions
- Confusion over Project information
- Belief the Project 'is a done deal'
- Requests for AGL to contact submitters to answer questions directly
- Lack of content in the 2011 Initial Assessment Report
- Perception of dishonesty amongst the Project team
- Differences in expectations of the process and the overall Project.

10.4 Response to feedback

10.4.1 Community Consultative Committee

AGL established the Coppers Gap CCC in May 2012. This was in response to the varying levels of feedback received in the initial public consultation phase of the Project.

The purpose of the CCC is to build trust within the local community and to address key issues as they are raised. The CCC is guided by a Terms of Reference that has been set by the committee. The CCC is voluntary and includes representatives from AGL, various agency groups, key stakeholders and community members who meet on a regular basis to discuss the Project and address community issues and concerns.

The CCC also provides an opportunity for the group to work directly with AGL and provide input into and ownership of the Project.

Table 10.1 provides a list of CCC meetings held to date. CCC meetings are planned to continue prior to and after the submission of this IAS.

Table 10.1 CCC meetings

Meeting number	Date	Venue and time
1	24 May 2012	Cooranga North Community Hall, 2pm – 4pm
2	14 June 2012	Cooranga North Community Hall, 10am – 12pm
3	19 July 2012	Cooranga North Community Hall, 2pm – 4pm
4	16 August 2012	Cooranga North Community Hall, 1pm – 4pm
5	20 September 2012	Cooranga North Community Hall, 1pm – 4pm
6	18 October 2012	Western Downs Regional Council, Dalby, 1pm – 4pm
7	15 November 2012	Cooranga North Community Hall, 3.30pm – 6.30pm
8	17 January 2013	Kingaroy Town Community Common Hall, 1pm – 4pm
9	21 February 2013	Bell Bunya Community Centre, 1pm – 4pm
10	21 March 2013	Jandowae Library, 1pm – 4pm
11	20 June 2013	Cooranga North Community Hall, 1pm – 4pm
12	19 September 2013	Kumbia Memorial Hall, 1pm – 4pm
13	20 February 2014	Bell Bunya Community Centre, 1pm – 4pm
14	15 May 2014	Western Downs Regional Council 1pm – 4pm
15	20 November 2014	Cooranga North Community Hall, 1pm – 4pm
16	3 December 2015	Cooranga North Community Hall, 1pm – 4pm

10.5 Next steps

Timeframes for delivery of these subsequent steps are still to be determined. However, agencies, key stakeholders and the broader community will be informed via newsletters and advertisements in the local newspapers. The following activities will also be undertaken:

- Community information “drop-in” sessions
- Community newsletters
- Guided tour to an operational wind farm
- CCC
- Landowner discussions
- Consultation with Western Downs and South Burnett Regional Councils
- Consultation with State Government Agencies
- Consultation with State and Federal members of parliament.

The Project’s public consultation approach and associated communication activities will continue to be monitored and will be reported on in future phases of the Project.

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12.0 Glossary, acronyms and abbreviations

AADT	Annual Average Daily Traffic
ACH Act	*Aboriginal Cultural Heritage Act 2003* (Qld)
ACMA	Australian Communications and Media Authority
AECOM	AECOM Australia Pty Ltd
AEMO	Australian Energy Market Operator
AGL	AGL Energy Limited operating as Coopers Gap Wind Farm Pty Ltd
AHD	Australian Height Datum
Aleis	Aleis Pty Ltd
ANZECC	Australian and New Zealand Environment and Conservation Council
ARG	Agency Reference Group
AS	Australian Standard
ASRIS	Australian Soil Resource Information System
BMNP	Bunya Mountains National Park
BMP	Bushfire Management Plan
BoM	Bureau of Meteorology
BP	(Years) Before Present
CASA	Civil Aviation Safety Authority
CCC	Community Consultative Committee
CE	Critically Endangered
CEMP	Construction Environmental Management Plan
CHMP	Cultural Heritage Management Plan
CID	Community Infrastructure Designation
CID Guidelines	*Guidelines About Environmental Assessment and Public Consultation Procedures for Designating Land for Community Infrastructure*
CLR	Contaminated Land Register
CO	Carbon monoxide
CO_2	Carbon Dioxide
CO_2-e	Carbon Dioxide Equivalent
CSG	Coal Seam Gas
DAB	Digital Audio Broadcasting
DAF	Department of Agriculture and Fisheries
DATSIP	Department of Aboriginal and Torres Strait Islander Partnerships
DEHP	Department of Environment and Heritage Protection
DERM	Department of Environment and Resource Management
DEWS	Department of Energy and Water Supply
DoE	Department of the Environment

DILGP	Department of Infrastructure, Local Government and Planning
DNRM	Department of Natural Resources and Management
DNWFDG	*Draft National Wind Farm Development Guidelines* (EPHC, 2010)
DRO	Desired Regional Outcome
EIS	Environmental Impact Statement
Electricity Act	*Electricity Act 1994*
EMI	Electromagnetic Interference
EMP	Environmental Management Plan
EMR	Electromagnetic Radiation
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPC	Engineering, Procurement and Construction
EPC	Exploration Permit (Coal)
EPHC	Environment Protection and Heritage Council
EPP (Noise)	*Environmental Protection (Noise) Policy 2008 (Qld)*
EPP (Water)	*Environmental Protection (Water) Policy 2009* (Qld)
EP Regulation	*Environmental Protection Regulation 1994* (Qld)
ERA	Environmentally Relevant Activity
ERM	Environmental Resources Management Australia Pty Ltd
ESCP	Erosion and Sediment Control Plan
EV	Environmental Values
EVNT	Endangered, Vulnerable or Near Threatened
Fisheries Act	*Fisheries Act 1994*
FPC	Foliage Projective Cover
GAB	Great Artesian Basin
GDA	Geocentric Datum of Australia
GDE	Groundwater Dependent Ecosystems
GWh	Gigawatt Hours
ha	Hectare
HVR	High Value Regrowth
IAS	Initial Advice Statement
IEC	International Electrotechnical Commission
IPCC	Intergovernmental Panel on Climate Change
kL	Kilolitre
km	Kilometres
kV	Kilovolt
LC	Least Concern
LGA	Local Government Areas

LNG	Liquefied Natural Gas
LP Act	*Land Protection (Pest and Stock Route Management) Act 2002* (Qld)
LRET	Large-scale Renewable Energy Target
m	Metres
m/s	metres per second
MNES	Matters of National Environmental Significance
MW	Megawatt
NC Act	*Nature Conservation Act 1992* (Qld)
NCWR	Nature Conservation (Wildlife) Regulation 2006
NEM	National Electricity Market
NO_x	Mono-nitrogen oxides
NSESD	National Strategy on Ecological Sustainable Development
NT	Near Threatened
NT Act	*Native Title Act 1993* (Cth)
OC	Of Concern
$PM_{2.5}$	Particulates of 2.5 microns fraction
PM_{10}	Particulates of 10 microns fraction
PMF	Probable Maximum Flood
PMST	Protected Matters Search Tool
QH Act	*Queensland Heritage Act 1992* (Qld)
QHR	Queensland Heritage Register
RAR	Revised Assessment Report
RE	Regional Ecosystem
RET	Renewable Energy Target
ROC	Record of Contact
ROP	Resource Operations Plan
SARA	State Assessment and Referral Agency
SAT	Spot Assessment Technique
SBRC	South Burnett Regional Council
SCR	State-Controlled Road
SDAP	State Development Assessment Provisions
SDPWO	*State Development and Public Works Organisation Act 1971*
SEVT	Semi-evergreen Vine Thicket
SLA	Statistical Local Area
SP Act	*Sustainable Planning Act 2009* (Qld)
SPP	State Planning Policy
SP Regulation	*Sustainable Planning Regulation 2009* (Qld)
TEC	Threatened Ecological Communities

the Project	Coopers Gap Wind Farm
the Project Site	The corridor in which the Project will be located
the Study Area	The land available for development, consisting of financially involved landowners
TMP	Traffic Management Plan
TMR	Department of Transport and Main Roads
TV	Television
UNFCCC	United Nations Framework Convention on Climate Change
UXO	Unexploded Ordnance
V	Vulnerable
VOC	Volatile organic compounds
VM Act	*Vegetation Management Act 1999* (Qld)
Water Act	*Water Act 2000*
Water Regulation	Water Regulation 2002
WBBRP	(Draft) Wide Bay Burnett Regional Plan