Legislative Framework

Environmental Impact Statement

April 2016
Prepared for – AGL Energy Limited – ABN: 74 115 061 375

Legislative Framework

Client: AGL Energy Limited

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3.0 Legislative Framework

3.1 Introduction

As a renewable energy development, the Project is generally consistent with a number of international, Commonwealth, State and regional/local agreements and policies that are based around responding to climate change and the development of renewable energy infrastructure.

The Project was declared a 'coordinated project' by the Coordinator-General on the 7th June 2016 for which an EIS is required under section 26(1)(a) of the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

This chapter describes how the Project is generally consistent with the range of relevant Commonwealth, State, regional and local legislation and policies. Sections 3.3 and 3.4 identify the potential permits and approvals likely to be required for the Project under both Commonwealth and State legislation.

3.2 International policy

3.2.1 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. Further discussion of the UNFCCC Kyoto Protocol with respect to the Project is provided in Chapter 19 Sustainability and Climate Change.

3.2.2 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.

Governments agreed:

- A long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels
- To aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change
- On the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries
- To undertake rapid reductions thereafter in accordance with the best available science.

The agreement will be deposited at the UN in New York and opened for signature for one year on 22 April 2016. The agreement will enter into force after 55 countries that account for at least 55% of global emissions have deposited their instruments of ratification.

3.3 Commonwealth policy and legislation

The National Strategy on Ecological Sustainable Development (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 Renewable Energy Target (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 Gigawatt hours (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. The NSESD and RET and their relationship to the Project are further discussed in Chapter 19 Sustainability and Climate Change.

3.3.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (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 Matters of National Environmental Significance (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 relevant MNES to the Project is provided in Chapter 12 Flora and Fauna. 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. Although some Project details have altered since 2011, the Study Area is predominantly unchanged. An assessment of the significance of impacts has been revisited during the preparation of the EIS and no significant impacts to MNES were identified. Table 3.1 provides a summary of the differences between the 2011 EPBC referral Project Site and the current Project Site.

Table 3.1 MNES self-assessment summary

Criterion	Nature and extent of likely impact		
MNES	**MNES assessed in the 2011 referral and the 2016 EIS**	**Additional MNES assessed in 2016 EIS and/or delisted since 2011**	**Additional Commentary**
World Heritage properties	Not applicable.	Not applicable.	No change in assessment.
National Heritage places	Not applicable.	Not applicable.	No change in assessment.
Wetlands of International importance	The Project is not anticipated to have any impacts on the Condamine River, and therefore the Project is not expected to have any influence on the condition of the Narran Lake Nature Reserve.	The project is not anticipated to have any impacts on the Condamine River, and therefore the Project is not expected to have any influence on the condition of the Narran Lake Nature Reserve.	No change in assessment.
Threatened Ecological Communities	- Semi-Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT) - Brigalow (*Acacia harpophylla* dominant and co-dominant) - White Box-Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grasses - Natural grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland - Weeping Myall Woodlands The Project will require the removal of SEVT only. The exact impact of the Project on SEVT would depend on the exact location of the turbines and the associated infrastructure (including tracks).	Additional communities assessed: - Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions There are no potential impacts on the additional community assessed, this Threatened Ecological Community (TEC) was not identified within the Project Study Area.	The 2016 Project Site has reduced the amount of potential SEVT that may require removal in comparison to the 2011 Referral Project Site.
Threatened Fauna	- Black-breasted button-quail - Squatter pigeon - Northern quoll - Spotted-tailed quoll - Grey-headed flying-fox - Collared delma	Additional species assessed: - Koala - Coxen's fig-parrot - Regent honeyeater - Painted honeyeater - Large-eared pied bat	The 2016 Project Site has reduced the amount of potential SEVT and remnant vegetation (which may provide suitable habitat for threatened fauna species) that may require removal in comparison to the 2011

Criterion	Nature and extent of likely impact		
MNES	**MNES assessed in the 2011 referral and the 2016 EIS**	**Additional MNES assessed in 2016 EIS and/or delisted since 2011**	**Additional Commentary**
	- South-eastern long eared bat No threatened fauna species were identified in field surveys. It is unlikely that the project will have a significant impact on threatened fauna species that have the potential to be found within the Study Area. There is a potential impact to birds and bats from the wind turbines during operation, but this is not considered to be a significant impact.	- Greater glider - Yakka skink - Dunmall's snake All threatened fauna species have a possible likelihood of occurrence within the Study Area with the exception of koala which is known to occur within the Study Area. The Project is unlikely to significantly impact these species. A Significance Impact Assessment of the potential impacts to koala was undertaken that determined that the Project Site did not contain habitat critical to the survival of the koala and that the Project will not adversely affect the survival of the koala or its recovery.	Referral Project Site. The maximum number of turbines within the 2016 Project Site remains the same as the 2011 Referral Project Site. There is unlikely to be a significant difference in impacts to birds and bats since the 2011 referral.
Threatened Flora	- Austral cornflower - Mt Berryman phebalium - Austral toadflax - Ooline - Stream clemantis Field surveys have not identified any flora species listed as threatened under the EPBC Act and State legislation. Potential suitable habitat for these species is limited to remnant vegetation, advanced regrowth vegetation and SEVT. Clearing within these communities may be required but will be avoided where possible.	Additional species assessed: - Small-leaved Denhamia - Satin-top grass - King blue-grass - Belson's panic - *Polianthion minutiflorum* Species delisted since 2011: - Finger Panic Grass - Cobar Greenhood Orchid These additional flora species were not recorded within the Study Area during the field surveys and given that no historical records exist for the Study Area, it is considered unlikely that any important populations are present.	The 2016 Project Site has reduced the amount of potential SEVT and remnant vegetation (which may provide suitable habitat for threatened flora species) that may require removal in comparison to the 2011 Referral Project Site.

Criterion	Nature and extent of likely impact		
MNES	**MNES assessed in the 2011 referral and the 2016 EIS**	**Additional MNES assessed in 2016 EIS and/or delisted since 2011**	**Additional Commentary**
Migratory Species	- Fork-tailed swift - White-throated needletail - Black-faced Monarch - Satin Flycatcher - Rufous Fantail - Latham's snipe No threatened migratory species were identified in field surveys. It is unlikely that the Project will have a significant impact on threatened migratory species that have the potential to be found within the Study Area.	Additional species assessed: - Oriental cuckoo - Spectacled monarch - Yellow Wagtail - Osprey Species delisted since 2011: - Rainbow Bee-eater - White-bellied Sea-eagle - Great Egret - Cattle Egret - Painted Snipe These additional species were not recorded during field surveys. The habitat within the Study Area is unlikely to be deemed important habitat and is unlikely to disrupt the lifecycle of the species. The Project is considered unlikely to have a significant impact on these species.	No change in assessment outcome.
Great Barrier Reef Marine Park	Not applicable	Not applicable	No change in assessment outcome.
Nuclear action	Not applicable	Not applicable	No change in assessment outcome.
Commonwealth marine areas	Not applicable	Not applicable	No change in assessment outcome.
Water resources in relation to coal seam gas development and large coal mining development	Not applicable	Not applicable	No change in assessment outcome.

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.

3.3.2 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).

The Study Area is currently subject to two active Native Title Claims (National Native Title Tribunal) as listed in Table 3.2.

Table 3.2 Native Title Claims

Claimant	Date	Status	Tribunal Number	Federal Court Number
Wulli Wulli People #2	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. As required under the Queensland Government Native Title Work Procedures, 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.

3.4 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.

3.4.1 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 was declared a 'coordinated project' by the Coordinator-General on the 7th June 2016 for which an EIS is required under section 26(1)(a) of the SDPWO Act.

The objective of the EIS is to ensure that all relevant environmental, social and economic impacts of the Project are identified and assessed; and to recommend mitigation measures to avoid and minimise adverse impacts.

The EIS is prepared in accordance with the Terms of Reference (ToR) which sets out the general and specific matters the Project proponent must address when preparing the EIS. The draft ToR was made available for public consultation between 10 June and 11 July 2016, with a final ToR released on 29 July 2016.

The public and state government advisory agencies are invited to make submissions on the draft EIS. Information on how to make a submission on the Project's draft EIS is provided in Chapter 1 Introduction.

At the end of environmental impact assessment process for an EIS, the Coordinator-General releases an evaluation report recommending any conditions to be imposed on an approval for the Project or recommending the an approval for the Project be refused.

3.4.2 Electricity Act 1994

Section 12(3)(a) of the *Electricity Act 1994* 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 1994* 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 1994* deals 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 kilovolt (kV) transmission line that intersects the Project Site. 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.

3.4.3 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. An assessment of the Project in relation to the relevant planning schemes is provided in Chapter 11 Land Use and Planning.

As outlined above, the Project was declared a 'coordinated project' by the Coordinator-General on the 7th June 2016 for which an EIS is required under section 26(1)(a) of the SDPWO Act. Where the Project is declared a 'coordinated project', the coordinated project process replaces the information and referral and notification stages of the IDAS process under the SP Act. The decision stage commences when the Coordinator-General's evaluation report on the EIS is provided to the relevant assessment manager.

3.4.4 Environmental Offsets Act 2014

On 1 July 2014, a new environmental offsets framework was introduced in Queensland, streamlining environmental offsets by providing an outcome-based approach to offsets,. The framework includes:

- The Environmental Offsets Act 2014
- The Environmental Offsets Regulation 2014
- The Queensland Environmental Offsets Policy 2016

An environmental offset may be required as a condition of approval where, following consideration of avoidance and mitigation measures, the activity is likely to result in a significant residual impact on prescribed environmental matters.

Consideration of environmental offsets for the Project are provided in Appendix E, Volume 3 of the EIS.

~~3.4.4~~3.4.5 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 the *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) - Northwestern portion of Study Area
- Western Wakka Wakka People (Team Beattie) - Northwestern 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 Cultural Heritage Management Plan under Part 7 of the ACH Act will be developed and negotiated for the Project.

~~3.4.5~~3.4.6 Regional Planning Interests Act 2014

The *Regional Planning Interests Act 2014* (RPI Act) identifies and protects areas of Queensland that are of regional interest. The RPI Act seeks to manage the impact and support coexistence of resource activities and other regulated activities in areas of regional interest (Department of Infrastructure, Local government and Planning 2015).

The strategic cropping area (SCA) is an area of regional interest under the RPI Act. The RPI Act restricts certain resource activities from being carried out within a SCA. Resource activities include any activity for which a resource authority is required. As the proposed wind farm is not classified as a resource activity a regional interests development approval (RIDA) is not required. There are no other implications for the Project in regards to the SCA or the RPI Act.

~~3.4.6~~3.4.7 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 *Forestry Act 1959* provides for forest reservations, the management silvicultural treatment and protection of State forests, and the sale and disposal of forest products and quarry material, the property of the Crown on State forests, timber reserves and on other lands; and for other purposes. The Project will not impact State forests or State owned forest resources. Th~~is~~e *Forestry ~~a~~Act 1959* is therefore not applicable to the Project.

Table 3.~~2~~23 provides a summary of other potentially applicable State legislation including potential approvals, licensing and permit requirements for the Project. Figure 3.1 illustrates the key approvals and where there will be opportunities in the relevant application processes for public comment.

Table 3.3 Table of potential approvals for the construction and operation of the Project

Item	Approval required	Legislative assessment trigger	Applicable assessment manager	Applicable level of assessment	Relevant assessment provisions	How EIS informs the relevant application	Comments
1	Owner's consent for development applications	*Sustainable Planning Act 2009*, Section 263	Dependant on land tenure (Department of Natural Resources and Mines (DNRM)	Not Applicable	For State land appropriate tenure is obtained and demonstrated to the applicable assessment manager	Owner's consent for all required development applications will need to be obtained.	Owner's consent required for development applications to be deemed 'properly made' under the *Sustainable Planning Act 2009* (Qld).
2	Development permit for material change of use for wind farm	Sustainable Planning Regulation 2009 (Qld), Schedule 3, Part 1, Table 2, Item 11 Sustainable Planning Regulation 2009 (Qld), Schedule 24, Part 1, Item 1(1)(a) referral to DNRM for clearing of native vegetation	Department of Infrastructure, Local Government and Planning (DILGP)	Code Assessable	The relevant provisions of the State Development Assessment Provisions including (Module 20 - Wind Farm State Code, Module 8- Native Vegetation Clearing State Code) State Planning Regulatory Provisions Relevant Regional Plan State Planning Policies	The EIS addresses the relevant assessment provisions. The decision stage for the application starts when the Coordinator-General (CG) gives the assessment manager a copy of the CG's report for the EIS.	Application includes proposed ancillary substation and clearing native vegetation. Code assessable if all wind turbines for the wind farm are at least 1,500m from a sensitive land use on a non-host lot; or 1 or more wind turbines for the wind farm are less than 1,500m from a sensitive land use on a non-host lot and the owner of the non-host lot has, by deed, agreed to the turbines being less than 1,500m from the sensitive land use.
3	Development permit for operational works and/ or water licence for taking and interfering with water	Sustainable Planning Regulation 2009 (Qld), Schedule 3, Table 4, Item 3 *Water Act 2000*, Section 204	DILGP/ DNRM	Code Assessment for Development Application (DA) No relevant level of assessment	DA requirements The relevant provisions of the State Development Assessment Provisions (Module 7 –Sustainable Management of Water Resources State Code) State Planning	An application for operational works and/ or water licence for taking and interfering with water will need to be obtained prior to work commencing.	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 2000*, then the works can

Item	Approval required	Legislative assessment trigger	Applicable assessment manager	Applicable level of assessment	Relevant assessment provisions	How EIS informs the relevant application	Comments
				for water licence	Regulatory Provisions Relevant Regional Plan State Planning Policies A relevant temporary local planning instrument A relevant preliminary approval to which section 242 applies The relevant planning scheme Water License requirements: Description and location of land Reason for interference Details of proposed activity Source and location of water Water requirements (where applicable)		be undertaken without the need for a notification, development approval or licence as it is outside DNRM's jurisdiction. Where the water features are deemed watercourses under the *Water Act 2000* and compliance with the applicable exemption/self-assessable development requirements cannot be met, a development application and/or water licence will be required.
4	Development permit for a material change of use for environmentally relevant activity 16 for extractive and screening activities)	Sustainable Planning Regulation 2009 (Qld), Schedule 3, Table 2, Item 1 Environmental Protection Regulation 2008, Schedule 2, Part 4, Item 16	DILGP	Code Assessment	The relevant provisions of the State Development Assessment Provisions (Module 4 – Concurrence Environmentally Relevant Activity State Code) State Planning Regulatory Provisions Relevant Regional Plan	An application for relevant ERA's will be submitted by the constructing contractor prior to construction commencing.	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

Item	Approval required	Legislative assessment trigger	Applicable assessment manager	Applicable level of assessment	Relevant assessment provisions	How EIS informs the relevant application	Comments
					State Planning Policies A relevant temporary local planning instrument A relevant preliminary approval to which section 242 applies Relevant planning scheme		environmentally relevant activity 16 -extractive and screening activities.
5	Development permit for operational works for waterway barrier work	Sustainable Planning Regulation 2009 (Qld), Schedule 3, Table 4, Item 6	DILGP	Code Assessment	If not in accordance with the self-assessable code, a development permit will be required prior to the commencement of construction activities within a waterway. The relevant provisions of the State Development Assessment Provisions (Module 5.2– Constructing or raising waterway barrier works in fish habitats state code) State Planning Regulatory Provisions Relevant Regional Plan State Planning Policies A relevant temporary local planning instrument A relevant preliminary approval to which	This EIS identifies the potential need for waterway barrier works to facilitate new crossings. The exact details of the approval cannot be determined until further Project information is available at the detailed design stage.	Operational work that is the constructing or raising of waterway barrier works, other than operational work that is self-assessable development under part 2 or carried out on premises to which structure plan arrangements apply. Compliance with self-assessable code for minor waterway barrier works part 3: culvert crossings (WWBW01 April 2013) – for culverts Compliance with Self-assessable code for temporary waterway barrier works (WWBW02 April 2013) – For temporary barriers across Waterway Barrier Works Waterways (i.e. diversions).

Item	Approval required	Legislative assessment trigger	Applicable assessment manager	Applicable level of assessment	Relevant assessment provisions	How EIS informs the relevant application	Comments
					section 242 applies Relevant planning scheme		
6	Development permit for reconfiguring a lot	Kingaroy Shire IPA Planning Scheme, Part 3, Division 2, table 3B Sustainable Planning Regulation 2009 (Qld), Schedule 7, Table 2 relevant referral agency (where applicable)	South Burnett Regional Council	Code Assessment	Applicable codes within the Kingaroy Shire IPA Planning Scheme State Planning Regulatory Provisions Wide Bay Burnett Regional Plan State Planning Policies Temporary local planning instrument A preliminary approval to which section 242 applies The relevant provisions of the State Development Assessment Provisions trigger under Schedule 7, Table 2)	A development application will be required for the required reconfiguration of a lot.	If the proponent enters into a landholder agreement (as it is with the wind turbines) reconfiguration of a lot will not be necessary. Applicable planning scheme to be determined at time of lodgement.
		Draft South Burnett Planning Scheme, Table 5.6.1 Sustainable Planning Regulation 2009 (Qld), Schedule 7, Table 2 relevant referral agency (where applicable)	South Burnett Regional Council	Impact Assessment	The South Burnett Planning Scheme State Planning Regulatory Provisions Wide Bay Burnett Regional Plan State Planning Policies Temporary local planning instrument A preliminary approval to which section 242		

Item	Approval required	Legislative assessment trigger	Applicable assessment manager	Applicable level of assessment	Relevant assessment provisions	How EIS informs the relevant application	Comments
					applies The relevant provisions of the State Development Assessment Provisions trigger under Schedule 7, Table 2		
7	Development permit for operational works for excavation and/or filling	Draft South Burnett Planning Scheme, Part 5, Table 5.8.1	South Burnett Regional Council	Code Assessment	Self- assessment Carry out a self-assessment to make sure proposal complies with the relevant code. Code Assessment: Applicable codes within the relevant planning scheme State Planning Regulatory Provisions Wide Bay Burnett Regional Plan State Planning Policies Temporary local planning instrument A preliminary approval to which section 242 applies	As assessment against the relevant local planning scheme will need to be undertaken once the extent of excavation and/filling works have been finalised during the detailed design of the Project.	Applicable Local Plan and Overlay levels of assessment need to be confirmed at the detailed design phase to determine if impact assessment is required.
		Kingaroy Shire IPA Planning Scheme, Part 3, Division 2, Table 3B	South Burnett Regional Council	Self - assessment or Code Assessment			
		Planning Scheme for Wambo Shire, Part 4, Table 4.1.2 (4)	Western Down Regional Council	Self - assessment or Code Assessment			
		Draft Western Downs Planning Scheme	Western Down Regional Council	Self - assessment or Code Assessment			
8	Development permit for building work	Sustainable Planning Regulation 2009 (Qld), Schedule 3, Part 1, Table 1, Item 1	Private Certifier	Code Assessable	The relevant provisions of the following, as they apply under the *Building Act 1975* (Qld), Chapter 4, Part 1, Division 1: *The Building Act* (Qld), chapters 3 and 4;	The relevant assessment provisions of the Building Code of Australia will need to be addressed following detailed design.	

Item	Approval required	Legislative assessment trigger	Applicable assessment manager	Applicable level of assessment	Relevant assessment provisions	How EIS informs the relevant application	Comments
					Any local law or local planning instrument that the division allows to apply to the assessment; - Note Sustainable Planning Regulation 2009 (Qld), Schedule 4 exemption; The Queensland Development Code; The Building Code of Australia.		
9	Self- Assessable Building Works	Building work made self-assessable or exempt under the Sustainable Planning Regulation 2009 (Qld), Schedule 3, Part 2, Table 1, Item 2	Not Applicable	Self-Assessment/ Exempt Development	Self-Assessment *Building Act 1975* (Qld), Section 21 Exempt Development Building Regulation 2006, Schedule 2	The relevant assessment provisions of the Building Code of Australia will need to be complied with.	
10	Compliance assessment for plumbing, drainage and on site sewerage work	*Plumbing and Drainage Act 2002* (Qld), Section 85, 86 and 86A	Applicable Regional Council	Compliance Assessment	Standard Plumbing and Drainage Regulation 2003	The relevant assessment provisions of assessment criteria described under the Standard Plumbing and Drainage Regulation 2003 will need to be addressed following detailed design.	Requires confirmation that the proposal will be connected to local government infrastructure for plumbing and drainage during the detailed design phase

Item	Approval required	Legislative assessment trigger	Applicable assessment manager	Applicable level of assessment	Relevant assessment provisions	How EIS informs the relevant application	Comments
11	Cultural Heritage Management Plan (CHMP)	*Aboriginal Cultural Heritage Act 2003* (Qld), Part 7	Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP)	Not Applicable	Divisions 3 to 7 of Part 7 of the *Aboriginal Cultural Heritage Act 2003* (Qld)	A CHMP is compulsory where an EIS is required.	A CHMP is being developed and negotiated for the Project.
12	Compliance with *Aboriginal Cultural Heritage Act 2003* Duty of Care Guidelines	*Aboriginal Cultural Heritage Act 2003*, Section 28	DATSIP	Not Applicable	Demonstration of compliance with *Aboriginal Cultural Heritage Act 2003* Duty of Care Guidelines	Provided the land user is compliant with the approved CHMP, the proponent has certainty that they are acting lawfully under the legislation and that they are meeting their cultural heritage duty of care.	-
13	Protected plant clearing permit	*Nature Conservation Act 1992* (Qld), Section 89	Department of Environment and Heritage Protection (DEHP)	Not Applicable	A clearing permit is only is required if the area is not identified as high risk and the proponent is aware, or becomes aware, before the clearing commences that there are EVNT plants within the area being cleared or within 100m of the area being cleared	This EIS confirms that the flora survey trigger map does not identify any high risk areas within the Project Site.	-
14	Damage mitigation permit and/or a species management plan.	Nature Conservation (Wildlife Management) Regulation 2006,	DEHP	Not Applicable	Demonstrate real need to take wildlife and mitigation measures to damage caused	This EIS confirms that a fauna construction management plan will be submitted to DEHP to obtain an approved	-

Item	Approval required	Legislative assessment trigger	Applicable assessment manager	Applicable level of assessment	Relevant assessment provisions	How EIS informs the relevant application	Comments
		Section 332(1) and Section 332(4)				Species Management Plan for Least Concern fauna.	
15	Riverine Protection Permit	*Water Act 2000*, Part 8, Section 266	DNRM	Applicable	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. The application must include the written consent of the registered owners of land— (a) wholly containing the length of the 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.	This EIS identifies the potential need for a riverine protection permit for works within a watercourse. The exact details of the approval cannot be determined until further Project information is available at the detailed design stage	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.

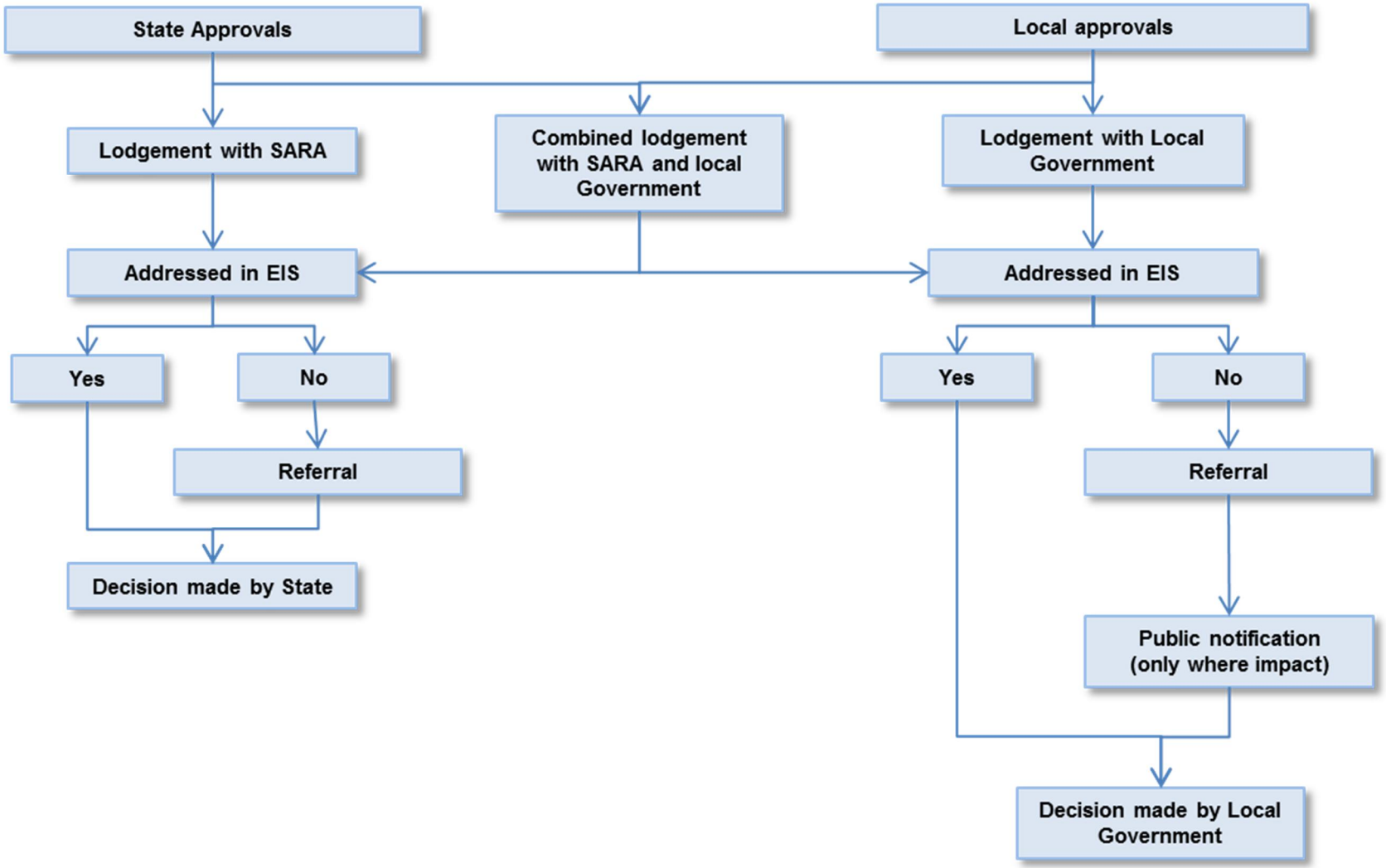

Figure 3.1 Key approvals

3.5 Plans and policies

The Project Site is subject to a range of State Interests expressed in the Queensland State Planning Policy. The Project 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 (see Chapter 11 Land Use and Planning for a detailed discussion of the Project in relation to the regional and local planning instruments).

3.6 Queensland Wind Farm State Code and supporting Planning Guideline

The Queensland Wind Farm State Code and supporting Planning Guideline came into effect on 22 July 2016. It provides a consistent, coordinated, whole-of-government approach to the assessment and regulation of wind farm development across Queensland. The code and guideline will facilitate quality renewable energy outcomes whilst protecting communities from any adverse impacts as a result of wind farm development.

The Queensland Wind Farm State Code and supporting Planning Guideline will support the role of DILGP, via the State Assessment and Referral Agency (SARA), as the assessment manager for all wind farm proposals in Queensland. As a result, responsibility for assessing wind farm developments will shift from local governments to the State.

The purpose of the Queensland Wind Farm State Code is to protect individuals, communities and the environment from adverse impacts as a result of the construction, operations and decommissioning of wind farm development.

The Queensland Wind Farm Planning Guideline assists applicants in preparing development applications for wind farm proposals and to provide assistance in responding to performance outcomes and acceptable outcomes of the Queensland Wind Farm State Code. It provides guidance in relation to required technical assessments and suggested further reading/information.

The EIS has been developed to be consistent with the Queensland Wind Farm State Code and supporting Planning Guideline.

3.7 Draft National Wind Farm Development Guidelines

The DNWFDG were released by the Environment Protection and Heritage Council (EPHC) in July 2010. The DNWFDG are non-statutory and are intended to provide guidance to decision makers about the potential impacts of wind farm development, and the methodologies that should be adopted when undertaking environmental impact assessments (as part of a planning approval process) for wind farm developments.

The DNWFDG have been borne from recognition that reporting requirements for wind farms presently differ significantly throughout Australia, and that some consistency in approach is required for the environmental assessment procedures between states. A Working Group was established by the EPHC consisting of Commonwealth and State Government agencies, the Planning and Local Government Minister's Council, and a number of expert consultants to draft the DNWFDG.

The DNWFDG in conjunction with the Queensland Wind Farm State Code and supporting Planning Guideline provides as a useful tool for project stakeholders – including relevant agencies, local councils, landowners and the general community to help inform stakeholders about project assessment and reporting requirements.

The 2011 Senate Community Affairs Reference Committee tabled its report into the social and economic impacts of rural wind farms. The report made specific recommendations on updating the DNWFDG. In the Australian Government's response it was indicated that it did not support this recommendation. The Australian Government stated that:

> "…*jurisdictions have developed, or are currently developing, planning application, assessment and approval processes within their own planning frameworks to manage community concerns about wind farm developments such as turbine noise, shadow flicker, electromagnetic interference and impacts on*

landscapes and wildlife. The EPHC Standing Committee therefore has decided to cease further development of the Guidelines."

It was noted by the Australian Government that the DNWFDG remain a valuable reference document for industry and planning authorities. Given the limited extent of previous wind farm developments within Queensland, the DNWFDG provide a nationally recognised benchmark for assessment of the Project.

3.8 Summary

This chapter has described Commonwealth and State legislation and policies and local government planning schemes of relevance to the Project. The resulting consideration (necessary permits and approvals) for the Project have also been identified. The relationship of the EIS investigations with respect to nationally recognised policy guidance has also been discussed.

As a renewable energy project, the Project will be developed in accordance with applicable Commonwealth and State legislation and will seek to achieve the outcomes sought by various international, national, regional and local policies.

Noise and Vibration

Environmental Impact Statement

May 2016
Prepared for – AGL Energy Limited – ABN: 74 115 061 375

Noise and Vibration

Impact Assessment Report

Client: AGL Energy Limited

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4.0 Noise and Vibration

4.1 Introduction

The construction and operation of a wind farm is likely to generate noise (such as aerodynamic noise from wind turbines or from associated sources such as construction traffic). It is therefore necessary to design a wind farm so that increases in ambient noise levels at nearby sensitive receptors are minimised or avoided.

A Noise and Vibration Impact Assessment (NVIA) ~~construction and operational noise and vibration impact assessment~~ has been carried out for the Project in order to appropriately positon the wind turbines to avoid or minimise the incidence of noise at nearby sensitive receptors.

Appendix F in Volume 3 provides the NVIA~~Noise and Vibration Impact Assessment~~ for the Project. This chapter provides a summary of that assessment.

4.2 Scope of assessment

The scope of the noise and vibration assessment is to:

- Conduct background noise monitoring at nearby sensitive receptors
- Undertake operational noise modelling and determine potential noise impacts generated by the Project
- Consider construction noise and vibration impacts
- Discuss potential mitigation and management measures.

The assessment methodology was undertaken in accordance with the Queensland Department of Infrastructure, Local Government and Planning Wind Farm State Code Planning Guideline (DILGP, 2016), in order to achieve compliance with the performance outcomes of the ~~code~~Code.

4.3 Legislation and policy

4.3.1 Queensland Wind Farm State Code and Planning Guideline

The Queensland Wind Farm State Code is contained in Module 20 Section 1 of the State Development Assessment Provisions (SDAP) (DILGP, 2016) and is intended to regulate the development of new wind farms, or the expansion of existing wind farms. The code aims to mitigate potential adverse impacts on the community and environment during the operation of a wind farm, and provides the assessment criteria performance outcomes that must be met.

The planning guideline that accompanies the code, also produced by DILGP, includes technical material that aims to assist proponents in preparing development applications for new or expanded wind farms and to provide assistance in responding to performance outcomes and acceptable outcomes of the code.

Sensitive receptors that are located on either host lots or non-host lots who have an agreed Deed of Release with AGL are referred to in this chapter as “participating landowners”. All other sensitive receptors on non-host lots, where landowners have not entered into a commercial agreement with AGL, are referred to in this chapter as “non-participating landowners”.

Appendix 4 of the planning guideline provides guidance material to assist in conducting a noise impact assessment for a wind farm, with the aim at meeting the performance outcomes for acoustic amenity. The Noise and Vibration Impact Assessment has been informed by this guideline and is included in Appendix F, Volume 3.

The Draft Queensland Wind Farm State Code (Draft QLD Code) has been referred to for assessment criteria for low frequency noise emissions, as the QLD Code does not cover low frequency noise emission criteria. A low frequency assessment was performed to address Information Requirement 10.5 of the Coopers Gap Wind Farm Project Terms of Reference for an Environmental Impact Statement, which states that impact predictions must address the potential impacts of any low frequency noise emissions below 200 Hz.

4.3.2 New South Wales Planning Guideline

The NSW Department of Planning & Infrastructure *Draft NSW Planning Guidelines – Wind Farms*, December 2011 (NSW Planning Guideline) has been referred to for low frequency noise limits, further to the Draft QLD

Code. The Noise and Vibration Impact Assessment included in Appendix F, Volume 3 has been informed by this guideline.

4.3.3 Environmental Protection Act 1994

Division 3 – Default Noise Standards of the *Environmental Protection Act 1994* (EP Act), has been referred to for the determination of noise limits to specific noise sources, where applicable. The EP Act provides noise limits for noise sources of steady state nature, which can be applied to establish a noise criterion for steady-state noise emission of infrastructure related to the Project, other than the wind turbines.

4.4 Methodology

4.4.1 Construction noise

The Queensland Wind Farm State Code outlines a performance outcome for ~~-~~construction management, with guidelines to demonstrating compliance with this outcome for noise and vibration given in the associated planning guidelines (DILGP, 2016). There is no legislation in Queensland that specifically sets construction noise limits. For construction activity in Queensland, the EP Act states that:

"A person must not carry out building work in a way that makes an audible noise –

a. On a business day or Saturday, before 6:30am or after 6:30pm; or

b. On any other day, at any time."

Thus noise from construction activity is generally controlled through limiting the hours of operation, and through application of relevant industry management techniques.

4.4.2 Construction vibration

To assess perceptible vibration to humans, the vibration criteria from the Australian Standard (AS) 2670.2 - 1990 Evaluation of human exposure to whole-body vibration - Part 2: Continuous and shock induced vibration in buildings (1 to 80 Hz) is used. These criteria are summarised in Table ~~9~~ 10 of Appendix F, Volume 3.

International standards exist for vibration-induced damage to structures and can provide guidance on acceptable limits. These documents are commonly used to assess structural response to vibration throughout Australia.

The German standard DIN 4150 Part 3, and British Standards (BS) 5228 Part 4 and BS 7385 Part 2 recommend vibration criteria relating to structural damage of buildings. These standards are considered to be best practice in Australia. The criteria from the standards are summarised in Table ~~10~~11 and Table ~~11~~12 of Appendix F, Volume 3.

Based on typical levels of vibration from construction activities, it is expected that both occupants and dwellings at distances of 200 m and greater from construction works will be unlikely to perceive construction vibration. Vibration impacts are not considered to present a significant impact to sensitive receptors and are therefore not considered further in this chapter.

4.4.3 Background noise measurements

The acoustic environment prior to construction of the Project was evaluated by undertaking a background noise monitoring program. Noise monitoring locations were selected to represent areas that are expected to have the greatest noise impact from the Project.

The monitoring was carried out in 2016~~2010 and 2011 across three periods for approximately one month during each period~~ to measure background noise at 12 locations for a minimum period of 6 weeks.~~.~~ Both wind speed and noise data were collected as an average for each 10 minute measurement throughout the monitoring. In all cases, the microphone was located a minimum of 1.2 m above the ground and at least 5 m from any reflecting surface, including buildings or significant vegetation such as trees and away from existing significant noise sources where practicable, in order to get an indication of the typical acoustic environment at noise sensitive receptors. ~~AGL are in the process of obtaining supplementary noise monitoring. The results from supplementary monitoring are not expected to vary significantly from the 2010 and 2011 measurements, as there have been no significant changes in noise generating activities in the area.~~

Background noise measurements were undertaken following guidance from the DILGP 2016~~at 12 representative locations near the Project Site (refer Figure 4.1 in Volume 2). In the absence of a Queensland wind farm noise guideline at the time of measurement, background noise monitoring was undertaken following guidance from the~~

~~South Australian Environment Protection Agency (EPA) Wind farms environmental noise guidelines (SA 2009) and also in accordance with Australian Standard *AS4959-2010 Acoustics-Measurement*, prediction and assessment of noise from wind turbine generators which is generally in accordance with the Queensland Wind Farm State Code and supporting Planning Guideline. The minor differences will have minimal effect on the acoustic outcome of the predicted noise measurements, and will be updated when supplementary noise monitoring is complete.~~

4.4.4 Operational Noise Modelling

A three-dimensional computer noise model of the Project Site was created in SoundPLAN Version 7.4, acoustic modelling software. Environmental noise predictions were carried out using the algorithms from ISO 9613.2:1996 *Acoustics – Attenuation of Sound during propagation outdoors – Part 2: General method of calculation*, as implemented by the SoundPLAN software package and as required by the Queensland Wind Farm Planning Guideline. SoundPLAN is a modelling package that has been used in Queensland for numerous infrastructure developments.

The following data was used to create the computer model:

- Topographical ground contours for the Project Site and surrounding area
- Proposed turbine layout, developed in July 2016. The wind turbines were entered at hub height of 117 metres above ground level
- Receiver locations, determined from aerial photograph and cadastral data overlaid on the ground contours. Sensitive receptors were entered in the model at a height of four metres above ground level.

An aerial view of the Project showing the location of turbines and sensitive receptors (participating and non-participating landholders) is provided in Figure 4.1, Volume 2.

The following parameters were entered in the computer model, in accordance with the Queensland Wind Farm State Code and supporting Planning Guideline:

- Atmospheric conditions at 10°C and 70% temperature humidity
- Hard ground (0.1 ground factor)
- ~~The noise modelling is undertaken for 'worst case' conditions, which occur when the wind blows from the turbines towards each residence. Noise levels will be lower at the residences when the wind blows upwind, or at cross winds, from the residence. A conservative assumption was made by considering that wind is blowing from each turbine to every receptor~~
- No penalty for tonality was applied (0.0 dB penalty)
- A sound power level (L_W) for a typical 3.6 MW turbine of 107 dB(A) has been assumed. Larger turbines may be considered where there is sufficient data to suggest that the sound power output and spectral content complies with the parameters in this assessment and the Queensland Wind Farm State Code and supporting Planning Guideline
- A relationship of $L_{Aeq} = L_{A90}$ was used to model the wind farm layout.

A noise-compliant wind turbine layout was generated using the acoustic modelling software, which is the basis of the current Project layout.

4.5 Potential impacts

4.5.1 Construction noise impacts

Specific details of the construction methodology and equipment are not known at this early stage of the Project. However, it is anticipated that the construction work may include excavation, rock hammering, drilling and bulldozing. Noise will be generated by mobile plant such as excavators, bulldozers, mobile cranes and semi-trailers delivering or removing material from construction sites.

It is expected that the following typical construction equipment will be used:

- Excavators
- Tracked bulldozers

- Semi-trailers
- Tractors
- Mobile cranes
- Concrete trucks.

Construction noise impacts for the majority of nearby sensitive receptors are likely to be below the existing typical daytime background level. Some nearby receptors may receive elevated construction noise levels during turbine foundation civil works. However, potential noise impacts would be localised and temporary and are unlikely to result in significant adverse impacts to sensitive receptors.

~~There are no additional noise or vibration sources anticipated during commissioning of the Project or during upset conditions.~~

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4.5.2 Operational noise impacts

Appendix F, Volume 3 presents the outdoor noise compliance assessment for the turbine layout during worst-case turbine noise emissions. The noise levels presented are $L_{Aeq,10min}$ noise levels at the receptors, assessed against the noise limits.

Figure 4.2, Volume 2 shows that the noise predictions comply with the Queensland Wind Farm State Code and supporting Planning Guideline noise limits at all sensitive receptors.

Appendix F, Volume 3 presents the low frequency noise compliance assessment for the turbine layout during worst-case turbine noise emissions. The noise levels presented are $L_{Ceq,10min}$ noise levels at the sensitive receptors, assessed against a 60 dB(C) night time limit, as per the NSW Code and Draft QLD Code. The Draft QLD Code has been referred to for assessment criteria for low frequency noise emissions, as the QLD Code does not cover low frequency noise emission criteria.

The noise contour maps are generated based on a grid of calculations which are interpolated to generate the contours. Single point calculations provided in Appendix F, Volume 3 should be referred to for specific levels at a receptor.

Figure 4.3 in Volume 2 shows that the noise predictions comply with the low frequency noise criteria at all but one receptor. The low frequency noise limit was exceeded by less than 1 dB(C) at receptor G. The conservative assumptions made when building the model mean that the measured noise levels would likely be lower than those predicted as part of this assessment. As such, noise compliance at receptor G with a 60 dB(C) noise limit is expected. The location of receptor G is shown in Figure 4.3, Volume 2.

~~Levels of exposure to wind farm infrasound have consistently been found to be below the threshold of human perception (85 G-weighted decibels (dBG)). There is no evidence of physiological effects from infrasound that is below the level of audibility. The infrasound emitted by wind farms has been found to be comparable to a number of other sources including coastlines, urban areas and other industrial processes.~~

The Project is seeking approval to install turbines up to a 4 MW power rating. The 4 MW upper limit is to allow for innovation in turbine design should there be a 4 MW turbine that has the same SPL as a 3.6 MW turbine prior to construction. Regardless of the size or output of the turbine. AGL will be required to build a wind farm that complies with the acoustic requirements of the Queensland Wind Farm State Code and supporting Planning Guideline.

In addition to the EIS noise assessment presented in Appendix F, Volume 3, AGL has conducted separate façade testing at the request of the community. This assessment determined that, with windows fully open, there was an 8 to 13 dB(A) reduction in noise levels between outdoors and indoors. The level of reduction was dependent on the construction material of the residence.

4.6 Mitigation measures

4.6.1 Construction noise mitigation measures

Construction noise will represent a short term impact and is anticipated to include a range of noise sources. To minimise the impacts of construction noise, the construction contractor will prepare a Construction Noise and Vibration Management Plan which outlines the proposed methodology and monitoring procedures to be put in

place for the duration of the works. The Construction Noise and Vibration Management Plan will incorporate the following as a minimum:

- Community Noise Consultation
- Site Management
- Equipment management
- Noise Monitoring.

Further details of the plan are provided in Appendix F, Volume 3.

4.6.2 Operational mitigation measures

Operational noise would be limited to operational wind turbine noise and infrastructure noise. Once the wind farm is operational, compliance noise measurements will be undertaken at a number of sensitive receptors adjacent to the Project Site to demonstrate that compliance with the relevant criteria has been achieved.

A preliminary Compliance Management Plan has been developed to incorporate a compliance measurement methodology. It is noted that the Queensland Wind Farm Planning Guideline does not establish a methodology for conducting compliance noise measurements on wind farms, therefore, a compliance measurement methodology will be incorporated into a compliance management plan. This methodology is provided in Appendix F, Volume 3 and was developed following guidance from the following documents:

- NSW Department of Planning & Infrastructure *Draft NSW Planning Guidelines – Wind Farms*, December 2011
- Victoria Department of Planning and Community Development *Policy and Planning Guidelines for development of wind energy facilities in Victoria, July 2012*
- New Zealand Standard NZS6808:2010 *Acoustics – Wind farm noise.*

Compliance noise measurements will be conducted and processed following the principles for conducting background measurements outlined in the Queensland Wind Farm State Code and supporting Planning Guideline, with guidance from the above documents.

4.7 Residual impacts

4.7.1 Construction noise residual impacts

Construction noise is temporary and transient in nature and can be controlled through good site working practices, limiting construction hours and adopting noise control measures where necessary. The construction contractor will sign up to a Construction Environmental Management Plan (CEMP) which will include a Construction Noise and Vibration Management Plan that will ensure effective controls are put in place. For this reason, it is considered that residual noise impacts from the construction phase are unlikely to be significant.

4.7.2 Operational noise residual impacts

Based on the results of noise predictions, the noise limits proposed in Appendix F, Volume 3 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. Compliance measurements will ensure that residual impacts to nearby sensitive receptors will be minimised or avoided.

4.8 Cumulative impacts

No new or proposed developments have been identified within the Study Area that are likely to result in combined or successive noise impacts with the Project. Cumulative noise impacts to sensitive receptors are therefore considered to be unlikely.

4.9 Summary and conclusions

A noise impact assessment was conducted for the operation of the Project in general accordance with the requirements of the Queensland Wind Farm State Code and supporting Planning Guideline 2016. Operational

noise limits were defined from the operational outcomes of the 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 limits contained within the Queensland Wind Farm State Code are expected to be complied with during operation of the Project, based on the results of noise predictions. 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.

Compliance measurements will be undertaken at a selected number of the potentially most affected sensitive receivers following the commissioning of the Project. In lieu of a compliance methodology within the Queensland Wind Farm State Code a basic methodology has been proposed in this assessment. A preliminary Compliance Management Plan has been developed to incorporate the compliance measurement methodology. This is provided in Appendix F, Volume 3. Testing will be undertaken once all noise sources associated with the Project are in operating mode, i.e. all turbines have been commissioned and are operating correctly.

4.10 References

Australian Standard AS 2670.2, 1990. *Evaluation of human exposure to whole-body vibration - Part 2: Continuous and shock induced vibration in buildings (1 to 80Hz)*

British Standards BS 5228 Part 4 Incorporating. Amendment No.1. Noise control on construction and open sites

British Standards BS 7385 Part 2 Vibration

German standard DIN 4150 Part 3 Structural vibration - Effects of vibration on structures

Commonwealth Government, 2010. *Draft National Wind Farm Development Guidelines*.

State of Queensland Department of Infrastructure, Local Governance and Planning (DILGP), 2016. *State Development Assessment Provisions.*

State of Queensland Department of Infrastructure, Local Governance and Planning (DILGP), 2016. *Queensland Wind Farm State Code and Planning Guideline.*

New Zealand Standard NZS6808:2010 *Acoustics – Wind farm noise.*

NSW Department of Planning & Infrastructure *Draft NSW Planning Guidelines – Wind Farms*, December 2011

Victoria Department of Planning and Community Development *Policy and Planning Guidelines for development of wind energy facilities in Victoria, July 2012*

Flora and Fauna

Environmental Impact Statement

Flora and Fauna

Environmental Impact Statement

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EIS_1	15-Aug-2016	Draft for legal review	Mark Herod	
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1.0 Flora and fauna

1.1 Introduction

This chapter of the Environmental Impact Statement (EIS) provides the flora and fauna assessment for the Project. The Project is located in the Eastern Darling Downs province of the Brigalow Belt Bioregion (Bioregion), and between Bunya Mountains National Park and Diamondy State Forest (Figure 12.1, Volume 2) and is subject to a number of flora and fauna values.

The chapter describes the known ecological values within and adjacent to the Project Site that have been retrieved from desktop resources and a series of on-site investigations. This information has been used through the design refinement process to select the Project Site, including avoidance of threatened ecological values where possible. The potential impacts to flora and fauna from the construction and operational works within the Project Site are discussed and, where relevant, mitigation measures are provided to suitably avoid, minimise and/or mitigate those potential impacts.

1.2 Scope of assessment

The aim of this assessment is to identify the ecological values that may exist within the Study Area and Project Site. This assessment seeks to use this information to:

- Identify and map areas that are environmentally sensitive to the proposed construction of operation of the Project
- Describe the terrestrial flora and fauna values within the Study Area and Project Site
- Provide input to the design refinement process, so that
  - impacts to: (i) remnant vegetation; (ii) high value regrowth vegetation; (iii) essential habitat; and (iv) riparian areas are minimised
  - turbines avoid (where possible) remnant vegetation, regrowth vegetation, and habitat identified as important for species of conservation significance, in particular to minimise the occurrence of bird and bat strikes
  - individual paddock trees are avoided, which could provide stepping stones for fauna moving through the Study Area.
- Provide an assessment of the potential impacts to all flora and fauna values within the Study Area
- Outlines measures to mitigate the impacts of the Project on the flora and fauna values, including residual and cumulative impacts
- Consider the relevant legislative requirements to protect ecological values, including where works require permits, approvals and offsets.

1.3 Legislation and policy

1.3.1 Commonwealth

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides the legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. These are defined under the EPBC Act as 'matters of national environmental significance' (MNES). Under the EPBC Act, a referral to the Department of the Environment and Energy (DOTEE) would be required if the Project had the potential to cause a 'significant impact' on MNES. The determination is made with reference to the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DEWHA 2009) and other EPBC Act policy statements including significant impact guidelines for individual threatened species, groups of species and threatened ecological communities (DOTE, 2016).

The Project has been referred to the DOTEE (and its predecessors, the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) and the Department of Environment, Water, Heritage and the Arts (DEWHA)) on three occasions for determination of controlled action status. On each occasion a decision was returned that the Project was "not a controlled action". The most recent decision notice (received on 29 July 2011 - Ref. 2011/5976) was based on the Project Site assessed as part of the Initial Assessment Report, published in 2011.

An assessment on MNES was undertaken based on the updated layout for the Project and taking into consideration changes to the EPBC Act Protected Matters database search tool (PMST) since 2011. Based on the likelihood of occurrence and the significance of potential impacts to threatened communities and species, an updated referral to DOTEE is not considered to be required. The EPBC Act MNES assessment is summarised in Chapter 3 Legislative Framework.

1.3.2 Queensland

Nature Conservation Act 1992

The Object of the *Nature Conservation Act 1992* (NC Act) is "the conservation of nature" (Section 4, NC Act). Section 5 of the NC Act sets out how the object is to be achieved.

In support of the NC Act, the Nature Conservation (Wildlife) Regulation 2006 (NCWR) lists 'protected wildlife' (flora and fauna species), which are considered to be 'extinct in the wild', 'Endangered' (E), 'Vulnerable' (V) and 'Near Threatened' (NT) (EVNT species) and 'Least Concern' (LC) wildlife. Under Sections 88 and 89 of the NC Act, it is an offense to take or use protected wildlife, which is outside a 'protected area', unless exemptions apply or an approval (e.g. clearing permit) is obtained from the Department of Environment and Heritage Protection (DEHP).

It is also an offense under Section 332 of the Nature Conservation (Wildlife Management) Regulation 2006 (NCWMR) to interfere with an animal breeding place used by protected wildlife to incubate or rear the animal's offspring unless an exemption applies or an approval is given by way of a Species Management Plan (SMP) submitted by the applicant.

Environmental Protection Act 1994

The object of the EP Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development) (refer Section 3, EP Act). Section 4 of the EP Act sets out how the object of the Act is to be achieved.

The EP Act provides the key legislative framework for the protection of the environment in Queensland. 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.

The Project follows the 'Avoidance', 'Mitigation' and 'Offset' principle, thus taking reasonable and practical measures to prevent or minimise harm. Avoidance has been achieved through the design refinement process detailed in Chapter 2 Project Description which has guided the alignment of the Project Site to avoid ecologically significant areas. In cases where avoidance is not possible, mitigation and management measures have been provided (refer Section 1.7).

Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act) regulates the clearing of native vegetation in Queensland. The purpose of the VM Act is to regulate the clearing of vegetation in a way that: (a) conserves remnant vegetation; (b) conserves vegetation in declared areas; (c) ensures that clearing does not cause land degradation; (d) prevents the loss of biodiversity; (e) maintains ecological processes; (f) manages the environmental effects of the clearing to achieve the matters mentioned in paragraphs (a) to (e); and (g) reduces greenhouse gas emissions (refer s3(1) of the VM Act). Section 3(2) of the VM Act outlines how the purpose of the Act is to be achieved.

The VM Act protects and regulates the clearing of native vegetation including 'remnant' vegetation (shown as Category B area on the Regulated Vegetation Management Map) on freehold land, Indigenous land and State tenures. The VM Act also protects and regulates the clearing of particular 'regulated regrowth' vegetation, and areas designated for offsets or compliance.

Clearing of regulated vegetation is made assessable under the *Sustainable Planning Act 2009* (SP Act). Schedule 3 of the Sustainable Planning Regulation 2009 details that operational work for clearing native vegetation is code assessable, unless the clearing is under a structure plan or is clearing mentioned under schedule 24 of the SP Act. These exemptions do not apply to the Project and a development approval under the SP Act must be sort for the clearing.

The *Vegetation Management Framework Amendment Act 2013* was passed in May 2013 which significantly reformed the vegetation management framework in Queensland including the removal of regrowth regulations. Prior to May 2013 desktop and field assessments were undertaken to confirm the presence of 'high value regrowth' within the Project. The presence of regrowth vegetation has continued to be used to inform the assessment and siting of the Project Site and its infrastructure.

The *Vegetation Management (Reinstatement) and Other Legislation Amendment Bill 2016* was introduced on 17 March 2016 which if passed will change the vegetation management framework and will be effective from the date the Bill was introduced. These changes include (but are not limited to) regulations around the clearing of high-value regrowth (category C) and regrowth vegetation within 50 m of a watercourse in the Burnett-Mary, Eastern Cape York and Fitzroy Great Barrier Reef catchments (category R). The requirements relating to proposed category C and R (which do occur within the Project Site) do not take effect until the proposed Reinstatement Bill is passed, at which stage they will be addressed.

Land Protection (Pest and Stock Route Management) Act 2002

The main purpose of the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) is to provide for: (a) pest management; and (b) stock route network management (refer Section 3, LP Act). Section 4 sets out how these purposes are to be achieved.

The LP Act provides a legislative framework for managing pest species and addressing their economic, environmental and social impact. The associated Land Protection (Pest and Stock Route) Regulation 2003 (LPR) declares the pest plants and pest animals for control and management in the State.

Under the LP Act, specified plants and animals are listed as 'declared pests', and assigned a Class of threat. Depending upon the Class, a range of statutory restrictions is activated. There are three Class categories, Class 1 pest, Class 2 pest and Class 3 pest. These categories, their description and statutory restrictions are noted in Table 12.1. The Project will need to consider the presence and potential spread of 'declared pests' within the Study Area that may result from Project activities.

Table 12.1 Categories of declared pests in Queensland listed under the LP Act, their description and legislative requirements.

Category	Description	Statutory requirements
Class 1	A plant or animal that: · Is not commonly present in Queensland and, if introduced, would cause an adverse economic, environmental or social impact. · Are subject to eradication by the State	Class 1 pests established in Queensland are subject to eradication from the state. Land owners must take reasonable steps to keep land free of Class 1 pests. It is a serious offense to introduce, keep or supply a Class 1 pest without a permit issued by Biosecurity Queensland.
Class 2	A plant or animal that: · Is established in Queensland and have, or could have, an adverse economic, environmental or social impact · Requires coordination and are subject to programs led by local government, community and landowners.	Landowners must take reasonable steps to keep land free of Class 2 pests. It is a serious offense to introduce, keep or supply a Class 2 pest without a permit issued by Biosecurity Queensland.

Category	Description	Statutory requirements
Class 3	A plant that: · Is established in Queensland and has, or could have, a substantial adverse economic, environmental or social impact.	Landowners may be required to manage Class 3 weeds in or near environmentally significant areas such as protected areas, important habitats for threatened species or areas of interest only.

Queensland Environmental Offsets Framework

The Queensland Environment Offsets Frameworks provides a single approach to environmental offsets and aligns requirements across three levels of government.

The offset framework includes:

· The *Environmental Offsets Act 2014*, which establishes the environmental offset framework with the purpose of counterbalancing significant residual impacts of particular activities on prescribed environmental matters through the use of offsets;

· The Environmental Offsets Regulation 2014, which provides the details of prescribed activities regulated under existing legislation and prescribed environmental matters to which the Act applies; and

· Queensland Environmental Offsets Policy (V1.1), which clarifies how environmental offsets should be delivered. This policy provides a single, streamlined framework for environment-related offsets in Queensland. This policy replaces the following offset policies:

  - Queensland Government Environmental Offsets Policy (2008)
  - Marine Fish Habitat Offsets Policy (version FHMOP005.2)
  - Policy for Vegetation Management Offsets (2011)
  - Queensland Biodiversity Offset Policy (2011)
  - Offsets for Net Gain in Koala Habitat in South East Queensland Policy (2010).

Environmental Offsets Act 2014 and Environmental Offsets Regulation 2014

Under Section 14 of the *Environmental Offsets Act 2014*, offsets conditions can only be imposed for prescribed activities if:

· a prescribed activity will, or is likely to have, a significant residual impact on a prescribed environmental matter; and

· all reasonable on-site mitigation measures for the prescribed activity have been, or will be, undertaken.

Prescribed activities are the subject of an authority under another Act for which an offset condition may be imposed and is detailed in Schedule 1 of the Offsets Regulation. The Project is likely to entail a prescribed activity as it will be subject to the application of a development approval for the clearing of regulated vegetation (a prescribed environmental matter) under the SP Act, for which an environmental offset may be required.

The environmental offset required for the Project will be determined following the detailed design (at which stage the extent of clearing will be confirmed) and if necessary an Offset Strategy will be developed to support all relevant approvals and authorities. It is not anticipated at this stage that the Project will require an authority for impacts to other prescribed environmental matters besides clearing of regulated vegetation.

State Development Assessment Provisions – Module 20 Wind Farm Development

Under Module 20 of the SDAP, wind farm development is required to ensure that impacts on flora, fauna and associated ecological processes are avoided, or minimised and mitigated, through effective siting, design and operation of the development. This is addressed below, and a compliance

assessment is provided in Appendix M State Development Assessment Provisions Compliance Assessment.

1.4 Methodology

1.4.1 Desktop assessment

A desktop review of information relating to flora and fauna values within and surrounding the Study Area has been undertaken. The review considered the following datasets, government publications, published literature and previous field studies:

- DOTE's EPBC PMST (March 2016) to identify MNES that may occur within the Study Area. A copy of the search data is provided in Appendix D, Volume 3
- DEHPs' Wildlife Online database to identify flora and fauna species, including EVNT species recorded from or surrounding the Study Area. A copy of the search data is provided in Appendix D, Volume 3
- DNRM Regulated Vegetation Management Map (2016) to determine the extent of Category A, Category B and Category R vegetation within and surrounding the Study Area. The occurrence of remnant vegetation (Category B) in the Study Area is provided as the relevant Regional Ecosystems on Figure 12.2, Volume 2
- DNRM's Vegetation Management Supporting Map (2016) including Essential Habitat and Wetland mapping. Note that the Study Area does not contain either of these designations
- DEHP's certified Biodiversity Planning Assessment (BPA) mapping to identify significant wildlife corridors and areas of State, regional and local biodiversity significance. An extract of the BPA mapping is provided on Figure 12.3, Volume 2
- DEHP's Protected plants flora survey trigger map (2016) to identify the high risk areas for protected plants and determine whether a flora survey and a clearing permit is required. There are no high risk areas within the Project Site
- The Queensland Herbarium Regional Ecosystem Description Database (REDD) for current RE descriptions and geological and land zone descriptions
- Atlas of Living Australia database (2016) incorporating Queensland Herbarium HERBRECS specimens and Queensland Museum species database
- Land Zones of Queensland (Wilson & Taylor, 2012) for a description of land zones
- Coopers Gap Wind Farm Flora and Fauna Assessment (ERM, 2008).

The search extent for the Protected matters searches and wildlife online specified a search radius of 20 km from the Study Area centre point (-26.71° South, 151.42° East). The search results are provided in Appendix D, Volume 3.

1.4.2 Field assessments

For the purpose of the field assessments the 'Study Area' was defined as the properties of 'involved landholders' (Figure 2.1, Volume 2).

In February 2008, a flora and fauna survey of the Study Area was undertaken over nine days and consisted of:

- Surveying 37 flora sites to describe the structure, composition and condition of the vegetation; and targeting habitats suitable for threatened flora
- Fauna habitat assessment
- Diurnal bird surveys developed and adapted from the AUSWEA Guidelines – Wind Farms and Birds: Interim standards for Risk Assessment (Brett Lane and Associates 2005), including: (i) a regional assessment of threatened and migratory species, and a one day preliminary site assessment to determine broad habitat values; (ii) fourteen dedicated bird utilisation surveys

(point area search method with each point being surveyed for 20 minutes); and (iii) roaming/meander bird surveys throughout all habitat types

- Call playback and spotlighting for nocturnal birds
- Call playback for amphibians
- Three nights of ultrasonic bat detection. The habitats sampled were described as: (i) ridgeline in the vicinity of the proposed turbines; (ii) a remnant woodland community; and (iii) wooded stream bank vegetation
- Opportunistic sightings of species and evidence of fauna activity (scratches, scats, etc.).

Documented survey locations are shown on Figure 12.4 and Figure 12.5 in Volume 2.

Further site assessment was carried out between 2010 and 2013 and involved three stages:

- Stage 1: Flora, bird and bat surveys (October 2010)
- Stage 2: Comprehensive terrestrial fauna survey (February and May 2012)
- Stage 3: Comprehensive terrestrial flora survey, fauna habitat assessments and koala surveys (February 2013).

This was undertaken to address the following:

- The addition and removal of a number of threatened flora and fauna species listed under the EPBC Act and NC Act
- Updated desktop search results from databases including the EPBC Act PMST, wildlife online, Queensland Museum and the Queensland Herbarium
- Changes to the status of Regional Ecosystems listed under the VM Act
- Changes to the Regional Ecosystem Maps with the release of Version 6.1
- The introduction of legislation protecting 'High Value Regrowth' (which has subsequently been removed)
- The need to undertake spring survey for two of the threatened orchids known from the locality
- Detailed and targeted fauna surveys
- More detailed microchiropteran bat surveys.

1.4.2.1 Stage 1: Threatened flora, bird and bat surveys (October 2010)

The stage 1 surveys were undertaken by two ecologists between 25 October 2010 and 30 October 2010 (the 2010 Survey). This assessment focussed on surveying suitable habitat for threatened bats, birds and flora (specifically orchids) with the potential to occur within the Study Area. The results of the October 2010 survey are attached as Appendix D in Volume 3.

Threatened flora survey

Database searches (undertaken in 2010) identified the potential occurrence of a number of threatened flora species in the Study Area: Mt Berryman Phebalium (*Phebalium distans*), Austral Cornflower (*Rhaponticum australe*), Austral Toadflax (*Thesium australe*), Ooline (*Cadellia pentastylis*), Bailey's Cypress Pine (*Callitris baileyi*), Finger Panic Grass (*Digitaria porrecta*) and Slender purple donkey orchid (*Diuris parvipetala*). The 2008 field assessment had also identified the Cobar greenhood orchid (*Pterosylis cobarensis*) as a possible occurrence.

The 37 flora assessment sites completed in the 2008 field survey provided a reasonable degree of insight into the habitat values of the Study Area for most of the threatened flora species. However, it was acknowledged that the summer survey period was not appropriate for sampling native orchids. Therefore in 2010, a further 18 sites were surveyed in areas of remnant vegetation and regrowth vegetation in close proximity (within 20 m) of potential turbine locations. At each survey site a preliminary qualitative assessment was undertaken to record characteristics such as landform, dominant flora species, disturbance and condition. Regional ecosystem mapping was ground-truthed,

and specific searches were conducted for the target threatened species. The spring survey period was suitable for detecting both the Cobar greenhood orchid and the slender purple donkey orchid (TSSC, 2008 and Stanley and Ross, 1983).

Microchiropteran Bat surveys

Ultrasonic bat call detectors were placed at nine locations throughout the Study Area and sampled a range of broad habitat types. Survey effort targeted microhabitat of greatest habitat value, and detectors were set at sites where the greatest number and diversity of species were likely to be recorded.

Sampling sites within remnant vegetation was conducted in riparian woodland; Eucalypt woodland and open forest; and vine thicket. A dam was the focus for sampling in the non-remnant open grassland community as water bodies are known to be a common focus for microchiropteran bats in sparsely vegetated areas.

The detectors were secured to trees at approximately 1.5 m above ground level and left in place for three to nine nights. Sampling sites are shown on Figure 12.5 in Volume 2. Table 12.2 identifies the broad habitat type at each sampling site and the number of sampling nights conducted.

Table 12.2 Number of Bat Detection Nights at each ultrasonic bat detector sites

Sampling site	Broad habitat type	Number of sampling nights
B1, B3, B4, B9	Fringing riparian woodland	9, 5, 3, 6 respectively.
B2	Non-remnant open grassland (next to a man-made dam)	7
B5, B7	Eucalypt woodland or open forest	3, 3 respectively
B6	Vine thicket	7
B8	Non-remnant open grassland (on an open hill)	3
	Total nights	**46**

Harp trapping was also used in identifying the presence of microchiropteran bats. Three harp traps were set in wooded riparian areas with suitably enclosed flyways. Sampling sites B2 and B4 were located in riparian woodland adjoining first order watercourses. Sampling site B3 was located in the flyway of a stream order three watercourse. The watercourse contained small pools of water at the time of survey. A fourth sampling site (B1) was located in a small dam in a sparsely vegetated area. All bat calls were identified by a specialist in the analysis of micro-bat echolocation calls in eastern Australia.

Bird surveys

A meandering search technique targeting the areas less disturbed habitat (remnant vegetation and regrowth vegetation) was used to survey birds across the Study Area. Surveys commenced at dawn and continued throughout the day. Surveys were conducted for the duration of the survey period. The open grassland areas were subject to opportunistic survey during vehicle traverse. Hilltop vantage points were used to observe aerial hunters, feeders and scavengers such as raptors, wood swallows and bee-eaters. At least 15 minutes was spent at each vantage point in an effort to record these species.

1.4.2.2 Stage 2: Terrestrial fauna surveys and threatened fauna searches

Following the consultation period of the 2011 IAR, the Queensland Department of Environment and Resource management (DERM) (now Department of Environment and Heritage Protection (DEHP)) issued an information request seeking further detail on a range of matters, including vegetation management, biodiversity and protected flora and fauna. To meet this request, additional survey effort was proposed and agreed with DERM that built upon the surveys undertaken over different seasons in earlier years, including a trapping program targeting small terrestrial mammals.

This additional survey was undertaken between 20 February 2012 and 25 February 2012 (the 2012 Summer Survey) which was limited by poor weather. To supplement this, further survey was undertaken between 14 May 2012 and 16 May 2012 (the 2012 Autumn Survey).

During these surveys, four detailed trapping sites were established in habitat types most suitable to the identified threatened fauna species. Figure 12.5 in Volume 2 shows the location of the detailed survey sites; Table 12.3 describes the broad habitat types in which the detailed survey sites were located; and Table 12.4 describes the survey methods completed at the detailed survey sites (it also describes the cumulative effort for the survey program).

Field Coc

Other fauna encountered opportunistically during the survey (e.g. during vehicle traverse) were also recorded. Signs of fauna presence such as tracks, scats, bones, scratches and diggings were analysed and recorded. Scats of unknown origin and hair samples were sent to specialists for identification.

Table 12.3~~3~~ Detailed fauna survey sites

Field Coc

Detailed trapping site	Broad habitat type	Target species
DS1	Vine thicket	· Black-breasted button-quail *(Turnix melanogaster)* · Northern quoll (*Dasyurus hallucatus*) · Spotted-tailed quoll (s. ssp) (*Dasyurus maculatus maculatus*)
DS2	Eucalypt woodland or open forest	· Collared Delma (*Delma torquata*) · Yakka skink (*Egernia rugosa*) · Dunmall's snake (*Furina dunmalli*) · Northern quoll (*Dasyurus hallucatus*) · Spotted-tailed quoll (s. ssp) (*Dasyurus maculatus maculatus*)
DS3	Eucalypt woodland or open forest	· Collared Delma (*Delma torquata*) · Yakka skink (*Egernia rugosa*) · Dunmall's snake (*Furina dunmalli*) · Northern quoll (*Dasyurus hallucatus*) · Spotted-tailed quoll (s. ssp) (*Dasyurus maculatus maculatus*)
DS4	Fringing riparian (non-remnant)	· Collared Delma (*Delma torquata*) · Northern quoll (*Dasyurus hallucatus*) · Spotted-tailed quoll (s. ssp) (*Dasyurus maculatus maculatus*)

Table 12.4~~4~~ Methods and effort used at each detailed survey site, and overall cumulative effort

Field Coc

Method	Target species	Daily effort / site	Cumulative (total) effort / site	Cumulative (total) effort / all sites
Elliot 'A'	Small mammals	25 traps (over three nights)	75 trap nights	225 trap nights
Elliot 'B'	Small to medium sized mammals	5 traps (over three nights)	15 trap nights	45 trap nights
Funnels	Amphibians, reptiles, small mammals	6 traps along three 5 m drift fences (2 per drift fence) (over three days)	18 trap nights	54 trap nights
Cages	Medium to large mammals	5 traps (over three nights)	15 trap nights	45 trap nights
Cameras	All medium to large species	1 camera (over three nights)	3 observation nights	12 observation nights
Bat detector	Microchiropteran bats	1 detector (over two nights) (site DS2 only)	2 recording nights	2 recording nights

Method	Target species	Daily effort / site	Cumulative (total) effort / site	Cumulative (total) effort / all sites
Hair tubes	Small to medium mammals	10 tubes (over three nights)	30 trap nights	120 trap nights
Spotlighting and nocturnal active searches	Nocturnal species	2hr/night for two nights	4 hours	16 hours
Diurnal active searches	Diurnal reptiles	2hr/day over three days	6 hours	24 hours
	Black-breasted button-quail	50min/day over three days	2.5 hours	10 hours
Bird surveys	Birds	2 hours (over three days either in the morning of afternoon) using the random meander technique	6 hours	24 hours

Active survey for the black-breasted button-quail involved a detailed traverse of suitable vine thicket habitat within or in close proximity to the Project Site. Patches greater than 10 ha were subject to traverse along transects. The traverse was undertaken to identify button quail platelets (Distinctive circular feeding depressions 15-25 cm in diameter) and to flush individuals. It was recognised that platelets can be made by the black-breasted button-quail and other button-quail species (e.g. painted button-quail *Turnix varius*), and so the presence of platelets was to be treated as a catalyst for more intensive black-breasted button-quail searches rather than conclusive proof of the species' presence.

Platelet searches were also undertaken during non-targeted site traverses (passive observation) for other purposes (e.g. setting and checking mammal traps and conducting reptile searches). Overall, it is estimated that 10 hours of active and passive observation was achieved over the three day survey period.

Survey conditions were suitable for detecting the northern quoll and spotted-tailed quoll, with the May-August months preferable due to the least amount of disruption to species reproduction periods (DSEWPC, 2011). Habitat assessments were undertaken throughout the Study Area to identify micro-habitat types in which the species was most likely to be detected. Targeted micro-habitat types included rocky outcrops, caves, crevices, hollows bearing trees and fallen logs. Habitat which incorporated these preferred habitat features were then targeted during the detailed trapping survey.

Field Coc

Twelve assessment sites were established for the northern quoll and spotted-tailed quoll (remote camera/hair tube sites are provided in Figure 12.5, Volume 2). Surveys undertaken at these sites included: searches for den and latrine sites; placement of remote infra-red cameras (Reconyx Hyperfire HC600) and hairtube analysis. Remote cameras were positioned at eight of the sites and left in place for 21 nights (168 sample nights). Chicken frames were pegged to the ground and lightly covered with earth to act as an attractant to the camera site. Twenty hairtubes were placed at each of the assessment sites and left in place for 21 nights (5040 sample nights). The hairtubes were baited with a mix of sardines, oats, peanut paste and honey.

Results of the fauna survey are provided in the fauna species list, Appendix D, Volume 3.

1.4.2.3 Stage 3: Comprehensive flora survey and habitat assessments

Further detailed flora and habitat assessment survey across the Study Area was undertaken from 12 – 19 February 2013 (the 2013 Summer Survey).

The survey was undertaken to address limitations identified in previous assessments and provide further detail on values of concern. The scope of this assessment was to provide further detail on flora

and vegetation communities; undertake a koala habitat assessment; and additional fauna habitat assessment sites.

Comprehensive flora and vegetation

Observations of flora and vegetation were made at 72 sites across the Study Area; primarily in areas of remnant vegetation intersecting the Project Site. In accordance with Neldner *et al*. (2012), tertiary level assessment was undertaken at 30 sites, and quaternary level assessment was undertaken at 42 sites (Figure 12.4, Volume 2, Appendix D, Volume 3).

At each of the tertiary survey sites the following data was collected:

- Site name, location (using hand-held GPS)
- Photos (taken north, east, south, west)
- Landform and soil descriptions
- Observed disturbance factors (weeds, fire, drought, grazing)
- Vegetation condition, using the scale of Kaesehagen (1994) (Table 12.5)
- Vegetation structural description using modified Specht (1970) (Neldner, Wilson, Thompson, & Dilewaard, 2012)
- Full list of vascular flora species recorded within a radius of approximately 20 m from the centre point
- Strata, height and an estimate of Foliage Projective Cover (FPC) percentage for each species.

Quaternary sites were used to confirm vegetation between tertiary sites. At each of the quaternary sites the following data was collected:

- Site name
- Location
- Remnant status
- RE
- Dominant species present
- Estimate of FPC
- Other general condition or vegetation comments.

In addition, opportunistic species, not located at a particular site but observed throughout the course of the survey, were also recorded. A flora species list is provided within Appendix D, Volume 3

Scientific names of plants follow that of the Census of the Queensland Flora (Bostock & Holland, 2010).

Species that could not be identified in the field were collected, tagged, pressed, dried and then sorted into families. Specimens were identified through comparison of named materials at the Queensland Herbarium reference collection and through the use of taxonomic keys. Specimens that could not be identified through this process were submitted to the Queensland Herbarium for identification.

Table 12.5~~5~~ The Vegetation Condition Scale of Kaesehagen (1994).

Vegetation condition	Description
'Very Good to Excellent'	· 80% to 100% native flora composition. · Vegetation structure intact or nearly so. · Cover/abundance of weeds <5%. · No or minimal signs of disturbance.
'Fair to Good'	· 50% to 80% native flora composition. · Vegetation structure modified or nearly so.

Vegetation condition	Description
	· Cover/abundance of weeds 5% to 20%, any number of individuals. · Minor signs of disturbance.
'Poor'	· 20% to 50% native flora composition. · Vegetation structure completely modified or nearly so. · Cover/abundance of weeds 20% to 60%, any number of individuals. · Disturbance incidence high.
'Very Poor'	· 0% to 20% native flora composition. · Vegetation structure disappeared. · Cover/abundance of weeds 60% to 100%, any number of individuals. · Disturbance incidence very high.

Plant communities were mapped by overlaying the flora survey locations (tertiary and quaternary sites) onto aerial photography (aerial flown April 2011) and mapped at a scale of 1:20,000. Plant communities were mapped through extrapolation of survey points and interpretation of the vegetation patterns on the aerial imagery. Supplementary information used to map plant communities included the DEHP RE boundaries, topographic contour mapping and geological mapping.

Plant communities and regrowth vegetation were attributed to an RE of the Brigalow Belt South Bioregion. REs were attributed based on land zone and dominant species data, using the Queensland Herbarium regional ecosystem classification (Queensland Herbarium 2012).

Vegetation condition was mapped by extrapolation of condition values recorded at the tertiary and quaternary survey sites and interpretation of the aerial photography. Vegetation condition was also mapped at a scale of 1:20,000.

Koala Habitat Assessment

On 2 May 2012, Koala populations in Queensland, New South Wales and the Australian Capital Territory were listed as Vulnerable under the EPBC Act. While the Project's "controlled action" status had already been determined by DOTEE (refer to Section 1.3), it was considered of interest during the ongoing assessment in 2012 to assess the Study Area's koala habitat values against the *Interim Koala Referral Advice for Proponents* (IKRAP) (DSEWPaC 2012) as habitat suitable for koala was known to be present in the Study Area.

Field Coc

The following assessments were undertaken:

· During the 2013 Summer Survey, eight koala scat search sites were established within or in close proximity to the Project Site (Figure 12.5, Volume 2). Sites were established in areas where either koala activity was observed or an appropriate suite of koala habitat trees was present (i.e. remnant or regrowth sclerophyll vegetation). Two of the sites were within areas identified as "essential regrowth habitat" for the koala (refer to Figure 12.5, Volume 2). Scat searches were undertaken in accordance with the 'Spot Assessment Technique' (SAT) (Phillips & Callaghan, 2011). The koala scat search data is provided in Appendix D, Volume 3.

Field Coc

· Quantitative data from the tertiary and quaternary vegetation assessment sites was used to determine if the Study Area contained "*habitat critical to the survival of the koala*". The IKRAP references the work of Callaghan (unpublished) in regard to making this assessment

· Diurnal and nocturnal canopy searches. While the recommended line transect method was not implemented, the studies undertaken since 2008 have included a significant number of hours of passive and active canopy observation during bird survey, spotlighting and general site traverse. Landholders also provided information on koala occurrence.

In 2014, DOTE finalised the EPBC Act referral guidelines for the vulnerable koala (DOTE, 2014) (the guidelines), which replaces the Draft EPBC Act referral guidelines for the vulnerable Koala (draft guidelines) which, in turn, replaced the IKRAP.

The guidelines encourage the assessment of significant impacts on the koala primarily through the assessment of habitat critical to the survival of the koala and actions that interfere substantially with the recovery of the koala. The guidelines provide a koala habitat assessment tool which is applied to the entire impact area of the Project Site. This tool has been applied to the Project (Table 12.10) based on the outcome of the survey and 2016 desktop data.

Fauna habitat assessment

Fauna habitat values were assessed at 28 fauna habitat sites within or adjoining the Project Site (Figure 12.5, Volume 2). The Basic Site Information data sheet (Biodiversity and Ecosystem Sciences, 2012) was used as a template for recording field data. Information from the data sheet was summarised and added to photographs showing the fauna habitat assessment site and surrounding landscape (taken to show north, east, south and west perspectives). Fauna habitat assessment sites correspond with flora assessment sites, and therefore are also focused in areas of remnant vegetation and regrowth vegetation. Survey data for fauna habitat sites is provided in Appendix D, Volume 3.

1.4.3 Limitations

- Heavy rainfall during Stage 2 of the field surveys forced the comprehensive sites to be shut-down after three nights
- Funnel traps were unable to be installed in Detailed Site 4 (D4) due to the very dense exotic pasture grasses and the abundance of cattle.

1.5 Description of environmental values

1.5.1 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).

1.5.2 General site description

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 less than 10% 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. Vegetation is described further in Section 1.5.4.

1.5.3 Geology and land zones

Geology mapping (Natural Resource Sciences, 2004) shows that three geological units underlie the Study Area.

Land zones are categories that describe the major geologies and associated landforms and geomorphic processes of the State of Queensland. The differences between land zones result in marked differences in the function of ecosystems and their associated biodiversity and this is due in part to the effects that geology (lithology, structure, alteration) has on landform, hydrology and landscape processes (geomorphology and soil formation).

The identity and relationship of the geological units to Land Zones (Wilson & Taylor, 2012) is as follows:

Field Cod

1. Main Range Volcanics (Tertiary Basalt) dominate the eastern portions of the Study Area. This geology is defined as Land Zone 8: Cainozoic igneous rocks (basalt plains and hills) under the regional ecosystem framework
2. Marburg Formation (Sedimentary Rocks) dominates the western portions of the Study Area. This geology includes: (i) Land Zone 9: fine grained sedimentary rocks (undulating country on fine grained sedimentary rocks); and (ii) Land Zone 10: coarse grained sedimentary rocks (sandstone ranges). These geologies are described as landzones 9 and 10 (respectively) under the regional ecosystem framework
3. Quaternary Alluvium occurs along the larger watercourses. This geology is analogous to Land Zone 3: recent Quaternary alluvial system (alluvial river and creek flats) under the regional ecosystem framework.

1.5.4 Flora

1.5.4.1 Regional ecosystems

The VM Act conserves vegetation that is endangered, of concern or least concern REs. REs are vegetation communities within a bioregion that consistently occur in association with a particular combination of geology, landform and soil.

REs have been described and mapped by the Queensland Herbarium at a scale of 1:100 000 across the state of Queensland and are identified as Category B areas (remnant vegetation) on the Department of Natural Resource and Mines (DNRM) Regulated Vegetation Management Map and their status is described on the DNRM Vegetation Management Supporting Map.

The DNRM Vegetation Management Supporting Map shows that there are 12 REs (many in 'mixed polygon' REs) mapped within the Study Area, a description of the RE's is provided in Table 12.6.

Field Cod

Seven of these coincide with the Project Site (Figure 12.2, Volume 2), 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' 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 12.6~~6~~ A list and description of the Regional Ecosystems with the Study Area and their conservation status

Field Cod

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
11.8.3	Semi-evergreen vine thicket on Cainozoic igneous rocks. Steep hillsides	OC	OC	E	Yes
11.8.5	*Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks	LC	NC	-	Yes
*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
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
11.9.5	*Acacia harpophylla* and / or *Casuarina cristata* open forest on fine-grained sedimentary rocks.	E	E	E	No
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
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

[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.

*the TEC represents a primary component of this RE

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

1.5.4.2 Verified Regional Ecosystems

The field assessment and subsequent mapping verified the occurrence of six remnant REs across the Study Area. These are mapped on Figure 12.4, Volume 2 and 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. Occurs on upper slopes and crests of tertiary basalt (Plate 12.1). This community occurs on upper slopes and crests of tertiary basalt across the central and south-eastern parts of the Study Area (Figure 12.4, Volume 2).

Field Coc

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 (Plate 12.2). This community occurs in patches within the southern and western portions of the Study Area (Figure 12.4, Volume 2). 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.

Field Coc

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'.

Plate 12.1 Plant Community 1 - EcEm: Woodland of *Eucalyptus crebra* and *Eucalyptus melliodora* over shrubland of *Xanthorrhoea glauca* over closed tussock grassland of *Poa sieberiana* and *Cymbopogon refractus*. Vegetation in a 'Very Good' condition

Field Coc

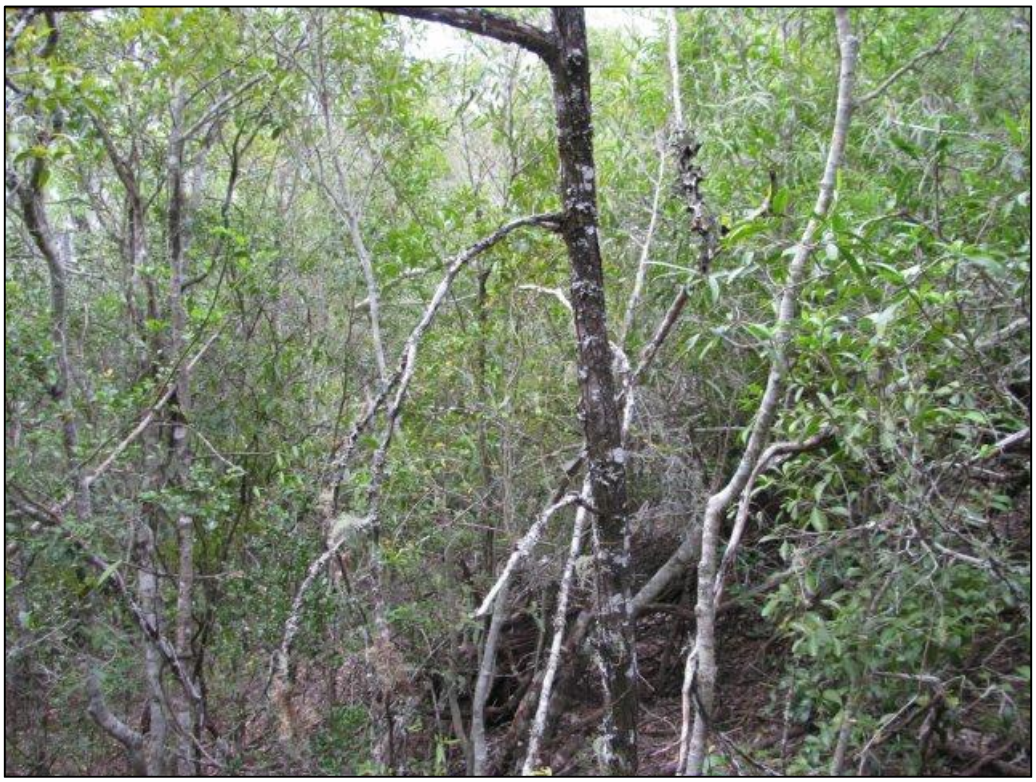

Plate 12.2 Plant Community 2 - BaAc: Open scrub of *Backhousia angustifolia, Alstonia constricta* and *Canthium odoratum* over shrubland of *Carissa ovata* and *Croton insularis* over sparse grasses and forbs on upper slopes and crests of tertiary basalt.

Field Coc

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) (Plate 12.3). This spotted gum community occurs on the sedimentary formations in the west and northwest portions of the Study Area (Figure 12.4, Volume 2).

Field Coc

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 (Plate 12.4). 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 12.4, Volume 2).

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.

Plate 12.3 Plant Community 3 - CcEc: Open forest of *Corymbia citriodora* and *Eucalyptus decorticans* over a shrub layer of *Exocarpus cupressiformis* over a tussock grassland of *Ancistrachne uncinulata* and *Aristida personata*. Vegetation in a 'Fair to Good' condition.

Plate 12.4 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

Field Coc

Plant Community 5 - AhCc: Open forest of Brigalow *(Acacia harpophylla*) and/or *Casuarina cristata* on fine-grained sedimentary rocks. The ERM (2008) survey mapped this community; however no survey location was placed in this community in the 2013 survey as it occurs away from the Project Site. *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.

Field Coc

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 (Plate 12.5).

Field Coc

This community occurs on the alluvium surrounding a number of streamlines in the northern sections of the Study Area (Figure 12.4, Volume 2).

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*, *Swainsona* sp., and *Lobelia purpurascens*.

Plate 12.5 Plant Community EtAf: Open forest to woodland of *Eucalyptus tereticornis* over low woodland of *Angophora floribunda*, *Corymbia tessellaris* and *Acacia salicina* on alluvium surrounding creeklines

Field Coc

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 (Plate 12.6). 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 (Plate 12.7).

Field Coc

Field Coc

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* (Plate 12.8).

Field Coc

Plate 12.6 Example regrowth found in eastern half of Study Area

Field Coc

Plate 12.7 Example regrowth found in central and western sections of the Study Area

Field Coc

Plate 12.8 Non-remnant cleared paddocks with scattered native tree and shrub species

Field Coc

1.5.4.3 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 PMST identified the potential occurrence of six TEC's (Appendix D, Volume 3). 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 11.9.4a
- 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 12.4, Volume 2. 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 11.9.4a, have been identified and field-verified within the Study Area (Figure 12.4, Volume 2).

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 (Figure 12.4, Volume 2).

1.5.4.4 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 12.6, Volume 2.

1.5.4.5 Flora species

The 2013 survey 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*.

Appendix D in Volume 3 lists all flora species recorded during the 2008 and 2013 surveys.

1.5.4.6 Threatened flora

Fourteen threatened flora species were identified through database searches as occurring or potentially occurring within, or in close proximity to the Study Area. Of these, ten 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 ten species identified as 'likely' or 'possible' occurrences are listed in Table 12.7 with a full likelihood assessment provided in Appendix D, Volume 3. 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.

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Table 12.7~~7~~ Likelihood of occurrence of threatened flora species within the Study Area

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.
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	*Homopholis*	E, V	*Homopholis belsonii* occurs within the Brigalow Belt	Perennial	EPBC Act	**Possible**

Family name	Species	Status (NC Act, EPBC Act)	Preferred habitat	Life strategy	Records	Likelihood
	belsonii Belson's panic		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).		search	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	**Likely** 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** Suitable habitat could exist within RE 11.10.1.
Rutaceae	*Phebalium distans* Mt Berryman phebalium	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 adjacent to this vegetation type. Populations are only known from near Mt Berryman and Mt Jones Plateau, near Kingaroy (TSSC, 2008).	Perennial	EPBC Act search	**Possible** While suitable habitat occurs within the Study Area, there is a lack of proximal records for this species.
Santalaceae	*Thesium*	V, V	*Thesium australe* is largely confined to moist	Perennial	EPBC Act	**Possible**

Family name	Species	Status (NC Act, EPBC Act)	Preferred habitat	Life strategy	Records	Likelihood
	australe Austral toadflax, toadflax		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*.		search, Wildlife online	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.

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1.5.4.7 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.

1.5.5 Fauna

1.5.5.1 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 12.8, and their extent is shown on Figure 12.5, Volume 2. Further detail is provided in Appendix D, Volume 3.

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Table 12.8~~8~~ Broad habitat types identified within the Study Area

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Habitat type	Field verified 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
Eucalypt woodland or open forest	12.8.16 (including regrowth) 11.8.5 (including regrowth) 11.10.1 (including regrowth)	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 and include **Zinnia peruviana* and **Verbena bonariensis*.	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.	2,443.88	· Squatter pigeon (southern) · Regent honeyeater · Painted honeyeater · Large-eared pied bat · Northern quoll · Spotted-tailed quoll (s. ssp.) · Greater glider · Eastern long eared bat · Koala · Grey-headed flying-fox · Collared delma · Yakka skink · Dunmall's snake
Fringing riparian woodlands	11.3.25 (including regrowth)	Open woodland to open forest associated with stream channels and ephemeral tributaries. Upper canopy dominated by eucalypt species (*Eucalyptus tereticornis* subsp.	Provides habitat to a range of forest and woodland-dependent and generalist species as well as species specialising in riparian habitats	Remnant vegetation is in a 'Fair to Good' condition.	72.34	· Regent honeyeater · Painted honeyeater · Eastern long

Habitat type	Field verified 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
		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.*	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.	Regrowth is in a 'Very Poor' to 'Poor' condition.		eared bat · Greater glider · Koala · Grey-headed flying-fox · Northern quoll · Spotted-tailed quoll (s. ssp) · Collared delma
Vine thickets	11.8.3 (including regrowth) 11.9.4 (including regrowth) *'Unknown' regrowth	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 excelsa* and Alectryon diversifolius. The ground layer is sparse due to the dense shrub layer, and consists of scattered grasses	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 stags, peeling bark suitable for	Remnant vegetation in a 'Fair to Good' to 'Very Good to Excellent' condition. Regrowth in a 'Poor' condition.	276.69	· Black-breasted Button-quail · Eastern long eared bat · Grey-headed flying-fox · Coxen's fig-parrot · Northern quoll · Spotted-tailed quoll (s. ssp)

Habitat type	Field verified 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 herbs.	roosting microchiropteran bats 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, microchiropteran bats and possibly woodland frogs.			
Non-eucalypt open forest	11.9.5 (including regrowth)	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	Condition not known[1].	33.97	· Eastern long eared bat · Koala · Dunmall's snake · Yakka skink ·

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

Habitat type	Field verified 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
			dwelling species such as reptiles at sites in good condition.			
Non-remnant pasture (closed tussock grassland)	N/A	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 include *Acacia leiocalyx, A. implexa, A. salicina, Canthium odoratum* forma *subnitida, Elaeodendron australe* and *Alectryon diversifolius*.	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'	7,376.35	· Squatter pigeon (southern subspecies)

* Three patches of mapped 'unknown' regrowth vegetation have been included in this habitat type, as they occur in proximity to remnant vine thicket vegetation

1.5.5.2 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. Survey results are provided in Appendix D, Volume 3. The suite of species recorded is characteristic of the highly fragmented landscape in which the Study Area occurs. Two species of conservation significance have been recorded by the surveys: koala (*Phascolarctos cinereus*) ('Vulnerable' EPBC Act), and the Eastern long-eared bat (*Nyctophilus corbeni)* ('Vulnerable' EPBC). The Eastern long-eared bat was recorded as Nyctophilus spp. during the survey and treated as *Nyctophilus corbeni* as a precautionary approach. A further 13 conservation significant fauna species have been identified through the desktop searches as 'possible' or 'likely' occurrences. These assessments are discussed in detail as follows.

Koala

DOTE is primarily focused upon protecting habitat that is critical to the survival and recovery of the koala. To inform koala occurrence within the Study Area, targeted koala surveys were conducted during the 2013 Summer Survey. Locations for the SATs were determined by an assessment of the likely koala habitat within the Study Area, including utilising the 'essential regrowth habitat' mapping for the koala (Figure 12.5, Volume 2). 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 (Figure 12.5, Volume 2). Table 12.9 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.

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Table 12.9~~9~~ Koala utilisation

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Koala site	Verified RE	Koala utilisation	Commentary	Utilisation category*
K1	RE 12.8.16	16.67%	-	High
K2	RE 12.8.16	20%	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).

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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 12.10.

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Table 12.10~~10~~ Koala habitat assessment tool

Attribute	Score	Description/Commentary
Koala occurrence	+1 (medium)	· The 2013 Summer Survey identified that there is evidence of one or more koalas occurring outside the Impact Area, but within 2 km in the last ten years. · The SAT survey sites indicated high utilisation in three areas of the Study Area – outside of the impact area. · The EPBC PMST, Wildlife Online and Living Atlas of Australia also indicate koala records in the Study Area.
Vegetation composition	+2 (high)	· The Project Site has 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.

Attribute	Score	Description/Commentary
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 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 (Appendix D, Volume 3). *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.

Threatened Fauna

In addition to the two confirmed threatened species identified through the field surveys (koala and Eastern long-eared bat), a further 13 species were identified through the desktop assessment as "likely" or "possible" occurrences. based on a "likelihood of Occurrence" assessment (refer to 1.5.4.6 for criteria). The species considered 'likely', 'possible' or 'confirmed' are presented and discussed further in Table 12.11.

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The full likelihood of assessment analysis is provided in Appendix D, Volume 3.

Table 12.11~~11~~ 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	**Possible** 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	Fringing riparian woodlands Eucalypt woodland or open forest	**Possible** 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

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		mistletoe, also appears to be important, particularly in years when flowering is poor in the surrounding eucalypt woodlands (Oliver, 1998).		the Project Site, but its use appears likely to be very uncommon.
Black-breasted Button-quail *Turnix melanogaster*	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 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)	Vine thickets	**Possible** Not recorded during targeted survey and passive observation over 5 year survey period, but suitable habitat is present. Considered to be a **possible** 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)	**Possible** 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.
Painted Honeyeater *Grantiella*	V, V	"The species inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands,	Fringing riparian woodlands	**Possible** The study area is located near the northern extent of the species main range, and contains

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
picta		paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower strips (Garnett et al., 2011)" (TSSC 2015). "The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations and almost all records of breeding come from south of 26ºS, on inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (Higgins et al., 2001)." (TSSC 2015).	Eucalypt woodland or open forest	suitable eucalypt habitat.
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	Eucalypt woodland or open forest	**Possible** 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.

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Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		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).		
Northern quoll (*Dasyurus hallucatus*)	-, E	The current distribution of the northern quoll is discontinuous across northern Australia, with core populations in rocky and/or high rainfall 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	Eucalypt woodland or open forest Vine thickets Fringing riparian	**Possible** Historically the Study Area was close to the southern limit of the species' range. However, a 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
		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, 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	Vine thickets Eucalypt woodland or open forest Fringing riparian	**Likely** 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

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		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).		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 woodland, Smooth-barked Apple, *Angophora leiocarpa,* woodland; River Red Gum, *Eucalyptus*	Eucalypt woodland or open forest Fringing riparian woodlands Vine thickets Non-eucalypt open forest	**Confirmed** During the 2010 Survey, calls from Microchiropteran bats in the *Nyctophilus* genera were recorded at seven of the nine Anabat locations (Appendix D, Volume 3). *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 and contains

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		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).		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).	Eucalypt woodland or open forest Fringing riparian woodlands Non-eucalypt open forest	**Confirmed** 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
		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 <800 m ASL), temperature and, at the western and northern ends of the range, leaf moisture. 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	Fringing riparian woodlands Eucalypt woodland or open forest Vine thickets	**Likely** 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

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		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: · productive during winter and spring, when food bottlenecks have been identified; · known to support populations of > 30 000 individuals within an area of 50 km radius (the maximum foraging distance of an adult); · productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (September to May); · productive during the final stages of fruit development and ripening in commercial crops affected by Grey-headed Flying-foxes (months vary between regions); · 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		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.

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Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		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).		
Greater glider *Petauroides volans*	-, V	"The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevational range from sea level to 1200 m above sea level. An isolated inland subpopulation occurs in the Gregory Range west of Townsville (Winter et al., 2004), and another in the Einasleigh Uplands (Vanderduys et al., 2012)." (TSSC 2016). The greater glider is largely restricted to eucalypt forests. "It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows (Andrews et al., 1994; Smith et al., 1994, 1995; Kavanagh 2000; Eyre 2004; van der Ree et al., 2004; Vanderduys et al., 2012)." (TSSC 2016).	Eucalypt woodland or open forest Fringing riparian woodlands	**Possible** The greater glider is sensitive to forest clearance, and thus unlikely to occur in the smaller patches of eucalypt woodland within the study area. The larger patches could possibly support the greater glider.
Reptiles				

Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
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. 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)	Eucalypt woodland or open forest Fringing riparian	**Likely** 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.
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	**Possible** 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. burrowii, A. deanei, A. leiocalyx), 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	Eucalypt woodland or open forest Non-eucalypt open forest Vine thickets	**Possible** 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

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Species	Status (NC Act, EPBC Act)	Preferred habitat	Available habitat	Likelihood of occurrence in or adjacent to the Project Site
		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).		habitat occurs within the Project Site.

1.5.5.3 Migratory species

Australia has signed agreements to protect migratory species and their habitat, including the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

The EPBC Act PMST identified 10 migratory species as potentially occurring within the Study Area, including:

- Fork-tailed Swift (*Apus pacificus*)
- Oriental Cuckoo (*Cuculus optatus*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Black-faced Monarch (*Monarcha melanopsis*)
- Spectacled Monarch (*Monarcha trivirgatus*)
- Yellow Wagtail (*Motacilla flava*)
- Satin Flycatcher (*Myiagra cynoleuca*)
- Rufous Fantail (*Rhipidura rufifrons*)
- Latham's Snipe (*Gallinago hardwickii*)
- Osprey (*Pandion haliaetus*).

None of these migratory species were identified during the field assessment (Appendix D, Volume 3).

1.5.5.4 Introduced pest fauna

Four fauna species recorded within the Study Area are Declared 'Class 2' pest species under LP Act:

- 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*).

1.5.6 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 (refer to Figure 12.5, Volume 2) as part of the koala assessment (refer to Section 1.5.5.2).

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1.5.7 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 (Figure 12.3, Volume 2).

1.5.8 Wetlands and watercourses

No RAMSAR wetlands occur within the Study area or surrounding area. No nationally important wetlands occur within the Study area or surrounding area. No referable or significant wetlands occur within the Study Area or surrounding area. No wetlands on the vegetation management wetland map occur within the Study Area or surrounding area. Many small to medium sized watercourses (stream order 1, 2 and 3) occur within the Study Area and intersect the Project Site (Figure 12.4, Volume 2).

1.5.9 Groundwater dependent ecosystems

Groundwater dependant ecosystems (GDEs) are defined as: '*ecosystems which require access to groundwater to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services'* (Richardson E. I., 2011). GDEs include aquifers, caves, lakes, palustrine wetlands, lacustrine wetlands, rivers and vegetation (Queensland Government, 2014).

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No aquifer, cave, lake, palustrine or lacustrine GDEs occur within the Study area. Wetland vegetation associated with riverine systems has been mapped within the Study area (Queensland Government, 2014) associated with the stream order 3 watercourse in the northern eastern section of the Study Area (Appendix D, Volume 3). This mapping has likely been based on the alluvial RE, 11.3.25.

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1.6 Potential impacts

Potential impacts to flora and fauna values may occur in the following phases of the Project:

1. Construction Phase
2. Operation and Maintenance Phase
3. Decommissioning Phase.

The construction footprint of the Project will be approximately 360 ha. The operational footprint will occupy approximately 100 ha. Land not occupied by infrastructure following the construction and rehabilitation period will continue to be used for rural and agricultural purposes.

1.6.1 Construction phase

The construction phase of the Project will involve construction of the wind turbines and associated wind farm infrastructure, as described within Chapter 2 Project Description.

The most significant impacts on flora and fauna will occur during the Project's construction phase, when vegetation and habitat removal will occur. Impacts associated with the construction phase of the Project will be from the following activities:

- Removal of native flora species and vegetation comprised of both remnant and regrowth elements
- Noise and vibration impacts from construction activities to fauna species
- Sedimentation and erosion from exposed and excavated areas
- Groundwater drawdown from sourced aquifers
- The introduction of additional pests and weeds.

Specific impacts to flora and fauna values are discussed in the following sections.

1.6.1.1 Potential impacts to flora

Removal of remnant vegetation

The Project Site intersects approximately 50 ha of remnant vegetation. However, the Project Site represents a broadly defined area and is taken as a worst case scenario in terms of potential impact. The actual disturbance footprint (and required vegetation clearing) is likely to be a much smaller impact area (refer to Chapter 2 Project Description).

The Project will cause only a very minor impact on the local and sub-regional extent of the affected RE's, as demonstrated within Table 12.12.

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Table 12.12~~12~~ Area of remnant vegetation within the Project Site

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RE	Status[#]		Area (ha) in Study Area	Area (ha) within Project Site	Area (ha) remaining in the Eastern Darling Downs Subregion	% to be removed from the Eastern Darling Downs Subregion
	VM Status	Biodiversity Status				
11.10.1	LC	NC	375.18	21.42	34,949.63	0.06%
11.3.25	LC	OC	20.24	2.50	10,432.90	0.02%
11.8.3	OC	OC	170.24	12.42	7,617.51	0.16%
11.9.4a	OC	E	22.59	2.79	1,106.31	0.25%
11.9.5	E	E	14.85	N/A	1,800.60	N/A
12.8.16	OC	OC	271.45	11.33	4,857.02	0.23%

[#]Status: OC= Of Concern, LC=Least Concern, NC=No Concern

Removal of Threatened Ecological Communities

Field surveys have confirmed the occurrence of two TEC's within the Study Area:

1. SEVT TEC (Represented by RE's 11.8.3, 11.9.4a)
2. Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (Represented by RE 11.9.5)

The Project Site is well-removed from the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC, and will not cause any direct or indirect impacts on this community.

The Project Site intersects 15.21 ha of SEVT TEC however, as discussed above, the actual disturbance footprint will likely result in a much smaller impact.

Removal of non-remnant and cleared paddocks

The Project Site intersects 1,912 ha of non-remnant vegetation and cleared paddocks. As the Project is designed to avoid areas of ecological significance, the greatest land take and disturbance will be in this category.

Loss of threatened flora

Desktop assessment indicates that ten threatened flora species could occur in the Study Area (Table 12.7). However, systematic survey over a number of years and seasons within the Project Site (encompassing a broad range of conditions) has failed to record any of these species. The NC Act Protected Plant Trigger Map does not identify the Project Site as being within a High Risk area. While the occurrence of some cryptic species cannot be wholly discounted, the survey results provided a high degree of surety that the Project is unlikely to have a significant impact on a threatened flora species.

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Vegetation fragmentation/edge effects

The Study Area is within a highly fragmented landscape that retains areas of remnant vegetation. The Study Area is itself characteristic of this broader fragmented landscape. To the greatest extent possible the design process has sought to minimise further fragmentation of remnant vegetation by positioning the Project in the more highly disturbed components of the Study Area. While it has not been possible to avoid remnant vegetation in all areas, it is important to understand that the Project

Site represents a broadly defined footprint into which the much smaller disturbance footprint will be placed. Where the Project Site intersects areas of remnant vegetation, micro-siting will be used to minimise further fragmentation. For example, infrastructure could be moved outside of a remnant boundary or an infrastructure pathway (e.g. access track) could be aligned to minimise impact on significant ecological features (e.g. hollow bearing trees).

There is the potential for project-generated (new) edge effects. However, this occurs in an already highly fragmented landscape in which the Project will be located. It is considered unlikely that the Project will cause significant additional light penetration in what are already open forest – woodland communities or areas with fragmented regrowth. Increased light penetration is considered to be of greater significance in the closed SEVT communities.

Groundwater drawdown from sourced aquifers

A groundwater bore network will be developed for the construction phase of the project, which will require extraction of water for construction purposes (Chapter 15 – Groundwater). As GDEs require access to groundwater to meet some or all of their water requirements, extraction of groundwater may impact on these communities. Within the Study Area, the only GDEs identified are the alluvial plant communities of the RE 11.3.25, associated with watercourses.

To manage any impacts on GDEs, groundwater monitoring program will be developed for all Project stages, which identifies suitable drawdown levels, which fall below identified thresholds.

Weed establishment and spread

During field surveys it was noted that most of the declared and more common pest plants occurred in non-remnant, regrowth vegetation and the more disturbed areas of remnant vegetation. They were generally uncommon or absent from the high integrity remnant areas. The potential for weed establishment in new areas (and a management response) is therefore most pervasive in these later high integrity areas. Mitigation and management is discussed in Section 12.7.

During the construction phase, machinery movement and earthworks has the potential to introduce new weeds to the Project Site and increase the spread of those species which already occur, although this potential impact is readily managed by routine weed hygiene protocols as discussed in Section 12.7:

Erosion and sedimentation

There is potential for erosion and sedimentation to occur during both the construction and operational phases of the Project, but contemporary management practices will ensure that impacts are localised and of minimal duration. Nonetheless, it is considered important to ensure that earthworks are minimised as far as practicable and appropriate erosion and sediment control requirements are contained in the management plans for the Project. Further discussion is provided in Section 12.7.

Clearing within a watercourse or drainage feature

During construction, vegetation clearance within a watercourse or drainage feature is required. The defined distance required for clearing in a regional ecosystem has been determined in accordance with Schedule 2 clause 2, subsections (4) and (6) of the *Environmental Offsets Regulation 2014*. The extent of clearance from each watercourse that crosses the Project Site is summarised below.

Table 12.13 Extent of vegetation clearing required within a watercourse or drainage feature

Plant community	Habitat condition	Broad habitat type	Verified RE	Area to be cleared (hectare)
High value regrowth	Poor	Eucalypt woodland or open forest	11.10.1	2.06
High value regrowth	Poor	Eucalypt woodland or open forest	11.10.1	1.10
High value regrowth	Poor	Non-eucalypt open forest	11.9.5	0.47

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Plant community	Habitat condition	Broad habitat type	Verified RE	Area to be cleared (hectare)
High value regrowth	Poor	Eucalypt woodland or open forest	11.8.5	1.95
High value regrowth	Poor	Eucalypt woodland or open forest	11.8.5	0.44
High value regrowth	Poor	Eucalypt woodland or open forest	12.8.16	2.62
High value regrowth	Poor	Eucalypt woodland or open forest	12.8.16	2.04
High value regrowth	Poor	Eucalypt woodland or open forest	12.8.16	0.38
High value regrowth	Poor	Fringing Riparian Woodlands	11.3.25	2.94
High value regrowth	Poor	Fringing Riparian Woodlands	11.3.25	0.55
EcEm/EtAf	Fair to good	Fringing Riparian Woodlands	12.8.16/11.3.25	2.85
BaAc	Very good to excellent	Vine thickets	11.8.3	0.11
High value regrowth	Poor	Fringing Riparian Woodlands	11.3.25/11.8.5	0.11

Based on the Project Site which includes for a 250 m corridor, a total of 17.58 ha of vegetation within a watercourse or drainage feature is required to be cleared for the Project. 14.63 ha of this is considered to be in a poor condition. 0.11 ha of vine thickets that is considered to be in very good to excellent condition, and 2.85 ha of fringing riparian woodlands that is considered to be in fair to good condition. However, due to the large amounts of remaining habitat within the Study Area, this clearance is not considered to have a significant impact. It should also be noted that the construction footprint will occupy a considerably smaller area than the Project Site and therefore the actual level of impact will be significantly less than the areas stated above. The area to be cleared will be assessed following detailed design when impacts to watercourses and drainage features are known.

1.6.1.2 Potential impacts to fauna

Impacts on fauna associated with the construction phase of the Project include the direct clearing of fauna habitat, such as removal of remnant or high value regrowth vegetation and habitat trees. Other indirect short-term impacts associated with the construction phase are likely to be construction activity and noise disturbance.

Loss of fauna habitat

Clearing of native vegetation can adversely affect native fauna species. Impacts resulting from clearing native vegetation (DECC 2005) can include:

- Destruction of habitat causing a reduction of biological diversity or loss of local populations and genotypes

- Fragmentation of populations, which can reduce gene flow between small isolated populations, reduced the potential for species to adapt to environmental change and loss or severe modification of the interactions between species
- Disturbance which can permit the establishment and spread of exotic species that may displace native species
- Loss of leaf litter, removing habitat for a wide variety of vertebrates and invertebrates
- Loss of food resources such as foliage, flowers, nectar, fruit and seeds.

The fauna habitat occurring within the Project Site and the Study Area likely to be affected by the Project is provided in Table 12.14, along with the threatened species that are 'possible', 'likely' or 'confirmed' to occur within the Study Area. A significant residual impact assessment based on the *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* for the threatened species that are 'possible', 'likely' or 'confirmed' to occur within the Study Area is provided in Appendix D, Volume 3.

The Project's impact on fauna (including threatened species) through the mechanism of habitat loss is unlikely to be significant due to:

- The area of each habitat type to be affected is small in comparison to that which remains in the broader landscape
- Habitat fragmentation will be only very minor and will occur within a landscape already subject to significant fragmentation
- There are no species highly or solely dependent on the habitats within the Study Area.

Table 12.14~~13~~ Fauna habitat that coincides with the Project Site and potential threatened species that can occur within the broad habitat type

Broad habitat	Threatened species 'possible', 'likely' or 'confirmed' to occur within each habitat	Area (ha) of habitat within the Study Area	Area (ha) of habitat within the Project Site
Eucalypt woodland or open forest	· Squatter pigeon (southern) · Regent honeyeater · Painted honeyeater · Large-eared pied bat · Northern quoll · Spotted-tailed quoll (s. ssp.) · Greater glider · Eastern long eared bat (confirmed) · Koala (confirmed) · Grey-headed flying-fox · Collared delma · Yakka skink · Dunmall's snake	2,443.88	342.37
Fringing riparian woodlands	· Regent honeyeater · Painted honeyeater · Eastern long eared bat (confirmed) · Greater glider · Koala (confirmed) · Grey-headed flying-fox · Northern quoll · Spotted-tailed quoll (s. ssp) · Collared delma	72.34	8.31
Non-eucalypt open forest	· Eastern long eared bat (confirmed) · Koala (confirmed) · Dunmall's snake	33.97	2.89

Broad habitat	Threatened species 'possible', 'likely' or 'confirmed' to occur within each habitat	Area (ha) of habitat within the Study Area	Area (ha) of habitat within the Project Site
	· Yakka skink		
Vine thickets	· Black-breasted Button-quail · Eastern long eared bat (confirmed) · Grey-headed flying-fox · Coxen's fig-parrot · Northern quoll · Spotted-tailed quoll (s. ssp)	276.69	28.39
Non-remnant open grassland pasture	· Squatter pigeon (southern subspecies)	7,376.35	1667.59

Construction activity and noise

During the construction phase (short term) there will be an increase in noise and activity in the Study Area as machinery establishes access routes and infrastructure is installed. It is important to note that these impacts will not affect all of the Study Area simultaneously nor will they persist in any one area for a considerable period of time (months). However, when activity and noise is occurring in areas adjoining conserved habitat, potential impacts may include:

· Reduced foraging ability by auditory predators due to increased background noise

· Increased risk of predation by visual predators due to increased background noise

· Reduction in breeding of species which use auditory calls for attracting mates (e.g. frogs, birds)

· Inhibitions to using a home range of dispersing

· Increased potential for collisions with vehicles

· Human visitation causing disturbance to foraging or breeding behaviours.

While these potential impacts are acknowledged it is considered unlikely that they will cause a significant impact on any of the species detected or likely to occur in the Study Area.

1.6.2 Operation and maintenance

1.6.2.1 Potential impacts to flora

Potential for impacts on flora during the operation and maintenance phase of the Project are considered to be limited to:

· Erosion and sedimentation of soils

· Dispersal and spread of weeds.

The significance of this impact is considered to be low as operation and maintenance activities are infrequent and can be adequately controlled by standard management and hygiene practices. Groundwater extractions are expected to primarily occur for the construction phase, limited extraction is anticipated for the operations phase.

1.6.2.2 Potential impacts to fauna

Fauna connectivity

In a fragmented landscape, biodiversity corridors can be very important to help maintain viable populations of biota by increasing connectivity. A biodiversity linkage or corridor can be described as a linear landscape element that connects two or more patches of natural habitat and functions to facilitate movement (including birds, bats and other fauna).

At the landscape scale, the Brigalow Belt BPA is identified as a State significant fauna corridor approximately 10 km wide between Bunya Mountains to the southeast of the Study Area and Diamondy State Forest to the northwest (Figure 12.3, Volume 2).

The Project Site extends up to 6 km into the corridor, but the degree of encroachment is less than 3 km in most areas. The Study Area does not contain significant forested areas, and so while the BPA corridor may represent the shortest distance between Bunya Mountains National Park and Diamondy State Forest it may not provide the most important link between these areas and/or there is the potential for other connectivity paths within the wider area. For example, Figure 12.3, Volume 2 shows that a number of remnant parcels occur to the south of the Study Area, including Mahen and Jandowae State Forests. While this link between Bunya Mountains and Diamondy State Forest is more circuitous than the BPA corridor, it is also significantly less fragmented and would provide a significant secondary pathway. Similarly, there is also habitat to the north of the Project Site that would continue to provide a movement pathway. The Project is therefore considered unlikely to have a significant impact on the BPA.

Terrestrial fauna

Fauna species that may be present within the Project Site during operation include native threatened and common native fauna, livestock and feral fauna. The majority of research on the relationship between wind farms and fauna is focused on the impacts to birds and bats (discussed in detail in the sections below).

Potential impacts to terrestrial fauna within the available studies include; destruction and modification of the habitat, including the impacts of roads, habitat fragmentation and barriers to gene flow; noise and vibration effects; visual effects; shadow flicker; macro- and microclimate change; predator attraction and an increase in fire risks. There is limited peer reviewed research on these impacts and the small number of studies that do exist all acknowledge there are large gaps in the field.

One study concluded that wind farms affect large mammals mainly through an increase in human activity at the wind farm area. During the construction phase, large animals may temporarily avoid wind farms, but when construction and human presence is removed, animals acclimate to wind energy infrastructure (Helldin, 2012). The presence of humans during the operation phase will be limited to maintenance works and inspections. The Project will be otherwise operated remotely.

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For fenced animals with little opportunity to move or for fauna species with limited home ranges; it is possible that noise and visual effects from turbines may increase stress levels. It may affect aspects of their lifecycle involving auditory cues (reduced auditory detectability of predators; reduced auditory detectability of prey; reduced detectability of mating calls etc.).

The Project does not provide fencing around the turbines and tracks, therefore cattle will continue to be able to move within the boundaries of their existing paddocks. It is recognised that there may be some slight negative impact to movement to native fauna from the proposed tracks, through avoidance.

Minor quantities of hazardous substances will be stored on the Project Site during the construction and operation of the Project. With the proposed methods for handling and storage of these contaminants, it is not anticipated that there will be exposure of contaminants to fauna, or bioaccumulation in the system. It is considered likely that in the long term there will be a certain degree of habituation to the background noise, and that significant long term reduction in habitat values is unlikely to occur.

Birds

Potential impacts to birds include displacement from suitable habitat due to wind farm avoidance; increased energy expenditure due to increased flight distances as a result of wind farm avoidance; and fatalities due to collisions with turbines and associated power lines.

Appropriate siting of a wind farm is the most effective measure to avoid bird fatalities. However, there is no universal formula or method that can accurately determine where impacts to birds will occur. A qualitative review of the known and likely birds within the Study Area has been undertaken to determine the potential impact to least concern and threatened bird species.

Avoidance behaviour

There is potential for the abundance of birds within the Study Area to marginally decline. During operation, avoidance of areas in which turbines are located has the potential to result in the loss of access to habitat areas and displacement of birds. This impact may not be long term, as some birds may habituate and begin to utilise the Project Site again.

The Project is located in a highly cleared landscape in which species typical of fragmented rural environments are common. Avoidance of the Project Site by these species is considered unlikely to affect their broader populations. The issue of avoidance is more significant for forest dependent birds, but in this regard it is noted that the turbines are located on largely cleared ridgelines and that forested areas generally occur at a lower topographic position on adjoining slopes. The height of the turbine towers together with the steepness of slopes combines to create a significant topographic and visual separation between the towers and forested areas within a short distance. This factor is considered likely to attenuate the avoidance behaviour.

Collision mortality and injury

Bird collision rates with turbines depend on a range of factors related to bird species characteristics, numbers and behaviour, weather conditions, habitat type, topography and the operation of the wind farm itself.

Birds can become visually aware of turbines from substantial distances and demonstrate considerable caution. However, although fatalities at wind firms are highly variable they tend to be associated with particular behaviours, with the species most susceptible to wind turbine collision being those that exhibit direct foraging behaviours within the wind farm area, causing them to lose track of turbines while focused on prey. Such behaviours include diving on prey items, fly-catching and hovering. These behaviours are most common among raptor species.

Increased collision-related fatalities are also associated with increased interactions with other birds, either of the same or another species, which serves as a distraction leading to increased collision risk. Bird strike is also most likely to be experienced at turbines located at the head of gullies and at turbines adjoining vegetated slopes. These locations are more likely to have larger raptors, attempting to benefit from topographic lift and pursing prey and fail to recall the hazard that turbines pose.

Raptors have been identified within the Study Area including wedge-tailed eagle, brown falcon and nankeen kestrel (refer to Appendix D, Volume 3). The quantitative impact to populations within the Study Area is not possible to fully determine. However, it is likely that whilst individuals within the Study Area may be impacted through collision, this is unlikely to have a significant impact on the populations with the local region.

The area is not known to contain an important population of threatened or migratory birds. The only threatened forest-dependent birds (which may fly at a higher elevation) which may be found within the Study Area is the glossy black cockatoo (refer to Table 12.11). However, suitable habitat does not occur within or adjacent to the Project Site. The collision risk potential to this species is considered to be low.

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Other threatened birds that may possibly be found within the Study Area are likely to be utilising the ground and are less likely to fly above canopy height. The potential impact to these species is considered to be low.

Bats

Wind farms also pose a potential collision fatality and injury risk to bats, with the greatest risk being to migratory or tree roosting bats. There are a number of potential reasons and behaviours that may cause the risk of impact, including pre-migration flocking behaviour and possibly mating activity.

Low wind conditions are associated with increased insect activity, which may attract bats, and encourage the use of turbines from which to hawk, and is also associated with conditions under which bat migration activity peaks.

Barotrauma (tissue damage in the lungs caused by rapid changes in air pressure) around turbines is also a cause of microchiropteran bat deaths.

Fourteen species of microchiropteran bat have been recorded from the Study Area, including the Eastern long-eared bat. The Project is located in a highly cleared landscape, and in this regard is

considered to be appropriately positioned to avoid impacts on important forage habitat for this group. Most microchiropteran bat activity will be associated with the vegetated slopes, which occur at a lower topographic position than the turbines. The height of the turbine towers together with the steepness of slopes combines to create a significant topographic and visual separation between the towers and forested areas within a short distance. This factor is considered likely to attenuate avoidance behaviour, i.e. reduce the potential for direct strike with the turbines and barotrauma. Surveys of the Study Area did not record caves or areas supporting a large collective of microchiropteran bats, which may concentrate a large proportion of a local population into a particular narrow flyway susceptible to turbine strike.

Three species of megachiropteran bat are known from the broader locality including the threatened grey-headed flying-fox. While none were recorded during surveys within the Study Area, all are considered possible occurrences and may use the area due to its biodiversity connectivity. The vegetated slopes and valleys will provide the most important habitat for these species.

Less is known about the risk of turbines to flying-foxes. However, the significant topographic and visual separation between the turbines and the most important forage habitat for this group will attenuate avoidance behaviour and the potential for direct strike with the turbines. The likely impact from the addition of the overhead transmission lines is also likely to be low and will not impact a local population. Barotrauma is not known to be a concern for megachiropteran bats and surveys of the Study Area did not record flying fox roosts, which may concentrate a large proportion of a local population into a particular narrow flyway susceptible to turbine strike.

1.7 Mitigation measures

Table 12.15 describes mitigation measures that will be implemented during the design, construction and operation phases of the Project. Further detail will be developed through the Project CEMP in consultation with relevant stakeholders.

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Table 12.15~~14~~ Mitigation and management measures

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Design
· Micro-siting will be undertaken during detailed design to further minimise impact on the areas of remnant vegetation and SEVT where possible. · A vegetation and fauna management plan will be prepared to provide clear guidance on areas to be cleared and retained; methods for clearing; role of the spotter catcher; and other relevant environmental protection measures. · A fauna construction management plan will be submitted to DEHP to obtain an approved Species Management Plan (SMP) for Least Concern fauna. · A Weed and Pest Control Plan will be developed and implemented, detailing procedures for cleaning and checking construction vehicles entering the construction site. The Weed and Pest Control plan will incorporate appropriate mosquito management. A Pest Management Technician, licensed under the *Pest Management Act 2001*, will be engaged when pest control activities are required to be undertaken (during all stages of the project). · Groundwater drawdown thresholds for the maintenance of GDEs will be considered as part of the groundwater extraction program. · A fauna welfare plan will be prepared to address issues arising from bird and bat strike at turbines and overhead powerlines. · An adaptive management monitoring program will be developed to document bird and bat mortalities, remove carcasses and assess the effectiveness of controls. · An erosion and sediment control plan will be developed to control practices along roads and around infrastructure, which will minimise potential for sedimentation within adjoining conserved habitats. · Any turbine lighting is to be minimised, and red lights used to prevent the attraction of insects.
Construction
· The recommendations of the micro-siting study will be implemented and include: - Pre-clearing surveys - Avoidance of features of localised conservation significance (e.g. hollow bearing trees; bottle

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trees; and rock outcrops). This will include reviewing turbine locations, road alignments, works areas, electricity infrastructure.

- Legislative requirements for clearing vegetation will be complied with.
- Requirements of the vegetation and fauna management plan/SMP will be complied with.
- Requirements of the Weed and Pest Control Plan will be complied with.
- Remove overabundant or notifiable pest species in accordance with advice from the Department of Agriculture and Fisheries
- Weekly visual inspection of construction areas for new infestations of weeds or pests
- Weekly inspections of weed or pest treatment areas to determine efficacy of measures
- Comply with groundwater drawdown thresholds identified in the design phase for the maintenance of GDEs
- The sediment and erosion management strategy will be implemented as part of the CEMP. Sediment and erosion control measures would be particularly important where roads and turbine footprints occur on steep slopes and within or adjacent to waterways, remnant vegetation or high value regrowth. The following measures will be included as a minimum:
  - minimise earthworks as much as possible;
  - install sediment and erosion control structures prior to commencement of construction;
  - ensure sediment traps and other appropriate controls are maintained until all construction surfaces have stabilised;
  - monitor regularly to ensure functioning of sediment and erosion control measures is maintained;
  - stabilise and revegetate disturbed surfaces as soon as practicable; and
  - construct batters to a gradient that allows adequate soil stability and ease of plant colonisation.
- If threatened flora species are located during pre-clearing surveys, efforts will be made to avoid or minimise impacts through the micro-siting process.

Operation and Maintenance

- The requirements of the Weed and Pest Control Plan will be complied with.
- The fauna welfare plan will be implemented which will include establishing a relationship with a veterinarian suitably experienced in the management of native wildlife, and a wildlife carers group experienced in the rehabilitation of injured birds.
- An adaptive management monitoring program will be implemented. If the results of assessment demonstrate that further mitigation is required, further assessment will be undertaken to determine appropriate mitigation or management measures.
- The erosion and sediment control plan (operation phase) will be implemented.
- Comply with groundwater drawdown thresholds identified in the design phase for the maintenance of GDEs
- Vehicle movements will be restricted to formed tracks to minimise the potential for collection and dispersal of weed seed on vehicles.
- Noxious weeds will be regularly controlled in areas adjoining tracks and infrastructure to further minimise risk of seed collection and dispersal. Areas downslope of tracks and infrastructure (in particular, gullies and areas of SEVT) will be inspected for sedimentation and signs of new weed establishment (measured against the baseline of the weed management plan).

1.8 Residual impacts

Residual impacts are impacts that are considered likely to occur following the application of suitable mitigation measures.

Despite the design refinement process and micro-siting during detailed design and construction, there will be some loss of remnant vegetation and fauna habitat for the footprint of the turbines and supporting infrastructure. This loss of habitat forms a very small percentage of the available vegetation within the Study Area and is not likely to have a significant adverse impact on species or vegetation communities.

Following decommissioning of the Project, the land will be rehabilitated in a manner that promotes the reestablishment of the land use and vegetation that was removed.

Residual impacts to flora related values are therefore considered to be low and not significant.

In terms of fauna, it is likely that some degree of bird and bat mortality and injury will occur as a result of the Project, however there will be many factors involved in the actual severity of impact experienced. It is considered that positioning the Project in a largely cleared landscape (principally occupied by regionally common species) is the most significant measure to avoid any significant impacts occurring to bird and bat species. Ongoing monitoring during operation of the Project will indicate whether any further mitigation is required.

1.9 Cumulative impacts

Cumulative impacts occur where there is the potential for a combination of impacts from other projects or developments in the area. As there are no wind farms currently planned within 150 km of the Project, or other planned projects that are likely to have a significant impact to bats and birds (e.g. airfields, high-rise buildings), no cumulative impacts with the Project are expected to occur.

The Warrego Highway Upgrade is the closest project that may result in a cumulative loss of vegetation. However, this project is over 60 km from the Project Site and is unlikely to result in significant impacts to regional flora values being an upgrade to an existing road network. The Project's relatively small impact on flora values would result in a minor cumulative impact but is not considered to be significant in a local or regional context.

1.10 Summary and conclusions

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

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Project Commitments

Environmental Impact Statement

Project Commitments

Environmental Impact Statement

Client: AGL Energy Limited

ABN: 74 115 061 375

Prepared by

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AECOM in Australia and New Zealand is certified to the latest version of ISO9001, ISO14001, AS/NZS4801 and OHSAS18001.

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20.0 Project Commitments

20.1 Introduction and approach

This summary of mitigation and management measures was developed to provide advice on the environmental management measures to be considered and included during the design, construction, and operation of the Project. Mitigation and management measures to be applied during the decommissioning phase of the Project will be provided in a decommissioning and rehabilitation plan prior to the end of the Project's operational period.

This chapter uses information about the existing environment, potential impacts, and proposed mitigation measures from the corresponding sections within this EIS, relating to:

- Noise and Vibration
- Landscape and Visual
- Shadow Flicker
- Electromagnetic Interference
- Aviation
- Hazard and Risk
- Socio-Economics
- Land Use and Planning
- Flora and Fauna
- Traffic and Transport
- Surface Water and Groundwater
- Topography, Geology and Soils
- Waste Management
- Cultural Heritage
- Sustainability and Climate Change.

The summary of mitigation and management measures has been structured to highlight approaches to prevent, mitigate, and monitor potential impacts during the design, construction, and operational phases. This information can then be reviewed and adopted at each phase of the Project. These mitigation and management measures will be further refined during the detailed design stage of the Project so that site and location-specific issues are captured and fully relevant to the final design of the Project. It will be at this stage that a detailed CEMP can be prepared to manage the potential impacts associated with the construction phase.

The CEMP is anticipated to include the following:

- Responsibilities
- Compliance obligations
- Training and competencies
- Monitoring and auditing
- Incident management
- Reporting.

Responsibilities associated with mitigation and management measures rest with the Project proponent, and other organisations involved with each Project stage, including design consultants and EPC contractor. Each person engaged to work on the Project, during any phase, will be required to comply with the CEMP. To this end, an environmental induction program will be necessary to ensure all site workers (involved in construction or operation) are inducted into the CEMP program prior to their commencement of duties.

Section 1: Noise and Vibration

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Noise and vibration	Noise and vibration impacts at residential dwellings	Compliance with Queensland Wind Farm State Code and Planning Guideline	**Prevention**	Ensure that any wind turbine layout within the Project Site is compliant with the applicable noise criteria Use of low-noise plant and equipment model.	Preparation of a CEMP Scheduling of construction activities Maintenance of construction equipment Use of low-impact construction methods, where practicable Appropriate consultation with surrounding community about scheduling of construction activities Regular community consultation regarding noise created by the Project Limitation of construction hours to Monday to Saturday where practicable. Construction work on Sunday to be specifically addressed in CEMP.	N/A
			Contingency Measures	N/A	Prepare a noise complaints procedure and register, and investigate any construction noise complaints appropriately. Vibration complaints are not expected, but will be appropriately investigated.	Investigate any operational noise complaints appropriately

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Monitoring	N/A	Noise monitoring in accordance with the CEMP	Undertake compliance noise measurements at sensitive receivers located in proximity to the Project to ensure compliance with the Queensland Wind Farm State Code and supporting Planning Guidelines

Section 2: Landscape and Visual

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Visual Amenity	Reduced visual amenity	No complaints relating to loss of visual amenity	**Prevention**	Minimise vegetation removal, where possible Design of facilities to minimise visual impact on surrounds, such as semi-matt finishes on turbines to reduce glint Natural line of the existing landscape will be used wherever practicable	Limit works compounds and restrict to areas of lower visual sensitivity and/or lesser visibility where possible to avoid unnecessary visual impact Control after-dark construction lighting to minimise effects on sensitive visual receptors Use of spoil from excavation sites for incorporation into bunding for buffer planting zones	Maintain access roads in a tidy manner
			Contingency Measures	Use the natural line of the landscape to reduce visibility and assist integration of the wind farm infrastructure Wind turbines should be white or off-white, with a semi-matt surface to reduce the reflection of light	Construct overhead electrical reticulation below the ridgeline, where possible Consider new native planting to assist in visual screen, where necessary Ensure the screening consists of mixed plants of local provenance including some fast-growing species, as appropriate to the landscape character CEMP to control landscape and visual effects Site waste management plan will be enacted to ensure waste is minimised and reduces impacts to landscape character	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Monitoring	N/A	Weekly visual inspection of construction areas for new infestations of weeds Weekly inspections of weed treatment areas to determine efficacy of measures	Regular visual inspections of rehabilitation areas for 12 months or until established for weed invasion Inspection of the Project Site during scheduled maintenance for weed infestation A post-decommissioning rehabilitation plan will be prepared to reinstate the Project Site to its pre-existing (or enhanced) conditions

Section 3: Shadow Flicker

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Shadow Flicker	Shadow flicker experienced at dwellings and causing nuisance	No exceedance of guideline limits for shadow flicker at non-participating sensitive receptors.	**Prevention**	Detailed design to be informed by further shadow flicker modelling if turbine layout is altered Site visit to investigate the dwellings expected to experience some shadow flicker to determine site-specific conditions. This will enable further modelling of the detailed design layout to incorporate site conditions at these locations, and will identify the need for mitigation measures at these locations Relocate turbines if shadow flicker impacts are determined to be extreme and unable to be mitigated through other means	N/A	If determined to be necessary, implement control strategies to shut down certain turbines when shadow flicker is likely to occur at particular dwellings.
			Contingency Measures	N/A	N/A	Enable landowners with concerns about shadow flicker to contact the wind farm operator. Any complaints to be investigated appropriately. Install screening structures or plant trees to block shadows cast by turbines during operation, where required.
			Monitoring	N/A	N/A	N/A

Section 4: Electromagnetic Interference

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Electromagnetic Interference	Disruption to RFID operations in proximity to the wind farm	No EMI impacts or disruption	**Prevention**	N/A	N/A	N/A
			Contingency Measures	N/A	N/A	Establish a feedback process whereby stakeholders can raise concerns about EMI impacts with the wind farm operator. Investigate these complaints appropriately.
			Monitoring	N/A	N/A	N/A
	Disruption to CB radio and mobile phone signals	Minimal temporary disruption to signals	**Prevention**	Educate landowners and stakeholders about potential interference to CB radio and mobile phone signals	N/A	N/A
			Contingency Measures	N/A	Encourage CB radio and mobile phone users to move a short distance when experiencing signal interference.	Encourage CB radio and mobile phone users to move a short distance when experiencing signal interference.
			Monitoring	N/A	N/A	N/A
	Disruption to satellite and digital TV reception	No satellite or digital TV reception interference	**Prevention**	Ensure that any changes during detailed design to the wind farm layout are investigated for potential disruption to satellite or digital television		Educate residents experiencing interference issues on how to tune household antennas to alternative sources.

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Contingency Measures	N/A	Establish a feedback process whereby stakeholders can raise concerns about EMI impacts with AGL. Investigate complaints accordingly and where mitigation measures are necessary, consider undertaking one or more of the following: Tune the householder's antenna into alternative sources of the same or suitable TV signal Install a more directional and/or higher gain antenna at the affected dwelling Relocate the antenna to a less-affected position Install satellite TV at the affected dwelling Install a TV relay station	Establish a feedback process whereby stakeholders can raise concerns about EMI impacts with the wind farm operator. Investigate these complaints appropriately and employ the appropriate mitigation measures as necessary
			Monitoring	N/A	N/A	N/A

Section 5: Aviation

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Airspace	Increased risk of collisions by aircraft with wind turbines or meteorological masts	No increase to risk profile	**Prevention**	Consultation with appropriate authorities, including CASA, Airservices Australia, RAAF, AAAA, GFA and Hang Gliding Federation of Australia regarding the Project Liaise with RAAF about the low-level operations in the region, and the implications that this may have on the Project.	Notify Airservices Australia, CASA and RAAF when construction commences. Have the Project included on aeronautical charts.	Wind farm operator to provide avenues for consultation with aviation stakeholders if any issues arise during the operation of the Project with respect to aviation-related factors.
			Contingency Measures	Consider inclusion of obstacle lighting on wind turbines if they penetrate navigable airspace in accordance with International Civil Aviation Organisation requirements.	Operate obstacle lighting in accordance with International Civil Aviation Organisation requirements if required.	Operate obstacle lighting in accordance with International Civil Aviation Organisation requirements if required.
			Monitoring	N/A	N/A	N/A

Section 6: Hazard and Risk

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Bushfire	Increase in prevalence and severity of bushfires	Reduced bushfire risk in the Study Area	**Prevention**	Preparation of a Bushfire Management Plan in consultation with the QFRS Keep electricity services underground where possible (e.g. between turbines) Equipment and machinery (including the turbines) to provide high safety standards Develop emergency provisions for property owners neighbouring and containing wind turbines The Queensland Department of Community Safety (DCS) will be consulted prior to construction of the Project. The Project detailed design will be in accordance with relevant standards, including requirements for emergency vehicle access.	Maintain fire breaks around construction site Visual inspection of construction areas for presence of dry fuel Incorporate Bushfire Risk Plan into the CEMP Avoid higher risk areas when siting buildings or other infrastructure Ensure buildings meet specifications and requirements of AS 3959 Install lightning protection devices in wind turbines Observe fire warnings and notices Fit buildings with fire detection systems in accordance with AS1670 Maintain fire extinguishers at site offices and construction vehicles	Observe fire warnings and notices Maintain vegetation to remove any potential forest fuels

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Contingency Measures	Provide suitable ingress and egress to the Project Site and escape routes Roads should be designed to carry fully-loaded fire fighting vehicles Ensure appropriate water supply	Prepare and implement an Emergency Response Plan for construction Investigate the cause of any fire, and update facilities or procedures to prevent further incidents Fire Danger Index (FDI) will be monitored daily.	Prepare and implement an Emergency Response Plan for operation Investigate the cause of any fire, and update facilities or procedures to prevent further incidents
			Monitoring	N/A	N/A	Maintenance of vegetation to remove forest fuels Fuel management strategy to mitigate fire hazards, including planned fuel reduction burns Regular maintenance and serving of equipment and turbines
Mosquitos	Potential creation of artificial breeding sites	Compliance with the *Public Health Act 2005*	**Prevention**	Provide a mosquito management component in the Weed and Pest ~~Control~~Management plan	A Pest Management Technician, licensed under the *Pest Management Act 2001*, will be engaged when pest control activities are required to be undertaken during construction	A Pest Management Technician, licensed under the *Pest Management Act 2001*, will be engaged when pest control activities are required to be undertaken during operation

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Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Contingency Measures	N/A	Maintain activities as set out in the Weed and Pest Management Plan	Maintain activities as set out in the Weed and Pest Management Plan
			Monitoring	N/A	Visual inspections in accordance with the requirements set out in the Weed and Pest Management Plan	Visual inspections in accordance with the requirements set out in the Weed and Pest Management Plan

Section 7: Socio-Economic Environment

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Social Impact	Noise exceedances at residents surrounding the wind farm due to operational noise impacts	Compliance with all applicable noise criteria	**Prevention**	Final turbine layout within the Project Site is to ensure compliance with operational noise criteria Application of operational noise criteria and setbacks from sensitive receptors	N/A	N/A
			Contingency Measures	N/A	N/A	N/A
			Monitoring	N/A	N/A	Undertake compliance noise measurements at sensitive receivers located in proximity to the Project to ensure compliance with the Queensland Wind Farm State Code and supporting Planning Guidelines

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
	Missed opportunities in relation to local employment and use of local contractors	Maximise local employment and contractor opportunities	**Prevention**	Develop workforce management arrangement and a Local procurement and Content Plan. Update and implement revised Stakeholder Consultation and Engagement Plan Early engagement with TSBE and the community to increase awareness of employment opportunities for the construction and operation of the wind farm Incorporate draft agreement terms for utilisation of local quarry in EPC Contract.	Implement workforce management arrangement and a Local procurement and Content Plan Implement and revise where necessary the Stakeholder Consultation and Engagement Plan Use of local contractors wherever feasible for all associated construction work Maximise local employment during construction phase	Maximise local employment during operational phase Implement and revise where necessary the Stakeholder Consultation and Engagement Plan
			Contingency Measures	N/A	N/A	N/A
			Monitoring	N/A	N/A	N/A
	Changes in the local housing marking	Minimise impacts to the local housing market	**Prevention**	Prepare a Housing and Accommodation Action Plan in consultation with the local councils	Implement Housing and Accommodation Action Plan.	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Contingency Measures	N/A	Should there be changes in local workforce or housing availability, Housing and Accommodation Action Plan should be amended accordingly	N/A
			Monitoring	N/A	Monitor housing market in collaboration with the local councils	N/A
	Reduced safety within the area Nuisance impacts associated with operation	No reduction in safety characteristics of the area No nuisance impacts	**Prevention**	Ensure that the final turbine layout is compliant with noise guidelines, shadow flicker guidelines and minimises EMI impacts and bushfire risk Prepare a Community Health and Wellbeing Plan	CEMP to control noise and bushfire risk appropriately Implement a Community Health and Wellbeing Plan	Implementation of a Bushfire Management Plan
			Contingency Measures	N/A	Implement a complaint recording, investigation and reporting system for construction Investigate source of complaint and address the issue appropriately	Implement a complaint recording, investigation and reporting system for operation Investigate source of complaint and address the issue appropriately

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Monitoring	N/A	N/A	Undertake compliance noise measurements at sensitive receivers located in proximity to the Project to ensure compliance with the Queensland Wind Farm State Code and supporting Planning Guidelines.

Section 8: Land Use and Planning

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Land Use and Planning	Loss of Good Quality Agricultural Land Disruption to agricultural practices	Minimal reduction in rural production or output caused by construction or operation of the wind farm	**Prevention**	Consult with landowners to determine methods to prevent disruption to current agricultural practices Avoid areas of Class A and B ALC ~~GQAL~~ where possible	Develop and implement a CEMP, outlining how disruption of agricultural practices will be minimised during construction, based on discussions with landowners during the design phase	Operate the wind farm in accordance with measures identified during the design phase
			Contingency Measures	Where some disruption cannot be avoided, consult with landowners to identify ways to minimise impacts to agricultural practices	Where disruption cannot be avoided, liaise with landowners to reduce potential impacts Investigate the cause of complaints of disrupted activities and address the issue appropriately	Investigate the cause of complaints of disrupted activities and address the issue appropriately Implement a complaint recording, investigation and reporting system for construction and operation
			Monitoring	No monitoring required	No monitoring required	No monitoring required

Section 9: Flora and Fauna

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Flora Conservation	Direct loss of endangered Semi-Evergreen Vine Thicket (SEVT) vegetation community	Compliance with the EPBC Act, NC Act, VM Act, and EP Act Maintain the current extent of endangered SEVT vegetation community	**Prevention**	Avoid all SEVT for wind turbines and other infrastructure unless there is no suitable alternative Co-locate access roads and underground electrical reticulation to reduce area of vegetation clearing required	Minimise construction activities within remnant vegetation Locate all construction sites, such as site office, soil stockpiles, machinery/ equipment storage within existing cleared areas or disturbed area Impose strict no-go zones for construction workers and machinery within endangered vegetation Micro-siting will be used to minimise impacts on the areas of remnant vegetation and regrowth vegetation.	N/A
			Contingency Measures	Prior to clearing, collection of seeds from local trees for propagation and use in seed mixes	All vegetation to be removed is clearly marked and clearing contractors briefed on clearing requirements Educate all contractors on the importance of the vegetation and ensure no encroachment on surrounding vegetation Implement the SEVT management and rehabilitation plan in accordance with the SEVT Recovery Plan (McDonald, 2007).	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Monitoring	N/A	Daily visual inspection of vegetation clearing boundaries	N/A
Flora Conservation	Direct loss of 'Of Concern' Regional Ecosystem	Compliance with the EPBC Act, NC Act, VM Act, and EP Act Maintain the current extent of 'Of Concern' vegetation communities	**Prevention**	Avoid all aAreas Of Concern RE unless there is no suitable alternative Detailed design of the Project to promote the retention of remnant vegetation within the Study Area Co-locate infrastructure to reduce area of vegetation clearing required	Minimise construction activities within remnant vegetation Locate all construction sites, such as site office, soil stockpiles, machinery/ equipment storage within existing cleared areas or disturbed area Impose strict no-go zones for construction workers and machinery within remnant vegetation	N/A
			Contingency Measures	Research viability of compensatory planting Develop a management and rehabilitation plan	All vegetation to be removed is clearly marked and clearing contractors briefed on clearing requirements Educate all contractors on the importance of the vegetation and ensure no encroachment on surrounding vegetation Implement the management and rehabilitation plan	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Monitoring	N/A	Daily visual inspection of vegetation clearing boundaries	N/A
Flora Conservation	Direct loss of regrowth vegetation	Compliance with the EPBC Act, NC Act, VM Act, and EP Act Maintain the current extent of regrowth vegetation	**Prevention**	Avoid all regrowth vegetation unless there is no suitable alternative Detailed design of the Project to promote the retention of regrowth vegetation within the Study Area Co-locate infrastructure to reduce area of vegetation clearing required	Minimise construction activities within regrowth vegetation Locate all construction sites, such as site office, soil stockpiles, machinery/ equipment storage within existing cleared areas or disturbed area Impose strict no-go zones for construction workers and machinery within regrowth vegetation	N/A
			Contingency Measures	Research viability of compensatory planting Develop a management and rehabilitation plan	All vegetation to be removed is clearly marked and clearing contractors briefed on clearing requirements Educate all contractors on the importance of the vegetation and ensure no encroachment on surrounding vegetation Implement the management and rehabilitation plan	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Monitoring	N/A	Daily visual inspection of vegetation clearing boundaries	N/A
Flora Conservation	Degradation of vegetation communities and habitats through indirect impacts, including edge effects, spread of weeds, introduced pests, modified surface water drainage, light and noise intrusion	Compliance with the EPBC Act, NC Act, VM Act, and EP Act No new infestations of weeds or pests attributable to the Project	**Prevention**	Avoid further fragmentation of existing small patches (<5 ha) Maintain, as far as practicable, existing surface drainage paths	Minimise construction activities within remnant vegetation Install washdown facilities at main site entry/exit points to remove soil and weeds Develop and implement a Weed Management Plan that includes specific controls for environmental and noxious weeds \	Revegetate disturbed areas as soon as practicable after works with appropriate native and locally endemic species that have high habitat value
			Contingency Measures	N/A	Maintain activities as set out in the Weed Management Plan	Maintain activities as set out in the Weed Management Plan
			Monitoring	N/A	Imported topsoils/mulches to be weed-free prior to material arriving onsite Visual inspections in accordance with the requirements set out in the Weed Management Plan	Visual inspections in accordance with the requirements set out in the Weed Management Plan
Flora Conservation	Removal of prescribed environmental matters that are regulated vegetation communities	Compliance with SP Act, VM Act and Environmental Offsets Act 2014	**Contingency Measures**	Determination of offsets (if required) Confirmation on delivery of offsets Delivery of financial offset (if appropriate)		

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Fauna Conservation	Mortality of native fauna	No significant impact on a native fauna population directly attributable to the Project	**Prevention**	Avoid the removal of large hollow-bearing trees or dead trees wherever possible	Speed limits will be clearly signed on access roads and roads during construction and known fauna crossing points highlighted with signage Avoid travelling on roads during dusk and dawn, where possible. Removal and translocation of hollows containing wildlife from habitat trees shall be conducted using a cherry picker, arborist and spotter/catcher All nests and dreys shall be safely removed from trees prior to any trees being felled All native fauna are protected (including snakes) and shall not be intentionally harmed as a result of the works or workers actions All site personnel shall be made aware of sensitive fauna/habitat areas and the requirements for the protection of these areas	Maintenance of fauna exclusion systems and structures designed for safe fauna passage to enable these systems to function effectively

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
					Fauna exclusion devices shall be implemented where practical to discourage fauna from entering the construction site In accordance with statutory obligations/policies, construction activities to be monitored in accordance with a standardised Flora and Fauna Monitoring Program Avoid disturbing, removing or breaking up fallen timber (especially larger logs) wherever possible Wherever it is unavoidable to disturb fallen timber, relocate them adjacent to the turbine footprint or road	
			Contingency Measures	N/A	Investigate the cause of any fauna injury or death Information gained through investigations to be applied in adaptive management to prevent or minimise further losses or injuries where possible and practical and/or implement compensatory actions	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Monitoring	Develop a pre-construction and post-construction monitoring plan for bats and birds	Prepare a Flora and Fauna Monitoring Program that includes assessment of mortality of native fauna and adaptive management processes to prevent or minimise further losses or injuries and/or identifies measures to be implemented as compensatory actions Visual inspections in accordance with the Flora and Fauna Monitoring Program	Continued visual inspection of Project Site for fauna mortality in conjunction with scheduled maintenance works and according to the requirements established in the Flora and Fauna Monitoring Program Flora and Fauna Monitoring Program to include targeted monitoring of bats and birds Records of all mortalities should be kept to ensure that mortality rates are kept to an acceptable level

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Fauna Conservation	Impediment to movement of at risk wildlife (birds and bats) through natural wildlife corridors, particularly when travelling between Diamondy State Forest and Bunya Mountains National Park	Compliance with the EPBC Act, NC Act, VM Act, and EP Act	**Prevention**	Any turbine lighting is to be minimised, and red lights used to prevent the attraction of insects	Where possible, construction, and clearing of vegetation, should be staged to allow for continued wildlife movement outside the immediate danger of the construction site All construction activities, e.g. site offices, stockpiles etc should be located in existing disturbed or cleared areas to minimise disruption of wildlife habitat In accordance with statutory obligations, spotter/catchers will be present at all vegetation clearing to ensure minimal disturbance to onsite fauna and recover and rescue any injured or orphaned fauna during construction	N/A
			Contingency Measures	N/A	In accordance with statutory obligations, spotter/catchers will be present at all vegetation clearing to ensure minimal disturbance to onsite fauna and recover and rescue any injured or orphaned fauna during construction	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
			Monitoring	N/A	Visual inspections in accordance with the Flora and Fauna Monitoring Program	Continued visual inspection of wind farm for fauna mortality in conjunction with scheduled maintenance works and according to the requirements established in the Flora and Fauna Monitoring Program with input from QPWS

Section 10: Traffic

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Traffic Impact	Delays to traffic on SCRs and local roads	Manage increased traffic volumes appropriately	**Prevention**	Preparation of a Road Use Management Plan or Traffic Management Plan in consultation with TMR, SBRC and WDRC Investigate opportunities to use alternative routes for deliveries avoiding school bus routes and populated areas	Implementation of the Road Use Management Plan or Traffic Management Plan for construction traffic	Implementation of the Road Use Management Plan or Traffic Management Plan for operational traffic
			Contingency Measures	Specific traffic planning elements to be considered will include road diversions, construction route options and scheduling of deliveries, services and shift patterns	Any necessary road closures will be described within the Road Use Management Plan or Traffic Management Plan and necessary approval obtained from TMR and Councils Access points to be located with adequate sight lines and advance warning signs provided	N/A
			Monitoring	N/A	N/A	N/A
Stock Routes	Disruptions to stock movement along a stock route	No stock movement disruptions along stock routes	**Prevention**	Investigate detailed design solutions to minimise impact on existing roads and stock routes.	Ensure all stock routes remain open during construction phase, and any works or improvements to the road infrastructure must consider potential stock movement	Ensure all stock routes remain open throughout the operational period where possible
			Contingency Measures	N/A	N/A	N/A
			Monitoring	N/A	N/A	N/A

Section 11: Surface Water, Riparian Areas and Groundwater

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Water Quality	Sediment from disturbed areas may enter nearby waterways	Compliance with current State and Commonwealth legislation Compliance with current State and Commonwealth guidelines, strategies and standards No visible evidence of sediment leaving construction sites No visible increase in turbidity attributable to construction or operation of the wind farm	**Prevention**	N/A	Develop and implement of a Sediment and Erosion Control Plan in accordance with Engineers Australia's *Soil Erosion and Sediment Guidelines for Queensland Construction Sites* Works within riparian zones to be scheduled outside the wetter months (November–February) as far as practicably possible	Maintain vegetation along easements to prevent soil erosion.
			Contingency Measures	N/A	Maintain, repair or reinstate damaged erosion and sediment control infrastructure Investigate cause of increased turbidity or released sediment and address accordingly	Implement erosion and sediment control measures if areas are causing high sediment loads or turbidity in nearby waterways
			Monitoring	No background monitoring required	Daily visual inspections of sediment control infrastructure Weekly visual inspections of discharge water and receiving water bodies Visual inspections of discharge water and receiving water bodies after rainfall Turbidity monitoring in the event of turbid plumes from construction activities	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Riparian Zone	Physical damage or alteration to riparian areas	No net degradation of riparian areas attributable to construction or operation	**Prevention**	Design to avoid structures within riparian areas where practicable Design to include rehabilitation of riparian areas Design to minimise scour and erosion of riparian areas CEMP to clarify guidelines on construction activities around riparian areas in the project construction zone.	Minimise vegetation removal and construction activities within waterways Rehabilitate riparian areas as soon as practicable after construction.	N/A
			Contingency Measures	N/A	Rehabilitate disturbed areas	If vegetation in rehabilitation areas dies due to the operation of the Project, investigate and address the cause and rehabilitate.
			Monitoring	No background monitoring required	Daily visual inspection of construction site for clearing or construction activities beyond designated areas Weekly visual inspection of rehabilitated areas until construction period is complete	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Riparian Zone	Interference with stream flow	No interference with stream flow attributable to construction or operation	**Prevention**	Design to avoid construction within riparian areas where practicable Assess construction water supply requirements as part of design Department of Agriculture and Fisheries self-assessable codes for low-impact development activities will be used to design waterway barrier developments within the Project Site during construction.	Obtain construction water from sources other than local waterways	Obtain water for irrigation of revegetated areas from a source other than local waterways
			Contingency Measures	N/A	Cease abstraction of water from local waterways Acquire construction water from an alternative source	Cease abstraction of water from local waterways Acquire construction water from an alternative source
			Monitoring	N/A	N/A	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Riparian Zones	Introduction of weeds and pests	No introduction of weeds or pests into riparian areas	**Prevention**	Design to avoid construction within riparian areas where practicable Design to include rehabilitation of riparian areas to prevent establishment of new weed and pest species	Develop and implement a Weed and Pest Control Plan, detailing procedures for cleaning and checking construction vehicles entering the construction site Minimise vegetation removal and construction activities within waterways Rehabilitate riparian areas as soon as practicable after construction	Maintain vegetation within the Project Site to prevent the establishment of weed species
			Contingency Measures	N/A	Manually remove weed species within and adjacent construction areas Remove overabundant or notifiable pest species in accordance with advice from the Department of Agriculture and Fisheries	Manually remove weed species within and adjacent to wind farm infrastructure in riparian areas
			Monitoring	No background monitoring required	Weekly visual inspection of construction areas for new infestations of weeds or pests Weekly inspections of weed or pest treatment areas to determine efficacy of measures	Inspection of Project Site during maintenance activities for weed infestation
Groundwater	Degradation of groundwater resource	No significant variation to local groundwater levels due to construction No contamination of	**Prevention**	Determine water requirements for construction and identify suitable water sources Identify surface water	Comply with Emergency Spill Containment Plan in the event of a spillage/leak of potentially hazardous substances Contain poor quality discharge water	No specific mitigation measures are considered necessary due to low potential risk

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
		local groundwater system		bodies sensitive to groundwater movement (i.e. dams) Identify all local users of groundwater resources within a 1 km radius of the Study Area	and treat prior to disposal, subject to achieving water quality guidelines	
			Contingency Measures	N/A	Investigate the nature of any spilled/leaked potentially hazardous/contaminating substances Investigate the extent of any spillage/leakage of potentially hazardous/contaminating substances	N/A
			Monitoring	N/A	Gauge daily groundwater levels in nearby privately owned (with permission) and registered bore holes Should groundwater quality in the immediate vicinity degrade as a result of the Project's construction activities, monitor down-gradient groundwater quality and downstream surface water quality	Conduct groundwater quality sampling, using the existing registered bore hole network, following a major spillage/leakage event All chemicals, fuel and oil will be stored in above ground tanks in bunded areas, with accurate records maintained of volumes purchased and stored, to ensure any contamination of land or water is prevented, and any spill is detected quickly.

Section 12: Topography, Geology and Soils

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Topography, Geology & Soils	Erosion	Effective erosion and sediment control measures implemented and maintained	**Prevention**	Incorporation of stable embankments and cuts, with catch drains to minimise longer term erosion	Prepare and maintain a project-specific Erosion and Sediment Control Plan Keep land clearance to a minimum Avoid wherever possible clearing areas of highly erodible soils which are prone to water and wind erosion Where appropriate, revegetate and mulch progressively as each section of works is completed. The interval between clearing and revegetation should be kept to an absolute minimum Coordinate work schedules, if more than one contractor is working on a site, so that there are no delays in construction activities resulting in disturbed land remaining destabilised Program construction activities so that the area of exposed soil is minimised during times of the year when the potential for erosion is high, for example during Summer when intense rainstorms are common	No specific mitigation measures are considered necessary due to low potential risk

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
					Stabilise the site and install and maintain erosion controls in accordance with the project-specific Erosion and Sediment Control Plan Keep vehicles to well-defined access roads, and keep access roads off sloping terrain wherever practical	
			Contingency Measures	N/A	Identify and investigate the site of erosion and address in accordance with the project-specific Erosion and Sediment Control Plan Maintenance of road surfaces and cleared footprints will be conducted prior to and immediately following rainfall events during the construction phase and throughout the life of the Project, reducing the potential of mass movement of sediment.	Identify and investigate the site of erosion and provide suitable erosion controls, in accordance with the Erosion and Sediment Control Plan A land rehabilitation program will be established progressively, to reinstate a suitable soil profile.
			Monitoring	No background sampling required	Erosion and sediment control measures documented Daily visual inspection and check sheets maintained In-situ turbidity (NTU) monitoring of local receiving surface waters, in accordance	N/A

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
					with the requirements of the project-specific Erosion and Sediment Control Plan	
Topography, Geology & Soils	Mass Wasting	No mass wasting/landslip events.	**Prevention**	Geological and geotechnical investigations in areas requiring cuts – areas for turbine foundations and hardstand, and access roads. Geological profile of slopes, with slope stability reports issued prior to undertaking earthworks Incorporate rock bolting, retaining walls and stable cuts with associated catch drains as required to maintain slope stability	Construction activities undertaken in accordance with relevant work method statements	Visual inspection of susceptible areas following heavy rainfall/landslip inducing event
			Contingency Measures	N/A	Identify and investigate the site of mass wasting and provide suitable remediation	Identify and investigate the site of mass wasting and provide suitable remediation
			Monitoring	No background sampling required	Mass wasting and landslip control measures documented	No background sampling required

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
					Daily visual inspection and check sheets maintained	
Topography, Geology & Soils	Generation of Acidic Material	No generation of acidic waste water No generation of acidic material	**Prevention**	Inspection of intrusive igneous rock bodies for disseminated sulphides will be conducted as part of the geotechnical investigation	Any exposed acid producing material will need to be neutralized and contained according to the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines*	No specific mitigation measures are considered necessary due to low potential risk
			Contingency Measures	N/A	Divert potentially acidic surface run-off away from local waterways, into established sedimentation basins Neutralise the contained surface run-off by chemical/biological means, in accordance with the *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines*	N/A
			Monitoring	No background sampling required	Submission of samples of suspected acidic material to a NATA accredited laboratory for characterisation pH monitoring of surface run-off generated from operational construction sites, at times and in locations where generation of acidic runoff is likely	No background sampling required

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
					pH monitoring of local surface waters receiving surface run-off from construction sites, at times and in locations where generation of acidic runoff is likely	
Contaminated Land	Land contamination by on-site construction activities or by export of contaminated material from site or importation of contaminated material	No contamination of land	**Prevention**	Investigate the presence of any Notifiable Activities on properties within the Study Area An Emergency Spill Containment Plan to be produced	Nature, quantity and location of all hazardous materials on-site recorded in a manifest Storage areas to consist of a compacted base, bunding to contain spillages and roofing to prevent contamination and infiltration of stormwater (as per AS1940 and AS3780) Residual hazardous materials will be removed from the construction site and returned to an appropriate storage area or a suitable waste facility Spillages of all dangerous goods and contaminated materials will be rendered harmless through investigation, collection and disposal at a suitable disposal facility Fill material imported from off-site to be procured from a licensed quarrying facility and accompanied by relevant	The application of good practice in the storage and handling of dangerous and hazardous goods will provide appropriate practical responses to manage impacts on occupational health and safety and minimise the risk of a spill occurring

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
					documentation to verify it is contaminant/ASS free Contaminated fill material exported from site will be disposed at a facility licensed for disposal of such material	
			Contingency Measures	N/A	If potentially contaminated soils are encountered, a preliminary site investigation should be undertaken Visual and olfactory observation of all in-situ material excavated during construction	Preliminary site investigation of land exposed to leaked or spilled potentially hazardous substances/material
			Monitoring	No background sampling required	Submission of samples of suspected contaminated material to a NATA accredited laboratory for characterisation	Submission of samples of suspected contaminated material, generated from operational activities, to a NATA accredited laboratory for characterisation

Section 13: Waste Management

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Waste	Excessive waste generation	Minimal waste generation	Prevention	Detailed design for infrastructure to carefully specify material needs to avoid over estimating requirements.	AGL will use a hierarchical approach to waste management, from the most preferable (reduce, reuse or recycle wastes) to the least preferable (disposal), and prioritise waste management strategies to avoid waste generation.	The waste stream generated from a wind farm during operation is minimal. AGL will use a hierarchical approach to waste management during operation.
			Contingency Measures	N/A	Where waste cannot be avoided, waste materials will be segregated by type for collection and removal (for processing or disposal) by licensed contractors.	Where waste cannot be avoided, waste materials will be segregated by type for collection and removal (for processing or disposal) by licensed contractors.

Section 14: Cultural Heritage

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Cultural Heritage	Disturbance of items of cultural heritage	Minimal reduction of cultural heritage values	**Prevention**	Establish a dialogue between AGL and Traditional Owners Development of a Cultural Heritage Management Plan	Include construction phase within the Cultural Heritage Management Plan	Include operation phase within the Cultural Heritage Management Plan
			Contingency Measures	N/A	If items of potential cultural heritage significance are discovered during construction, work is to cease immediately in the vicinity of the construction works and a cultural heritage professional is to be invited to investigate prior to works recommencing in that area Cultural Heritage Management Plan to potentially include recommendations for Traditional Owners on site during construction activities	Investigate any heritage-related complaints and address accordingly Implement a complaint recording, investigation and reporting system for construction and operation
			Monitoring	N/A	N/A	Visual inspection of items of cultural heritage value in the event of a complaint

Section 15: Sustainability and Climate Change

Environmental Factor	Potential Impact	Target	Management Objective			
				Design	Construction	Operation
Sustainability and Climate Change	Increased global temperature due to increased energy usage	Reduce carbon footprint of the Project	**Prevention**	Energy efficient lighting to be used, whilst satisfying the safety requirements of the Project Use of sustainably sourced or recycled materials for temporary structures and drainage where possible	N/A	N/A
			Contingency Measures	N/A	Water efficiencies used wherever available, including minimising potable water during construction, and using construction waste water for dust suppression Avoidance of clearing vegetation where possible	N/A
			Monitoring	N/A	N/A	N/A

Draft Community Consultation and Engagement Plan

Coopers Gap Wind Farm EIS

Date: 28 November 2016

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Review and Update Procedures

This Coopers Gap Wind Farm Community Consultation and Engagement Plan (the Plan) will be reviewed and, if necessary, amended and updated:

- On an annual basis by the AGL Coopers Gap Wind Farm Community Stakeholder Engagement Manager (CSEM);
- Following any major incident (review may be restricted to applicable sections);
- Upon receipt of new regulatory approval conditions, licences and permits;
- When directed by any appropriate regulator; and
- In the lead up to the construction, commissioning and operational phases of the project.

Application

The Plan addresses the community engagement requirements of the Coopers Gap Wind Farm Terms of Reference for an environmental impact statement. In addition, this Plan has been reviewed and updated to incorporate the Coordinator-General's requirements relevant to community consultation.

Distribution

All individuals in the following distribution list must be notified when the document is amended and new versions reissued through the appropriate document management system. Others may be notified at the discretion of the CSEM. All requests for changes to the distribution list must be addressed to the CSEM.

Entity	Position	Name	Location
AGL	Community Stakeholder Engagement Manager	Claire Mildren	Toowoomba
	Project Manager	Neil Cooke	Melbourne
Council	Western Downs Regional Council	Alison Lister	Dalby
	South Burnett Regional Council	Chris Du Plessis	Kingaroy

1. Community Engagement Principles

AGL Energy Limited (AGL) has developed six guiding principles for community engagement that are general statements of good practice. These principles do not prescribe specific ways to engage. Many factors, including the type, scale and location of each individual operation, create unique conditions requiring a tailored application of the principles to achieve the most practical outcome.

AGL is committed to working with stakeholders and communities to understand positive and negative impacts of their projects and ensure that concerns are addressed wherever possible. AGL support and nurture meaningful community participation and understand that trust is essential in developing and maintaining long term partnerships with landholders, interested stakeholders and the community.

The principles provide guidance as to how engagement should be undertaken with stakeholders and the community. These guiding principles are:

1. Knowing where you stand - We want to understand the communities in which we operate. We combine a local presence, local knowledge and targeted research to understand attitudes to what we do and how we may impact upon communities.

2. Creating a digital mirror - We use current technology to provide opportunities for whole communities to be informed and involved in our projects. Online, interactive consultation portals will be an integral part of reaching as many people as possible with the information they need.

3. Keeping it local - We take every opportunity to employ local people where appropriate to do so, involve local communities and build local relationships. We seek feedback from the communities in which we operate, to improve the way we work together for their long term interest.

4. Showing not telling - We provide opportunities for communities to see and experience how we operate, including running site tours, equipment inspections and site-based community information centres.

5. Doing what we say we'll do - We want to deliver on our promises to the community and be trusted to do so. We record, measure and report on our commitments to ensure we are keeping them.

6. Building internal capability - We continuously review and improve our internal communication strategies and activities at all levels of our company, so that the whole of AGL is informed, engaged and committed to the promises we make.

2. Preface

2.1 Coopers Gap Wind Farm and the community

This Plan is part of AGL's commitment to deliver community consultation activities through honest and transparent processes and is in compliance with the relevant approvals and requirements of the Coopers Gap Wind Farm (the Project).

AGL has been operating in Australia for over 175 years and are the largest private owner, operator and developer of renewable generation assets, making AGL one of Australia's leading renewable energy companies.

The Project will create opportunities for the local community by creating new jobs, compensating property owners, and generating new tax revenue for both the state and federal governments, as well as setting Queensland on the path to achieving renewable energy targets. While AGL is required to comply with a strict regulatory framework bound by a rigorous and regulated framework that can be monitored, evaluated and continuously improved, it is recognised that to establish trust within the community AGL need to demonstrate willingness to operate openly and transparently. AGL understands that community engagement is central to the Project and are committed to building and maintaining relationships based on mutual respect and trust with all interested stakeholders.

3. Purpose of this Plan

3.1 Introduction

This Plan details stakeholder and community engagement to be undertaken as part of the pre-construction phase of the Project. Further plans will be developed for the Construction and Operation phases of the Project.

The plan demonstrates AGL's ongoing commitment to a program of genuine engagement with the community and stakeholders which values their contribution and involvement with the Project.

Its purpose is to clearly articulate the approach AGL has taken since Project inception, outline the principles and objectives of this Plan and to detail continuation of a dedicated community engagement and stakeholder management approach.

The Plan outlines how and when information will be provided and when the community will be asked for feedback that will be considered during project decision making processes. Public consultation and engagement is a fundamental part of the approvals process.

Since becoming proponent of the Project in 2008, AGL has undertaken range of public consultation and engagement activities for the Project in accordance with AGL's broader community engagement strategic approach.

Community engagement activities were commenced early in the Project planning cycle. 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 for the Project. At this time, AGL decided not to progress the draft Revised Assessment Report for public consultation until a decision was made by the Australian Government on the RET.

In June 2015, a reduced 2020 large scale gigawatt hour (GWh) target of 33,000 GWh was legislated. The Project is now seeking an assessment by the Coordinator-General under the State Development and Public Works Organisation Act 1971 (SDPWO Act) pursuant to the Project's declaration as a 'coordinated project' for which an Environmental Impact Statement (EIS) is required under section 26(1)(a) of the Act.

This Plan has been prepared in accordance with the Coordinator-General's directive that a Community Consultation and Engagement Plan be developed to meet the Social Impact Assessment (SIA) Requirements of the Project.

The EIS for the Coopers Gap Wind Farm was available for public comment from Friday 23rd September 2016 until Monday 7th November 2016. This Plan been developed in general accordance with the Coordinator-General's Social impact assessment guideline (DSD 2013).

3.2 Coordinator-General Requirements

This Plan has been developed in order to meet the commitments outlined in the Project EIS. Commitments and conditions will be met through development of specific management plans for the various Project phases. The implementation, monitoring and auditing of these plans, including this Plan, will ensure compliance with these commitments.

In accordance with the Terms of Reference requirements, following the submission of the EIS, AGL will continue to:

- Consult with Local, State and Government agencies, and potentially affected local communities (Section 6.6):
- Capitalise on opportunities potentially available for capable local industries and communities. (Section 10 – Social and economic (b)):
- Undertake a community engagement strategy to engage at the earliest practicable stage with all likely affected parties across the project footprint and all

infrastructure corridor alignments. Where appropriate, consideration should be given to coordinating local and/or regional community engagement processes with other project proponents. Discuss engagement, negotiation and liaison strategies, including how complaints resolution will be addressed, for all stages of the project (Section 10.22-24)

› The following impact mitigation and management Action Plans detailing outcomes to be achieved must be provided: (Section 10.26).

4. Overview

4.1 Project Description

The Project is located approximately 180 kilometres (km) north-west of Brisbane, between Dalby and Kingaroy, near Cooranga North.

The Project falls within the jurisdiction of the South Burnett Regional Council and the Western Downs Regional Council Local Government Areas. The closest townships to the Project are Bell approximately 30 km to the south and Kumbia approximately 30km to the east.

The Project 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 participating properties), with the Project Site (land which the Project infrastructure will be located, allowing for micro siting) occupying a smaller area within the Study Area; approximately 2,048 ha.

The Project Site represents approximately 20% of the Study Area. The Project Site has been refined through an iterative process and has been influenced by a combination of wind resource, economic, constructability and environmental considerations. The construction footprint of the Project will be approximately 360 ha. The operational footprint will occupy approximately 100 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 12 landowners and 36 properties. A 1,500 m setback from existing or approved sensitive land uses has been applied. Where wind turbines are within 1,500 m of existing or approved sensitive land uses, a written agreement (deed of release) has been obtained from the affected owners accepting the reduced setback.

The design of the Project has been optimised in order to produce a layout that maximises the use of the land available for wind power generation, balanced against the overall environmental impact of the development, utilising the Queensland Wind Farm State Code and supporting Planning Guideline (DILGP 2016) as the assessment criteria.

4.1.1 Project Benefits

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.

As well as 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.

4.2 Construction and Operations considerations

The chosen Engineering, Procurement and Construction (EPC) contractor will be ultimately responsible for the detailed construction methodology for the Project. The construction period is anticipated to be approximately two to two and a half years. Subject to Project approvals, construction is anticipated to commence mid-2017.

4.2.1 Pre-Construction Works

Prior to the commencement of construction, some pre-construction enabling works will be required, including:

- Detailed site investigations for the purposes of micro-siting the turbines
- Obtaining all necessary land access consents and reinstatement agreements for construction.

4.2.2 Construction and Operations

During Construction and Operations 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.

4.3 Previous Public Consultation

Previous proponents, Windlab and Investec, undertook public consultation activities with various stakeholders in 2008. This consultation related directly to the process of identifying land in the vicinity of Coopers Gap as a potential Project Site and Study Area. The specific public consultation activities undertaken during this time are not available and therefore not included as part of this report.

AGL acquired the Project from the previous proponents in December 2008. Changes resulting from AGL becoming the proponent included a revised Study Area, Project description, Project team and approval strategy. These changes identified a need to re-introduce the Project to all stakeholders and undertake further consultation to meet the consultation requirements for the revised Project.

Since the time AGL acquired the Project, consultation with government agencies, landowners, businesses and interested parties has continued. This consultation directly related to the release of the 2011 Initial Assessment Report and included:

- Participating in an Agency Reference Group (ARG) meeting in November 2010 and April 2011 to reintroduce the Project to agencies, outline anticipated Project timeframes, explain the approvals process and establish points of contact
- Site visits to landowners during March 2011 to re-establish the Project, determine the level of Project understanding and re-engage with landowners to outline preferred methods of contact, and how they can input into the process
- Community Information Day held in April 2011 to inform and gather feedback from the broader community
- Distribution of newsletters, newspaper advertisements and exhibition of the 2011 Initial Assessment Report document online and in local libraries.

This initial consultation involved engaging a broad cross-section of stakeholders including key government agencies, landowners, businesses, and the local community to achieve the following objectives:

- Generate awareness and understanding of the Project and associated impacts
- Generate understanding of the approval process
- Provide and promote opportunities and channels for interested parties to become informed and provide formal feedback
- Ensure accuracy of reporting stakeholder issues and how these will be considered in subsequent stages of the Project.

Further details of consultation undertaken for the Project are provided in Appendix G in Volume 3 of the EIS. The Project's public consultation approach and associated communication activities will continue during the Project's EIS assessment, pre-construction, Construction and Operational phases.

4.3.1 Community Consultative Committee

AGL established the Coppers Gap Community Consultative Committee (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 1 provides a list of CCC meetings held to date. CCC meetings are planned to continue prior to and after the submission of this EIS.

Table 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
17	17 March 2016	Cooranga North War Memorial Hall, 1pm – 2.30pm
18	30 June 2016	Bell Bunya Community Hall, 1pm – 3pm
19	25 August 2016	Cooranga North Memorial Hall, 1pm – 3pm

4.4 Guided tour to an Operational Wind Farm

Between 1 and 4 August 2016, AGL escorted 35 interested community members and Councillors from the South Burnett Regional Council to visit two operational wind farms in Victoria. The guided tour took place at the MacArthur Wind Farm and the Oaklands Hill Wind Farms and provided the opportunity for the community to have a first hand experience of an operational wind farm. Community members were also provided the opportunity to meet with landowners who host turbines, and neighbouring landowners, both supportive and not supportive, in order to hear a range of viewpoints. Overall, the community members found the visit to be very informative with some of the concerned community members becoming more relaxed after being exposed to an operational wind farm.

4.5 Local Business Presentation

On the 16th August 2016, the South Burnett Regional Council organised a meeting in conjunction with AGL and the Toowoomba Surat Basin Enterprise. The purpose of the meeting was to ensure the local businesses were aware of the upcoming tendering requirements and what was required in order to be considered for employment opportunities. AGL intends to hold regular briefing sessions over the coming months to provide Project updates regarding tendering requirements in conjunction with South Burnett Regional Council and the Western Downs Regional Council.

4.6 Community Information "drop-in" sessions

AGL held two community information "drop in" sessions on the 13 October 2016 and 15 October 2016. The sessions were advertised in the local newspapers and allowed members of the community to speak to members of the project team, learn about the Project and ask questions.

5. Approach

The approach detailed in this Plan has been informed by previous plans, reporting and performance data, stakeholder feedback and consultation to date, the Project, and likely approval condition requirements. The Plan will be implemented throughout the life of the Project.

5.1 Goals and Objectives

This Plan has been prepared to support the pre-construction, Construction and Operational phases of the Project, which forms part of AGL's commitment to build a sustainable energy future for all Australians.

The primary goal of this Plan is to manage and implement communications and engagement to proactively disseminate Project information, consult with stakeholders at key stages, identify and respond to issues and concerns, and continuously evaluate the effectiveness of the engagement approach to increase its effectiveness over the pre-construction, construction and operational phases.

The objectives of this plan are to:

- Identify the Project's stakeholders, their issues and concerns, influence, and participation levels
- Provide an overview of the communication tools and techniques to be implemented through pre-construction, construction and operational phases of the Project that will be used to engage and communicate with stakeholders
- Document how issues will be managed and risks mitigated in accordance with conditions of approval
- Outline the plan for regular evaluation, reporting and continuous improvement of consultation and engagement with Project stakeholders
- Document complaints and provide enquiries management procedures that the Project team will follow to manage interactions with stakeholders.

6. Stakeholders

6.1 Analysis

A range of key stakeholders were identified as having an interest and influence over the Project during the planning, approval, design, construction and operation of the Project. AGL acknowledges that involving the local community in the Project and keeping the local community informed about activities are important parts of any pre-construction program. Even those who are not directly affected by pre-construction may have an interest.

6.1.1 Understanding the Local Community

The Project covers areas of the South Burnett and Western Downs local government areas (LGA). The Kingaroy and Wambo Statistical Local Areas (SLAs) are taken to be representative of the relevant area of study for the Project's socio-economic assessment.

At the 2011 Census, the combined municipalities had median age brackets characterised by a relatively high proportion of people aged 0-14 and 50+, with a relatively low proportion of people aged 15-49.

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.

The Wambo district is within the Western Downs Regional Council 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 wellbeing and the preservation of a high quality lifestyle.

6.1.2 The Broader Community

AGL understands that interest in the Project also extends to the broader community. AGL will engage people and individuals outside the directly affected project area as appropriate.

6.2 Compliance and best practice

AGL's work on the ground is guided by best practice and regulatory compliance in stakeholder and community engagement. To ensure best practice, the engagement approach is guided by the International Association for Public Participation's (IAP2) Public Participation Spectrum.

Stakeholders will have a varying influence on issues such as easements, access, construction activities and operation of the Project. There is a need for negotiation at the individual and small group level on these issues as they arise and there is a need to change or modify activities to ease resident and recreational concerns.

It is important to recognise that not all issues can be negotiated to the satisfaction of all stakeholders and this will be managed as part of the stakeholder engagement process. The IAP2 spectrum identifies the level of participation that defines the stakeholder's role, and therefore the communications and engagement function, in any community engagement program. The spectrum shows that differing levels of information and participation are legitimate depending on the interests, influence and concerns that stakeholders hold in the process. To ensure consultation is as effective as possible, tools should be tailored to the level of influence or interest in the Project and Project outcomes.

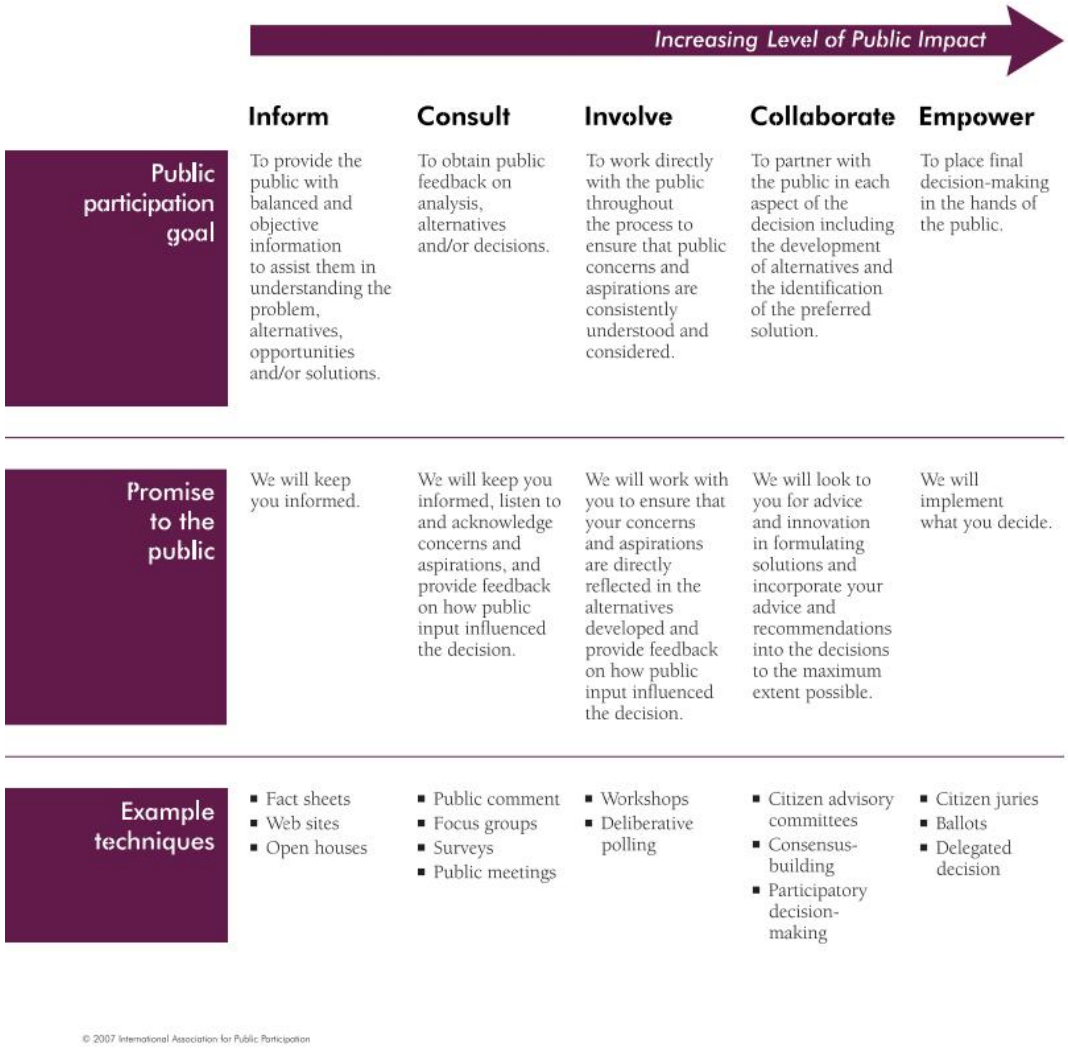

Figure 1: International Association of Public Participation (IAP2) Public Participation Spectrum

6.2.1 Who is a Stakeholder?

For the purpose of this Project, a stakeholder is defined as anyone who (currently, or in the future):

› Has an influence on the Project (including its process and outcomes)
› Has an interest in the Project
› Is directly impacted by the Project.

6.3 Key Stakeholders

6.3.1 Categorisation of Stakeholders

Not all stakeholder groups are homogenous and within each stakeholder group there will be varying levels of impact and interest. Preconstruction activities will also impact different stakeholders uniquely.

AGL's stakeholder analysis has taken into account the level that individual stakeholders may be impacted by the proposed activities. This measure is detailed in Table 2.

Table 2: Categorisation of stakeholder impacts

Level of impact	Engagement approach	Description
High	Actively manage	Significant, repetitive, regular or frequent aspects of the project that will affect people's lives and lifestyles, such as excessive noise and dust. This may include landholders and neighbours.
Medium	Keep informed	Occasional, or regular but infrequent aspects of the project that may be partial or avoidable/manageable.
Low	Monitor	Infrequent and very occasional impacts of the project that will not affect the community's wellbeing.

Stakeholders and their level of interest may change as the Project progresses, depending on the impacts associated with each stage of design, construction or delivery. Table 3 below provides a list of specific stakeholders and their level of interest and impact at pre-construction.

Table 3: Analysis of stakeholders

Stakeholder Group	Name	Level of impact	Level of interest
Local community	Participating landholders	High	High
	Neighbours of participating landholders	Medium	High
	Local residents	Low	Medium
	New residents (moving to the area)	Low	Low
	Visitors	Low	Low
Broader community	Road users	Medium	Medium
	Broader residents	Low	Low
Interest Groups	Coopers Gap Wind Power Supporters Group	Medium	High
	Advance Western Downs	Medium	Medium
	Jandowae Business and Community Group	Medium	Medium
	Dalby Chamber of Commerce and Industry	Low	Low
	Chinchilla Community, Commerce and Industry	Low	Low
	Miles and District Chamber of Commerce	Low	Low
	Kingaroy Chamber of Commerce	Low	Low
	Kingaroy and District Native Plants Queensland	Low	Low
	Condamine Alliance	Low	Low
Business and industry	Local business	Low	High
	Local industry	Low	High
Local government	Western Downs Regional Council	High	High
	Southern Burnett Regional Council	High	High
State government	Department of State Development	High	High
	Department of Environment and Health	High	High
	Department of Local Government and Planning	High	High

6.4 Key Issues

AGL is aware that members of the community are concerned about potential risks of the Project. AGL understands the community and stakeholders will also be interested in measures and procedures for consultation with landowners relating to existing land use including agriculture activities, procedures for consultation with affected stakeholders, and procedures to inform the community of planned activities. This Plan sets out steps that will be taken by AGL to address these concerns and to keep the community and stakeholders informed of activity associated with the Project during the pre-construction

stage. Detailed Community Consultation and Engagement Plans will be developed for the construction and operational phases of the Project.

Issues in Table 4 have been identified through consultation with landowners, community members and key stakeholders since early 2008. Risk workshops, community forums, public exhibition of the EIS and subsequent submissions have identified key risk areas for stakeholder management and organisational reputation.

Table 4: Identified stakeholder issues and risks

Stakeholder Group	Area of interest	Level of influence
Local community	Social impacts, including: - Noise and infrasound - Vibration - Shadow-flicker - Visual amenity - Health impacts. Environment issues, including: - Adherence to standards - Flora and fauna management. Economic issues, including: - Property values - Employment - Agriculture and farming - Improved infrastructure Engagement and trust, including: - Regularity and transparency of information - Commitment to timeframes General issues, including: - Road access and detours - EMI and telecommunications.	High
Broader community	Environment issues, including: - Adherence to standards - Flora and fauna management. Economic issues, including: - Property values - Employment - Agriculture and farming - Improved infrastructure General issues, including: - Road access and detours.	Medium
Business and industry	Economic issues, including: - Employment - Agriculture and farming - Improved infrastructure General issues, including: - Road access and detours.	Medium
Government (local and State)	Environment issues, including: - Adherence to standards - Flora and fauna management. Economic issues, including: - Employment - Improved infrastructure General issues, including: - Road access and detours.	High

7. Communication and Engagement Activities

7.1 How we will engage

AGL is committed to providing information that is objective, balanced and communicated in easy to understand language, free of technical jargon.

7.1.1 Two way communication

AGL actively seeks opportunities to engage with the community and seek their feedback. Feedback will be captured throughout the life of the project and recorded in the Project database. Set out below is how AGL communicates with the community to let them know how their feedback has influenced or informed the project.

7.2 Communication activities

Communication and community engagement about the project, including pre-construction activities, has been and will be ongoing. Key communication activities will be identified to ensure that the community and stakeholders are consulted and informed about relevant proposed activities to reduce as far as possible:

- Any intrusion and disruption to existing land use (including agricultural activities)
- Minimise the risk of conflict
- Impacts on existing infrastructure and future development potential
- Cumulative impacts from development.

Outlined in Table 5Table below are essential communication and engagement tools that will support the implementation of this Plan.

AGL uses a number of methods to publish communication materials, including publishing all physical documents (newsletters, fact sheets) on the Project website. These are the relevant communication activities for the pre-construction phase of the Project.

Table 5: Communication and engagement tools

Tool	Description
Website	As the largest wind farm in Queensland, a dedicated website for the Project, with information about AGL's commitment to sustainable energy has been established and will be maintained during the pre-construction phase and during constructions and operational phases. The website will host electronic copies of all Project collateral, including newsletters, fact sheets, construction notices and information about upcoming consultation activities, as well as the Project contact mechanisms and complaints resolution process.
Newsletters	Updated information will be provided through a bi-monthly or as required community newsletter, updating interested landowners, community members and key stakeholders on the latest developments of the Project. It will be distributed in both hard and electronic copy using the consultation database.
Fact Sheets/FAQ's	A series of fact sheets and frequently asked questions (FAQs) will be developed to inform stakeholders about various elements of the Project, including design, construction or operational elements, issues such as noise or amenity, and to coincide with Project milestones.
Construction Notices and Advertisements	Letters to residents along with advertisements detailing scheduled major construction activities, which may include potential noise or traffic impacts, as well as Project progress and milestone updates will be placed in local newspapers and, if there are significant impacts, on radio. Early and regular notifications will enable stakeholders to respond or plan appropriately. Announcement of Project progress and milestones will convey updates about the Project to key stakeholders and the local community.
Notification Letters	AGL will appropriately inform stakeholders of any pre-construction activities that

	are relevant or specific to their property to provide detailed information about the work, including Project contact details.
Information Sessions	Information sessions will be undertaken on an as-needs basis, particularly during the Construction phase. Information sessions provide opportunities for the local community to directly discuss the Project and impacts with the Project team, and an opportunity to collect feedback and early identification of community issues and concerns.
Static Displays	Static displays are used to disseminate information and may take the form of, but are not limited to: › Posters and other information displayed at key locations in the area (i.e. libraries, shopping centres, cultural and community centres, Council chambers); › Copies of fact sheets and newsletters are regularly made available at these displays. In addition, display material may be adapted to posters and mounted on community noticeboards.

7.3 Engagement Activities

7.3.1 Landholder Liaison

AGL recognises that establishing and maintaining good relationships with landholders, based on mutual trust and respect, is critical to the success of Projects. In recognition of this, in 2014, AGL signed the Agreed Principles of Land Access, which states that:

› Any Landholder must be allowed to freely express their views of operations that should or should not take place on their land without criticism, pressure, harassment or intimidation. Landholders are at liberty to say “yes” or “no” to the conduct of operations on their land
› AGL will respect the Landholder’s wishes and not enter onto a Landholder’s property to conduct operations where that Landholder has clearly expressed the view that operations on their property would be unwelcome
› AGL will uphold a Landholder’s decision to allow access for operations and does not support attempts by third party groups to interfere with any agreed operations.

Consultation with potentially impacted landholders is already underway and will continue throughout the pre-construction, construction and operations phases of the Project.

Early engagement with landholders includes informal conversations before any formal arrangements are agreed. This allows landholders time to ask any questions they have, including discussing aspects of operations with AGL’s environmental and technical specialists. This enables AGL to take into account any specific constraints or considerations the landholder may have, and discuss potential locations of infrastructure taking into account those matters.

7.3.2 Agency Reference Groups

AGL has previously engaged closely with an Agency Reference Group, including the South Burnett Regional Council and Western Downs Regional Council.

These local Council’s provide a tangible link to the local community, businesses, and customers and will be consulted on a regular basis. Building a relationship with the local Councils surrounding the Project area is important. AGL will continue to develop existing relationships with the local Councils and exchange project specific information where appropriate.

7.4 Project Contact Mechanisms

During the pre-construction phase, the following Project contact mechanisms will be established:

- Free call 1800 number
- Project email address
- A reply paid PO Box Service.

Information collected through these contact points will be recorded in a consultation database and inform regular reporting.

7.5 Complaints and enquiries resolution

A complaints management system consistent with ISO 10002 (formerly AS 4269 Complaints Handling) will be developed and implemented prior to the commencement of construction activities. The system will be maintained for the duration of construction activities.

Details of how to make a complaint or enquiry will be included in all communications materials such as community updates, advertisements and the Project website. A 24-hour complaints telephone service will also be operational prior to construction and continuing until completion of construction.

An overview of the proposed complaints and enquiries management process is detailed in Figure .

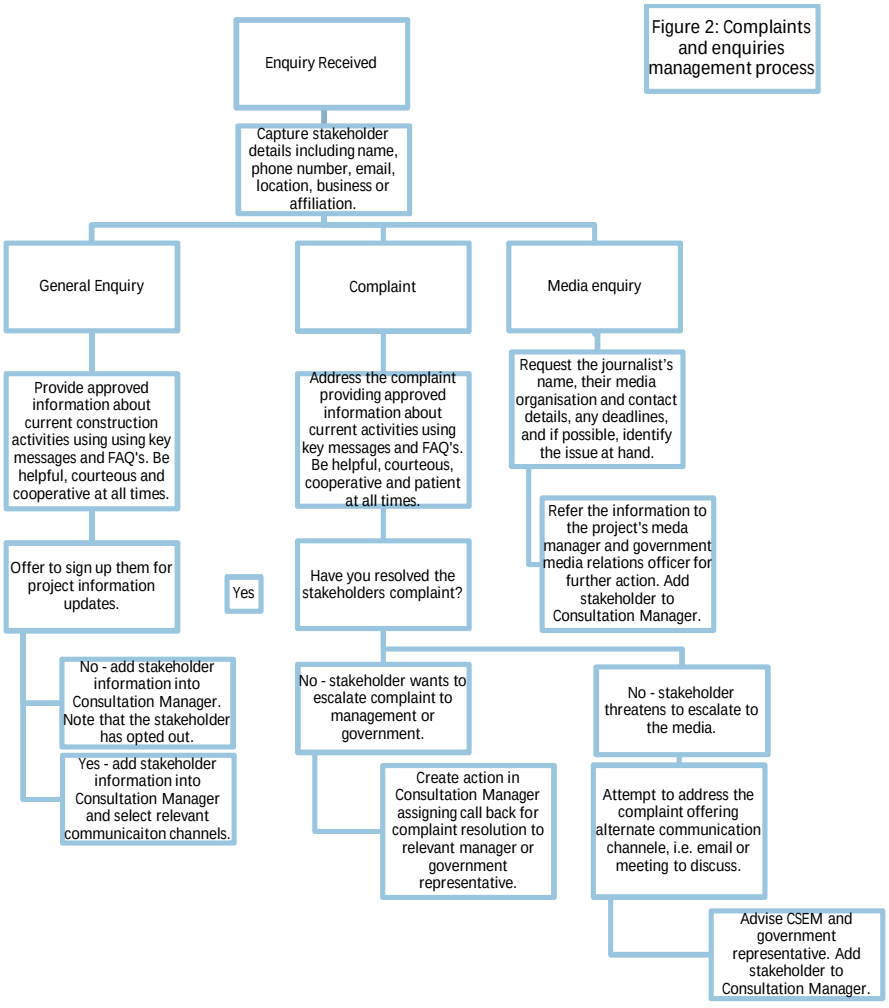

Figure 2: Complaints and enquiries management process

7.5.1 Timeframes

All enquiries / complaints relating to the pre-construction activities will be responded to the next business day of being received and details logged into a stakeholder engagement database. If the enquiry or complaint is not about current activities the aim will be to respond or resolve the matter within 72 hours.

Email and letter enquiries shall be responded within five days of receipt of the correspondence. In addition to the approach outlined above, newsletters advertisements in local newspapers and other documents will provide a simple explanation of how the community can provide feedback and/or make a complaint.

AGL will provide a number of Project contact mechanisms (Section 7.4) so that providing feedback on the Project is easy and accessible.

7.5.2 Unresolved complains and disputes

In the event that complaints are not resolved through the enquiry and complaints management process described above the following steps have been designed to progress dispute resolution. These steps are in accordance with the principles of the Australian Commercial Dispute Centre's Mediation Guidelines (the Mediation Guidelines).

1. Written notice of dispute

The complainant must write to the other party to give notice of the dispute and specify that they are using this dispute resolution procedure. The following details need to be included in the letter:

- nature of dispute
- outcome the complainant is seeking
- what action the complainant believes will settle the dispute.

2. Direct negotiation between parties

The parties should attempt to resolve the dispute between themselves by meeting together. If the issues for discussion are of a technical nature, both parties may wish to invite technical experts.

3. Request for a mediator

If the dispute cannot be resolved within two weeks after notice of the dispute has been given, either party may ask AGL to appoint a mediator.

4. Appointment of a mediator

If the parties to the dispute make a request, an independent Australian accredited mediator must be appointed within 14 days of the request.

5. Set mediation details

The mediator must decide:

- how the mediation is to be undertaken (for example by video conference, telephone or meeting)
- the time and place for mediation (usually at neutral premises)
- the day that the mediation commences.

6. Mediation

When mediation is requested by either party, it becomes mandatory for both to attend the mediation and to try to resolve the dispute. Refusal to attend the mediation and/ or make a genuine attempt to resolve the dispute constitutes a breach of the Mediation Guidelines.

The mediation process should be conducted in accordance with the Mediation Guidelines. The Guidelines can be found at this link: https://www.acdcltd.com.au/adr-clausesguidelines/guidelines

7. Agreement is reached or mediation is terminated

When an outcome is agreed to between the parties, the mediator will assist them in writing it down. The written record will normally be a binding contract. The mediator may terminate the mediation at any time if the mediator is satisfied that a resolution is not likely to occur. More information can be found at the Australian Commercial Dispute Resolution Centre

7.6 Media

Media enquiries will be managed by AGL's CSEM. No Project members will be able to comment to the media on any issue related to the Project or AGL without prior approval.

Media opportunities will be identified and planned in a proactive manner during the pre-construction, Construction and Operational phases of the Project.

7.7 Ministerial enquiries

Ministerial enquiries will be managed by AGL's CSEM

8. Construction and Operations Approach

This Plan also provides an overarching communications and engagement approach for the construction and operational phases of the Project. Specific Community Engagement Plan's (CEP) will be developed and appended to this overarching Plan during the construction and operational phases to assist in achieving the specific objectives and activities detailed below.

8.1 Construction Phase

8.1.1 Objectives

AGL will continue to engage actively with the community and key stakeholders throughout the construction phase of the Project.

During construction, the broad objectives of engagement will be to:

- Maintain community and stakeholder support of the Project to facilitate construction activities
- Fulfil any statutory requirements, including conditions of approval, relevant to stakeholders
- Ensure all stakeholders are identified and engaged with in an appropriate, timely and consistent manner, and their needs and interests recognised
- Understand issues and concerns relating to construction and resolve them in an appropriate manner
- Avoid construction delays by providing stakeholders with information about any construction timeframes and/or environmental impacts, and create awareness of mitigation measures that will be in place to minimise these impact
- Manage risks and issues so that they do not escalate.

8.1.2 Activities

A range of communications and management strategies will be implemented for specific issues related to the construction of the Project. Indicative communications and engagement strategies are identified below for the following specific construction issues:

- Traffic management (including property access and easements)
- Construction activities including out-of-hours' work
- Noise and vibration management.

Land access negotiation

- Affected land holders will be engaged with in accordance with AGL's Agreed Principles of Land Access.

Traffic management

- Identify potential road user delays during the pre-construction and construction phases
- Provide advance notification for potential road user delays across a variety of channels
- Avoid conflicts with the existing road network and maximise spatial separation between work areas and travel lanes
- Provide a mechanism for the community to report incidents and delays.

Construction activities including out-of-hours work

- Regular meetings with key stakeholders affected through private property access
- Regular consultation with transport authorities minimise impacts associated with potential road closures
- Provide advance notification for any planned out–of-hours work. The Project will likely be required to provide specific community notifications for out-of-hours work and procedures for recording and addressing complaints in these scenarios.

Noise and vibration mitigation and management

Construction noise will represent a short term impact and is anticipated to include a range of noise sources. To minimise the impacts of construction noise, the construction contractor will prepare a Construction Noise and Vibration Management Plan which outlines the proposed methodology and monitoring procedures to be put in place for the duration of the works. The Construction Noise and Vibration Management Plan will incorporate the following as a minimum:

- Community Noise Consultation
- Site Management
- Equipment management
- Noise Monitoring.

Operational noise would be limited to operational wind turbine noise and infrastructure noise. Once the wind farm is operational, compliance noise measurements will be undertaken at a number of sensitive receptors adjacent to the Project Site to demonstrate that compliance with the relevant criteria has been achieved.

A Compliance Management Plan will be developed to incorporate a compliance measurement methodology. Compliance noise measurements will be conducted and processed following the principles for conducting background measurements outlined in the Queensland Wind Farm State Code and supporting Planning Guideline.

Reinstatement and rehabilitation

Specific consultation is required where landowners are affected by construction activities. The stakeholder must:

- Have input into the reinstatement and rehabilitation process affecting their property
- Be aware of, and have provided permission for, construction activities occurring on their property before they occur
- Have an avenue for communication with the Project team.

8.2 Operations Phase

8.2.1 Objectives

AGL will continue to engage actively with the community and key stakeholders throughout the Operational phase of the Project.

During operations, the broad objectives of engagement will be to:

- Maintain community and stakeholder support of the Project to facilitate operations
- Fulfil any statutory requirements, including conditions of approval, relevant to stakeholders
- Ensure all stakeholders are identified and engaged with in an appropriate, timely and consistent manner, and their needs and interests recognised
- Provide stakeholders with information about any operational impacts that will affect them and create awareness of mitigation measures that will be in place
- Manage risks and issues so that they do not escalate.

8.2.2 Operational Noise

Operational noise will be limited to operational wind turbine noise and infrastructure noise. Once the wind farm is operational, compliance noise measurements will be undertaken at a number of sensitive receptors adjacent to the Project Site to demonstrate that compliance with the relevant criteria has been achieved.

A Compliance Management Plan will be developed to incorporate a compliance measurement methodology. Compliance noise measurements will be conducted and processed following the principles for conducting background measurements outlined in the Queensland Wind Farm State Code and supporting Planning Guideline.

8.2.3 Other Activities

As the Project moves to the operational phase, the core communication and complaints management responsibility will shift to AGL. AGL is customer service focused, with well-developed systems and procedures to manage emergency and general customer queries.

8.2.4 Complaints Management

AGL has a comprehensive Complaints Management Procedure which describes how customer and stakeholder complaints are responded to and resolved in a timely and responsive manner. It provides the steps to be followed when a complaint is made, and the protocols or code of behaviour that should be followed when managing stakeholder complaints. AGL Anytime™ means that stakeholders can speak to someone 24 hours a day, 7 days a week.

9. Results and Evaluation

The performance and effectiveness of the community consultation and involvement activities undertaken during the pre-construction, construction and operational phases of the Project will be monitored regularly for effectiveness.

9.1 Maintaining Consultation Records

A record of all community engagement activities will be maintained in the stakeholder engagement database. AGL staff and contractors will update the database, recording all contact with stakeholders, including enquiries, complaints and meetings. All actions will be documented.

9.2 Key Performance Indicators

The assessment of Key Performance Indicators (KPI's), detailed in Table 6, will assist in the evaluation of the success of this Plan.

Table 6: Key Performance Indicators

KPI	Method	Result
Complaint Management Through effective and efficient response to complaints, community and stakeholder satisfaction will be maximised.	Based on consultation database records, complaints resolution will be scored on a scale of 1-10 based on the following: · Initial response times to complaints (all complaints responded to within 4 hours (construction hours) and 8 hours (out of construction hours)) · All complaints resolved / closed out to the satisfaction of the stakeholder within 5 working days · No repeat complaints (same stakeholder, same issue only) · Follow up phone call to a sample of stakeholders bi-annually – checking that they were satisfied with the manner in which the complaint was dealt with.	Timely, accurate, effective response to community complaints will avoid repeat complaints, reduce or eliminate escalation and maximise community satisfaction with the program.
Community Engagement The Project positively engages the community and stakeholders through outstanding relationship management to assist in achieving Project objectives.	A CCC has been established consisting of key stakeholders. The CCC will be surveyed quarterly via a quantitative survey. Survey scores are from 1 – 10 and are averaged and reported progressively.	Average score of 75 /100 to deliver outstanding community engagement and stakeholder management results.

9.3 Continuous Improvement

In order to achieve best practice, this Plan will be reviewed through a range of methods designed to achieve continuous improvement.

9.3.1 Reporting

There are a number of ways the Project team will formally and informally report on the Plan. These include:

- A monthly report including stakeholder engagement statistics, issues and complaints
- A bi-annual Plan review, which will assess:
  - The performance of the strategy against KPI's and objectives
  - The effectiveness of key messages;
  - The status of existing and emerging issues;
  - The nature and level of media coverage
  - The level of stakeholder complaints
  - The nature and level of stakeholder contacts (e.g. phone calls, face to face meetings, letters, emails, website usage, email registrations, information session attendances).
- A continuous improvement report at the conclusion of each Project phase, identifying opportunities for improvement prior to the commencement of the next Project phase
- Attendance at and verbal reporting at meetings regarding issues, contacts and complaints
- Verbal reporting, on an as needed basis, for urgent issues or stakeholder contacts.

9.3.2 Evaluation

The strategy and implementation approach set out in this Plan will be reviewed bi-annually and at the conclusion of each Project phase, prior to the commencement of the next Project phase. Additionally, AGL will complete quarterly assessments of the implementation of this strategy against the identified KPI's and objectives. The results of these assessments and the outcomes of regular reporting functions will be used to review and refine the plan.

10. Conclusion

The objectives of the consultation process during the pre-construction, construction and operational phases have been outlined in this Plan. This Plan will provide the basis for the development of detailed CEPs in future stages of the Project. The CEPs will provide further information regarding communications and engagement including how the community and stakeholders will be able to participate in certain outcomes for the Project and how to proactively engage with the community.

Significant residual impact assessment for endangered and vulnerable wildlife habitat (including essential habitat)

Painted honeyeater – potentially present within Eucalypt woodland or open forest, and non-remnant open grassland pasture
Lead to a long-term decrease in the size of a local population:
Field assessments did not record the presence of this species. No populations of Painted honeyeater were identified during desktop assessments within the Study Area. Given the availability of similar habitat in the area, the Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that will lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
The Painted honeyeater was not recorded during field surveys within the Study Area. The clearance of potential habitat for the species is unlikely to significantly reduce the extent of occurrence of the species, given the availability of suitable habitat in the area.
Fragment an existing population:
No populations of Painted honeyeater were identified during field surveys or desktop assessment within the Study Area. Given habitat within the Study area and immediate region is highly fragmented and that no populations were recorded, the proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing population of Painted honeyeater into genetically distinct populations. Due to the availability of suitable habitat (particularly Eucalypt woodland or open forest) within the broader area and that fauna corridors to the south and north will be avoided, no significant impacts to existing connectivity corridors are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is unlikely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species. Fauna spotter catchers during clearing activities will ensure disruptions to this species, particularly during breeding periods (October - March) are reduced.

Large-eared pied bat – potentially present within Eucalypt woodland or open forest
Lead to a long-term decrease in the size of a local population:
This species was not identified during field surveys. Habitat assessments determined that habitat critical to the survival of the species was not present. The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that will lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
This species was not identified during field surveys. Habitat assessments determined that habitat critical to the survival of the species was not present. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
This species was not identified during field surveys. Habitat assessments determined that habitat critical to the survival of the species was not present. No populations are known to the immediate area. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Large-eared pied bat into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, no significant impacts to connectivity are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population.

Greater glider – potentially present within Eucalypt woodland or open forest, and fringing riparian woodlands
Lead to a long-term decrease in the size of a local population:
The Greater glider was not recorded during field surveys. No populations are known to occur within the Study Area. Habitat critical to the survival of the Greater glider was not recorded within the Study Area, with only marginal riparian habitat identified. The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that will lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
Field surveys did not record this species within the Study Area. No populations are known. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
Field surveys did not record this species within the Study Area. No populations are known. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Greater glider into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, no significant impacts to connectivity are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Yakka skink – potentially present within Eucalypt woodland or open forest, and non-eucalypt open forest
Lead to a long-term decrease in the size of a local population:
Field surveys did not record this species within the Study Area. No populations are known. Potential habitat was identified within the Project Site for this species; however, no records were made despite extensive habitat searches. The clearance of this potential habitat is proposed. Given the availability of similar habitat in the region, this clearance is not anticipated to lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
Field surveys did not record this species within the Study Area. No populations are known. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey. The Proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Yakka skink into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, no significant impacts to connectivity are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Dunmall's snake – potentially present within Eucalypt woodland or open forest, and non-eucalypt open forest
Lead to a long-term decrease in the size of a local population:
Field surveys did not record this species within the Project Site. No populations are known. Potential habitat was identified within the Study Area for this species; however, no records were made despite extensive habitat searches. The clearance of this potential habitat is proposed. Given the availability of similar habitat in the region, this clearance is not anticipated to lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
Field surveys did not record this species within the Study Area. No populations are known. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Dunmall's snake into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, no significant impacts to connectivity are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Coxen's fig-parrot - potentially present within vine thickets
Lead to a long-term decrease in the size of a local population:
Field surveys did not record this species within the Study Area. No populations are known. Vine thicket vegetation was identified as having potential to support the species. This vegetation is considered secondary habitat given the low diversity of fig species, which are favoured by the species. This species was not recorded during the surveys. The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that will lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
Field surveys did not record this species within the Study Area. The Project Site is positioned outside/or at the western extent of the species range. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Coxen's fig parrot into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, no significant impacts to connectivity are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species; however it is noted as a threat with potential to impede the recovery of the species (captive breeding and release) (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Regent honeyeater – potentially present within Eucalypt woodland or open forest, and fringing riparian woodlands
Lead to a long-term decrease in the size of a local population:
No populations of Regent honeyeater were identified during field surveys or desktop assessment within the Study Area. Vegetation within the Project Site supports ironbark species (*E. crebra*), not identified as a key foraging species. The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that will lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
Field surveys did not record this species within the Study Area. The Project Site is positioned on the western extent of the species known range. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Regent honeyeater into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, no significant impacts to connectivity are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Koala – potentially present within Eucalypt woodland or open forest, fringing riparian woodlands, and non-eucalypt open forest
Lead to a long-term decrease in the size of a local population:
Koalas were identified within the Study Area during the 2013 field surveys. The Project Site intersects suitable forage and shelter habitat for this species. The Project Site has remnant vegetation and regrowth vegetation with two or more known koala food tree species. However, 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. Therefore, given the availability of similar habitat in the region; the clearing of this habitat is not anticipated to lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
Removal of vegetation and habitat for the Project may reduce the extent of habitat available for the species; however the extent of habitat loss as a proportion of the habitat available within the region is small. In addition, the species is known to utilise a wide range of different habitats, minimising the impact of habitat clearing on the species. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
The vegetation within the Project Site is highly fragmented and not part of a contiguous landscape with woodlands forming small pockets of habitat within a predominantly rural/agricultural landscape. Existing habitat such as riparian zones and Eucalypt woodland, providing limited dispersal opportunities between larger habitat patches to the north and south of the Project site. The Project is unlikely to significantly exacerbate habitat fragmentation beyond current levels. As such, the Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of koala into genetically distinct populations. Due to the extent of suitable habitat within the Study Area, no significant impacts to connectivity are expected as a result of the action, with fauna corridors to the south of the Project maintained.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Diseases affecting koala populations are *Chlamydia* and Koala Retrovirus (DOTEE, 2016); however the Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
Habitat loss associated with the Project is unlikely to significantly impact with the recovery of the species, with north-south fauna corridors maintained to the south of the Study area.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The koala habitat assessment tool provides a total habitat score of +4 for the Project (Table 12.10). This indicates that the Study Area does not contain habitat critical to the survival of the koala; and that the Project will not adversely affect habitat critical to the survival of the koala. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Eastern long-eared bat – potentially present within Eucalypt woodland or open forest, fringing riparian woodlands, non-eucalypt open forest and vine thickets
Lead to a long-term decrease in the size of a local population:
During the 2010 field survey, the Eastern long-eared bat was recorded as *Nyctophilus* spp. during the survey and treated as *Nyctophilus corbeni* as a precautionary approach. While the quality, extent and connectivity of existing available habitat has been affected by clearing for agricultural purposes, there appears to be abundant habitat throughout the region. The poor condition of much of the existing habitat within the Project Site, the potential habitat within the Study Area and the mobile nature of the species indicate that it is unlikely that the Project will lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
The Eastern long-eared bat has a limited distribution that is restricted around the Murray-Darling Basin in south-eastern Australia. In Queensland, it is mainly recorded in the Brigalow Belt South Bioregion, extending eastwards to the Bunya Mountains National Park. It is unlikely that the proposed Project will significantly reduce the extent of occurrence of the species.
Fragment an existing population:
The vegetation within the Project Site is highly fragmented and not part of a contiguous landscape. Due to the existing levels of fragmentation in the Study Area, the proposed Project is unlikely to significantly exacerbate fragmentation to an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing population of Eastern long-eared bat into genetically distinct populations with north-south connectivity maintained.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Squatter pigeon (southern) – potentially present within Eucalypt woodland or open forest, and non-remnant open grassland pasture
Lead to a long-term decrease in the size of a local population:
Field surveys did not record this species within the Study Area. No populations are known. Potential habitat was identified within the Project Site for this species; however, no records were made despite extensive habitat searches. Given the availability of similar habitat in the region, this clearance is not anticipated to result in species decline. The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that will lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
Removal of vegetation and habitat for the Project may reduce the extent of habitat available for the species; however the extent of habitat loss as a proportion of the habitat available within the region is small. In addition, the species is known to utilise a wide range of different habitats, minimising the impact of habitat clearing on the species. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Squatter pigeon into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, and that the species is highly mobile, connectivity between populations will be maintained.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Northern quoll – potentially present within Eucalypt woodland or open forest, fringing riparian woodlands, and vine thickets
Lead to a long-term decrease in the size of a local population:
Field surveys did not record this species within the Study Area. No populations are known. Potential habitat was identified within the Project Site for this species; however, no records were made despite extensive habitat searches. Given the availability of similar habitat in the region, this clearance is not anticipated to result in species decline. The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that will lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
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 southern Queensland since 1999. Further, the Study Area does not support the rugged rocky habitat preferred by this species. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Northern quoll into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, and that fauna corridors to the south will be maintained (albeit fragmented), connectivity between potentially occurring populations will be maintained.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Spotted tail quoll – potentially present within Eucalypt woodland or open forest, fringing riparian woodlands, and vine thickets
Lead to a long-term decrease in the size of a local population:
Field surveys did not record this species within the Study Area and no populations are known. Potential habitat was identified within the Project Site for this species; however, no records were made despite extensive habitat searches. The clearance of this potential habitat is proposed. Given this species was not recorded despite extensive searches and the presence of similar habitat in the region, this clearance is not anticipated to result in long-term species decline. The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that it will lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species:
The Study Area is within the range of a reported population (Eastern Darling Downs- Inglewood Sandstone provinces of the Brigalow Belt South Bioregion) and contains suitable habitat. However given this species was not recorded during field surveys it is unlikely that the proposed Project will significantly reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey despite extensive searches. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
Given the above, it is unlikely the Project will fragment an existing important population of Spotted tail quoll into genetically distinct populations.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Grey-headed flying fox – potentially present within Eucalypt woodland or open forest, fringing riparian woodlands, and vine thickets
Lead to a long-term decrease in the size of a local population:
Field surveys did not record this species within the Study Area. No populations are known. Potential habitat was identified within the Project Site for this species; however, no records were made despite extensive habitat searches. Given the availability of similar habitat in the region, the loss of habitat is unlikely to lead to a long-term decline in the size of a local population. The positioning of turbines at higher elevations and within non-remnant vegetation will ensure impacts associated with turbine collision minimal and unlikely to lead to a long-term decline in the size of a local population.
Reduce the extent of occurrence of the species:
The Study Area is approaching the western limit of the species' range, and 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. It is unlikely that the proposed Project will reduce the extent of roosting habitat. Foraging habitat will be impacted as a result of vegetation clearing, although given the availability of suitable habitat in the area, the Project is unlikely to reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey. No known flying-fox camps exist in or around the proposed development area (Jeff Hayter, QPWS, pers. comm.) so it is unlikely that large numbers will pass through the site. The Project Site contains only a small amount of vegetated area so the species is unlikely to visit in large numbers. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Grey-headed flying fox into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, no significant impacts to connectivity are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Collared delma – potentially present within Eucalypt woodland or open forest, and fringing riparian woodlands
Lead to a long-term decrease in the size of a local population:
Field surveys did not record this species within the Study Area. No populations are known. Potential habitat was identified within the Project Site for this species; however, no records were made despite extensive habitat searches. RE 11.10.1 (identified at the Project Site) is considered important habitat for the Collared delma, and the clearance of this potential habitat is proposed. Given the relatively small amount of clearing of this habitat for the Project, in relation to remaining habitat in the Project Site and in the Eastern Darling Downs Subregion, this clearance is not anticipated to result in long-term species decline of a local population.
Reduce the extent of occurrence of the species:
Removal of vegetation and habitat for the Project may reduce the extent of habitat available for the species; however the extent of habitat loss as a proportion of the habitat available within the region is small. It is unlikely that the proposed Project will significantly reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Collared delma into genetically distinct populations. Due to the large extent of suitable habitat within the Study Area, no significant impacts to connectivity are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
Given the small amount of clearing of important habitat for the Project, and the large amount of remaining habitat in the Project Site and in the Eastern Darling Downs Subregion, this clearance is not anticipated significantly disrupt ecologically significant locations. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Black-breasted button quail – potentially present within vine thickets
Lead to a long-term decrease in the size of a local population:
Suitable habitat (vine thickets) occurs within and adjacent to the Project Site, however evidence of this species has not been recorded during targeted survey and passive observation over 5 year survey period. The clearance of this potential habitat is proposed. Given this species was not recorded and the availability of suitable habitat in the area is the Project is not anticipated to lead to a long-term decline in the species.
Reduce the extent of occurrence of the species:
Field surveys did not record this species within the Study Area. The vine thick habitat is highly disturbed, occurs in only small remnant patches and is of low quality. It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
No populations are known within the Study Area. This species was not recorded during the field survey. The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Black-breasted button quail into genetically distinct populations. No significant impacts to connectivity are expected as a result of the action.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat:
A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The action is unlikely to introduced or exacerbate invasive species populations beyond current levels.
Introduce disease that may cause the population to decline:
Disease is not listed as a current threat to the species (DOTEE, 2016). The Project is unlikely to introduce or spread a disease which may cause the species to decline.
Interfere with the recovery of the species:
The Project is not considered likely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
Remnant vine forest adjacent to Hoop Pine plantations and agricultural land is an important refuge for the species; however due to the small amount of clearing of this habitat for the Project, and the large amount of remaining habitat in the Project Site, the proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

Significant residual impact assessment for special least concern (non-migratory) wildlife habitat

Echidna – potentially present within Eucalypt woodland or open forest, fringing riparian woodlands, non-eucalypt open forest and vine thickets
Result in a long term decrease in the size of a local population:
The Echidna was recorded during the 2012 field survey. Echidnas are found all over Australia. The proposed clearing of potential habitat within the Study Area is unlikely to be significant given the availability of similar habitat in the area and the broad habitat requirements of the species. The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that will lead to a long-term decrease in the size of a local population.
Result in a reduced extent of occurrence of the species:
It is unlikely that the proposed Project will reduce the extent of occurrence of the species.
Fragment an existing population:
The proposed Project is unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation:
It is unlikely the Project will fragment an existing important population of Echidna into genetically distinct populations. No significant impacts to connectivity are expected as a result of the action.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting areas) of a species:
The proposed Project is not expected to adversely affect habitat critical to the survival of the species, or disrupt the breeding cycle of a population. Fauna spotter catchers during clearing activities will ensure disruptions to this species are reduced.

AECOM

List of Terms and Abbreviations

Environmental Impact Statement

List of Terms and Abbreviations

Environmental Impact Statement

Client: AGL Energy Limited

ABN: 74 115 061 375

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Quality Information

Document List of Terms and Abbreviations

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			Name/Position	Signature
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0	7-Apr-2016	Draft for client review	Mark Herod	
1	22-Apr-2016	Final for issue	Mark Herod	
2	5-May-2016	Update to Coordinated Project	Mark Herod	
EIS_0	16-Sep-2016	Final for Issue	Mark Herod	
EIS_A	1-Nov-2016	Response to submissions	Mark Herod	

Table of Contents

List of Abbreviations and Terms 1

List of Abbreviations and Terms

AAAA	Aerial Agricultural Association of Australia
AADT	Annual Average Daily Traffic
ABC	Australian Broadcasting Corporation
ACA	Australian Communications Authority
ACH Act	*Aboriginal Cultural Heritage Act 2003* (Qld)
ACMA	Australian Communications and Media Authority
ADG	Australian Dangerous Goods
AECOM	AECOM Australia Pty Ltd
AEMO	Australian Energy Market Operator
AFN	Australian Fiducial Network
AGL	AGL Energy Limited
AHD	Australian Height Datum
AIS	Aeronautical Information Service (RAAF)
ALC	Agricultural Land Classification
Aleis	Aleis Pty Ltd
AM	Amplitude Modulation
ANZECC	Australian and New Zealand Environment and Conservation Council
ARG	Agency Reference Group
AS	Australian Standard
ASA	AirServices Australia
ASRIS	Australian Soil Resource Information System
AusWEA	Australian Wind Energy Association
BAL	Bushfire Attack Level
BMNP	Bunya Mountains National Park
BMP	Bushfire Management Plan
BoM	Bureau of Meteorology
BP	(Years) Before Present
BPM	Biodiversity Planning Assessment
Burnett ROP	Burnett Basin Resource Operations Plan 2003
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation
CB	Citizen's Band Radio
CCC	Community Consultative Committee
CE	Critically Endangered

CEMP	Construction Environmental Management Plan
CFA	Country Fire Association
CHMA	Cultural Heritage Management Agreement
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
DCDB	Digital Cadastral Database
DCS	Department of Community Safety
DDRP	Darling Downs Regional Plan
DEM	Digital Elevation Model
DEO	Desired Environmental Outcome
DEHP	Department of Environment and Heritage Protection
DERM	Department of Environment and Resource Management
DEWHA	Department of Environment, Water, Heritage and the Arts
DEWS	Department of Energy and Water Supply
DoE	Department of the Environment
DIDO	Drive In Drive Out
DILGP	Department of Infrastructure, Local Government and Planning
DNRM	Department of Natural Resources and ~~Management~~Mines
DNWFDG	*Draft National Wind Farm Development Guidelines* (EPHC, 2010)
DoD	Department of Defence
DRO	Desired Regional Outcome
DRP	Decommissioning and Rehabilitation Plan
DSD	Department of State Development
DNV GL	DNV GL – Energy Renewables Advisory (formerly Garrad Hassan)
EC	Ecological Community
EDM	Electronic Distance Measuring
EIS	Environmental Impact Statement

Electricity Act	*Electricity Act 1994*
EMI	Electromagnetic Interference
EMP	Environmental Management Plan
EMR	Environmental Management Register
EMR	Electromagnetic Radiation
EP Act	*Environmental Protection Act 1994* (Qld)
EP Regulation	*Environmental Protection Regulation 2008*
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
EPM	Exploration Permit (Mineral)
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
ESA	Equivalent Standard Axles
ESRA	En Route Supplement Australia
ERM	Environmental Resources Management Australia Pty Ltd
ESCP	Erosion and Sediment Control Plan
EV	Environmental Values
EVNT	Endangered, Vulnerable or Near Threatened
FDI	Fire Danger Index
FFDI	Forest Fire Danger Index
FIFO	Fly In Fly Out
Fisheries Act	*Fisheries Act 1994*
FM	Frequency Modulation
FPC	Foliage Projective Cover
FWD	Fire Warden District
GAB	Great Artesian Basin
GARID	Guidelines for Assessment of Road Impacts of Development
GDA	Geocentric Datum of Australia
GDE	Groundwater Dependent Ecosystems
GFA	Gliding Federation of Australia
GH	Garrad Hassan Pacific Pty Ltd
GPS	Geographic Positioning System
GQAL	Good Quality Agricultural Land

GSV	Ground Surface Visibility
GWh	Gigawatt Hours
ha	Hectare
HF	High Frequency
HML	Higher Mass Limit
HSE	Health, Safety and Environment
HV	Heavy Vehicle
HVR	High Value Regrowth
IAR	Initial Assessment Report
IAS	Initial Advice Statement
IATA	International Air Transport Association
IDAS	Integrated Development Assessment System
IEC	International Electrotechnical Commission
IECA	International Erosion Control Association
IFAO	Interim Floodplain Assessment Overlay
IFR	Instrumental Flight Route
IKRAP	Interim Koala Referral Advice for Proponents
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
IPP	Indigenous Participation Plan
KRA	Key Resource Area
kL	Kilolitre
km	Kilometres
kV	Kilovolt
LC	Least Concern
LGA	Local Government Areas
LGC	Large-scale Generation Certificate
LIPP	Local Industry Participation Plan
LNG	Liquefied Natural Gas
LP Act	*Land Protection (Pest and Stock Route Management) Act 2002* (Qld)
LPSI	Land Planning and Spatial Information (RAAF)
LSALT	Lowest Safe Altitude
LRET	Large-scale Renewable Energy Target
LVIA	Landscape and Visual Impact Assessment
m	Metres
mm	Millimetres
m/s	metres per second

MHP	Materials Handling Plan
MNES	Matters of National Environmental Significance
MoS	Manual of Standards
MW	Megawatt
NATA	National Association of Testing Authorities
NBN	National Broadband Network
NBN Co	NBN Co Limited
NC Act	*Nature Conservation Act 1992* (Qld)
NCWR	Nature Conservation (Wildlife) Regulation 2006
NGER Act	*National Greenhouse and Energy Reporting Act 2007*
NEM	National Electricity Market
NEPM	National Environment Protection Measures
NIMBY	Not In My Back Yard
NOTAM	Notices to Airmen
NO_x	Mono-nitrogen oxides
NPI	National Pollutant Inventory
NSESD	National Strategy on Ecological Sustainable Development
NT	Near Threatened
NT Act	*Native Title Act 1993* (Cth)
OC	Of Concern
OCE	Office of Clean Energy
OD	Over-Dimensioned
OLS	Obstacle Limitation Surface
PHA	Preliminary Hazard Report
$PM_{2.5}$	Particulates of 2.5 microns fraction
PM_{10}	Particulates of 10 microns fraction
PMF	Probable Maximum Flood
PMST	Protected Matters Search Tool
PPE	Personal Protective Equipment
PRDs	Prohibited, Restricted and Dangerous areas
PSP	Planning Scheme Policy
PSR	Primary Surveillance Radar
QFES	Queensland Fire and Emergency Service
QH Act	*Queensland Heritage Act 1992* (Qld)
QHR	Queensland Heritage Register
OLS	Obstacle Limitation Surfaces
QPWS	Queensland Parks and Wildlife Service

QR	Queensland Rail
QRA	Queensland Reconstruction Authority
RAR	Revised Assessment Report
RAAF	Royal Australian Air Force
RCR	Regional Council Roads
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
RET	Renewable Energy Target
RFID	Radio-Frequency Identification
RIA	Road Impact Assessment
RNE	Register of the National Estate
ROC	Record of Contact
ROP	Resource Operations Plan
RUMP	Road Use Management Plan
SARA	State Assessment and Referral Agency
SAT	Spot Assessment Technique
SBRC	South Burnett Regional Council
SBRPF	(Draft) Surat Basin Regional Planning Framework
SCR	State-Controlled Road
SDAP	State Development Assessment Provisions
SDPWO Act	*State Development and Public Works Organisation Act 1971* (Qld)
SDS	Safety Data Sheets
SEVT	Semi-evergreen Vine Thicket
SIA	Significant Impact Analysis
SLA	Statistical Local Area
SLR	Single Lens Reflex
SMP	Species Management Plan
SP Act	*Sustainable Planning Act 2009* (Qld)
SPP	State Planning Policy
SP Regulation	*Sustainable Planning Regulation 2009* (Qld)
SPRP	Spill Prevention and Response Plan
SRN	Stock Route Network
SRTM	Shuttle Radar Topographic Mission
SSB	Single Side Band
SSR	Secondary Surveillance Radar
T	Tonnes
TEC	Threatened Ecological Communities

the Project	Coopers Gap Wind Farm
the Project Site	The land in which the Project will be located
the Study Area	The land available for development, consisting of participating landowners
TI Act	*Transport Infrastructure Act 1994* (Qld)
TJ	Terajoules
TMP	Traffic Management Plan
TMR	Department of Transport and Main Roads
TSBE	Toowoomba and Surat Basin Enterprise
TV	Television
UHF	Ultra High Frequency
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UXO	Unexploded Ordnance
V	Vulnerable
VHF	Very High Frequency
VOC	Volatile organic compounds
VFR	Visual Flight Route
VM Act	*Vegetation Management Act 1999* (Qld)
WAC	World Aeronautical Chart
Water Act	*Water Act 2000*
Water Regulation	Water Regulation 2002
WBB	Wide Bay Burnett
WBBRP	(Draft) Wide Bay Burnett Regional Plan
WDRC	Western Downs Regional Council
WHS Act	*Work Health and Safety Act 2011* (Qld)
WROLA Act	*Water Reform and Other Legislation Amendment Act 2014* (Qld)
WRP	Water Resource Plan
WRP Burnett	Water Resource (Burnett Basin) Plan 2014
WRP Condamine and Balonne	Water Resource (Condamine and Balonne) Plan 2004
WRP Great Artesian Basin	Water Resource (Great Artesian Basin) Plan 2006
ZTV	Zone of Theoretical Visibility