Wandoan Coal Project
Southern coal seam methane water supply pipeline
Terrestrial ecology impact assessment

November, 2008

Wandoan Joint Venture

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Acronyms

Acronym	Definition
CHPP	Coal Handling and Preparation Plant
CoG	Coordinator-General
DEWHA	The Department of the Environment, Water, Heritage and the Arts
DME	Queensland Department of Mines and Energy
EPP	Environmental Protection Policy
EIS	Environmental Impact Statement
EP Act	Queensland Environmental Protection Act 1994
EPA	Environmental Protection Agency, a department of the Queensland Government.
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EA	Environmental Authority as issued under the EP Act.
EP Act	Environmental Protection Act 1994
GAB	Great Artesian Basin
IDAS	Integrated Development Assessment System
IP Act	Queensland Integrated Planning Act 1997
KCP	Queensland Nature Conservation (Koala) Conservation Plan 2006
LP Act	Queensland *Land Protection (Pest and Stock Route Management) Act 2002*
MDL	mineral development licence
ML	Million litres
MLA	Mining lease application
MNES	Matters of National Environmental Significance
MR Act	Queensland *Mineral Resources Act 1989*
Mtpa	million tonnes per annum
NC Act	Queensland *Nature Conservation Act 1992*
NC Regulation	Queensland Nature Conservation (Wildlife) Regulation 2006
NRL	Northern Range Limit
NRW	Queensland Department of Natural Resources and Water
QPWS	Queensland Parks and Wildlife Service
RE	Regional Ecosystem
ROM coal	Run of Mine coal
SDPWO Act	Queensland *State Development and Public Works Organisation Act 1971*
SRL	Southern Range Limit
TOR	Terms of Reference
VM Act	Queensland *Vegetation Management Act 1999*
WJV	Wandoan Joint Venture
WRL	Western Range Limit

Executive summary

The Wandoan Coal Project comprises the development of thermal coal resources immediately west of Wandoan, a small rural town situated approximately 350 km northwest of Brisbane and 60 km south of Taroom. The coal reserves for this Project exist within three mining lease applications (MLA areas 50229, 50230 and 50231) and will be developed as an open cut mine with related infrastructure. The Project is being developed by the Wandoan Joint Venture (WJV), a partnership which includes Xstrata Coal Queensland Pty Ltd (XCQ), ICRA RPW Pty Ltd and Sumisho Coal Australia Pty Ltd. PB, together with Xenith Consulting Pty Ltd, and Sedgman Limited, have been commissioned by the WJV to undertake the planning and prefeasibility design and assessment of the coal mine and associated works.

Project description

Under current plans, coal mined from the MLA areas is to be processed (washed) on site, requiring a constant and reliable supply of water. With coal production estimated at 30 million tonnes per annum (Mt/a), an annual raw water demand is anticipated to peak at 9,100 megalitres (ML) (with demand for water increasing to 11,400 ML/a, should mine production increase to 40 Mt/a). In order to meet this demand, water will need to be sourced from outside the MLA areas.

A number of options are currently being considered for the supply of raw water to the Project for mine operations. One of these options is the use of by-product water from coal seam methane (CSM) extraction from the Berwyndale South CSM fields, south of Miles. For this to occur, a new pipeline is needed to transfer CSM by-product water from the Condamine Power Station (where it is delivered for use from the Berwyndale South CSM fields) north to the Wandoan Coal Project site. The construction of this water pipeline is the subject of Volume 2 of Environmental Impact Statement (EIS) and this terrestrial ecology impact assessment.

Environmental assessment

On 21 December 2007, the Coordinator-General (CoG) declared under section 26 of the *State Development and Public Works Organisation Act 1971 Act* (SDPWO Act) that the Wandoan Coal Project was a significant project for which an Environmental Impact Statement (EIS) is required. The Wandoan Coal Project was also referred Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) under four inter-related referrals:

- Wandoan Coal Project Mine and Infrastructure (referral reference number 2008/4284)
- Wandoan Coal Project — Coal Seam Methane Water Supply South (referral reference number 2008/4287, the subject of this assessment)
- Wandoan Coal Project Coal Seam Methane Water Supply West (referral reference number 2008/4283)
- Wandoan Coal Project Glebe Weir Raising (referral reference number 2008/4285).

The DEWHA decided that the actions listed above are controlled actions as they are likely to have a significant impact on listed threatened species and ecological communities and listed migratory species which are Matters of National Environmental Significance under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). As such, the DEWHA confirmed that as per section 75 of the EPBC Act, the Project will require assessment and approval by the Minster for the Environment, Heritage and the Arts (Commonwealth) before it can proceed.

The Project will be assessed through the Queensland Environmental Impact Statement Process. Under the bilateral agreement between the Australian Government and the State of Queensland relating to Environmental Assessment (Department of the Environment and Heritage 2004), this EIS will also be used for the Commonwealth assessment by the DEWHA.

Due to the scale of the project, the Wandoan Coal Project Mine and Infrastructure and the water supply options are being assessed separately. The Coal Seam Methane Water Supply South is the subject of Volume 2 of the EIS.

Terrestrial ecological impact assessment

In preparation of the EIS, PB have undertaken technical studies of terrestrial ecology to address the requirements of the Terms of Reference and other relevant International, Commonwealth and State policies relating to biodiversity. Aquatic Ecology has been assessed separately.

The approach to the terrestrial ecological impact assessment involved a desk-based assessment of literature and relevant databases followed by field surveys. The literature and database review was used to compile a list of conservation significant species for consideration in the EIS based on known records or predicted habitat and identify other ecologically sensitive areas in the study area and surrounds.

Field surveys were undertaken in the Study Area to verify the presence of, and provide site specific descriptions, of vegetation communities, species or their habitats in the Study Area in August 2008 (late winter). Flora and fauna surveys of the northern section of the Study Area within the MLA areas were undertaken in Spring 2007 and Autumn 2008 for the Terrestrial ecology impact assessment of the MLA and infrastructure and are the subject of the Terrestrial ecology impact assessment supporting Volume 1 of the EIS. As such, the pipeline corridor in the MLA areas was not surveyed in August 2008. The assessment of impacts to terrestrial ecology includes remnant and non-remnant vegetation and species of plant and animal identified, or considered likely to occur, within the habitats along the pipeline corridor within the MLA areas.

Survey of terrestrial flora involved verification of Regional Ecosystem (RE) type and remnant status as mapped by the Environmental Protection Agency, mapping and description of other regrowth vegetation (non-remnant vegetation) and compilation of a comprehensive list of species of plant that occur in the study area. The survey method for terrestrial flora was based on the approach outlined in the Queensland Herbarium's *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. The flora survey method also used techniques used by the Queensland Herbarium's for compilation of species lists for the CORVEG database.

Survey of terrestrial fauna aimed to compile a comprehensive list of species of animals that occur in the study area and their habitats. The surveys involved a range of survey methods providing a census of terrestrial vertebrate fauna. These methods included trapping, ultrasonic bat detection, spotlighting, call broadcast and active searches for herpetofauna, birds and other incidental evidence of fauna. In addition to these census techniques, fauna habitat assessments were also done to provide a basis for the assessment of likelihood of rare and threatened species to occur in the Study Area and surrounds.

Based on the findings of the desk-based assessment and field surveys, an assessment of the significance of the Project to threatened communities, threatened species and their habitats was undertaken. These impact assessments also consider the range of impact mitigation measures proposed to avoid, reduce and mitigate environmental impacts. Assessment of the significance of impacts was completed for:

- threatened species that were either recorded in the study area or considered likely to occur
- migratory species for which the study area is at their distributional range limit
- threatened ecological communities and endangered REs.

Key findings

The proposed southern CSM water pipeline corridor traverses a range of land uses and areas of different biodiversity value. Country in the Study Area north of Giligulgul has been largely cleared for grazing and dryland agriculture. Between Giligulgul and Miles however, the Study Area traverses the Great Dividing Range. Soils and geology associated with the Great Dividing Range are less arable and are dominated by shallow rocky or deeply weather soils. As such, country through this section of the Study Area has not been subject to as extensive broad scale and routine clearing as in the north. Vegetation associated with the Great Dividing Range forms part of a State Wildlife Corridor and also includes areas of Essential Habitat mapped under the Biodiversity Planning Assessment framework. Vegetation associated with the Great Dividing Range is also referred to as the Gurulmundi Special Area under the Biodiversity Planning Assessment which comprises Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway. The Gurulmundi Special Area is known to provide habitat for numerous Rate and Threatened species.

In total, fourteen Regional Ecosystems were field verified in the Study Area including two listed as Of Concern and one listed as Endangered under the *Vegetation Management Act 1999*. One of these Regional Ecosystems, RE 11.9.5, is also consistent with the Brigalow (*Acacia harpophylla* dominant and co-dominant) Endangered ecological community listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Additional area of Brigalow regrowth between Giligulgul and Fosters Road may also be consistent with the Brigalow (*Acacia harpophylla* dominant and co-dominant) Endangered ecological community; however these properties were not accessed during the winter field surveys.

The field surveys of the Study Area identified 351 species of plant (322 native species) and 160 species of vertebrate fauna (148 native species) in the Study Area. This included three Rare or Threatened species of animal:

- Brigalow Scaly-foot (*Paradelma orientalis*)
- Little Pied Bat (*Chalinolobus picatus*)
- Golden-tailed Gecko (*Diplodactylus taenicauda* syn. *Strophurus taenicauda*).

No Threatened species of plant were recorded. Surveys were not however done in the optimum period to identify many of the Threatened species of plant that may occur in the Study Area. In addition to the Threatened species recorded, 21 Rare or Threatened species of plant and 15 Rare or Threatened species of animal were considered likely to occur in the Study Area and surrounds. Additional targeted seasonal surveys will be done to determine the location, size and extent of Threatened species likely to be affected by the proposed pipeline.

Potential impacts and mitigation measures

The proposed pipeline has potential to result in a range of direct and indirect impacts to Threatened ecological communities, species, their habitats, and other biodiversity that occur in the Study Area and surrounds. Impacts to biodiversity have been avoided where possible by following existing road or power line easements to avoid remnant vegetation as far as possible and thereby minimise the extent of vegetation clearing required. Nonetheless, the Project will still result in a range of direct and indirect

impacts to Threatened ecological communities, species, their habitats, and other biodiversity that occur in the Study Area and surrounds. These include:

- loss of vegetation and habitats (55.8 ha of remnant vegetation and 30.0 ha of non-remnant vegetation)
- habitat fragmentation and loss of connectivity
- direct mortality
- increase in weeds and pest species
- increased noise and dust during construction.

In order to avoid, minimise and mitigate these impacts, detailed mitigation measures will be developed and presented in a flora and fauna management plan relating to the construction and operation of the pipeline. The plan could include, where relevant, procedures for:

- detailed design of mitigation measures such as fencing
- staff and contractor inductions to address the location of sensitive biodiversity and their role and responsibilities to the protection and/or minimisation of impacts to all native biodiversity
- pre-clearing surveys and fauna salvage/translocation
- vegetation clearing protocols
- rehabilitation and revegetation of adjoining habitat
- weed control
- pest management
- rehabilitation protocols
- a flora and fauna monitoring program for the Project to better understand and manage impacts and rehabilitation actions to flora and fauna.

The plan will include clear objectives and actions for the Project including:

- minimise human interferences to flora and fauna
- minimise vegetation clearing/disturbance
- minimise impact to Threatened species and communities
- minimise impacts to aquatic habitats and species
- ongoing monitoring of impacts on flora and fauna.

In addition, where there is residual loss or degradation of vegetation and habitat after detailed design and determination of mitigation measures, compensation in the form of compensatory habitat, land rehabilitation and/or contribution to research should be employed (i.e. offsets). As such, a Green Offsets Package developed that will address the residual impacts associated with construction and operation of the southern CSM water supply pipeline. The Green Offsets Package will be developed in consultation with the Environmental Protection Agency (EPA) and the DEWHA giving consideration to relevant State and Commonwealth policies relating to offsets (outlined below):

- Queensland Government Environmental Offsets Policy
- State policy for vegetation management offsetting
- Environmental offsets for impact on Matters of National Environmental Significance.

Conclusions of terrestrial impact assessment

The southern CSM water supply pipeline is located in a landscape that is includes a range of high biodiversity values, particularly between Giligulgul and Miles where the Study Area traverses the Great Dividing Range that has not been subject to as extensive broad scale and routine clearing. Vegetation associated with the Great Dividing Range forms part of a State Wildlife Corridor and also includes areas of Essential Habitat mapped under the Biodiversity Planning Assessment framework. Vegetation associated with the Great Dividing Range is also referred to as the Gurulmundi Special Area which is known to provide habitat for numerous Rate and Threatened species.

The southern CSM water supply pipeline is located in a landscape that is includes a range of high biodiversity values, particularly between Giligulgul and Miles where the Study Area traverses the Great Dividing Range that has not been subject to as extensive broad scale and routine clearing. Vegetation associated with the Great Dividing Range forms part of a State Wildlife Corridor and also includes areas of Essential Habitat mapped under the Biodiversity Planning Assessment framework. Vegetation associated with the Great Dividing Range is also referred to as the Gurulmundi Special Area which is known to provide habitat for numerous Rate and Threatened species.

Impacts to biodiversity have been avoided where possible by following existing road corridor or power line easements and thereby minimise the extent of vegetation clearing required. Nonetheless, the Project will result loss 85.8 ha of vegetation and habitats (55.8 ha of remnant vegetation and 30.0 ha of non-remnant vegetation).

The impact assessments concluded that the Project was unlikely to result in a significant impact to any threatened species of plant or animal, RE or ecological community. However, further seasonal should be undertaken in accordance with the project's Terms of Reference and the impact assessments reviewed in based on the findings of these surveys.

The impacts of the Project will also require detailed mitigation measures to ensure that all possible impacts are avoided, reduced or mitigated. In addition, where there is residual loss or degradation of vegetation and habitat after mine plan and infrastructure detailed design, and determination of mitigation measures, compensation in the form of compensatory habitat, land rehabilitation and/or contribution to research will be employed (i.e. offsets). A Green Offsets Package for the Project will be developed in consultation with EPA and DEWHA giving consideration to relevant State and Commonwealth policies relating to offsets.

1. Introduction

1.1 Background

The Wandoan Coal Project (hitherto referred to as 'the Project') comprises the development of thermal coal resources immediately west of Wandoan, a rural town situated approximately 350 km northwest of Brisbane and 60 km south of Taroom (see Figure 1-1). The coal resources for this Project exist within three mining lease applications (MLA areas 50229, 50230 and 50231) which cover a combined area of approximately 32,000 ha (see Figure 1-2). The coal resources in this area will be developed as an open cut mine with related infrastructure (described further in Section 1.3).

The Project is being developed by the Wandoan Joint Venture (WJV), a partnership which includes Xstrata Coal Queensland Pty Ltd (XCQ), ICRA RPW Pty Ltd and Sumisho Coal Australia Pty Ltd.

PB, together with Xenith Consulting Pty Ltd, and Sedgman Limited, have been commissioned by the WJV to undertake the planning and prefeasibility design and assessment of the coal mine and associated works (preparation of the Volume 4 of the EIS associated with the Glebe Weir Raising and Pipeline has been conducted by MWH on behalf of Sunwater).

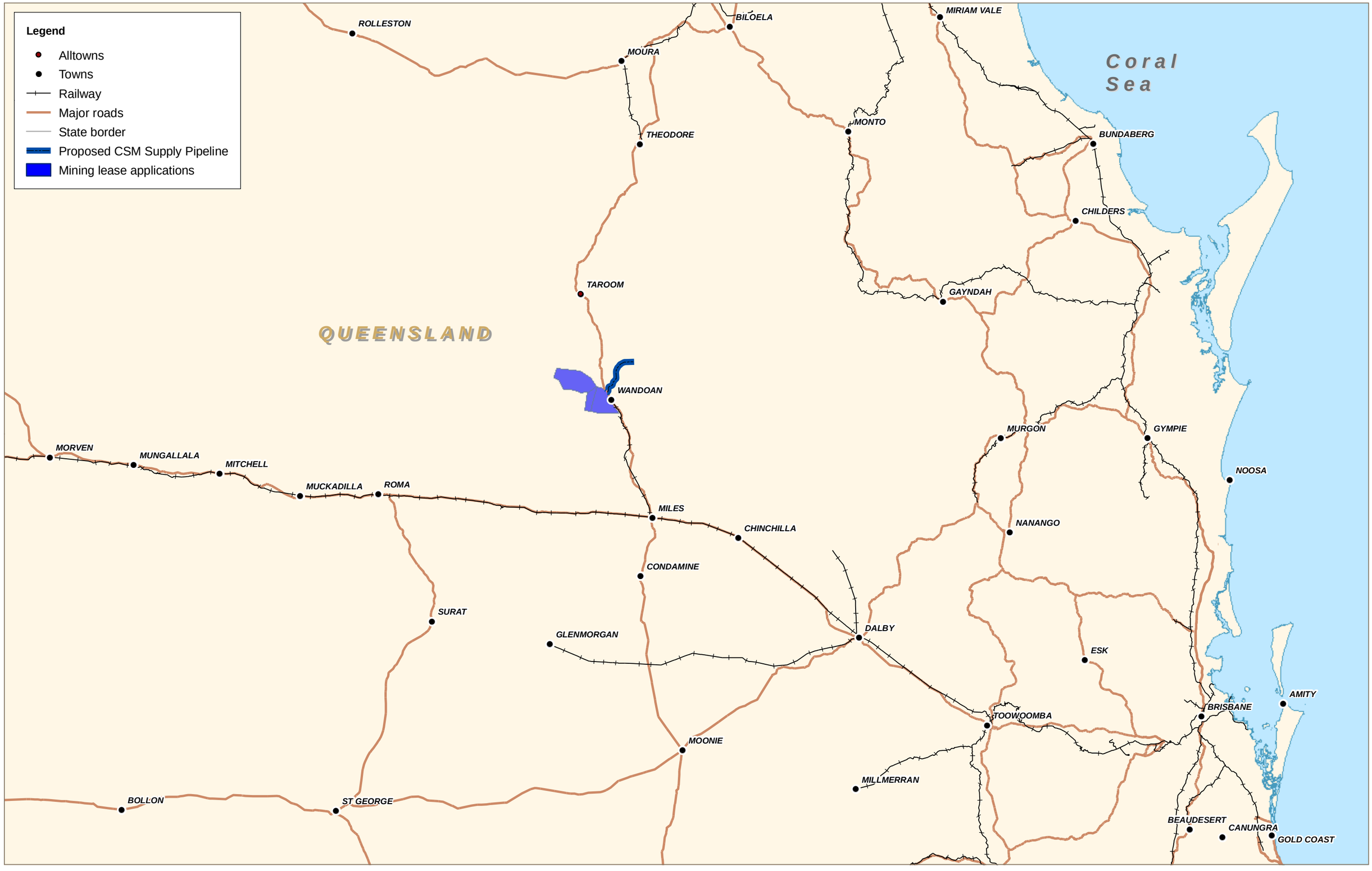
In preparation of the Environmental Impact Statement (EIS), PB have undertaken technical studies of terrestrial ecology with the assistance of Lewis Ecological Services and Place Environmental. Aquatic Ecology has been assessed separately by frc environmental.

1.2 Context and scope of this assessment

1.2.1 Structure of the Environmental Impact Assessment and the ecological assessments

The Project was declared a significant project requiring an EIS by the Coordinator-General in December 2007 under the *State Development and Public Works Organisation Act 1971* (SDPWO Act). A Terms of Reference (ToR) for the Project was prepared in accordance with S.29 and S.30 of the SDPWO Act to identify those matters that should be addressed in the EIS. The ToR is based on the initial outline of the proposed Project given in the Proponent's Initial Advice Statement dated December 2007.

On 21 July 2008, the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) decided that the Project was a controlled actions as they are likely to have a significant impact on listed threatened species and ecological communities and which are Matters of National Environmental Significance under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). As such, the DEWHA confirmed that as per section 75 of the EPBC Act, the Project will require assessment and approval by the Minster for the Environment, Heritage and the Arts (Commonwealth) before it can proceed. A summary of Matters of National Environmental Significance and the likely impacts of the Project on them are presented in Attachment J of this Technical Report.



J:\A442-ENG\PROJ\2133006C__Wandoan_prefea\10_GIS\Projects\Env\Technical Report\Figure 1-1 Project Location.mxd

Source: Roads, QLD State Digital Road Network (2004); Towns, Coastline , boundaries, 1:250K Topo, Geoscience Australia (2006)

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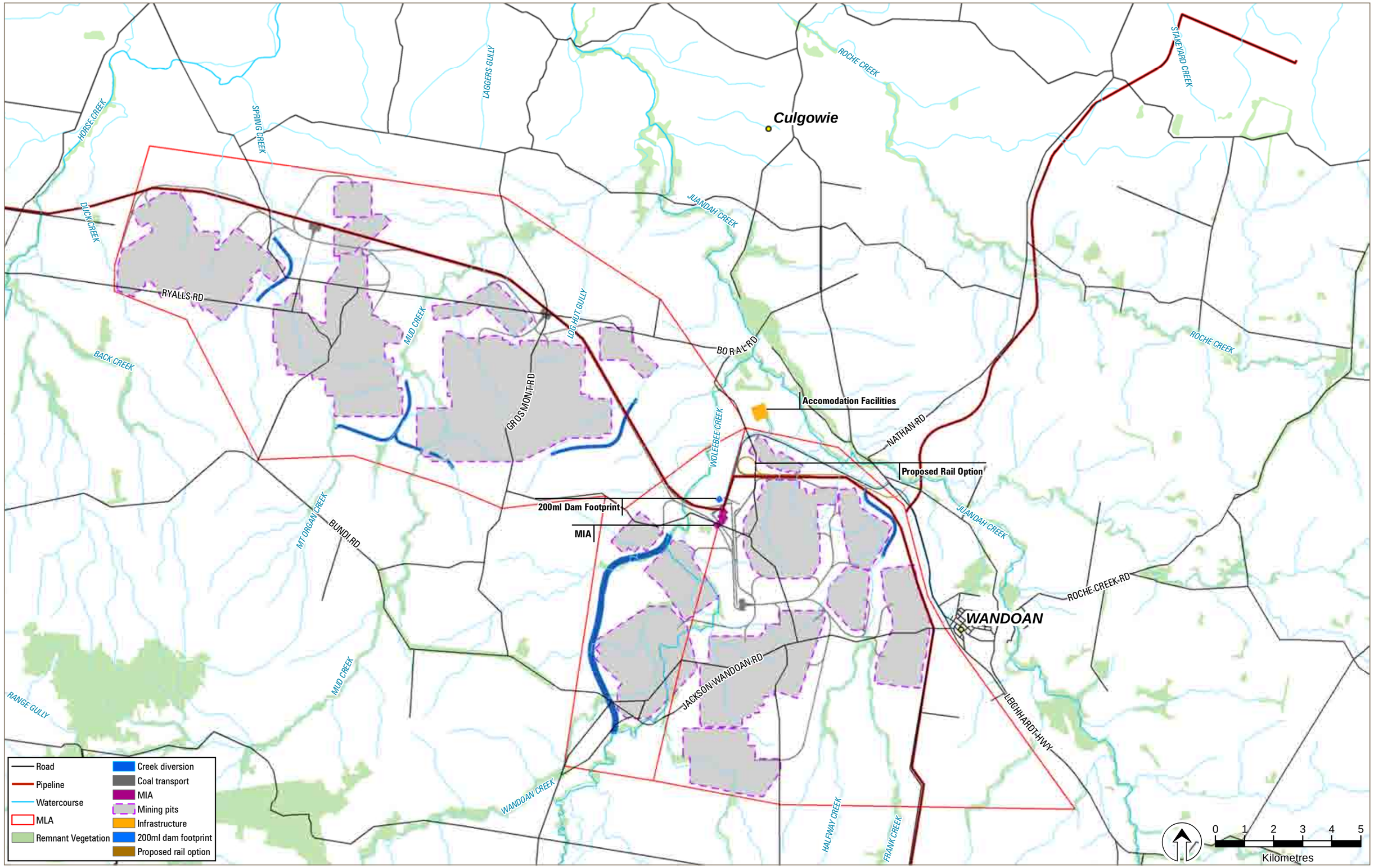
0 25 50 75 100 125
Kilometers

Figure 1-1
Project Location



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Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

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Figure 1-2
Study Area

Given the scale of the Project, the EIS associated with the Wandoan Coal Project has been divided into four inter-related Volumes. A terrestrial ecological impact assessment has been prepared to support each Volume of the EIS.

Volume 1 – MLA area and surrounds: assessment of lands and infrastructure associated with MLA areas, the mine accommodation facilities, Wandoan township, Great Artesian Basin (GAB) construction and potable water extraction, and the gas supply pipeline from the lateral Peat-Scotia gas pipeline. Volume 1 is the overarching assessment document to which Volumes 2, 3 and 4 contribute.

Volume 2 – Southern CSM water supply pipeline: assessment of a pipeline option to supply Coal Seam Methane (CSM) water from the Condamine Power Station approximately 101 km south of the MLA areas. This is the subject of this assessment.

Volume 3 – Western CSM water supply pipeline: assessment of a pipeline option to supply CSM water from the Origin Energy Spring Gully Reverse Osmosis Plant approximately 91 km west of the MLA areas.

Volume 4 - Glebe Weir Raising and Pipeline: provides impact assessment of the Glebe Weir Raising and Pipeline water supply option, located approximately 80 km north-east of the Project on the Dawson River (the preparation of the environmental impact assessment associated with the Glebe Weir Raising and Pipeline has been conducted by MWH on behalf of Sunwater).

An Integrated EIS Summary collates and summarises all four volumes in a separate stand-alone document, providing an overarching view of the Project.

Terrestrial ecological impact assessments

Separate terrestrial ecological impact assessments have been prepared for each Volume of the EIS. These assessments provide a description of the environmental values of the Project area, and identify potential impacts and mitigation measures for sensitive environmental areas, terrestrial flora and terrestrial fauna.

The specific objectives of the terrestrial ecological assessments were as follows:

- to identify and map areas that are environmentally sensitive in proximity to the Project including:
  - Matter of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A summary of Matters of National Environmental Significance and the likely impacts of the proposed pipeline on them are presented in Attachment J of this Technical Report
  - important habitats of species listed under the *Nature Conservation Act 1992* (NC Act) and/or the EPBC Act as Endangered, Vulnerable or Rare
  - regional ecosystems (REs) recognised by the Environmental Protection Agency (EPA) as 'Endangered' or 'Of concern' or 'Not of concern' but where permits are no longer granted due to being at threshold levels, and/or ecosystems listed as 'Critically Endangered', 'Endangered' or 'Vulnerable' under the EPBC Act

- ecosystems that provide important ecological functions, such as riparian vegetation, important buffers to protected areas, drought or fire refugia, or important corridors linking areas of habitat
- protected areas which have been proclaimed under the NC Act or are under consideration for proclamation.

- to describe and map terrestrial flora in proximity to the Project including:
  - location and extent of vegetation types including recognised RE type descriptions and any areas of national, state or regional significance
  - location of vegetation types of conservation significance
  - vegetation map unit descriptions, including a list of species present
  - description of REs, their value as habitat for fauna and for conservation of specific rare floral and faunal assemblages or community types
  - the current extent (bioregional and catchment) of protected vegetation types of conservation significance within the protected areas (e.g. national parks, conservation parks, resource reserves, nature refuges etc)
  - any plant communities of cultural, commercial or recreational significance
  - the distribution and abundance of significant exotic and weed species.
- to describe and map terrestrial fauna present or likely to be present in the area including:
  - species diversity (i.e. a species list) and indicative abundance of animals, including amphibians, birds, reptiles, mammals (including bats)
  - any species that are poorly known but suspected of being rare or potentially threatened
  - habitat requirements and sensitivity to change; including movement corridors and barriers to movement
  - the existence of feral or exotic animals, including maps of major pest infestations
  - existence of any rare, threatened or otherwise noteworthy species/communities in the Study Area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, and current level of protection (e.g. any requirements of protected area management plans)
  - use of the area by Migratory and nomadic birds, in particular areas for breeding or significant congregations.
- to provide an assessment of the potential impact on terrestrial flora, fauna and environmentally sensitive areas. This assessment outlines:
  - the significance of impacts at a local, catchment, bioregional, state or national levels
  - direct (or short term) and indirect (or long-term) impacts due to loss of range/habitat, food supply, nest sites, breeding/recruiting potential or movement corridors
  - cumulative effects of direct and indirect impacts
  - impacts on rare and threatened or otherwise noteworthy species
  - threatening processes leading to progressive loss

  - identification of the conservation importance of identified populations at the regional, state and national levels.

- to outline measures to mitigate the impacts of the proposed pipeline on terrestrial flora, fauna and environmentally sensitive areas. These measures include:
  - methods to ensure rapid rehabilitation of disturbed areas following construction, including the species chosen for revegetation which should be consistent with the surrounding associations. Details of any post construction monitoring programs and what benchmarks would be used for review of monitoring should be included
  - methods of minimising the potential for the introduction and/or spread of weeds or plant disease
  - measures to minimise wildlife capture and mortality during construction and operation
  - methodologies to avoid injuries to native fauna as a result of the proposed pipeline's construction and operational works
  - methods for minimising the introduction of feral animals, and other exotic fauna such as declared pest ant species (fire ants and yellow crazy ants).

1.3 Southern CSM water supply pipeline details and Study Area

For the purpose of this assessment the following definitions apply:

- **footprint:** the extent of direct impacts of the Project. This was taken to be the 20 m corridor required for construction of the Project
- **study area:** the study site and any additional areas that could potentially be affected by the proposal either directly or indirectly, such as ancillary construction areas. In this case it is taken to be a 100 m corridor along the southern CSM water supply pipeline from the Condamine Power Station east of Miles to the Wandoan Coal Project MLA areas (see Figure 1-2)
- **region:** a bioregion defined in a national system of bioregionalisation. For this study, this is the Brigalow Belt bioregion as defined in the Interim Biogeographic Regionalisation for Australia (Thackway & Cresswell 1995).

Under current plans, coal mined from the MLA areas is to be processed (washed) on site, requiring a constant and reliable supply of water. With coal production estimated at 30 million tonnes per annum (Mt/a), an annual raw water demand is anticipated to peak at 9,100 megalitres (ML) (with demand for water increasing to 11,400 ML/a, should mine production increase to 40 Mt/a). In order to meet this demand, water will need to be sourced from outside the MLA areas.

A number of options are currently being considered for the supply of raw water to the Project for mine operations. One of these options is the use of by-product water from coal seam methane (CSM) extraction from the Berwyndale South CSM fields, south of Miles. For this to occur, a new pipeline is needed to transfer CSM by-product water from the Condamine Power Station (where it is delivered for use from the Berwyndale South CSM fields) north to the Wandoan Coal Project site.

The proposed southern CSM water supply pipeline corridor lies primarily within existing road reserves or power line easement to minimise the extent of vegetation clearing required. From the Condamine Power Station this alignment follows:

- an existing high voltage transmission line easement to the east of Miles to Gearys Road (approximately 12 km).
- the northern side of the Gearys Road (within the road reserve) north of Miles (approximately 10 km) which consists of formed and unformed road
- the eastern side of the Leichhardt Highway road reserve to approximately 3 km south of Gurulmundi (approximately 23 km)
- the eastern side of the Baileys Road road reserve to Giligulgul (approximately 13 km)
- across freehold land for approximately 16 km to Fosters Road (Lot 28 CP885313, Lot 44 FT988, Lot 36 FT213, Lot 4 FT526 and Lot 39 FT1000)
- the northern side of the Fosters Road road reserve for approximately 3 km
- the eastern side for Peaks Road into the MLA areas (approximately 12 km)
- a further 10 km within the MLA areas to the pipeline endpoint east of Woleebee Creek.

Measuring 101 km in length, the proposed southern CSM water supply pipeline will generally be located underground and constructed using a section trench and backfill method. Construction of the pipeline will necessitate a 20 m wide corridor to accommodate the pipeline trench, and vehicle and plant access.

Following the existing road reserves and powerline easements has been chosen to avoid and minimise impact to flora and fauna, however vegetation remaining in the 20 m wide corridor will be cleared.

2. Relevant legislation

This section outlines the State and Commonwealth legislation and statutory framework relevant to this Terrestrial ecology impact assessment with specific reference application of state legislation, policy, permits and licenses relating to the protection of biodiversity. Refer to Chapter 3 of Volume 2 for further details of the key approvals applying to the proposed pipeline.

2.1 State assessment framework

The Wandoan Coal Project will require assessment and approval under a range of State planning legislation including the *State Development and Public Works Organisation Act 1971* (SDPWO Act), the *Mineral Resources Act 1989* (MR Act), the *Environmental Protection Act 1994* (EP Act) and the *Integrated Planning Act 1997* (IP Act). The application of these Acts to various components of the Wandoan Coal Project will in turn determine the application of state legislation, policy, permits and licenses relating to the protection of biodiversity as outlined below.

2.1.1 *State Development and Public Works Organisation Act 1971 Act*

The SDPWO Act provides for 'state planning and development through a coordinated system of public works organisation, for environmental coordination and for related purposes' to facilitate large projects in Queensland (p. 11, SDPWO Act). On 21 December 2007, the Coordinator-General (CG) declared under section 26 of the SDPWO Act that the Project was a significant project for which an EIS is required. The process followed for this EIS is specified by the SDPWO Act. This process is as follows:

- public notification of the EIS by the Wandoan Joint Venture (section 33 of the SDPWO Act)
- all properly made submissions about the EIS and any other material the CG considers relevant to the Project, will be reviewed by the CG (section 35(1) of the SDPWO Act)
- assuming that the CG requires additional information about the EIS, then the WJV will prepare a Supplementary EIS (section 35(2) of the SDPWO Act)
- the CG will evaluate the EIS and Supplementary EIS, taking into consideration the matters raised in (section 35(4) of the SDPWO Act)
- the CG's report is then provided to the Commonwealth Minister for DEWHA and the approval process under the EPBC Act then commences.

In reference to the above, the CG's Report is applied to approvals and requirements under various Acts, and may state conditions that would be assessed using the Integrated Development Assessment System under the IP Act.

2.1.2 *Mineral Resources Act 1989*

The *Mineral Resources Act 1989* (MR Act) provides for the 'assessment, development and utilisation of mineral resources to the maximum extent practicable consistent with sound economic and land use management' (p. 31, MR Act).

The MR Act does not apply to the assessment or approval of the southern CSM water supply water pipeline.

2.1.3 *Integrated Planning Act 1997*

The IP Act is Queensland's principle planning legislation and coordinates planning at the local, regional and State levels. The IP Act is applicable to the Project where development is 'assessable development' under schedule 8 of the IP Act (to the extent it is not otherwise exempt or self-assessable under the Planning Scheme for Taroom Shire, 2006). Such development applications will be assessed using the Integrated Development Assessment System (IDAS) process.

An aspect of the Project will require an approval under the IP Act if it involves 'development' (as defined under section 1.3.2 and section 1.3.5 of the IPA). However, the Project has been declared a significant project under the SDPWO Act and as such the environmental impact assessment will be controlled through the SDPWO Act EIS process.

2.1.4 *Environmental Protection Act 1994*

The *Environmental Protection Act 1994* (EP Act) provides the key legislative framework for environmental management and protection in Queensland. The EP Act utilises a number of mechanisms to achieve its objectives including the *Environmental Protection Regulation 1998,* Environmental Protection Policies (EPPs) and establishing a general environmental duty.

2.1.5 *Nature Conservation Act 1992*

The *Nature Conservation Act 1992* (NC Act) provides for the conservation of nature through protection of all native plants, birds, reptiles, mammals and amphibians in Queensland, along with a limited range of invertebrates (some butterflies, spiders and scorpions), freshwater fish and the grey nurse shark (other aquatic species are protected by the Queensland Department of Primary Industries and Fisheries and the Great Barrier Reef Marine Park Authority). The NC Act is based on principles aimed at conserving biological diversity, ecologically sustainable use of wildlife, ecologically sustainable development and international criteria developed by the World Conservation Union (International Union for the Conservation of Nature 2001) for establishing and managing protected areas. It includes the *Nature Conservation (Wildlife) Regulation 2006* (NC Regulation), which lists plants and animals 'Extinct in the Wild', 'Endangered', 'Vulnerable, 'Rare', 'Near Threatened' and 'Least Concern' wildlife (see Glossary for definitions of these terms).

Actions impacting on protected native flora and fauna are regulated under the NC Act. Accordingly, some or all of the following permits may be required for the proposed pipeline:

- Protected Animals Movement Permits (section 88 of the NC Act)

- Protected Plants Clearing Permits (section 89 of the NC Act)
- Wildlife Movement Permits (section 97 of the NC Act) for wildlife not protected under the NC Act but found in certain areas covered by conservation plans created and implemented under the NC Act.

2.1.6 Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006 to 2016

The *Nature Conservation (Koala) Conservation Plan 2006* (KCP) (Environmental Protection Agency & Queensland Parks and Wildlife Service 2005) is subordinate legislation to the NC Act that was prepared following listing of the Koala as a Vulnerable species within the South East Queensland bioregion (the Koala is listed as 'Least Concern' in the Brigalow Belt Bioregion). The plan aims to promote the continued existence of viable Koala populations in the wild, prevent the decline of Koala habitats and promote future land use and development that is compatible with the survival of Koala populations in the wild. Under the Plan, and the Nature Conservation (Koala) Management Program 2006–2016, the State has been divided into three districts to direct management regimes. The Study Area falls within Koala District C of the plan. This places restrictions on the methods of clearing in Koala habitat (discussed further in Section 7 under impact mitigation measures).

The KCP also provides a policy for offsets for net benefits to koalas and koala habitat for situations that impact high quality koala habitat. This policy only applies to south-east Queensland and therefore does not apply to the study area. Offsets developed for the proposed pipeline will however follow the intent of the KCP offsets policy.

2.1.7 *Vegetation Management Act 1999*

The *Vegetation Management Act 1999* (VM Act) regulates the conservation and management of vegetation communities and clearing of vegetation. It provides a framework for identification, description and mapping of Regional Ecosystems (REs) and remnant vegetation by the Queensland Herbarium as 'Endangered', 'Of Concern' or 'Not of Concern' under the VM Act (see Glossary for definitions of these terms).

Vegetation clearing for the proposed pipeline is dependant initially on whether the clearing will occur on, or off of, a mining lease area. Accordingly, the following is noted:

- under schedule 8, table 4, item 1A (j) of the IP Act, a development permit is not required for the clearing of vegetation on an MLA areas where the clearing supports a mining activity
- clearing of native vegetation on the MLA areas associated with non-mining related elements of the Project however may require a permit under the VM Act
- where off a mining lease, applications can be made to clear remnant assessable vegetation under section 22A(2)(a) of the VM Act. Due to the Project having been declared to be a Significant Project under the SDPWO Act, such applications will be accompanied by a Property Vegetation Management Plan.

Note the approvals regime for clearance of native vegetation in Queensland is complex. A number of other Acts regulate or have implications for vegetation clearing (e.g. clearing native vegetation on a road reserve triggers approval under the *Land Act 1994*). The full

implications for vegetation clearing permits and offsets will be determined at such time as detailed design for the proposed pipeline occurs.

To assist in the regulation of vegetation clearing, the VM Act requires the Minister to prepare policies relating to vegetation management including:

- State Policy for Vegetation Management (Department of Natural Resources and Water 2006)
- Regional vegetation management codes
- Policy for Vegetation Management Offsetting (Department of Natural Resources and Water 2007).

The application of these policies and code(s) is dependent on land tenure and the purpose or intent of vegetation clearing. Schedule 8 Table 4 of the IP Act identifies mining activities as being exempt with respect to approval for clearing of native vegetation on MLA areas (which is likely to include the proposed pipelines within the MLA areas). As such, the requirements of the aforementioned policies and codes do not strictly apply to vegetation clearing for the proposed pipeline in the MLA area. The intent of the relevant vegetation management code(s) and associated Policy for Vegetation Management Offsetting have, nevertheless, been considered when assessing impacts and mitigation opportunities for the Project as these are the most widely accepted tools for assessment and mitigation of vegetation impacts in Queensland. The application of the aforementioned policy instruments in the context of the current EIS is explained below.

Regional Vegetation Management Code for Brigalow Belt and New England Tablelands Bioregions

The Regional Vegetation Management Code for Brigalow Belt and New England Tablelands Bioregions (Department of Natural Resources and Water 2006) is used in the assessment of development applications for clearing of vegetation within the southern Brigalow Belt bioregion, under the IP Act.

Part S of the Regional Vegetation Management Code for Brigalow Belt and New England Tablelands Bioregions (the Regional Vegetation Code) specifically outlines the performance requirement and acceptable solutions for clearing of vegetation for projects declared to be a significant project under the SDPWO Act. The stated acceptable solution represents one way in which the relevant performance requirement may be met. Applicants can, however, propose an alternative solution to meet the performance requirement.

In relation to terrestrial ecological impacts, Part S specifies that projects assessed under the SDPWO Act must ‘maintain the current extent’ of:

- remnant Endangered, Of Concern and other REs (listed in Table 5 of the Regional Vegetation Code) the that are of regional significance
- essential habitat as shown on an essential habitat map.

The Regional Vegetation Code defines ‘maintain the current extent’ as:

- not clearing; or
- ensuring the regional ecosystem structure and function are maintained; or

- providing an offset in accordance with the policy in force at the date the application was properly made for vegetation management offsets administered by the Department of Natural Resources and Water (NRW). (This is likely to be the current policy on offsets, The Policy for Vegetation Management Offsetting (Department of Natural Resources and Water 2007)

Policy for Vegetation Management Offsetting

The Policy for Vegetation Management Offsetting (Department of Natural Resources and Water 2007) applies to an offset proposed to meet a performance requirement under a Regional Vegetation Management Code. The policy specifies seven offset criteria relating to:

1. Limitations on offset vegetation.
2. Selection and location of appropriate regional ecosystems.
3. Remnant mapping.
4. Obtaining ecological equivalence.
5. Ensuring ongoing management.
6. Ensuring the offset is legally secured (as defined in the policy).
7. Other requirements.

Offsets for the proposed pipeline are discussed further in Section 7.4.

2.1.8 *Land Protection (Pest and Stock Route Management) Act 2002*

The *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) lists declared plants and animals which are targeted for control because they have, or could have, serious economic, environmental or social impacts. There are legal obligations associated with the control supply, sale, keeping and transport of declared species. Under the Act, land managers in Queensland have a responsibility to manage declared pests on their lands.

A number of listed pest species were recorded in the Study Area and mitigation measures relating to their control have been included within this technical report.

2.2 Commonwealth assessment framework

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) relates to actions that involve or impact upon matters of national environmental significance. The EPBC Act identifies seven matters of national environmental significance:

- World Heritage properties
- National Heritage places
- wetlands of international importance (Ramsar wetlands)
- threatened species and ecological communities
- migratory species
- Commonwealth marine areas

- nuclear actions (including uranium mining).

Where a project or action has potential to significantly impact on a matter of national environment significance, it should be referred to the Department of the Environment, Water, Heritage and the Arts (DEWHA) to determine whether the development is a controlled action under the Act. If the Minister determines that the proposed action is controlled under the EPBC Act, a formal assessment process is required.

The Wandoan Coal Project has been referred to the under the EPBC Act to the Australian Government Minister for the Environment, Water, Heritage and the Arts as four inter-related referrals:

- Wandoan Coal Project Mine and Infrastructure (referral reference number 2008/4284,)
- **Wandoan Coal Project – Coal Seam Methane Water Supply South (referral reference number 2008/4287, the subject of this assessment)**
- Wandoan Coal Project Coal Seam Methane Water Supply West (referral reference number 2008/4283)
- Wandoan Coal Project Glebe Weir Raising (referral reference number 2008/4285).

On the 21 July 2008, DEWHA determined that the actions listed above are controlled actions with the southern CSM water supply pipeline identified as an action that involves habitat fragmentation and degradation through weed invasion and clearing of Endangered ecological communities.

The DEWHA confirmed that as per section 75 of the EPBC Act, the proposed pipeline will require assessment and approval by the Minster for the Environment, Heritage and the Arts (Commonwealth) before it can proceed. The proposed pipeline will however be assessed through the Queensland Environmental Impact Statement Process under the bilateral agreement between the Australian Government and the State of Queensland relating to Environmental Assessment (Department of the Environment and Heritage 2004).

Matters of National Environmental Significance are dealt with in Section 5.2. A separate summary of Matters of National Environmental Significance and the likely impacts of the Project on them are presented in Attachment J of this Technical Report.

3. Methods

This section outlines the methods used to gather information relating to ecologically sensitive areas and species of plants and animals that are known or likely to occur in the Study Area and surrounds. The approach to this assessment involved two key phases:

- **desk-based assessment of literature and relevant databases:** used to identify ecologically sensitive areas and compile a list of conservation significant species for consideration in the EIS based, on known records or predicted habitat in the Study Area and surrounds
- **field surveys:** used to verify the findings of the desk-based assessment and provide a detailed description of the environmental values of the Study Area.

3.1 Contributors and qualifications

The contributors to the preparation of this technical report, their qualifications and role are listed in Table 3-1.

Table 3-1: Contributors and their roles

Name	Association	Qualification	Role
Martin Predavec	PB	BSc(Hons), PhD	Ecology lead
Peter Monsted	PB	BSc	Botanist – field surveys and reporting
Josie Stokes	PB	BSc	Zoologist – field surveys and reporting
Ed Meyer	PB	BSc(Hons), PhD	Zoologist - field surveys and technical review
Stuart Worboys	PB	BSc(Hons)	Botanist – field surveys
Chris Hanson	Place Environmental	BMedSc, BSc (Hons)	Botanist – field surveys and reporting
Ben Lewis	Lewis Ecological Services	BAppSci(Hons)	Zoologist – field surveys and reporting
Greg Ford	Consultant Ecologist	BAppSci	Bat call analysis

All work was carried out under the necessary permits, including:

- Animal Ethics Permit from the Department of Primary Industries and Fisheries Animal Ethics Committee. Permit number CA 2007/10/223. Expires 31 October 2010
- Queensland Parks and Wildlife Service Scientific Purposes Permit issued under the Nature Conservation Regulation 1994. Permit Number WISP02443404. Expires 4 October 2009
- Department of Primary Industries and Fisheries Scientific Use Registration. Registration No: 064. Expires 13 March 2009
- Ancillary Works and Encroachment Permit for Seed & Plant Collection and Survey, from the Department of Main Roads. Expires 12 February 2009.

3.2 Nomenclature

3.2.1 Flora

Nomenclature for vascular plants follows Henderson (2002). Scientific names of plants have been used in this report.

Common names of plants have been provided the first time a species is mentioned (where available) and again thereafter for Threatened species of plant, or for plant names used in names of fauna habitat types. Exotic species have been denoted in the text with '*' (e.g. **Cenchrus ciliaris*).

3.2.2 Fauna

The nomenclature for vertebrate fauna follows the Queensland Parks and Wildlife Services (QPWS) *WildNet database* (2008a) and Census of Australian Vertebrates (CAVS) database (Department of the Environment Water Heritage and the Arts 2008a).

Common names are used in this report for species of animal followed by scientific name the first time the species is mentioned. Scientific and common names are included in species lists in the relevant attachments.

3.3 Literature and database review

Relevant literature, online-resources and numerous databases were reviewed to compile a list of conservation significant species and other environmentally sensitive areas for consideration in the EIS including:

- records of Threatened species listed under the EPBC and NC Acts and Priority taxa for the Brigalow Belt Bioregion as identified in the Brigalow Belt South Biodiversity Planning Assessment expert panel reports for flora and fauna (referred to as 'Priority taxa' (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a, 2002b)
- records of Migratory species listed under the EPBC Act
- Endangered and Of Concern REs mapped within in the Study Area and surrounds
- State Wildlife Corridors
- Essential or Critical habitat
- areas of local, regional and state biodiversity significance (as identified in Biodiversity Planning Assessment mapping)
- Matters of National Environmental Significance (MNES) in the Study Area and surrounds listed under the EPBC Act including world heritage properties, natural heritage properties and significant wetlands
- Recovery plans.

Table 3-2 provides a summary of the databases, on-line resources and literature reviewed including the area used for database searches.

Table 3-2: Literature and database review

Database/data source name	Organisation maintaining database/data source	Database search date[1]	Database search areas	Publication version	Data type
Protected Matters Search Tool	Department of the Environment, Water, Heritage and the Arts	5 September, 2008	S25.79472222 E149.66777778 to S26.17944444 E150.10416667 (latitude/ longitude decimal)	—	Matters of National Environmental Significance listed under the EPBC Act
Atlas of Australian Birds	Birds Australia	25 August 2008	20 km buffer	—	Records of birds including Threatened species
WildNet database	Queensland Parks and Wildlife Service	5 September, 2008	20 km buffer	—	Records of vertebrate fauna including Threatened species
Queensland Museum database	Queensland Museum	5 September, 2008	20 km buffer	—	Records of vertebrate fauna including Threatened species
HERBRECS and CORVEG database	Queensland Herbarium (2008)	21 August, 2008	20 km buffer	—	Records of vascular flora including Threatened species
Regional Ecosystem Mapping 1997–2003	Environmental Protection Agency (Environmental Protection Agency 2007)	—	Regional extent	Version 5.2	Regional Ecosystems
Biodiversity Planning Assessment	Environmental Protection Agency (2003)	—	Brigalow Belt Bioregion	Version 1.2	Wildlife Corridor, Essential Habitat and biodiversity significance levels mapping
State wildlife corridors mapping.	Environmental Protection Agency (2004b)	—	Regional extent	Version 1.0	State Wildlife Corridor mapping

Database/data source name	Organisation maintaining database/data source	Database search date[1]	Database search areas	Publication version	Data type
Brigalow Belt South Biodiversity Planning Assessment flora expert panel report	Environmental Protection Agency (2002b)	—	—	—	Bioregional Priority taxa (flora)
Brigalow Belt South Biodiversity Planning Assessment fauna expert panel report	Environmental Protection Agency (2002a)	—	—	—	Bioregional Priority taxa (fauna)
Register of critical habitat	Department of the Environment, Water, Heritage and the Arts (2008e)	1 September 2008	—	—	Critical habitat listed under the EPBC Act
EPBC listed Key Threatening Processes	Department of the Environment, Water, Heritage and the Arts (2008b)	1 September 2008	—	—	Key Threatening Processes listed under the EPBC Act
Recovery plans made or adopted and	Department of the Environment, Water, Heritage and the Arts (2008d)	1 September 2008	—	—	Recovery plans developed for species listed under the EPBC Act
Recovery and conservation plans	Environmental Protection Agency (2008)	1 September 2008	—	—	Recovery and conservation plans developed for communities and species of state conservation significance
Koala Districts and Koala Habitat Areas	Environmental Protection Agency & Queensland Parks and Wildlife Service (2005)	5 September 2008	—	—	Koala Districts and Koala Habitat Areas

1. Database searches were done prior to field surveys and reviewed in the preparation of this report.

3.4 Field surveys

Field surveys were undertaken in the Study Area to verify the presence of vegetation communities, species or their habitats including:

- verification of the remnant status of vegetation communities
- verification of RE type of remnant vegetation, or analogous RE type of regrowth (non-remnant vegetation)
- identification of nationally Threatened ecological communities listed under the EPBC Act
- identification of all vascular species of plant in the Study Area
- identification of all vertebrate species of animal in the Study Area
- identification the location and/or likely extent of Threatened species and Priority taxa of terrestrial plants and animals and their habitats.

Field surveys were done between the 10 and 22 August 2008 (late winter).

Flora and fauna surveys of the northern section of the Study Area within the MLA areas were undertaken in Spring 2007 and Autumn 2008 for the Terrestrial ecology impact assessment of the MLA and infrastructure and are the subject of the Terrestrial ecology impact assessment supporting Volume 1. As such, the pipeline corridor in the MLA was not surveyed in August 2008. The assessment of impacts to flora and fauna however includes remnant and non-remnant vegetation and species of plant and animal identified, or considered likely to occur, within the habitats along the pipeline corridor within the MLA.

3.4.1 Survey weather conditions

Weather conditions were generally cool during the winter survey period, with maximum daily temperatures ranging from 16°C to 28°C (Bureau of Meteorology 2008, Taroom weather station October 2007). Daily minimum temperatures ranged from -3°C to 7°C with sub-zero temperatures recorded most nights. Conditions were also generally dry, with no rainfall recorded at Taroom during surveys (Bureau of Meteorology 2008, Taroom weather station October 2007).

Rainfall in the year prior to surveys was near average across western Queensland and central districts, but well below average in south-eastern districts (Bureau of Meteorology 2008). Monthly rainfall totals through March, May and June were generally well below average. Rainfall at Taroom in the month prior to surveys, however, was almost twice the July average (Bureau of Meteorology 2008, Taroom weather station July 2007).

More detailed information on weather conditions for this survey periods is provided in Attachment A, and Chapter 7 of the EIS provides a description of the climate of the region.

3.4.2 Terrestrial flora

Survey of terrestrial flora was based on the approach outlined in the Queensland Herbarium's *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner *et al.* 2005), which recognises four types of survey, each requiring a decreasing level of detail in terms of the data collected: Primary, Secondary, Tertiary and Quaternary site surveys (as described below). The flora survey

method also used sample techniques and methods used for CORVEG secondary and tertiary site data collection (see Appendix 2 of Neldner *et al.* 2005).

The terrestrial flora survey also involved targeted searches and traverses, as well as validation of remnant status and RE type mapping by the EPA (Environmental Protection Agency 2007). The location of terrestrial flora survey effort is shown in Figure 3-1. A summary of the flora survey effort involved in survey and mapping of sites across the Study Area is provided in Table 3-3.

Table 3-3: Summary of flora survey effort

Survey technique	Measure of effort	Total effort
Primary sites	surveys sites	0
Secondary sites	surveys sites	22
Tertiary sites	surveys sites	49
Quaternary sites	surveys sites	0

Primary sites

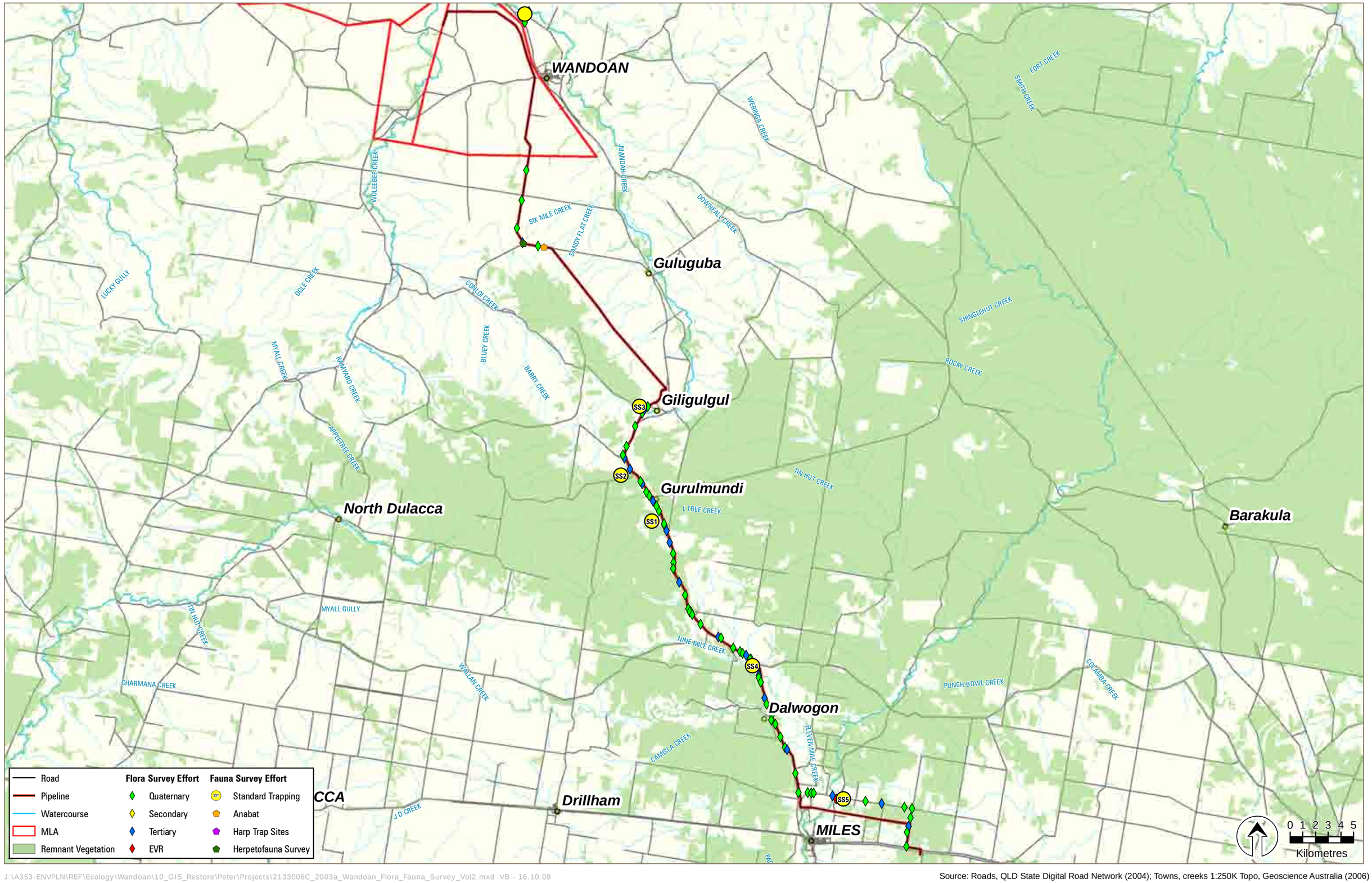
Primary sites are permanently marked plots where the individual tree and shrub species are marked or permanently located so that the growth of individual plants can be monitored over time. Primary sites will often include the collection of secondary site attributes with additional data depending on the aims of the specific project.

No Primary sites were established for this assessment.

Secondary sites

Secondary sites are used for classification and detailed descriptions of REs and vegetation communities. Location and physical environment details are recorded in addition to broader features such as landform, slope, soils, geology, ground layer composition (i.e. proportion of litter, rocks, bare ground etc), disturbance and habitat quality are also recorded. At secondary sites a range of sample techniques are used to describe flora composition and vegetation structure:

- **Quadrat survey:** Floral composition and abundance is recorded within a 20 m x 20 m quadrat. The abundance of species within the quadrat is recorded based on the percentage of crown/vegetative cover (in which the crown or cover of each plant is tabled to be opaque) using a modified Braun-Blanquet cover-abundance scale (Mueller-Dombois & Ellenberg 1974) as follows: 1 = sparse, <5%; 2 = any number, <5%; 3 = 5 – 25%; 4 = 25 – 50%; 5 = 50 – 75%; 6 = 75 – 100%.



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Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

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Figure 3-1

Flora and Fauna Survey

- **Random meander/traverses/targeted searched:** Additional species with the same RE patch (i.e. species not recorded within the quadrat) are also recorded and assigned a relative abundance of dominant, abundant, frequent, occasional or Rare.
- **Vegetation structure:** The vegetation community structure was described following the CORVEG methodology (refer Appendix 2 of Neldner *et al.* 2005) which recognises up to seven layers or strata of vascular plants within a community. For each stratum, the following data is collected:
  - height: median, maximum and minimum
  - total crown cover (the percentage of an area covered by the horizontal projection of the spread of a species' foliage (Walker & Hopkins 1990)) based on crown separation estimate: closed or dense, mid-dense, sparse, very sparse up to five predominant species: dominant, codominant, associated, suppressed or occasional.
- **Tree basal area (Bitterlich Method)**: Another measure of structure that calculates the cross-sectional area of tree stems in m^2/ha.

For this assessment, Secondary site surveys were undertaken at representative sites (non-randomly selected) with at least one site in each of the RE types within the Study Area.

Tertiary sites

Tertiary sites provide a rapid assessment to validate REs based on location, environmental and overall structural information (as per the secondary site) in addition to a comprehensive list of woody species (based on a random meander or traverse). Generally only the dominant or conspicuous species in the ground layer are recorded; however any species not previously recorded within an RE were also recorded for this assessment so as to provide a comprehensive cumulative species list for the Study Area.

A random meander search was performed within all sites to assess the presence or likelihood of presence of Rare and Threatened flora species and communities and their habitats identified from database searches.

Tertiary sites were done within the Study Area in both remnant and non-remnant vegetation representing all RE types (Figure 3-1).

Quaternary sites

Quaternary are 'plotless' sites used primarily as a record of field traverses and to verify RE mapping and provide the minimum data to validate vegetation communities and remnant status. In cases where the results of the quaternary site were inconclusive, a tertiary site could be established to collect more data. No quaternary sites were performed however for this assessment

In addition to Secondary, Tertiary and Quaternary sites, large areas of the Study Area were traversed on foot. The purpose of this type of assessment was to ensure adequate site coverage and to establish a comprehensive floral species list for the Study Area. This method was also used for the detection of Rare and Threatened species, especially in non-remnant vegetation and remnant vegetation outside of standardised survey sites.

Regional ecosystems validation

REs and remnant status of vegetation mapped by the EPA (2007) was validated in the field using data collected via the methods described above, in conjunction with relevant

geological mapping and explanatory notes (Bureau of Mineral Resources Geology and Geophysics 1971b) as well as high resolution satellite imagery from 2006 to 2008.

Mapping of non-remnant vegetation and refinement of existing RE mapping were carried out in the field using a tablet computer (Xplore C2V) with a built in ArcPad Geographic Information System (GIS) software (accuracy of ± 5 m, precision equivalent to 1:500 scale).

Plant species identification

Field species identifications were aided by the following sources: Anderson (2003), Auld and Medd (2002), Brooker and Kleinig (2004), Harden (2005), Moore (1983; 1986; 1989), Stanley and Ross (1996), Tothill and Hacker (2002), Wheeler et al. (1984), and Williams, Harden and McDonald (1984). Voucher specimens of Threatened species of plant, or species unable to be identified in the field, were sent to the Queensland Herbarium for identification or verification.

3.5 Terrestrial vertebrate fauna

The likely occurrence of fauna species in the Study Area was investigated by assessing the suitability of available habitat for fauna as well extensive opportunistic and systematic targeted surveys. Fauna habitat assessment and surveys were focused predominantly on Threatened species, EPBC Act listed migratory birds and Priority taxa for the southern Brigalow Belt bioregion.

3.5.1 Fauna habitat assessment

While targeted surveys can confirm the presence of species, a lack of records does not necessarily indicate the absence of the species from a site when suitable habitat is present. By the very nature of their rarity, Rare and Threatened species and are often difficult to detect. Suitable habitat is, therefore, an important factor to consider when determining the potential presence of such species.

For this study, suitability of habitat for fauna was assessed on the basis of RE mapping, aerial photograph interpretation and ground-truthing. Habitats were delineated by grouping vegetation communities/REs according to their structure and/or underlying geology (i.e. characteristics that determine the type of fauna likely to use them).

A field proforma was used to record vegetation composition, foraging resources, habitat structure and groundcover assemblages over a 50 x 50 m quadrat (0.25 ha). Data were also collected on the extent of tree hollow resources, foraging resources (including *Allocasuarina* and *Casuarina* trees utilised by Glossy Black-cockatoos (*Calyptorhynchus lathami*), hydrological features, disturbance and other habitat attributes generally associated with Threatened species and other Priority taxa for the southern Brigalow Belt bioregion.

The condition of habitats within the Study Area was categorised as follows:

- **Good:** A full range of fauna habitat components are usually present (e.g. old growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact.
- **Moderate:** Some fauna habitat components are missing or scarce (e.g. old growth trees, fallen timber), although linkages with other remnant habitats in the landscape are usually intact, but sometimes degraded.

- **Poor:** Many fauna habitat elements have been lost, including old-growth trees and fallen timber; tree canopies are also often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive past clearing.

3.5.2 Fauna survey techniques

The fauna survey methodology involved two types of fauna survey sites: standard sites and supplementary sites. Five standard trapping sites were selected to ensure a range of habitats were sampled and where applicable preference was given to remnant vegetation within each of these habitats (see Figure 3-1 and Attachment D for a detailed summary of fauna survey effort). An additional 29 supplementary sites were selected to provide a comprehensive survey of fauna assemblages and to ensure more discrete habitats such as roadside Brigalow, riparian zones and discrete depression areas were subject to at least some level of survey (see Figure 3-1).

At each of the standard sites the following survey methods were used:

- habitat assessment (as described above)
- ground trapping (10 x Elliott traps, 5 x pitfall traps, 4 x funnel traps)
- harp trapping (1 x harp left *in situ* for 2 nights)
- spotlighting (2 people x 30 minute survey)
- ultrasonic bat detection (Anabat) (1 night)
- herpetofauna active searches (2 people x 20 min)
- general bird surveys (2 people x 40 min)
- fauna features traverse (opportunistic each day).

Supplementary sites were selected to target specific habitat features likely to be used by rare or threatened fauna. Supplementary sites aimed to increase the spatial coverage of survey across the Study Area while sampling discrete fauna habitat types (e.g. wetland habitats) or sites with specific fauna microhabitat elements (e.g. tree hollows).

At each supplementary site, at least one of the following survey techniques was undertaken:

- harp trapping
- waterbird census
- general bird surveys
- ultrasonic bat detection
- herpetofauna active searches
- fauna features traverse
- nocturnal vehicle traverses
- spotlighting.

The fauna survey methods used at standard sites and supplementary sites are described below.

Ground trapping

Elliott traps (A Type) were used to census small ground dwelling fauna over a four night period. Transects of ten Elliott A traps were established at 15 m intervals and baited with a

mixture of peanut butter, honey and oats ('Universal bait'). Traps were checked early each morning and re-baited as necessary. This fauna survey technique resulted in 40 trap nights at each of the five sites for a total of 200 trap nights.

Pitfall traps were used to census small ground dwelling mammals, frogs and reptiles over a four night period resulting in 20 trap nights at each site for a total of 100 trap nights. Pitfall traps were set in lines of five traps (20 litre buckets) interconnected with plastic fencing (400 mm builders damp coarse) with bucket space intervals of approximately 5 m.

Additionally, two funnel traps (750 mm x 20 mm; WA Poultry Equipment) were set against each end of the drift fence (total of 4 funnel traps per line) to target larger vertebrates, particularly snakes that may escape from a pitfall trap. This fauna sampling technique resulted in a total of 80 trap nights.

Microchiropteran surveys

Some species of microchiroptera (insectivorous microbats) are easily identified from their unique echolocation calls, while other species can only be reliably detected or identified through trapping (Parnaby 1986; Woodside & Taylor 1985). In addition, different species are more likely to be captured by different trapping techniques. As such, a combination of ultrasonic detection and harp trapping were used to census microbats.

Stationary ultrasonic bat detection surveys were undertaken using the Z-CAIM digital system (Anabat II Z-CAIM – Titley Electronics, Ballina). This technique was employed at all four standard sites and five supplementary sites to increase the spatial coverage of survey effort across the Study Area (see Figure 3-1). At each site the unit was left operating for a minimum eight hour period to maximise the likelihood of sampling different species that are active at different periods during the night. Overall survey effort for this technique was estimated at 90 hrs detection time.

One standard harp trap (Ausbat 4.2 m^2) was used to capture microbats along tracks, flyways along riparian habitats, easements and around focal trees at each of the five standard sites and at three supplementary sites (see Figure 3-1). Harp traps were left *insitu* for two consecutive nights at each site resulting in a total survey effort of 16 trap nights. All captured microbats were identified to species level using Churchill (1998) and released at dusk.

Herpetofauna active searches

Diurnal herpetofauna surveys employing active searching techniques were undertaken at each of the five standard sites and at 22 supplementary sites (see Figure 3-1; Table 2- Attachment D). Each herpetofauna survey involved two people actively searching for a 20 minute period and included surveying for basking reptiles, actively turning rocks, logs, raking debris and peeling decorticating bark. Species were identified using Wilson (2005).

Spotlighting and nocturnal drive transects

Walk traverse spotlight surveys were undertaken by two people using either a 50 or 100 watt variable hand held spotlights over a standardised 30 minute census period (i.e. 1 person hour of effort). This approach was employed at each of the five standard sampling sites (5 person hours of survey effort) to target nocturnal herpetofauna, arboreal, flying, and large ground dwelling mammals. Spotlight surveys were not undertaken at any of the supplementary sites due to the cooler conditions experienced throughout the survey period. Spotlighting during colder weather is an ineffective method of detection for principal target species such as nocturnal reptiles compared to active diurnal herpetofauna searches.

Nocturnal drive transects were undertaken over four evenings on 11, 12, 21 and 22 August covering a total area of approximately 203 km and resulting in approximately 4.5 hours driving time. This technique involved the slow driving (i.e. 40–50 km/h) on dirt roads and tracks (between Gurulmundi and Giligulgul and along Gearys Road) in order to observe active nocturnal fauna including frogs, reptiles and a range of ground-dwelling and arboreal mammals. As outlined above, the cooler conditions lowered the activity of some target species but this method proved applicable for opportunistic observations of nocturnal birds and larger mammals.

Fauna features traverse

Fauna features traverses were undertaken to assess the suitability of habitat for fauna (particularly Threatened species) at each standard survey site. Sites were traversed on foot by two experienced observers for 30 minutes, with each observer looking for features/signs suggesting the likely occurrence of fauna (e.g., nests, large hollow-bearing trees, chewed remains of fruit and Casuarina cones, scratch marks and scats). Suitability of habitat for fauna was assessed this way at other sites within the Study Area as well. Supplementary surveys were undertaken at those sites where suitable habitat for Threatened and Migratory species and priority taxa was identified.

Fauna species identification

Field species identifications were aided by the following sources:

- general mammals – Menkhorst and Knight (2004), Strahan (1995) and Triggs (1996)
- insectivorous bats – Churchill (1998) and Menkhorst and Knight (2004)
- incidental evidence of mammals – Triggs (1996)
- birds and bird calls – Pizzey & Knight (1997), Debus (2001), Plowright (2004) and Stuart (1999)
- reptiles – Wilson (2005) and Cogger (2000)
- frogs and frog calls – Barker et al. (1995), Cogger (2000) and Stewart (1998).

3.5.3 Summary of terrestrial vertebrate fauna survey effort

The fauna survey effort of the Project is summarised in Table 3-4. Comprehensive details of the fauna survey effort are provided in Attachment D.

Table 3-4: Summary of fauna survey effort

Survey technique	Measure of effort	Total effort
Elliott A (ground trapping)	trap nights	200
Pitfall traps (ground trapping)	trap nights	100
Funnel traps	trap nights	80
Ultrasonic bat surveys	survey nights	9
Harp traps	trap nights	16
Herpetofauna active searches	search hours	18
Spotlighting	search hours	5
Nocturnal drive transects	search hours	4.5
	km traversed	203
	survey nights	4

3.6 Likelihood-of-occurrence assessment

The likelihood of Threatened, Migratory and Priority taxa species to occur in the Study Area was based on the results of the desk based assessment and field surveys.

A list of the Threatened and Migratory species, REs and ecological communities that may occur in the Study Area and surrounds was compiled based on the results of the database searches. For animals, the likelihood of all Priority taxa for the Brigalow Belt South bioregion was also considered. Some additional Threatened species of plant and animal was also added to this list based on the professional opinion of the contributors to this assessment.

The likelihood-of-occurrence assessment was based on records collected during the field survey, previous records from the Study Area and surrounds, current (known) distribution range and the presence and condition of suitable habitat in the Study Area.

Species considered to have a **low likelihood of occurrence** include species not recorded during the field surveys that fit one or more of the following criteria:

- have not been recorded previously in the Study Area and surrounds for which the Study Area is beyond the current distribution range
- use specific habitat types or resources that are not present in the Study Area
- are considered locally extinct.

Species considered to have a **moderate likelihood of occurrence** include species not recorded during the field surveys that fit one or more of the following criteria:

- have infrequently been recorded previously in the Study Area and surrounds
- use habitat types or resources that are present in the Study Area, although generally in a poor or modified condition
- are unlikely to maintain sedentary populations, however may seasonally utilise resources within the Study Area opportunistically during variable seasons or migration.

Species considered to have a **high likelihood of occurrence** include species recorded during the field surveys or species not recorded that fit one or more of the following criteria:

- have frequently been recorded previously in the Study Area and surrounds
- use habitat types or resources that are present in the Study Area that are abundant and/or in good condition within the Study Area
- are known or likely to maintain resident populations surrounding the Study Area
- are known or likely to visit the site during regular seasonal movements or migration.

The likelihood-of-occurrence assessment is provided Attachment G for flora and Attachment H for fauna.

3.7 Impact assessments

Assessment of the significance of impacts were completed for Threatened species (Endangered or Vulnerable), ecological communities, and REs (Threatened and Of Concern) that were either recorded in the Study Area or rated as having a moderate or high likelihood of occurrence. Impact assessments were also completed for Commonwealth listed Migratory species for which the Study Area is at their distributional range limit (considered important habitat as defined in the *Principal Significant Impact Guidelines*) and that were rated as having a moderate or high likelihood-of-occurrence in the Study Area.

A profile of each Threatened ecological community and species for which an EPBC impact assessment was completed is provided in Attachment I. These profiles outline the species, communities conservation status, distribution, habitat, threats, ecology and occurrence (or likelihood of occurrence) within the Study Area. The likely impacts of the proposed pipeline and relevant mitigation measures for each species, communities or REs is also outlined.

The conclusions of the impact assessments are based on the size and extent of populations or their habitat identified in the study area. For many species, a failure to detect the species has resulted in uncertainty in the actual size, extent or important of the local population. It is acknowledge however that field surveys were undertaken at a sub-optimal time of year (late winter) for detection of many species of plant and animal and that some sections of the Study Area were not accessed during this survey period. As such, the conclusions of the significance assessments (and mitigation measures) should be reviewed based on the findings of a follow up seasonal survey.

Impact assessments have not been undertaken for Rare and non-Threatened Priority taxa. These species were however considered in the overall discussion of the existing environment and the likely impacts, the design and implementation of impact mitigation measures and will be further considered in the development of suitable offsets.

3.7.1 Commonwealth listed communities and species

For ecological communities and species listed under the EPBC Act, impact assessments were completed in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment and Heritage 2006).

3.7.2 State listed communities and species

An impact assessment was done for REs listed as endangered or of concern under the VM Act and threatened species listed under the NC Act to consider the significance of impacts on these species and REs. While there is no standard or legislated methodology for assessing the significance of impacts on species and communities in Queensland listed under the NC Regulation or its ruling NC Act, the significance of likely impacts were considered to be significant if:

- areas of high conservation value for the species or RE be affected
- individual animals and/or plants and/or subpopulations that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community
- habitat features that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community
- the duration of impacts relating to the species or community long-term
- the impacts relating to the species or community permanent and irreversible.

3.8 Limitations

On all sites, varying degrees of non-uniformity of flora and fauna habitats are encountered. Hence no sampling technique can totally eliminate the possibility that a species is present on a site. The conclusions in this report are based upon data acquired for the site and the environmental field surveys and are, therefore, merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of significant species. Also, it should be recognised that site conditions, including the presence of Threatened species, can change with time.

The weather conditions proceeding and during the survey periods also has an influence on access to the site and the detectability and identification of species. The weather conditions during the late winter survey period were generally cool and sub-optimal for detecting herpetofauna (reptiles and frogs). The likelihood of some nectivorous species (in particular honeyeaters and flying foxes) occurring within the Study Area may also have been affected by a paucity of flowering canopy trees.

The cool dry weather and general season (late winter) is also a time of reduced vegetative growth and reproductive activity for many species of plant, particularly grasses and other herbaceous ground cover species. This season was however well suited for identifying many of the species of Acacia that were flowering.

Access to properties was another limitation of this assessment. No private properties were accessed for this assessment which accounts for the Study Area between Giligulgul and Fosters Road and between the Leichhardt Highway and Gearys Road, and land north across Eleven Mile Creek. In addition, the proposed pipeline route was modified between the Leichhardt Highway and the Warrego Highway (the Miles bypass) following completion of the winter field surveys. REs and flora and fauna habitats across these areas were inferred from desk based resources that should be verified during seasonal surveys.

4. Existing environment

4.1 Regional context

The Study Area traverses the Taroom Downs, Barakula and eastern edge of the Southern Downs subregions of the Brigalow Belt South bioregion. The Brigalow Belt bioregion covers an area of 279,496 km^2 and is one of the largest of the 80 defined bioregions (Thackway & Cresswell 1995), extending from Gladstone on the Queensland coast, south to Dubbo in New South Wales. Geologically this region consists predominantly of Jurassic and younger deposits of the Great Artesian Basin and Tertiary deposits with elevated basalt flows. Vegetation types include woodlands and open forests of *Eucalyptus populnea* (Poplar Box), *Corymbia citriodora* subsp*. variegata* (Spotted Gum), ironbarks, Bloodwoods (e.g. *Corymbia trachyphloia, C. hendersonii*) and *Callitris* spp. (Cypress Pine). Woodland and forests of *Acacia harpophylla* (Brigalow)*, Casuarina cristata* (Belah) and Semi-evergreen vine thicket (SEVT) are also a feature of this bioregion.

This bioregion has been cleared largely of woodlands for grazing and dryland agriculture, with the larger remaining areas of vegetation now generally occurring on the rockier hilly areas, as roadside vegetation or as relatively small isolated remnants. Country in the Study Area north of Giligulgul has been largely cleared for grazing and dryland agriculture. Between Giligulgul and Miles however, the Study Area traverses the Great Dividing Range. Soils and geology associated with the Great Dividing Range are less arable and are dominated by shallow rocky or deeply weather soils. As such, country through this section of the Study Area has not been subject to as extensive broad scale and routine clearing as in the north.

4.2 Drainage lines

The Study Area traverses numerous named and unnamed drainage lines including:

- Dogwood Creek 2.5 km north of Miles along Gearys Road
- Eleven Mile Creek 2.5 km north of Miles along Gearys Road
- Wallan Creek along the 11 km north of Miles along the Leichhardt Highway
- Eleven Mile Creek 13.5 km and 16.5 km north of Miles along the Leichhardt Highway
- eight unnamed drainage lines along the Leichhardt Highway between Miles and Gurulmundi
- L-Tree Creek at Gurulmundi along Baileys Road
- Juandah Creek approximately 1 km west of Giligulgul along Baileys Road
- one mapped unnamed drainage line along Baileys Road between Gurulmundi and Giligulgul
- Sandy Flat Creek between and Fosters Road
- one mapped unnamed drainage line along Fosters Road
- Frank Creek within the MLA
- three additional mapped unnamed drainage lines within the MLA.

4.3 Lithology and land zones

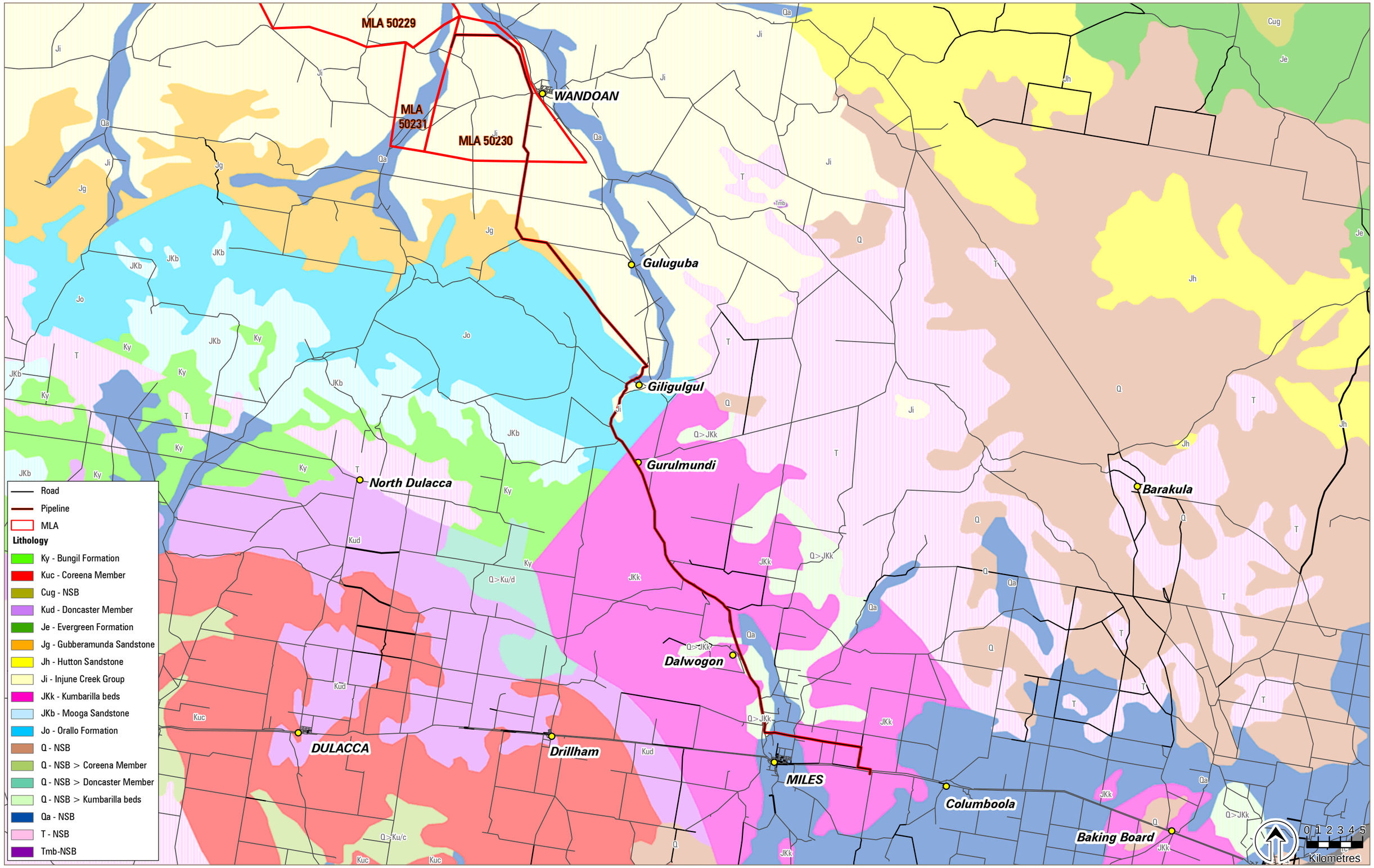
The southern CSM water supply pipeline traverses seven geological formations and associated land zones within the Study Area (see Table 4-1). In addition, a significant proportion of the Study Area has been subject to deep weathering (areas of deep weathering is not illustrated in Figure 4-1 due to lack of data however were determined in the field off the 1:250,000 Geological Series Sheet SG 55-12 and SG 56-9 (Bureau of Mineral Resources Geology and Geophysics 1971a, 1971b).

Table 4-1: Geological formation and corresponding land zone

Map symbol[1]	Formation name, age[1]	Lithology[1]	Land zone[2]
Qa	Alluvium, Quaternary	Alluvium	Land zone 3
Qs	Alluvium, Quaternary	Sand, some sandy soil	Land zone 3
Qpc	Alluvium, Quaternary	Sandy alluvium of Condamine River	Land zone 3
J-Kk	Kumbarilla Beds, Jurassic to lower Cretaceous	Sandstone, siltstone, mudstone	Land zone 10
J-Kk	Kumbarilla Beds, Jurassic to lower Cretaceous with deep weathering profile overlay, Jurassic to lower Cretaceous	Sandstone, siltstone, mudstone with deep weathering	Land zone 5 / 7
Jug	Gubberamunda sandstone, Middle to upper Jurassic	Cross bedded quartzose to sub-liable sandstone, some pebbly; conglomerate, siltstone. Fossil wood	Land zone 10
Juo	Orallo formation, Middle to upper Jurassic	Mudstone, liable sandstone, siltstone and some calcareous coal	Land zone 9
Juo	Orallo formation with deep weathering profile overlay, Middle to upper Jurassic	Deep weathering profile of the Orallo formation	Land zone 5/7
Ji	Injune Creek Group, Middle to upper Jurassic	Mudstone; liable sandstone, siltstone, some calcareous; coal	Land zone 9

1. Map symbol, formation name, age and litho lithology based on the 1:250,000 Geological Series Sheet SG 55-12 and SG 56-9 (Bureau of Mineral Resources Geology and Geophysics 1971a, 1971b).

2. Land zone as defined by the Environmental Protection Agency (2004a). Land zone 3 = Quaternary alluvial systems, Land zone 5 = plains and plateaus on Tertiary land surfaces, may have duricrust at depth, Land zone 7 = exposed or shallowly covered duricrusts, Land Zone 9 = fine grained sedimentary rocks, Land Zone 10 = coarse-grained sedimentary rocks.



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Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

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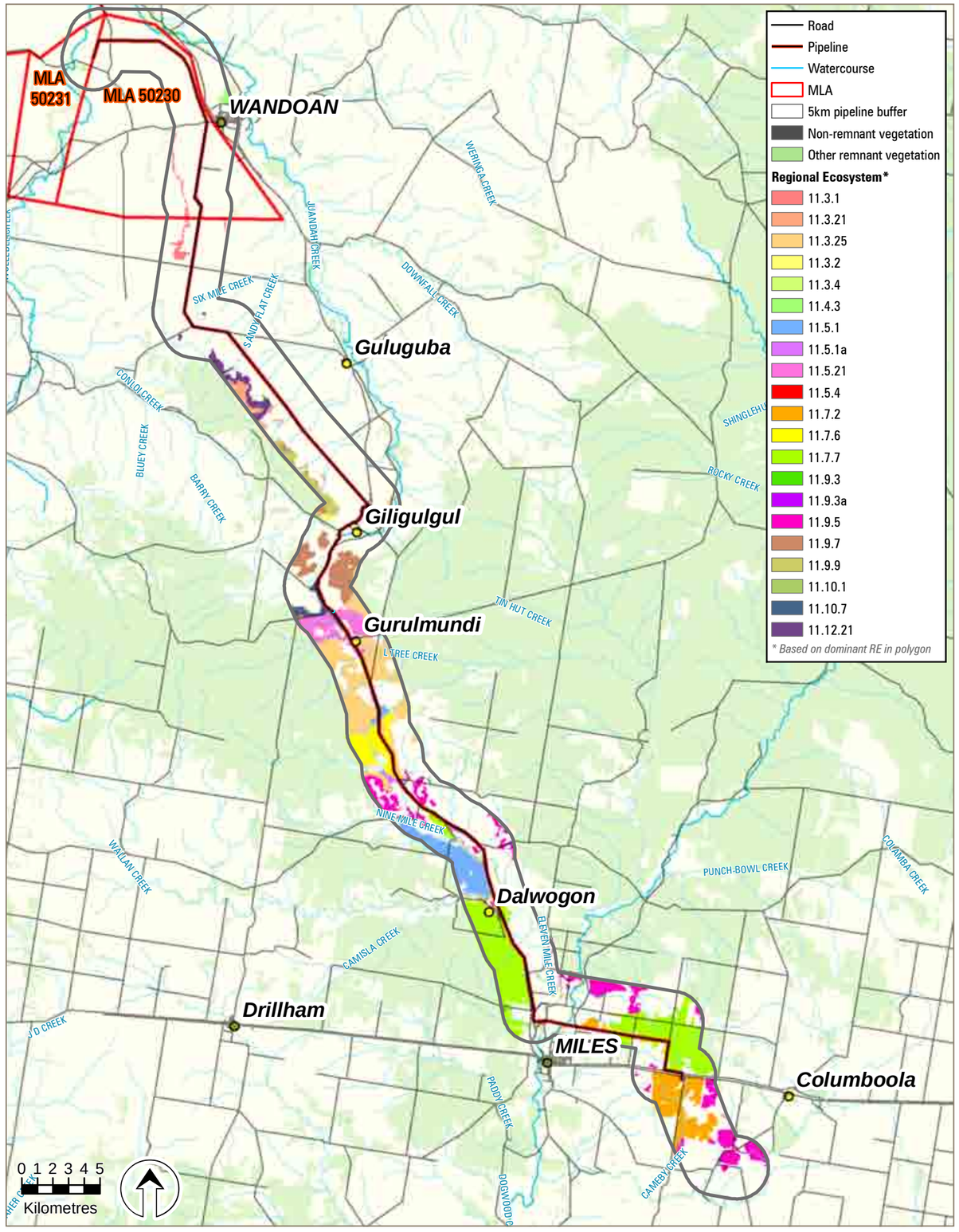
Figure 4-1
Lithology

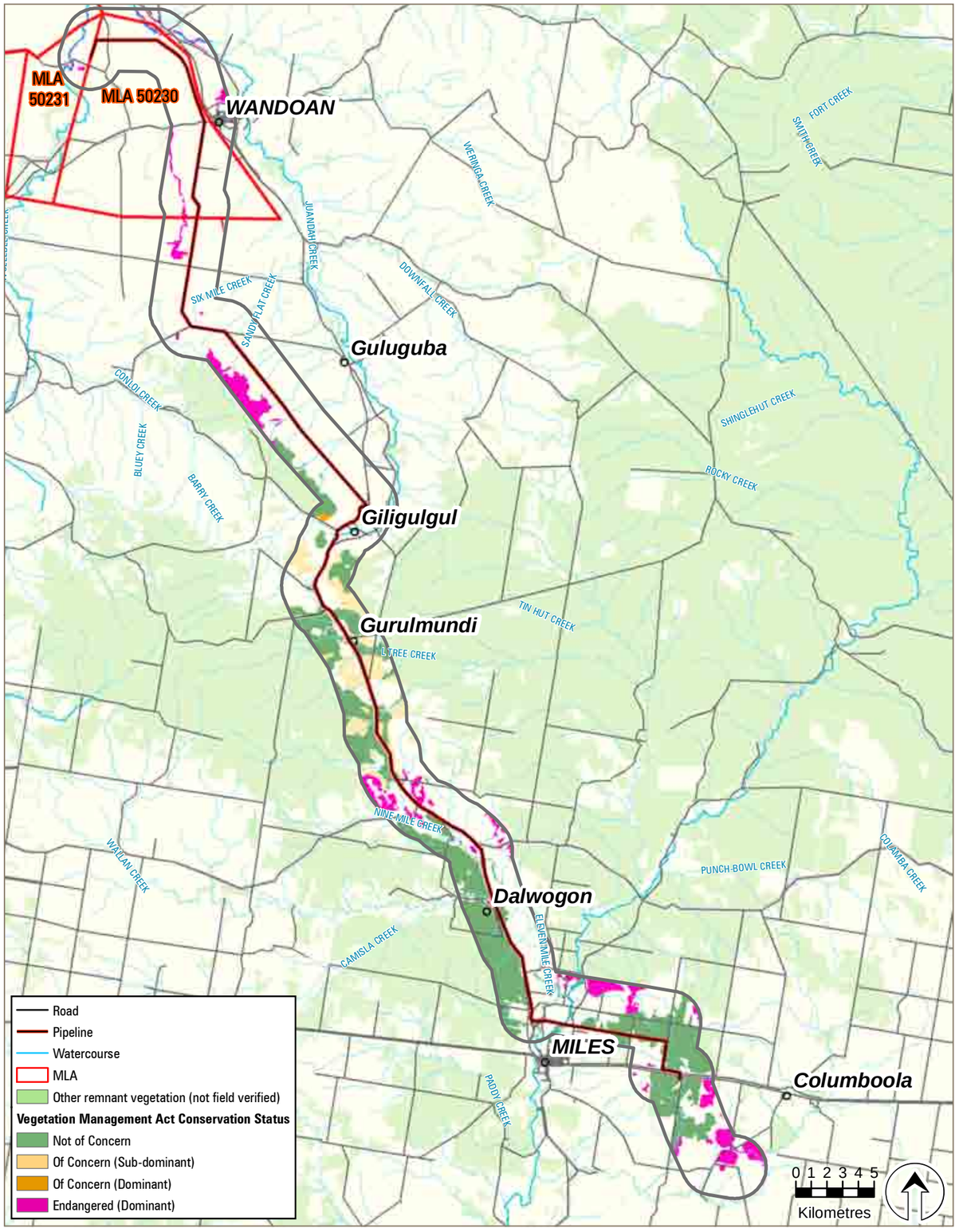
4.4 Regional ecosystems

An RE is a set of vegetation communities in a bioregion that is consistently associated with a particular combination of geology, landform and soil (Sattler & Williams 1999). Fourteen REs were identified within the Study Area (see Table 4-2 and Figure 4-2) and these are described below. Mapping of REs and non-remnant vegetation at 1:50,000 scale is provided in Attachment E.

Table 4-2: Field verified regional ecosystems within the Study Area

RE Code	RE description (EPA 2006)	Qld VMA status	EPA Biodiversity status	EPBC Act status
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	Of concern	Of concern	Not listed
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus spp.* tall woodland on alluvial plains	Of concern	Of concern	Not listed
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	Not of concern	Of concern	Not listed
11.5.1	*Eucalyptus crebra, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii* woodland on Cainozoic sand plains/remnant surfaces	Not of concern	No concern at present	Not listed
11.5.1a	*Eucalyptus populnea* woodland with *Allocasuarina luehmannii* low tree layer Cainozoic sand plains/remnant surfaces	Not of concern	No concern at present	Not listed
11.5.4	*Eucalyptus crebra, Callitris glaucophylla, C. endlicheri, Eucalyptus chloroclada, Angophora leiocarpa,* woodland on Cainozoic sand plains/remnant surfaces(deep sands)	Not of concern	No concern at present	Not listed
11.5.21	*Corymbia bloxsomei +/- Callitris glaucophylla +/- Eucalyptus crebra +/- Angophora leiocarpa* woodland on Cainozoic sand plains/remnant surfaces	Not of concern	No concern at present	Not listed
11.7.2	*Acacia spp.* woodland on lateritic duricrust. Scarp retreat zone	Not of concern	No concern at present	Not listed
11.7.4	*Eucalyptus decorticans* and/or *Eucalyptus spp., Corymbia spp., Acacia spp., Lysicarpus angustifolius* on laterised duricrust	Not of concern	No concern at present	Not listed
11.7.6	*Corymbia citriodora* ssp*. variegata* or *Eucalyptus crebra* woodland on lateritic duricrust	Not of concern	No concern at present	Not listed
11.7.7	*Eucalyptus fibrosa* ssp*. nubila +/- Corymbia spp +/- Eucalyptus spp.* woodland on lateritic duricrust	Not of concern	No concern at present	Not listed
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	Endangered	Endangered	Endangered
11.10.1	*Corymbia citriodora* open forest on coarse-grained sedimentary rocks	Not of concern	No concern at present	Not listed
11.10.7	*Eucalyptus crebra* woodland on coarse-grained sedimentary rocks	Not of concern	No concern at present	Not listed





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Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

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Figure 4-2

Regional Ecosystems, Regrowth (non - remnant vegetation) and Status Vegetation under the Vegetation Management Act

In order to be recognised under the VM Act, vegetation must be of 'remnant' status (see the Glossary for the definition of remnant vegetation). In addition to this, Queensland Herbarium remnant vegetation cover mapping is generally at the 1:100,000 scale, which delineates a minimum area for remnant vegetation of 5 ha and 75 m width limit for linear features. As such, many small patches of vegetation, regardless of condition, will not be captured by RE mapping.

The following RE descriptions of are based on the composition, structure and condition of these REs (or non-remnant vegetation analogous with these REs) as recorded in the Study Area.

RE 11.3.2 *Eucalyptus populnea* woodland on alluvial plains

RE 11.3.2 consisted of *Eucalyptus populnea* (Poplar Box) woodland on Quaternary alluvium systems (land zone 3) and occurred as a dominant remnant cohort at several locations and as a sub-dominant remnant cohort at two locations, generally in association with more contiguous vegetation (usually RE 11.3.25) along the creeks that traverse the Study Area. In general RE 11.3.2 may occur on a range of landforms on Quaternary alluvium such as floodplains, alluvial plains, alluvial fans and levees. Within the Study Area, however, it occurred most frequently on the floodplain terraces beyond the high banks of the channel where it fringed the riparian vegetation (RE 11.3.25).

Canopy: The canopy was dominated by *Eucalyptus populnea* and was sparse, with associated *Eucalyptus tereticornis* (Queensland Blue Gum) and *Alectryon oleifolius* ssp*. elongatus* (Western Rosewood) occurring at some sites. The canopy possessed a median height range of 12 to 19 m (see Photo 4-1). The sparse low tree layer was generally dominated by *Eucalyptus populnea* and associated *Alectryon oleifolius* ssp*. elongatus* and *Acacia excelsa* (Ironwood). The low tree layer possessed a median height range of 7 to 12 m.

Mid-stratum: The sparse to very sparse tall shrub layer was dominated by *Eremophila mitchellii* (Bastard Sandalwood) and/or *Geijera parviflora* (Wilga), with variously associated juvenile canopy species including *Alectryon oleifolius* ssp*. elongatus, Acacia excelsa, Alectryon diversifolius* (Scrub Boonaree)*, Eucalyptus populnea* and infrequent **Opuntia tomentosa* (Velvet Prickly Pear) and *Callitris glaucophylla* (White Cypress Pine). The low shrub layer was generally absent or represented by a very sparse distribution of regenerating tall shrub layer species.

Ground layer: The mid-dense ground layer in both the remnant and non-remnant patches was dominated generally by native grasses including *Aristida calycina* var*. praealta* (Dark Wiregrass), *Chloris divaricata* (Slender Chloris), *Bothriochloa bladhii* (Forest Bluegrass), *Heteropogon contortus* (Bunched Speargrass), *Sida spp.* (Sida), *Calotis spp.* (burr daisies) and *Einadia nutans* var. *nutans* (no common name). Introduced species such as **Verbena aristega* (Mayne's Pest), **Urochloa mosambicensis* (Sabi Grass) and **Megathyrsus maximus* var*. maximus* (Guinea Grass) were also locally common.

Photo 4-1: RE 11.3.2 – *Eucalyptus populnea* woodland on alluvial plains

Condition: RE 11.3.2 was identified primarily as remnant vegetation including narrow patches restricted to shallowly incised overflow channels immediately adjacent to more intact stands of RE 11.3.25. Two distinct patches of stand-alone, remnant, RE 11.3.2 were identified. Weed incursion was generally limited to the ground layer in the form of a dense cover of **V. aristega* and **M. maximus var. maximus.* The shrub layer generally supported occasional **Opuntia tomentosa* (Velvety Tree Pear), a class 2 pest under the *Land Protection (Pest and Stock Route Management) Act 2002.* The remnant occurrences of this RE had evidence of historic thinning, however due to cattle exclusion they were all in moderate condition.

Remnant status: One homogeneous polygon of remnant RE 11.3.2 was regionally mapped within the Study Area (Environmental Protection Agency 2005). Remnant RE 11.3.2 occurred only as a minor component of heterogeneous polygons in which RE 11.3.25 and/or 11.3.4 were dominant. Homogeneous polygons of RE 11.3.2 were defined in the Study Area during field verification and consisted of remnant vegetation that was generally contiguous with broader areas of RE 11.3.25 and/or 11.3.4. One patch of non-remnant RE 11.3.2 (that was close to remnant status) was identified in association with RE 11.9.5.

Conservation status: RE 11.3.2 is listed as 'Of concern' under the VM Act, and has a biodiversity status of 'Of concern'. This RE is not consistent with a Threatened ecological community listed under the EPBC Act.

RE 11.3.4 *Eucalyptus tereticornis* and/or *Eucalyptus spp.* tall woodland on alluvial plains

RE 11.3.4 consisted of *Eucalyptus tereticornis* (Queensland Blue Gum) open-forest to woodland on Quaternary alluvial systems (Land Zone 3). This RE is difficult to discern from RE 11.3.25 in the field which occurred from the channel floor to the high banks as well as in

overflow channels and floodplain depressions. No detailed secondary vegetation assessment sites were performed within this RE.

Canopy: *Eucalyptus tereticornis* generally dominated the canopy with associated *Eucalyptus populnea, Corymbia tessellaris* (Carbeen) and *Eucalyptus crebra* (Narrow-leaved Red Ironbark) occurring occasionally to frequently, and *Callitris glaucophylla* common at only some sites. The sparse canopy possessed a median height range of 19 to 21 m (see Photo 4-2). The sparse sub-canopy possessed a variable composition of juvenile canopy species and possessed a median height range of 12 to 13 m.

Photo 4-2: RE 11.3.4 – *Eucalyptus tereticornis* and/or *Eucalyptus spp.* tall woodland on alluvial plains

Mid-stratum: The mid stratum was generally absent and limited to isolated occurrences of variously juvenile canopy species in addition to *Alectryon diversifolius*, *Alectryon oleifolius* ssp*. elongatus*, *Acacia spectabilis* (Glory Wattle)*, Acacia semirigida* (Stony-ridge Wattle), *Acacia decora* (Pretty Wattle) and *Eremophila mitchellii*.

Ground layer: The ground layer was variable in composition across the sample sites, however was dominated generally by the introduced pastoral grasses **Megathyrsus maximus var. maximus* (Guinea Grass), **Chloris gayana* (Rhodes Grass) and **Urochloa mosambicensis.* Native groundcovers including *Aristida* spp*., Eragrostis* spp*.* (lovegrasses), *Chloris divaricata*, *Einadia nutans* var*. nutans, Atriplex muelleri* (Annual Saltbush), *Lomandra* spp*.* and *Austrostipa ramosissima* (Slender Bamboo Grass).

Condition: Although located in road reserves, RE 11.3.4 in the Study Area was used for pulse-grazing and other general farm maintenance activities such as mid-stratum/sub-canopy 'thinning', timber-getting and mechanical compaction or aeration appear to have occurred. Given this the canopy is moderately discontinuous and the overall condition of the RE is poor.

Remnant status: Two areas of RE 11.3.4 were defined during field verification and mapped as distinct units separate from the associated cohort, but both associations failed to satisfy the criteria for remnant status.

Conservation status: RE 11.3.4 is listed as "Of concern" under the VM Act, and has a biodiversity status of "Of concern". This RE is not consistent with a Threatened ecological community listed under the EPBC Act.

RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines

RE 11.3.25 consisted of *Eucalyptus tereticornis* (Queensland Blue Gum) open-forest to woodland on Quaternary alluvial systems (Land Zone 3). RE 11.3.25 in the Study Area was dominated by *Eucalyptus tereticornis* and occurred as remnant vegetation along several small tributaries of Eleven Mile Creek, including Wallan Creek. RE 11.3.25 occurred from the channel floor to the high banks as well as in overflow channels and floodplain depressions.

Canopy: *Eucalyptus tereticornis* dominated the canopy with associated *Angophora floribunda* (Rough-barked Apple) and *Eucalyptus populnea* occurring occasionally to frequently, and *Callitris glaucophylla* common at only some sites. No *Eucalyptus camaldulensis* (River Red Gum) was identified in the Study Area. The canopy possessed a median height range of 18 to 27 m (see Photo 4-3). The low tree layer was dominated primarily by juvenile canopy species and possessed a median height range of 12 to 15 m.

Photo 4-3: RE 11.3.25 – *Eucalyptus tereticornis* woodland fringing drainage lines

Mid-stratum: The very sparse mid stratum comprised of scattered *Melaleuca viminalis* (Weeping Bottlebrush) and *Leptospermum polygalifolium* (Wild May) on the banks of the main channel and juvenile canopy species on and slightly beyond the high bank. Numerous isolated *Acacia* spp. (wattle) were recorded and included *Acacia julifera* ssp. *julifera* (no common name), *Acacia blakei* ssp. *blakei* (Blake's Wattle) and *Acacia semilunata* (no common name).

Ground layer: The ground layer was variable in composition in the Study Area. Upper banks and terraces were dominated generally by the introduced pastoral grasses **Megathyrsus maximus* var*. maximus* and/or **Chloris gayana*, with *Aristida* spp., *Chloris divaricata*, *Lomandra longifolia* (Spiny-headed Mat-Rush), *Enchylaena tomentosa*, **Verbena aristega, Einadia nutans* var*. nutans, Themeda triandra* (Kangaroo Grass), *Atriplex muelleri* and *Austrostipa ramosissima* occurring occasionally to frequently. The toe of bank and terraces within the channel contained *Phragmites australis* (common reed), *Leptochloa digitata* (Umbrella Cane Grass), *Bothriochloa bladhii*, **Cynodon dactylon* (Couch), *Centipeda minima* (no common name) and/or *Juncus* spp*.* (rushes).

Condition: Given the large number of properties through which the creeks traverse and therefore, the variable land use intent and expansive distribution, RE 11.3.25 possessed a highly variable condition throughout the Study Area. Weed incursion was primarily limited to the ground layer in the form of a dense cover of **Megathyrsus maximus* var. *maximus* and/or **Chloris gayana*, while the shrub layer supported occasional **Opuntia tomentosa, *O. stricta* (Common Prickly Pear) and **Acacia farnesiana* (Prickly Acacia). Large, mature hollow-bearing trees were however present and abundant. Overall the condition of this RE was moderate.

Remnant status: RE 11.3.25 was mapped in large heterogeneous polygons in the Study Area along the larger drainage lines. This RE also occurred as a minor component of heterogeneous polygons in which RE 11.3.2 was the dominant RE. All of the areas currently mapped by EPA as supporting dominant RE 11.3.25 were found to satisfy the criteria for remnant status. Some additional areas of remnant RE 11.3.25 were also defined during field verification.

Conservation status: RE 11.3.25 is listed as 'Not of concern' under the VM Act, but has a biodiversity status of 'Of concern'. This RE is not consistent with a Threatened ecological community listed under the EPBC Act.

RE 11.5.1 Eucalyptus crebra, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii woodland on Cainozoic sand plains/ remnant surfaces

RE 11.5.1 is a prevalent RE, commonly mapped throughout the broader area (Environmental Protection Agency 2005), occurring on soils subject to deep weathering (land zone 5). The proposed pipeline corridor traversed both remnant and non-remnant occurrences of this RE, primarily along the Leichhardt Highway, south of Gurulmundi (see Figure 4-2). The RE possessed a moderately variable composition and intergraded with a number of other REs, including 11.5.1a, 11.5.4, 11.7.7 and 11.7.6.

Canopy: The sparse canopy layer was dominated by *Eucalyptus crebra* and associated *Callitris glaucophylla* and very occasional *Eucalyptus pilligaensis* (Narrow-leaved Grey Box) with a median height range of 12 to 20 m, but is most commonly around 14 m. A sparse sub-canopy layer was dominated by *Eucalyptus crebra* and *Callitris glaucophylla,* with variously

associated *Allocasuarina luehmannii* (Bull Oak), *Acacia blakei* ssp*. blakei, Acacia semilunata* and *Acacia crassa* ssp*. crassa* (Black Wattle) occurring infrequently. The sub-canopy layer possessed a median height of 9 m (see Photo 4-4).

Photo 4-4: ***Eucalyptus crebra, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii* woodland on Cainozoic sand plains/remnant surfaces (analogous to RE 11.5.1)**

Mid-stratum: The mid-dense to sparse shrub layer was comprised primarily of *Callitris glaucophylla* and *Allocasuarina luehmannii* and variously associated *Acacia* spp*.,* including *A. spectabilis, A. julifera* ssp*. julifera, A. crassa* ssp*. crassa, A. leiocalyx* ssp*. leiocalyx* (Early-flowering Black Wattle) and *Acacia caroleae* (Carole's Wattle). This tall shrub layer possessed a median height of 5 m. The low shrub layer was dominated by *Leucopogon pleiosperma* (a Beard Heath), *C. glaucophylla, A .luehmannii* and variously associated *Acacia ixiophylla* (Umbrella Wattle), juvenile tall shrub layer wattles and *Acacia triptera* (Spur-Wing Wattle), which has only recently been removed from the Nature Conservation (Wildlife) Regulation 2006 (previously listed as 'Rare'). The low shrub layer possessed a median height of 2 m.

Ground layer: The groundcover layer possessed a sparse cover dominated by *Eriachne mucronata* (Mountain Wanderrie Grass) and *Aristida ramose* (Purple Wiregrass), with *Lomandra* spp*., Eragrostis elongata* (clustered lovegrass), *Entolasia stricta* (Wiry Panic) and *Gahnia aspera* (Saw Sedge) occurring occasionally. **Cenchrus ciliaris* dominated the road edge.

Condition: RE 11.5.1 in the Study Area was moderately ubiquitous, albeit modified through edge effects, potential fire and pulse-grazing pressures and quarrying activities. Due to the depauperate deeply weathered soils, weed incursion was limited to infrequent incursion of **Megathyrsus maximus var. maximus, *Rhynchelytrum repens* (Red Natal Grass) and **Cenchrus ciliaris*.

Remnant status: Large areas of this RE were found to satisfy the criteria for remnant status. Although many other areas were non-remnant (borderline), many could potentially reach remnant status within ten years.

Conservation Status: RE 11.5.1 is listed as "Not of Concern" under the VM Act, and biodiversity status of "No concern at present". This RE is not consistent with any community listed under the EPBC Act.

RE 11.5.1a *Eucalyptus populnea* woodland with *Allocasuarina leuhmanii* low tree layer on Cainozoic sand plains/ remnant surfaces

RE 11.5.1a was a prevalent RE mapped throughout the central extent of the Study Area (Environmental Protection Agency 2005), occurring on soils subject to deep weathering (land zone 5). The proposed pipeline corridor traversed both remnant and non-remnant occurrences of this RE, primarily along the Leichhardt Highway, between Gurulmundi and Dalwogan Road (see Figure 4-2). The RE commonly intergraded with RE 11.5.1.

Canopy: The sparse canopy layer was dominated by *Eucalyptus populnea* and associated *Callitris glaucophylla,* and possessed a median height range of 11 to 15 m, but is most commonly around 13 m. The sparse sub-canopy layer was dominated by *Eucalyptus populnea* and *Callitris glaucophylla,* with variously associated *Eucalyptus crebra, Allocasuarina luehmannii, Alectryon oleifolius* ssp*. elongatus* and *Acacia excelsa* occurring infrequently. The sub-canopy layer possessed a median height range of 7 to 11 m (see Photograph 4-5).

Mid-stratum: The mid-dense to sparse shrub layer comprised primarily *Callitris glaucophylla* and *Allocasuarina luehmannii* and variously associated *Acacia* spp*., Casuarina cristata* (belah), *Geijera parviflora, Psydrax oleifolium, Eremophila mitchellii* and *Eucalyptus populnea*. This mid shrub layer possessed a median height of 4 m. The low shrub layer was sparse to very sparse and of similarly composition. The low shrub layer possessed a median height of 1 m.

Ground layer: The groundcover layer possessed a sparse to mid-dense cover generally dominated by *Aristida spp.*, *Chloris spp., Lomandra spp., Eragrostis sororia* (woodland lovegrass), *Entolasia stricta* (Wiry Panic), *Cheilanthes sieberi* ssp*. sieberi* (Mulga Fern) and *Brunoniella australis* (Blue Trumpet).

Condition: RE 11.5.1a in the Study Area was moderately fragmented within a large proportion of its distribution and tended to grade in an out dominance regularly. Due to the depauperate, deeply weathered soils, weed incursion was limited to infrequent incursion of **Megathyrsus maximus var. maximus, *Rhynchelytrum repens* (Red Natal Grass) and **Cenchrus ciliaris,* which in turn was generally restricted to the roadside edges.

Photo 4-5: ***Eucalyptus populnea*** **woodland with** ***Allocasuarina luehmannii*** **low tree layer on Cainozoic sand plains/remnant surfaces (analogous to RE 11.5.1a)**

Remnant status: Approximately half of the areas of this RE were found to satisfy the criteria for remnant status. Most of the patches that were non-remnant were too narrow and/or fragmented to be regarded as a mappable entity and therefore reach remnant status.

Conservation Status: RE 11.5.1a is listed as "Not of Concern" under the VM Act, and biodiversity status of "No concern at present". This RE is not consistent with any community listed under the EPBC Act.

RE 11.5.4 Eucalyptus crebra, Callitris glaucophylla, Callitris endlicheri, Eucalyptus chloroclada, Angophora leiocarpa woodland on Cainozoic sand plains/remnant surfaces

RE 11.5.4 was infrequently mapped as a marginal component of mixed polygons located throughout the central extent of the Study Area (Environmental Protection Agency 2005). The proposed pipeline corridor traversed only remnant occurrences of this RE, which occurred primarily along the Leichhardt Highway, between Gurulmundi and Myall Park Road, and along Bailey's Road near Gurulmundi (see Figure 4-2). RE 11.5.4 commonly intergrades with RE 11.5.1, RE 11.5.21 and RE 11.7.6. The RE was primarily associated with broad overland drainage corridors within depressions in the broader landscape of deeply weathered sand plains (Land Zone 5). The underlying geology within these drainage corridors is not resultant from Quaternary period alluvial deposition and therefore still aligns with Land Zone 5.

Canopy: The sparse canopy layer possessed a variable composition comprised of *Eucalyptus chloroclada* (Barradine Red Gum), *Callitris glaucophylla, Eucalyptus longirostrata* (Grey Gum), *Eucalyptus crebra*, *Corymbia clarksoniana* (Long-fruited Bloodwood) and/or *Angophora floribunda.* The canopy possessed a median height range of

13 to 22 m, but is most commonly around 13 m. The sparse to mid-dense sub-canopy layer is dominated by *Callitris glaucophylla* and/or *Eucalyptus chloroclada,* with variously associated *Eucalyptus crebra, Allocasuarina luehmannii, Acacia blakei* ssp*. blakei, Acacia shirleyi* (lancewood), *Eucalyptus longirostrata* and *Corymbia tessellaris* occurring infrequently. The sub-canopy layer possessed a median height range of 9 to 13 m (see Photo 4-6).

Photo 4-6: ***Eucalyptus crebra, Callitris glaucophylla, C. endlicheri, Eucalyptus chloroclada, Angophora leiocarpa,* woodland on Cainozoic sand plains/remnant surfaces(deep sands) (analogous to RE 11.5.4)**

Mid-stratum: The mid-dense to sparse shrub layer was comprised primarily of a sparse cover of *Callitris glaucophylla* and *Allocasuarina luehmannii* and variously associated *Acacia spp., Petalostigma pubescens* (Quinine Bush), *Psydrax oleifolium, Acacia excelsa* and/or juvenile canopy species. This tall shrub layer possessed a median height of 4 m. The sparse to very sparse low shrub layer was similarly composed, but possessed a greater prevalence of *Acacia* species. The low shrub layer possessed a median height of 1 m.

Ground layer: The groundcover layer possessed a sparse to mid-dense cover generally dominated by exotic grasses, primarily due to the influence of water and included **Megathyrsus maximus var. maximus, *Hyparrhenia rufa* (Thatch Grass) and **Rhynchelytrum repens*. Other species recorded included *Heteropogon contortus, Eragrostis spp., Aristida spp.* and *Arundinella nepalensis* (reed grass). The declared Class 2 pest, **Bryophyllum delagoense* (Mother-of-Millions), was prevalent within site this RE in the vicinity of the Gurulmundi township (flora survey point NS_T006).

Condition: RE 11.5.4 in the Study Area was generally restricted to a distribution directly associated with broad overland drainage lines. Despite the depauperate, deeply weathered soils, weed incursion was frequent and included **Megathyrsus maximus* var*. maximus,*

**Rhynchelytrum repens, *Hyparrhenia rufa, *Bryophyllum delagoense, *Opuntia tomentosa* and **Opuntia stricta*.

Remnant status: All of the identified areas of this RE were found to satisfy the criteria for remnant status, though some may be too narrow to be considered a mappable entity despite being contiguous with similar vegetation beyond the extent of the investigation area.

Conservation Status: RE 11.5.4 is listed as "Not of Concern" under the VM Act, and biodiversity status of "No concern at present". This RE is not consistent with any community listed under the EPBC Act.

RE 11.5.21 Corymbia bloxsomei+/- Callitris glaucophylla, Eucalyptus crebra +/- Angophora leiocarpa woodland on Cainozoic sand plains/remnant surfaces

RE 11.5.21 was frequently mapped as a sub-dominant component of mixed polygons located throughout the central extent of the Study Area (Environmental Protection Agency 2005). The proposed pipeline corridor traversed through three remnant occurrences of this RE, which occurred between Gurulmundi Road and Bailey's Road near Gurulmundi (see Figure 4-2). The RE commonly intergrades with RE 11.5.1, RE 11.5.4 and RE 11.7.6. The RE was primarily associated with deeply weathered sand plains (Land Zone 5).

Canopy: The sparse canopy layer was dominated by *Angophora leiocarpa* and/or *Eucalyptus crebra,* with *Corymbia clarksoniana* and *Callitris glaucophylla* occurring sporadically. The canopy layer possessed a median height range of 14 to 20 m, but was most commonly around 13 m. The sparse to mid-dense sub-canopy layer was dominated by *Callitris glaucophylla* and/or *Eucalyptus crebra,* with variously associated *Angophora leiocarpa, Eucalyptus chloroclada, Acacia blakei* ssp*. blakei, Acacia crassa* ssp*. crassa* and *Corymbia clarksoniana* occurring infrequently. The sub-canopy layer possessed a median height range of 10 to 15 m (see Photo 4-7). A low tree layer dominated by *Callitris glaucophylla* was prevalent within taller occurrences of this RE.

Mid-stratum: The sparse tall shrub layer was comprised primarily of a sparse cover of *Petalostigma pubescens* (Quinine Bush), *Acacia spectabilis, Acacia crassa* ssp*. crassa, Acacia blakei* ssp*. blakei, Callitris glaucophylla, Allocasuarina luehmannii* and/or juvenile canopy species. This tall shrub layer possessed a median height of 4 m. The sparse to very sparse low shrub layer was similarly composed, but possessed a greater prevalence of *Acacia spectabilis* and *Acacia conferta* (Crowded-leaf Wattle). The low shrub layer possessed a median height of 1 m.

Ground layer: The groundcover layer possessed a sparse cover generally dominated by *Aristida caput-medusae* (Many-headed Wiregrass), *Aristida ramosa* and *Lomandra* species.

Condition: RE 11.5.21 in the Study Area was generally devoid of weeds, due to the depauperate, deeply weathered soils. Occasional **Rhynchelytrum repens* was encountered in close proximity to the road edge.

Remnant status: All of the identified areas of this RE were found to satisfy the criteria for remnant status.

Conservation Status: RE 11.5.21 is listed as "Not of Concern" under the VM Act, and biodiversity status of "No concern at present". This RE is not consistent with any community listed under the EPBC Act.

Photo 4-7: ***Corymbia bloxsomei +/- Callitris glaucophylla +/- Eucalyptus crebra +/- Angophora leiocarpa*** **woodland on Cainozoic sand plains/remnant surfaces (analogous to RE 11.5.21)**

RE 11.7.2 *Acacia spp.* woodland on lateritic duricrust. Scarp retreat zone

RE 11.7.2 has been mapped as a marginal component of mixed polygons located throughout the southern extent of the Study Area (Environmental Protection Agency 2005). The proposed pipeline corridor traversed through three potentially remnant occurrences of this RE between Geary's Road and the Warrego Highway to the east of Miles township (see Figure 4-2). The RE commonly intergrades with 11.7.4 and 11.7.7 and is associated with inclined slopes on lateritic duricrust (Land Zone 7). One of the occurrences located at the western end of Geary's Road was potentially an augmented community resulting from ongoing timber thinning, and may have historically been analogous with RE 11.7.4.

Canopy: In the eastern two occurrences of the RE, the mid-dense canopy layer was dominated by *Acacia shirleyi,* with *Eucalyptus pilligaensis, Eucalyptus crebra* and/or *Eucalyptus fibrosa* ssp*. nubila* (Blue-leaved Ironbark) occurring sporadically. The canopy layer was the ecologically dominant layer and possessed a median height range of 12 to 14 m (see Photo 4-8).

The emergent tree layer in the patch at the western end of Geary's Road was dominated by isolated specimens of *Eucalyptus exserta* (Queensland Peppermint), *Acacia aprepta* (Miles Mulga) and sporadic *Corymbia trachyphloia* ssp*. trachyphloia* to 11 m (median height of 8.5 m) (see Photo 4-9).

Photo 4-8: *Acacia spp.* woodland on lateritic duricrust. Scarp retreat zone (analogous to RE 11.7.2)

Photo 4-9: 11.7.4 at the western end of Gearys Road that may represent modified RE 11.7.4

Mid-stratum: The very sparse tall shrub layer is dominated by juvenile *Acacia shirleyi* and possessed a median height range of 2 to 6 m.

The patch at the western end of Geary's Road had a sparse to mid-dense tall shrub layer possesses a median height of 5 m and was dominated by *A. aprepta* and suppressed *E. exserta* and *Amyema quandang* var*. bancroftii* (Grey Mistletoe). This layer represented the ecologically dominant layer. The very sparse low shrub layer possesses a median height of 0.75 m and is comprised of *Leucopogon pleiosperma*, *A. aprepta* and sporadic *E. exserta*.

Ground layer: The groundcover layer possessed a sparse to very sparse cover dominated by *Aristida caput-medusae* (Many-headed Wiregrass), *Aristida ramosa, Neurachne munroi* (no common name), *Hibiscus sturtii* (Hill Hibiscus), *Aristida jerichoensis* (Jericho wiregrass), *Solanum* spp*.* (Potato Weeds) and *Entolasia stricta.*

The patch at the western end of Geary's Road had a sparse groundcover layer with a low diversity dominated by *Aristida jerichoensis* (Jericho Wiregrass), with *Trachymene incisa* (Wild Parsnip) and *Cheilanthes sieberi* ssp*. sieberi* (Mulga Fern) occurring occasionally. Surface lateritic duricrust/rubble occurred commonly throughout the community.

Condition: RE 11.7.2 in the Study Area was generally devoid of weeds, due to the depauperate, deeply weathered soils, poor light penetration due to the mid-dense cover and deep leaf litter resultant of the mid-dense cover provided by the upper strata. A marked amount of fallen timber was identified on ground, with most logs appearing to belong to a similar age cohort. These logs may be the result of selective thinning or naturally fallen senescent, mature trees.

The patch at the western end of Geary's Road was contiguous with a large expanse of similarly composed remnant vegetation to the south. This patch had extensive fallen timber. As such, this patch may represent a modified RE 11.7.4 formerly dominated by *Eucalyptus fibrosa* ssp*. nubila* (Blue-leaved Ironbark), *Eucalyptus tenuipes* (Narrow-leaved White Mahogany), *Callitris glaucophylla* and *Corymbia trachyphloia* ssp*. trachyphloia* (Brown Bloodwood (species prevalent as throughout the surrounding vegetation). The fallen timber consists primarily of *Acacia aprepta* which may form homogenous shrublands (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002b) and recruitment of the aforementioned canopy species was absent.

Remnant status: All of the identified areas of this RE were found to satisfy the criteria for remnant status.

Conservation Status: RE 11.7.2 is listed as "Not of Concern" under the VM Act, and biodiversity status of "No concern at present". This RE is not consistent with any community listed under the EPBC Act.

RE 11.7.4 Eucalyptus decorticans and/or Eucalyptus spp., Corymbia spp., Acacia spp., Lysicarpus angustifolius on lateritic duricrust

RE 11.7.4 was mapped frequently as a dominant component of mixed polygons located throughout the southern extent of the Study Area (Environmental Protection Agency 2005). The proposed pipeline corridor traversed through three remnant and one non-remnant occurrence of this RE, between Geary's Road and the Warrego Highway to the east of Miles (see Figure 4-2). The RE commonly intergraded with 11.7.2 and 11.7.7 and was associated with inclined slopes on lateritic duricrust (Land Zone 7).

Canopy: The sparse to mid-dense canopy layer was of variable composition including *Corymbia trachyphloia* ssp*. trachyphloia*, *Eucalyptus crebra, Callitris glaucophylla, Acacia shirleyi, Eucalyptus tenuipes*, *Lysicarpus angustifolius* (Budgeroo) and/or *Eucalyptus fibrosa* ssp*. nubila*. The canopy layer possessed a median height range of 10 to 14 m (see Photo 4-10). The low tree layer was sparse and of similarly in composition to the upper canopy, however also comprised *Acacia blakei ssp. blakei* and/or *Acacia aprepta* (Miles Mulga). The low tree layer possessed a median height range of 8 m.

Photo 4-10: ***Eucalyptus decorticans* and/or *Eucalyptus spp., Corymbia spp., Acacia spp., Lysicarpus angustifolius* on laterised duricrust (analogous to RE 11.7.4)**

Mid-stratum: The very sparse tall shrub layer is dominated by juvenile *Acacia spp.* and possessed a median height range of 4 to 6 m.

Ground layer: The groundcover layer possessed a sparse to very sparse cover dominated by *Aristida caput-medusae* (Many-headed Wiregrass), *Gahnia aspera, Schoenus kennyi* (a bog rush), *Aristida ramosa, Neurachne munroi* (no common name), *Solanum spp.* (potato weeds) and *Entolasia stricta.*

Condition: RE 11.7.4 in the Study Area was generally devoid of weeds, due to the depauperate, deeply weathered soils, moderate leaf litter and dominance of native groundcover species. A large amount of fallen timber was also present. The non-remnant occurrence located within the road reserve of the Warrego Highway had been fragmented by the construction of fenceline firebreaks and construction of a high-voltage powerline and associated access tracks. Weed incursion was prevalent.

Remnant status: Half of the identified areas of this RE were found to satisfy the criteria for remnant status and are part of broader distribution of contiguous remnant vegetation.

Conservation Status: RE 11.7.4 is listed as "Not of Concern" under the VM Act, and biodiversity status of "No concern at present". This RE is not consistent with any community listed under the EPBC Act.

RE 11.7.6 Corymbia citriodora ssp. variegata or Eucalyptus crebra woodland on lateritic duricrust

RE 11.7.6 was mapped throughout the central extent of the Study Area (Environmental Protection Agency 2005) and the proposed pipeline corridor traversed multiple patches of this vegetation type (see Figure 4-2). The RE commonly intergrades with 11.5.21 and 11.10.1.

RE 11.10.1 is of very similar composition and structure to RE 11.7.6, however occurs on coarse-grained sedimentary rocks that have not undergone deep weathering (Land Zone 10). Although 11.10.1 may occur in the Study Area, it can not be distinguished from RE 11.7.6 in the field since the geological mapping (1:250,000, Bureau of Mineral Resources Geology and Geophysics 1971a) does not adequately distinguish the extent of deep weathering.

Canopy: The sparse to mid-dense canopy layer was dominated by *Corymbia citriodora* ssp*. variegata* (Spotted Gum) and associated *Eucalyptus crebra* and *Callitris glaucophylla,* and possessed a median height range of 14 to 21 m. *Corymbia citriodora* spp*. variegata* occurred as emergent layer to 30 m in some patches. The sparse sub-canopy layer was dominated by *Callitris glaucophylla* and *Corymbia citriodora* ssp*. variegata,* with variously associated *Eucalyptus crebra, Allocasuarina luehmannii, Acacia crassa* ssp*. crassa* and *Acacia shirleyi* occurring infrequently. The sub-canopy layer possessed a median height range of 10 to 14 m (see Photo 4-11). The low tree layer was similarly composed.

Mid-stratum: The sparse shrub layer was comprised primarily of *Callitris glaucophylla, Acacia crassa ssp. crassa* and *Allocasuarina luehmannii,* with variously associated *Acacia spp.* and juvenile canopy species occurring sporadically. This tall shrub layer possessed a median height of 4 m. The sparse to very sparse low shrub layer was similarly composed. The low shrub layer possessed a median height of 1 m.

Ground layer: The groundcover layer possessed a sparse cover generally dominated by *Aristida* spp., *Chloris spp., Lomandra* spp*., Entolasia stricta, Cheilanthes sieberi* ssp*. sieberi* and *Gahnia aspera*.

Condition: RE 11.7.6. in the Study Area was relatively intact and contiguous with broader areas of remnant vegetation. Due to the depauperate, deeply weathered soils, weed incursion was limited to very infrequent incursions of **Megathyrsus maximus* var*. maximus,* which in turn was generally restricted to the roadside edges.

Remnant status: All of the areas of this RE were found to satisfy the criteria for remnant status.

Conservation Status: RE 11.7.6 is listed as "Not of Concern" under the VM Act, and biodiversity status of "No concern at present". This RE is not consistent with any community listed under the EPBC Act.

Photo 4-11: *Corymbia citriodora ssp. variegata* or *Eucalyptus crebra* woodland on lateritic duricrust (analogous to RE 11.7.6)

RE 11.7.7 Eucalyptus fibrosa ssp. nubila +/- Corymbia spp. +/- Eucalyptus spp. woodland on lateritic duricrust

RE 11.7.7 was mapped throughout the southern extent of the Study Area (Environmental Protection Agency 2005). The proposed pipeline corridor traversed multiple remnant occurrences of this RE, primarily along the Leichhardt Highway, between Geary's Road and south of Mount Myrtle Road, and between Geary's Road and the Warrego Highway (see Figure4-2). The RE intergraded with 11.5.1, 11.7.2, 11.7.4, 11.7.6 and 11.10.1.

Canopy: The sparse to mid-dense canopy layer was dominated by *Eucalyptus fibrosa* ssp*. nubila* and variously associated *Eucalyptus crebra*, *Callitris glaucophylla, Angophora leiocarpa* and *Acacia shirleyi,* and possessed a median height range of 14 to 22 m (most commonly around 14 m). The sparse sub-canopy layer was dominated by *Callitris glaucophylla, Acacia shirleyi* and/or *Eucalyptus fibros* ssp*. nubila,* with variously associated *Eucalyptus exserta* occurring infrequently. The sub-canopy layer possessed a median height range of 9 to 17 m (see Photo 4-12).

Mid-stratum: The sparse to very sparse tall shrub layer was variously comprised primarily of *Callitris glaucophylla, Acacia crassa* ssp*. crassa, Allocasuarina luehmannii,* juvenile canopy species, *Petalostigma pubescens*, *Acacia semilunata, Santalum lanceolatum* (Sandalwood) and/or *Acacia conferta*. This tall shrub layer possessed a median height of 4m. The sparse to very sparse low shrub layer was dominated by *Acacia* spp*.*, particularly *Acacia ixiophylla, Dodonaea triangularis* (a hop bush), *Leucopogon pleiosperma* and/or *Boronia glabra* (Sandstone Boronia). The low shrub layer possessed a median height of 1 m.

Photo 4-12: ***Eucalyptus fibrosa ssp. nubila +/- Corymbia spp +/- Eucalyptus spp.*** **woodland on lateritic duricrust (analogous to RE 11.7.7)**

Ground layer: The groundcover layer possessed a sparse cover generally dominated by *Aristida* spp., *Chloris* spp*., Lomandra* spp*., Entolasia stricta Cheilanthes sieberi* ssp*. sieberi, Neurachne munroi* and *Gahnia aspera*.

Condition: RE 11.7.7 in the Study Area was relatively intact and contiguous with broader areas of remnant RE. Due to the depauperate, deeply weathered soils, weed incursion was limited to very infrequent incursion of **Megathyrsus maximus var. maximus* and **Opuntia tomentosa.*

Remnant status: All of the areas of this RE were found to satisfy the criteria for remnant status.

Conservation Status: RE 11.7.7 is listed as "Not of Concern" under the VM Act, and biodiversity status of "No concern at present". This RE is not consistent with any community listed under the EPBC Act.

RE 11.9.5 *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks

RE 11.9.5 *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks (Land Zone 9) occurred infrequently as non-remnant vegetation within the Study Area (see Figure 4-2). Remnant patches of this RE were recorded within the Study Area along Giligulgul Road and along the Leichhardt Highway. Several small areas of non-remnant 11.9.5 were also defined during the field verification within the central and northern extents of the Study Area, with these occurring primarily as sparse to mid-dense, mid-mature regrowth and low fragmented regrowth within respective road reserves. RE 11.9.5 also occurred in private landholdings in small fragmented patches of regrowth consisting of retained woodlots, cattle camps or stunted shrubby regrowth in ploughed paddocks. Access

to some properties between Fosters Road and Giligulgul was not possible during the winter survey period and have therefore been inferred from EPA mapping (2005) and satellite imagery interpretation. These areas will be verified during subsequent seasonal surveys.

Canopy: *Acacia harpophylla* and *Casuarina cristata* dominated the canopy, with associated *Brachychiton rupestris* and *Eucalyptus populnea* occurring infrequently and generally restricted to the periphery of the community. The highly variable median height possessed a range of 8 to 16 m (see Photo 4-13 and 4-14).

Mid-stratum: Due to the broad canopy height range of this RE, the mid- stratum was found to be dominated either by juvenile canopy species or comprised of *Alectryon diversifolius* and *Geijera parviflora*, with associated *Apophyllum anomalum* (Warrior Bush), *Psydrax oleifolium, Santalum lanceolatum, Capparis mitchellii*, *Lysiphyllum carronii* and/or *Elaeodendron australe* var*. integrifolium.* The low shrub layer, where present, was generally dominated by *G. parviflora, Capparis lasiantha* (Nipan)*, Jasminum didymium* ssp*. racemosum* (no common name) and/or *Carissa ovata.*

Ground layer: The sparse ground layer was limited by the presence of a mid-dense to dense leaf litter. It was dominated by *Chloris divaricata, Enteropogon acicularis* and **Cenchrus ciliaris,* with associated *Einadia* spp*., Paspalidium caespitosum* (Brigalow Shot Grass), *Rhagodia gaudichaudiana*, *Tetragonia tetragonoides, Salsola kali* and **Emex australis* (Spiny Emex).

Condition: This community consisted primarily of regrowth *A. harpophylla*, with evidence of thinning and use by cattle on private landholdings and in some cases within the road reserve. Small patches showed evidence of degradation from edge effects and *Amyema spp.* (mistletoes) were occasionally prevalent within the upper strata. Mature **Opuntia tomentosa* were encountered commonly within this vegetation type.

Remnant status: Only four field-mapped polygons of RE 11.9.5 potentially possessed the height, cover and population size characteristics which were favourable for consideration of remnant status. The remainder of field-mapped RE 11.9.5 polygons consisted of regrowth vegetation (most likely of less than fifteen years of age) or fragmented/thinned populations in which the mid-stratum facilitates the ecological dominant layer.

Conservation status: RE 11.9.5 has a VM Act status and EPA biodiversity status of “Endangered”. The VM Act status however only applies to remnant patches of this RE.

Field verification of the EPA mapping (2005) identified one remnant patch of RE 11.9.5 in remnant vegetation mapped as RE 11.9.7 on the southern side of Giligulgul Road.

Remnant RE 11.9.5 is consistent with the Brigalow (*Acacia harpophylla* dominant and co-dominant), an ecological community listed as Endangered under the EPBC Act. The listing of Brigalow (*Acacia harpophylla* dominant and co-dominant) under the EPBC Act does not automatically dismiss non-remnant vegetation, rather age and conditions are determining factors. Brigalow regrowth (non-remnant vegetation) in the Study Area was however of poor quality and generally lacked the species composition and structural elements to be considered part of the Brigalow ecological community that is listed under the EPBC Act (Threatened Species Scientific Committee 2001).

Photo 4-13: Vegetation representative of potentially remnant *Acacia harpophylla* open forest on fine-grained sedimentary rocks (RE 11.9.5)

Photo 4-14: Vegetation representative of non-remnant *Acacia harpophylla* open forest on fine-grained sedimentary rocks (RE 11.9.5)

RE 11.10.7 *Eucalyptus crebra* woodland on coarse-grained sedimentary rocks

RE 11.10.7 has not been mapped regionally within the Study Area (Environmental Protection Agency 2005). A narrow remnant of this RE was however identified through field surveys on Baileys Road to the north of the Gurulmundi Road intersection within a heterogeneous polygon of remnant vegetation consisting of 11.10.1/11.7.2 (90/10%) (see Figure 4-2). This patch was found however, to not contain *Corymbia citriodora ssp. variegata* indicative of 11.10.1.

RE 11.10.7 occurs on coarse-grained sedimentary rocks which have not undergone deep weathering. Two associations of RE 11.10.7 were identified and these relate to subtle changes in the soil characteristics of this geology. A population dominated by *Eucalyptus populnea* occurred on sandy soils with moderate clay content, and tended to *E. crebra* dominated woodland down slope on sandy soils.

Canopy: *Eucalyptus populnea* or *Eucalyptus crebra* dominated the canopy layers, with *Callitris glaucophylla* occurring infrequently. The sparse canopy layer possessed a median height range of 11 to 12 m (see Photo 4-15 and Photo 4-16). The sparse sub-canopy was similarly composed with a median height of 9 m.

Mid-stratum: The sparse to very sparse tall shrub layer possessed a median height of 4 m and was dominated by *Callitris glaucophylla,* with associated *Psydrax oleifolium*, *Owenia acidula* (Emu Apple), *Atalaya hemiglauca* (Whitewood), *Eremophila mitchellii, Allocasuarina luehmannii, Geijera parviflora* and/or *Eucalyptus populnea* occurring infrequently. The sparse low shrub layer is dominated by *Acacia decora, Alphitonia excelsa* and associated juvenile upper strata species. The low shrub layer possessed a median height range of 1 to 2 m.

Ground layer: The ground layer was generally dominated by a mid-dense cover of native grasses and herbs including *Aristida* spp*., Chloris* spp*., Panicum* spp*., Dichanthium sericeum* (Queensland Bluegrass), *Calotis* spp*.* and *Heteropogon contortus*.

Condition: This vegetation type was generally narrowly distributed, subject to edge effects and appeared stressed by recent dry weather. Weed incursion was low and juvenile recruitment was present through all strata. There was no evidence of recent timber felling or cattle grazing.

Remnant status: This community satisfied the height, area and cover requirements to be considered as remnant vegetation by the EPA.

Conservation status: RE 11.10.7 has a VM Act and EPA biodiversity status of “Not of Concern” and “No concern at present” respectively. This RE is not consistent with any community listed under the EPBC Act.

Photo 4-15: *Eucalyptus crebra* woodland on coarse-grained sedimentary rocks (analogous to RE 11.10.7) – *E. crebra* dominant

Photo 4-16: *Eucalyptus crebra* woodland on coarse-grained sedimentary rocks (analogous to RE 11.10.7) – *E. populnea* dominant

4.4.1 Cleared areas

The majority of northern extent of the Study Area consisted of cleared or highly disturbed vegetation (non-remnant) (refer Figure 4-2) that is no longer analogous with a RE and generally represented open pastoral expanses or degraded road reserves dominated by pastoral grasses (see Photo 4-17 and 4-18).

Canopy: Within the northern extent of the Study Area, isolated, small patches of woodland and individual paddock trees occurred that aligned generally with canopy trees that would have historically dominated the landscape. A preference for the retention of *Brachychiton rupestris* (Queensland Bottle Tree) was observed.

Mid-stratum: The mid stratum was generally absent, or limited to small clumps of regrowth *Acacia harpophylla* and/or *Santalum lanceolatum, Alectryon diversifolius, Atalaya hemiglauca, Capparis lasiantha* (Nipan) and *Geijera parviflora* to 5 m in height (median height of 2.5 m).

Ground layer: The ground layer provided the predominant vegetative cover throughout the cleared areas and, where not overgrazed, was dominated by **Cenchrus ciliaris* (Buffel grass). Areas subjected to continual overgrazing were found to support a range of species from the Asteraceae, Malvaceae and Chenopodiaceae families and included *Sclerolaena* spp., *Sida* spp. **Malvastrum* spp., *Einadia* spp., *Vittadinia* spp., *Calotis* spp., *Enchylaena tomentosa, *Gamochaeta* spp. and *Salsola kali.* Native grasses such as *Dichanthium sericeum* (Queensland Bluegrass), *Bothriochloa* spp., *Chloris* spp., *Enteropogon* spp. and *Aristida* spp. were locally prominent in some areas but were generally suppressed by **Cenchrus ciliaris*.

Remnant status: Cleared areas are not analogous with any described regional ecosystem. Although *Dichanthium sericeum* was present in some areas, the ecological condition of the cleared areas in the Study Area was poor (dominated by **Cenchrus ciliaris* and other exotic species) and not consistent with the any of the grassland dominated REs that occur in the region (i.e. RE 11.3.21, 11.3.31, 11.4.4, 11.4.11, 11.9.3, 11.9.12 or 11.11.17).

Conservation status: Cleared areas identified as non-remnant vegetation are not subject the provisions of the VM Act. The cleared areas in the Study Area are also in poor (ecological) condition and are not consistent with the Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South) ecological community listed under the EPBC Act.

4.4.2 Inconsistencies in RE mapping

No changes were made to the extent of remnant vegetation defined by the EPA RE mapping (2007). Regrowth (non-remnant) vegetation south of Giligulgul was however surveyed, mapped based on aerial photography and aligned to an RE description as non-remnant vegetation where possible.

The RE type of much of the remnant vegetation defined by the EPA RE mapping (2005) was however changed based on the surveys undertaken for this assessment. Most changes to the RE mapping type involved delineating homogeneous polygons within large heterogeneous polygons to provided more accurate calculations of the extent of each RE that will be impacted by the proposal. These changes are illustrated in detail in Appendix E.

Photo 4-17: Cleared vegetation (paddock)

Photo 4-18: Cleared vegetation (road reserve)

4.5 Species of plant

Searches of relevant databases identified records of 1,082 species of plant in the Study Area and surrounds consisting of 983 native species (see Attachment B). The high floral diversity is indicative of the numerous REs and habitat types traversed by the Study Area. Field surveys undertaken for this assessment identified 351 species of plant in the Study Area, of which 322 (91.7%) are native (see Attachment E). The most diverse families included the grasses (*Poaceae*), daises (*Asteraceae*), wattles (*Mimosaceae*) and eucalypts (*Myrtaceae*).

No Threatened species of plant was recorded in the Study Area during the winter survey. Four priority taxa species of plant for the Brigalow Belt South (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a) were recorded however in the Study Area: *Acacia melvillei* (Yaran), *Acacia omalophylla* (Yarran), *Acacia aprepta* (Miles Mulga) and *Dodonaea macrossanii* (no common name). *Acacia melvillei* and *A. omalophylla* were relatively common in RE 11.7.2 and also occurred in RE 11.7.4. *Acacia aprepta* was recorded at several locations only in RE 11.7.2. *Dodonaea macrossanii* was recorded at one location only in RE 11.7.7.

Three species recorded in the Study Area are 'declared plants' listed under the *Land Protection (Pest and Stock Route Management) Act 2002* (see Table 4-2), all listed as Class 2 pests. Class 2 pests are species established in Queensland that have, or could have, an adverse economic, environmental or social impact. The management of these pests requires coordination and they are subject to programs led by local government, community or landowners. Both of the **Opuntia* species were found to occur in most REs, but were most commonly found within vegetation representative of RE 11.9.5. The distribution of **B. delagoense* was restricted to a small distribution of RE 11.5.21 within L Tree Creek, in the vicinity of Gurulmundi. None of the species were found to occur as a dominant species.

Table 4-3 Declared plants recorded in the Study Area

Species	Common name	Class
**Bryophyllum delagoense*	*Mother-of-Millions*	2
**Opuntia stricta*	*Prickly Pear*	2
**Opuntia tomentosa*	*Velvet Tree Pear*	2

Several other exotic species are known from the region but were not recorded. Proposed seasonal surveys would be more likely to detect herbaceous and graminoid species if present, particularly **Parthenium hysterophorus* (Parthenium Weed) which is also a Class 2 pest.

4.6 Fauna habitats

Seven broad fauna habitat types exist within the Study Area: dry eucalypt forest, eucalypt woodlands, Acacia scrub (Lancewood and Miles Mulga), Acacia-Belah scrub (i.e. Brigalow), riparian (Queensland Blue Gum), cleared lands and wetlands (natural or artificial). These fauna habitats are broad groupings of the vegetation types/RE's present within the Study Area (see Table 4-4 and Section 4.2). Each broad habitat type is discussed below using site specific data where appropriate.

Table 4-4 Fauna habitats and EPA RE correspondence

Habitat type	EPA RE code
Dry eucalypt forest	RE 11.5.1, RE 11.5.1a, RE 11.5.4, RE 11.5.21, RE 11.7.6, RE 11.7.4, RE 11.10.1, RE 11.10.7
Eucalypt woodland	RE 11.3.2, RE 11.3.4, RE 11.7.7,
Acacia scrub	RE 11.7.2
Acacia harpophylla and/or *Casuarina cristata* scrub	RE 11.9.5
Riparian	RE 11.3.25
Wetland (artificial and natural)	Does not correspond with any RE
Cleared land	Everything not mapped as RE

4.6.1 Dry eucalypt forest

Dry Eucalypt Forest was largely distributed throughout the central extent of the Study Area from Baileys Road, Gurulmundi south to about Dalwogon. This habitat typically occurred as remnant vegetation growing on sandy plains from deeply weathered sand stone. Standard trapping sites 1 and 2 were established in this habitat as were a number of the supplementary sites (see Table 1, Attachment F).

The structure varied across the habitat type according to the dominant vegetation community, management regime (e.g. logging, clearing, grazing intensity) and community age (see Table 1, Attachment F). Dry Eucalypt Forests typically varied in height from 12 to 18 m, with scattered occurrences of *Eucalyptus crebra* reaching heights of 25 m. The crown cover was moderately dense (30–35%) and contained a sparse mid stratum (<10–20%) of *Callitris glaucophylla*, *Acacia luehmannii*, *Corymbia citriodora* ssp*. variegata* and other regenerating overstorey species.

In some more senescent stands, hollow bearing trees were estimated at densities up to 8 trees per hectare with an overall average somewhere closer to 1 to 3 trees per hectare. At most sites the hollows recorded were small (<5 cm opening), occasionally medium (5–15 cm) and seldom large (>15 cm) and provided a range of trunk and limb hollows suitable for bats, gliders, arboreal reptiles (geckos, monitors, and snakes), possums and larger birds including parrots and cockatoos.

At the time of survey the *Corymbia citriodora* ssp*. variegata*, some *Eucalyptus crebra* and the occasionally occurring *Eucalyptus chloroclada* and *Eucalyptus tereticornis* in this habitat were also flowering. Together they provided some seasonal foraging opportunities for many

of the sedentary, nomadic and migratory honeyeaters recorded or likely to occur in the Study Area (e.g. Painted Honeyeater, *Grantiella picta*).

The groundcover was somewhat variable and was comprised largely of litter (25-60%), vegetation (15-40%), log cover (5-15%) and base soil (5-20%). In some areas to the south of Gurulmundi, surface rock provided sheltering habitat for fauna and in these areas rock cover was estimated at around 10%. Some litter specialist species including the Threatened Death Adder (*Acanthophis antarcticus*) may occur in standard trapping sites 1 and 2 due in part to the obvious lack of site disturbance. This habitat provided an important resource for species associated with dry forest assemblages, particularly those that require large tracts of forested land with abundant log cover to maintain viable populations (e.g. Common Dunnart, *Sminthopsis murina*). The condition of dry eucalypt forest habitat within the Study Area was variable but was generally considered to be in high condition (refer Table 1, Attachment F).

4.6.2 Eucalypt woodlands

Three broad woodland communities of *Eucalyptus populnea* and Ironbark spp. were identified in the Study Area.

Eucalyptus populnea woodland was distributed from alluvial flats and some undulating rises in the central and southern sections of the Study Area and while moderately variable in composition, it corresponded most closely with RE 11.3.2. Standard trapping Site 4 and a number of targeted techniques were established in this habitat type.

The Ironbark woodland was dominated by *Eucalyptus fibrosa*, *Eucalyptus crebra* and rarely *Eucalyptus melanophloia*. Generally, this habitat type was restricted to the southern Study Area between Gurulmundi and Condamine Power Station to the east of Miles. Supplementary survey sites were established in this habitat as a means to assess its ecological value.

The structure varied across the habitat type according to the dominant vegetation community, management regime (i.e. logging, clearing, grazing intensity) and community age (see Table 1, Attachment F). Woodlands typically varied in height from 12-15m with a sparse crown cover (20%) and often contained a moderately dense (20%) mid stratum of *Callitris glaucophylla* and *Allocasuarina luehmannii*.

Tree hollow resources occurred in varying densities from being almost absent (~1 per hectare) at some regenerating sites (e.g. Gearys Road) to around 6 trees per hectare at sites near Dalwogon. At most sites hollow-bearing trees occurred at an estimated density of 3-4 trees per hectare and provided a range of trunk and limb hollows suitable for bats, gliders, arboreal reptiles (geckos, monitors, snakes), possums and larger birds including parrots and cockatoos.

The groundcover was comprised largely of litter (30-50%) and vegetative cover (15-45%) with rock and log cover varying somewhat depending on local site conditions (see Table 1, Attachment F). The extent of bare soil appears to reflect either grazing intensity or resulted from sheet erosion where dense stands of *Callitris glaucophylla* occurred.

The woodlands were generally devoid of surface water except where they bordered major drainage lines associated with tributaries of Wallan Creek. In these areas the water formed ephemeral pools which could potentially be utilised by frogs that select ephemeral breeding sites. The disturbance regime was largely influenced by the extent of roadside refuse, weed incursion and in adjacent areas timber harvesting and grazing. The condition of eucalypt

woodland habitat within the Study Area was variable and reflected extensive past and current disturbance but was generally considered to be in moderate-high condition (refer Table 1, Attachment F).

4.6.3 Acacia scrub

Acacia scrub habitat was distributed mainly to the north east of Miles along Gearys Road and correspond closely with RE 11.7.2 (see Table 1, Attachment F). Standard trapping Site 5 and a range of targeted surveys were established in this habitat.

At Site 5, this fauna habitat typically contained an over storey of *Acacia aprepta*, *Eucalyptus exserta*), and *Corymbia trachyphloia ssp. trachyphloia* reaching heights of 8.5 m and relatively consistent crown cover (35%). The sub canopy retained the same composition and featured some occasional *Amyema quandang* var*. bancroftii*.

Hollow bearing trees were restricted to the occasional emergent eucalypt and/or *Corymbia* estimated at 1–2 trees per hectare. Hollows were noted in both trunks and limbs of these trees and ranged in size from some small trunk hollows to more commonly encountered small (<5 cm) and medium (5–15 cm) limb hollows considered suitable refuge and breeding habitat for a wide range of fauna including bats, arboreal herpetofauna, gliders, possums and some larger birds including cockatoos, parrots and common owls (e.g. Pacific Barn Owl, *Tyto javanica*).

The groundcover was comprised largely of bare soil (40%), logs (20%) and rocks (20%) with reduced litter (15%) and vegetative cover (<5%) than what occurred in many of the other fauna habitats. The condition of Acacia scrub habitat within the Study Area was generally considered to be in moderate condition as it is a main vegetative component, providing habitat connectivity in an east-west direction to the riparian habitat associated with Dogwood Creek (refer Table 1, Attachment F).

4.6.4 *Acacia harpophylla* and *Casuarina cristata* Scrub

Acacia harpophylla and/or *Casuarina cristata* scrub was largely restricted to the road reserves found in the northern extent of the Study Area. The exception to this was a few isolated and relatively small patches between Nine Mile Creek and Eleven Mile Creek in the southern extent of the Study Area. Further remnant forms of this habitat occurred within road reserves along the Leichhardt Highway (e.g. Nine Mile Creek area), the northern end of Baileys Lane and further to the north near the intersection of Peakes Road and Hansens Road. This habitat typically occurred on a range of soil types, all with deep underlying clays. Standard trapping Site 3 and a number of the supplementary sites were established in this habitat (see Table 1, Attachment F).

In mature stands of this habitat type, hollow bearing trees were typically *Casuarina cristata* and occurred at estimated densities up to 3 trees per ha, but were largely absent in stands that failed to reach heights more indicative of remnant vegetation (i.e. >8-10 m). Generally the hollows recorded were small (<5 cm opening) and occasionally medium (5-10 cm) in size were generally suitable for microbats, small arboreal snakes, arboreal reptiles including geckos.

At the time of survey only the *C. cristata* provided a foraging resource for cockatoos with 20% of stems producing cones suitable for parrots and cockatoos including the Threatened Glossy Black Cockatoo (*Calyptorhynchus lathami*) which has been previously recorded in

the MLA areas during studies for the Wandoan Coal Project. Various Mistletoe species provided nectar resources for fauna including nomadic honeyeaters recorded or likely to occur in the Study Area (e.g. Painted Honeyeater, *Grantiella picta*).

The groundcover was comprised largely of litter (60%) and vegetative cover (20%) with rock and log cover varying somewhat depending on local site conditions (see Table 1, Attachment F). The extent of bare soil was highly variable and appeared to reflect grazing intensity and other past disturbances. None of the sites showed obvious deep cracking areas known to provide suitable refuge habitat for a range of small ground dwelling mammals, reptiles and frogs. Where a sufficient level of ground cover was present, there was potential for a range of conservation significant fauna to occur including the Threatened Brigalow Scaly-foot (*Paradelma orientalis)* and Dunmall's Snake (*Furina dunmalli*).

This habitat type was largely devoid of surface water except for ephemeral soaks and drainage lines, which could provide potential foraging and breeding habitat for frogs such as the Rare Rough Frog (*Cyclorana verrucosa*) and non-Threatened priority taxa such as the Salmon Sided Frog (*Limnodynastes salmini*).

The disturbance regime in this fauna habitat type was influenced largely by the extent of grazing, logging, clearing for road widening and weed incursion (refer Table 1, Attachment F). Despite its moderate quality, much of this habitat represents an important biological feature of the landscape in the northern extent of the Study Area as it is a main vegetative component, providing habitat connectivity and facilitating the movement of localised fauna.

4.6.5 Riparian

Riparian areas consisted predominantly of RE 11.3.25 but in some sections, they intergraded with RE 11.3.4 (see Table 1, Attachment F). The Riparian fauna habitat was dominated by large *Eucalyptus tereticornis* and occurred along the along major drainage lines within the Study Area including Juandah, Eleven Mile, Wollan and Dogwood Creeks. Although no standard trapping sites were established in this habitat, a range of targeted techniques including harp trapping, Anabat detection, herpetofauna survey and opportunistic census were employed.

Riparian habitats typically had an overstorey of *E. tereticornis* reaching heights of 20-22 m with a sparse crown cover (10-15%). *E. tereticornis* in riparian areas provided the highest densities of tree hollows in the Study Area, with a range of trunk and limb hollows commonly distributed throughout the upper and mid strata at high densities (averaging 10 trees per hectare). Hollows ranged in size from small (<5 cm), medium (5-15 cm) and large (>15 cm) were recorded in both limb and trunk sections and they were considered suitable refuge and breeding habitat for a wide range of fauna including bats, arboreal herpetofauna, gliders, possums and larger birds including cockatoos (which were observed using such hollows at Dogwood and Wallan Creeks), parrots and common owls (e.g. Barn Owl).

The groundcover was comprised largely of bare soil (30%), vegetation (35%), litter (20%) with varying log (5%) and rock cover (10%). As RE 11.3.25 was present along reaches of the various drainage lines in the Study Area, riparian habitats also formed the primary wildlife corridors at a landscape scale (see Section 4-1). These Riparian fauna habitats could provide specialised habitat niches for Threatened fauna species including but not limited to the Koala (*Phascolarctos cinereus*), Greater Glider (*Petauroides volans*), hollow-dependant fauna and some cover-dependant species including the Long-nosed Bandicoot (*Perameles nasuta*), which are known to inhabit the area. The condition of riparian habitat

within the Study Area reflected past and current land use and was generally considered to be in moderate-high condition as it provided important late winter foraging resources and abundant tree hollows (refer Table 1, Attachment F).

4.6.6 Wetland (natural and artificial)

Wetland habitats found within the Study Area were restricted to small (<0.5 ha) artificial dams and contained variable densities of fringing and aquatic vegetation. These habitats included dams to the south of Fosters Road and along the Leichhardt Highway near Kowguran and Eleven Mile Creek. This habitat type provided suitable foraging, breeding, roosting and refuge habitat for a range of common frog fauna, waterbirds and aquatic reptiles including turtles. Waterbirds including the Migratory Great Egret were observed foraging amongst these habitats within the Study Area. The condition of natural and artificial wetland habitat within the Study Area was considered to be in poor-moderate condition.

4.6.7 Cleared Land

Cleared or heavily disturbed land occurred over much of the Study Area. This habitat encompasses two broad forms of agriculture: grazing land that is predominantly cleared with scattered trees of remnant vegetation; and cultivated lands with little native vegetation other than contour strips and linear roadside reserves. The grazing land is of limited habitat value to vertebrate fauna except where timber has been retained and left *in situ*. In this instance a range of native ground dwelling fauna including the Threatened Brigalow Scaly–foot may potentially occur.

Isolated trees with hollows may provide refuge habitat for highly mobile fauna such as microchiropteran bats as well as nesting and foraging resources for ‘edge tolerant’ species of bird. Tree species such as Brigalow may provide suitable habitat for a range of nectivorous birds or facilitate movement or dispersal throughout this heavily fragmented landscape. The cultivated lands provided limited habitat for specific species of birds including the Australian Bustard (*Ardeotis australis*), ducks, ibis, egrets, quail and cockatoos on a seasonal basis. The condition of cleared land within the Study Area reflected past and current land use and was considered to be in extremely poor condition due to the extensive level of disturbance.

4.7 Corridors and connectivity

Wildlife corridors can be defined as “retained and/or restored systems of (linear) habitat which, at a minimum enhance connectivity of wildlife populations and may help them overcome the main consequences of habitat fragmentation” (Wilson, A. & Lindenmayer 1995). Corridors can assist ecological functioning at a variety of spatial and temporal scales from daily foraging movements of individuals, to broad-scale genetic gradients across biogeographical regions.

Corridors serve a number of different functions in terms of biodiversity conservation including:

- providing increased foraging area for wide-ranging species
- providing cover for movement between habitat patches, particularly for cover-dependent species and species with poor dispersal ability and enhancing the movement of animals through sub-optimal habitats

- reducing genetic isolation
- facilitating access to a mix of habitats and successional stages to those species which require them for different activities (for example, foraging or breeding)
- providing refuge from disturbances such as fire
- providing habitat in itself
- linking wildlife populations and maintaining immigration and recolonisation between otherwise isolated patches. This in turn may help reduce the risk of population extinction (Wilson, A. & Lindenmayer 1995).

How species use the corridor network will depend largely on the home and activity ranges of the species, their habitat requirements and the ecological characteristics of the corridor. For example, some large or mobile species may make direct movements through the corridor network, moving from one patch of habitat to another. These direct movements may be on the scale of a foraging expedition or a migration (Bennett 1990). Other species may have movements by single individuals punctuated by pauses in the corridor, which can last anything from a small foraging or resting bout to weeks and even months. If the corridor contains sufficient resources to maintain a population, then continuity through the corridor may be through gene flow through the resident population (Bennett 1990; Wilson, A. & Lindenmayer 1995).

Vegetation in the Study Area north of Giligulgul is highly fragmented with large expanses of cleared land surrounding. In these areas however, even small patches may provide stepping stones within the wider landscapes (Bennett 1993).

Expansive vegetation along the Great Dividing Range south of Giligulgul has been identified as a wildlife corridor by state wildlife corridor mapping (Environmental Protection Agency 2004b) and under the Biodiversity assessment and mapping methodology (Environmental Protection Agency 2003) (see Figure 4-1).

4.8 Species of animal

Database searches (refer Section 3.4) returned records of 240 terrestrial vertebrate species within the Study Area and surrounds comprising 195 species of bird, 11 species of frog, 11 species of mammal and 23 species of reptile (see Attachment C).

Field surveys of the Study Area recorded 160 species of vertebrate fauna including 148 native species and 12 introduced species (see Attachment F). Birds were the most diverse groups of terrestrial vertebrate fauna recorded in the Study Area followed by mammals, reptiles and frogs respectively (refer Table 4-5).

Table 4-5: Summary of species of terrestrial fauna recorded in the Study Area during current field surveys

Taxa	Native	Introduced	Total
Mammals	19	7	26
Birds	105	4	109
Frogs	6	1	7
Reptiles	18	0	18
Total	**148**	**12**	**160**

During field surveys, three Rare or Threatened species were recorded in the Study Area:

- Little Pied Bat (*Chalinolobus picatus*) – Rare
- Brigalow Scaly-foot (*Paradelma orientalis*) – Vulnerable
- Golden-tailed Gecko (*Strophurus taenicauda*) – Rare.

In addition, twelve regionally significant species and one Migratory species were recorded in the Study Area (see Attachment F).

Field surveys in the MLA for the Wandoan Coal Project recorded 232 species of animal including an additional 189 species not recorded during the current surveys in the Study Area including 134 species of bird, 10 species of frog, 12 species of mammal and 33 species of reptile. Twenty-five species were recorded within the Study Area during current field surveys for the southern CSM water supply pipeline, that were not detected during surveys for the MLA including 18 species of bird, two species of mammal and five species of reptile (refer Attachment F).

Species diversity was broadly comparable across fauna habitat types with the exception of wetland habitat, where only 27 species (mainly wetland birds and frogs) were recorded (see Table 4-6). In other habitat types, the number of species recorded during surveys ranged from 49 (Acacia scrub) to 79 species (*Acacia harpophylla* and/or *Casuarina cristata* habitat).

Table 4-6: Summary of terrestrial fauna diversity associated with broad habitat types

Group	Dry Eucalypt Forest	Eucalypt woodland	Acacia scrub	*Acacia harpophylla* and/or *Casuarina cristata* scrub	Riparian	Aquatic/ wetland	Cleared
Mammals	10	14	6	16	12	4	11
Birds	44	46	35	48	47	18	50
Frogs	1	3	0	3	3	4	6
Reptiles	9	10	8	12	8	1	6
Total	**64**	**73**	**49**	**79**	**70**	**27**	**73**

4.8.1 Mammals

Twenty-six species of mammal were recorded during the survey (see Attachment F) including nine species of flying mammal (microbats) and ten terrestrial and/or arboreal mammal species. Seven introduced species of mammal were also recorded in the Study Area.

Flying Mammals

Anabat ultrasonic call detection recorded medium levels of microbat activity with Eastern/Inland Free-tail Bat (*Mormopterus* sp 2/3), Eastern Bent-wing bat (*Miniopterus schreibersii oceanensis*), Gould's Wattled Bat (*Chalinolobus gouldii*), Little Broad-nosed Bat (*Scotorepens greyii*), and Little Pied Bat (*Chalinolobus picatus*) commonly recorded.

Four species of microbat were identified from captures in harp traps. These were Gould's Lone-eared Bat (*Nyctophilus gouldii*), Little Forest Bat (*Vespadelus vulturnus*), Lesser Long-eared Bat (*Nyctophilus geoffroyi*) and the Little Pied Bat.

The Little Pied Bat was the only Rare or Threatened microbat species recorded in the Study Area. This species was recorded from numerous locations in association with eucalypt woodland, non-eucalypt woodland, wetland and wooded riparian areas within the Study Area and was considered locally common. The Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*), which is considered a non-Threatened Priority taxa within the Brigalow Belt South bioregion (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a), was recorded in association with all habitat types except cleared and wetland areas.

One other species of microbat recorded during surveys, the Little Forest Bat is considered regionally significant due to its occurrence at or beyond its distributional limit, within the Study Area. This species was recorded in association with most habitat types except cleared and wetland areas.

Arboreal and terrestrial mammals

Two species of arboreal species of mammal were recorded in the Study Area: the Common Brushtail Possum (*Trichosurus vulpecula*) and Greater Glider (*Petauroides volans*). Both species are considered Priority taxa within the southern Brigalow Belt bioregion (Environmental Protection Agency and Environmental Planning Southwest Queensland

2002a). The Greater Glider was recorded in association with Riparian, Dry Eucalypt Forest and *Eucalyptus populnea* woodland fauna habitat types. It is a non-Threatened Priority taxa and considered to have potential as an icon species for the Brigalow South Bioregion (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a).

The Brushtail Possum was recorded in the Study Area in association with all habitat types except for cleared and wetland areas. While the Common Brushtail Possum is considered in serious decline in the Brigalow South Bioregion due to tree clearing (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a), it was relatively common within the Study Area.

One small ground-dwelling species of mammal, the Common Dunnart (*Sminthopsis murina*) was captured in an Elliott A trap in association with Dry Eucalypt Forest. Although this is not a Threatened species, it was considered uncommon within the Study Area in comparison to other small ground dwelling mammals, such as the introduced House Mouse (*Mus musculus*), which was recorded in abundance in all fauna habitat types.

One medium size ground-dwelling mammal, the Rufous Bettong (*Aepyprymnus rufescens*) which is a non-Threatened Priority taxon, was observed near a road verge of the Leichhardt Highway, north of Guluguba.

Four large ground-dwelling mammals, the Eastern Grey Kangaroo (*Macropus giganteus*), Red-necked Wallaby (*Macropus rufogriseus*), Swamp Wallaby (*Wallabia bicolor*) and Black-striped Wallaby (*Macropus dorsalis*) were recorded within the Study Area in association with most fauna habitat types. Of these, only the Black-striped Wallaby, which was commonly observed within the Study Area, is considered to be a Non-Threatened Priority taxa within the Brigalow South Bioregion (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a).

One egg-laying mammal (i.e. monotreme), the Short-beaked Echidna (*Tachyglossus aculeatus*) was recorded within the Study Area at all standard trapping sites. Tracks and scats of this species were detected in association with most fauna habitat types, with the exception of wetland areas.

All seven exotic species of mammal were ground-dwelling species. The Brown Hare (*Lepus capensis*), Rabbit (*Oryctolagus cuniculus*) and House Mouse (*Mus musculus*) were the most commonly encountered species. Incidental evidence of Feral Pig (*Sus scrofa*) and Wild Dog (*Canis lupus dingo*) in the form of scats, diggings and tracks were recorded occasionally throughout the Study Area suggesting they may use the Study Area in varying densities throughout the year. Incidental evidence (scats and tracks) of Red Fox (*Vulpes vulpes*) and Feral Cat (*Felis catus*) were also identified.

4.8.2 Birds

Birds were the most diverse group of terrestrial vertebrate fauna with 109 species recorded during the field surveys (see Attachment F). Most of these were common species associated with woodland, grassland and/or wetland habitat. No Threatened bird species listed under the NC Act and/or EPBC Act were recorded during field surveys. One Migratory species listed pursuant to the EPBC Act, the Great Egret (*Ardea alba*) and two non-Threatened Priority taxa: the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) and the Speckled Warbler (*Chthonicola sagittata*) were also recorded. The Grey-crowned Babbler

was recorded at most of the standard trapping sites and at several supplementary sites indicating it was common within the Study Area. The Speckled Warbler was observed on one occasion foraging within the low shrub layer of eucalypt woodland with Acacia understorey near Gearys Road.

4.8.3 Frogs

Seven species of frog comprising four families were recorded during the current field surveys (see Attachment F). All were recorded during active herpetofauna surveys as conditions were not suitable to allow significant application of other techniques (i.e. spotlighting wetland habitats).

None of the species of frog recorded are at their distributional limit, although the Salmon Striped Frog (*Limnodynastes salmini*) is a priority taxon in the Brigalow Belt South bioregion (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a). This species was recorded in association with remnant *Acacia harpophylla* and/or *Casuarina cristata* scrub habitat. One introduced species of amphibian, the Cane Toad (*Rhinella marinus*), was recorded in association with all habitat types except for dry eucalypt forest and Acacia scrub.

4.8.4 Reptiles

Eighteen species of reptile were recorded during the current field surveys, comprising three species of gecko, one species of pygopod lizard, eight species of skink, one species of snake, two species of dragon and one species of varanid (see Attachment F for details). Two Rare or Threatened priority taxa, the Golden-tailed Gecko (*Strophurus taenicauda*) and the Brigalow Scaly-foot (*Paradelma orientalis*), were detected through active herpetofauna searches in association with dry eucalypt forest and woodland.

5. Threatened biodiversity and other significant matters

This section summarises the biodiversity matters of national, state and regional significance identified from the desk based assessment and field surveys.

5.1 Commonwealth listed values — Matters of National Environmental Significance

Matters of National Environmental Significance are listed and protected under the EPBC Act. The Act identifies seven Matters of National Environmental Significance:

- world heritage properties
- national heritage places
- wetlands of international importance (Ramsar wetlands)
- threatened species and ecological communities
- migratory species
- commonwealth marine areas
- nuclear actions (including uranium mining).

Matters of National Environmental Significance relating to biodiversity are discussed below in relation to the proposed project based on the results of the EPBC Protected Matters Search Tool (Department of the Environment Water Heritage and the Arts 2008c), desktop review of databases and literature and the results of field surveys.

A complete summary of Matters of National Environmental Significance and the likely impacts of the Project on them are presented in Attachment J of this Technical Report. Details are also provided below.

5.1.1 Threatened ecological communities

Three Threatened ecological communities listed under the EPBC Act are known or predicted to occur in the Study Area:

- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Brigalow (*Acacia harpophylla* dominant and co-dominant) corresponded with remnant RE 11.9.5 in the Study Area. The listing of Brigalow (*Acacia harpophylla* dominant and co-dominant) under the EPBC Act does not automatically dismiss non-remnant vegetation, rather species composition and structural elements typical of that found in undisturbed areas of the listed Brigalow are determining factors. Four field-mapped polygons of RE 11.9.5 possessed were considered to be consistent with the definition of the Endangered ecological

community. Additional Brigalow regrowth between Giligulgul and Fosters Road may also be consistent with the definition of the Endangered ecological community however this sections of the proposed pipeline was not assessed during the winter field surveys.

No RE or regrowth vegetation characteristic of Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions or White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland was identified in the Study Area.

5.1.2 Threatened species

Twenty threatened species of plant and sixteen threatened species of animal listed under the EPBC Act have the potential to occur within the Study Area and surrounds based on the Protected Matters Search Tool (Department of the Environment Water Heritage and the Arts 2008c) (see Table 5-3, Attachments G and H).

Table 5-1: EPBC Act listed threatened species predicted to occur in the Study Area

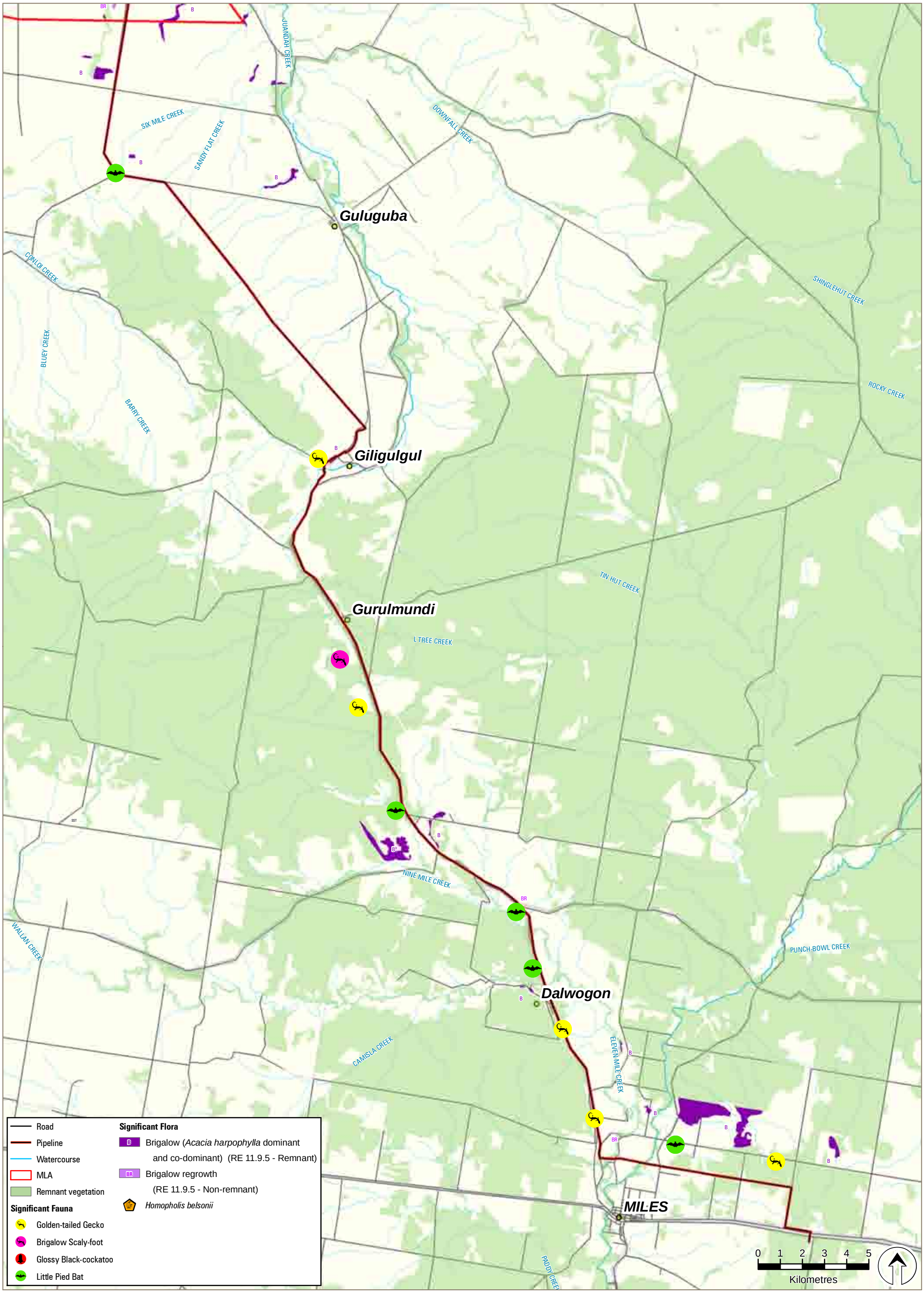
Name	Conservation status[1]	Likelihood of occurrence
Plants		
Acacia chinchillensis	V	Moderate
Acacia curranii	V	Moderate
Acacia handonis	V	Moderate
Acacia lauta	V	Moderate
Acacia wardellii	V	Low
Bothriochloa biloba	V	Low
Cadellia pentastylis	V	Low
Calytrix gurulmundensis	V	Moderate
Commersonia sp. *Cadarga*	V	Low
Denhamia parvifolia	V	Low
Digitaria porrecta	E	Low
Diuris tricolor	V	Low
Eucalyptus argophloia	V	Low
Eucalyptus virens	V	Low
Homopholis belsonii	V	Moderate
Homoranthus decumbens	V	Moderate
Philotheca sporadica	V	Low
Pterostylis cobarensis	V	Low
Stemmacantha australis	V	Low
Westringia cheelii (syn. *W. parvifolia*)	V	Moderate

Name	Conservation status[1]	Likelihood of occurrence
Mammals		
Grey-headed Flying-Fox	V	Low
Large-eared Pied Bat (*Chalinolobus dwyeri*)	V	Low
Eastern Long-eared Bat (*Nyctophilus timoriensis*)	V	Moderate
Birds		
Australian Painted Snipe (*Rostratula australis*)	V	Low
Black-breasted Button-quail (*Turnix melanogaster*)	V	Low
Squatter Pigeon (southern race) (*Geophaps scripta scripta*)	V	Moderate
Red Goshawk (*Erythotriorchis radiatus*)	V	Low
Swift Parrot (Lathamus discolour)	E	Low
Star Finch (*Neochmia ruficauda ruficauda*)	E	Low
Reptiles		
Fitzroy Tortoise (*Rheodytes leukops*)	V	Low
Collared Delma (*Delma torquata*)	V	Low
Grassland Earless Dragon (*Tympanocryptis pinguicolla*)	E	Low
Brigalow Scaly-foot (*Paradelma orientalis*)	V	Recorded
Five-clawed Worm Skink (*Anomalopus mackayi*)	V	Low
Yakka Skink (*Egernia rugosa*)	V	Moderate
Dunmall's Snake (*Furina dunmalli*)	V	Moderate

1. Conservation status. E = Endangered, V = Vulnerable (*EPBC Act*)

Eight Threatened species of plant were assessed to have a moderate likelihood-of-occurrence in the study area. Further targeted surveys are required to detect these species if present within the Study Area.

The Vulnerable Brigalow Scaly-foot (*Paradelma orientalis*) was the only EPBC Act listed Threatened species of animal detected during the surveys undertaken for this assessment (see Figure 5-1). One adult of this species was captured at Site 1 residing under a rubber car tyre within a tract of Dry Eucalypt Forest on the southern side of Gurulmundi (see Figure 5-1). This species is likely to occur sporadically throughout the Study Area where microhabitat features including but not limited to deep litter and abundant log cover occur.



Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

PARSONS BRINCKERHOFF

Figure 5-1

Threatened and Other Significant Biodiversity

J:\A353-ENVPLN\REF\Ecology\Wandoan\10_GIS_Restore\Peter\Projects\2133006C_2004_Wandoan_Threatened_FFlora_Fauna_Vol2.mxd VB - 06.11.08

The following Threatened species of animal listed under the EPBC Act were considered to have a moderate or high likelihood of occurring within the Study Area based on the presence of suitable roosting, foraging or breeding habitat:

- Dunmall's Snake (*Furina dunmalli*)
- Yakka Skink (*Egernia rugosa*)
- Squatter Pigeon (southern race) (*Geophaps scripta scripta*)
- Greater Long-eared Bat (*Nyctophilus timoriensis*).

5.2 Migratory species

Migratory species are those protected under international agreements to which Australia is a signatory. These include the *Japan Australia Migratory Bird Agreement* (JAMBA), the *China Australia Migratory Bird Agreement* (CAMBA), *Republic of Korea Australia Migratory Bird Agreement (RoKAMBA)* and the *Bonn Convention on the Conservation of Migratory Species of Wild Animals*. Migratory species are considered to comprise 'matters of national environmental significance' and are protected under the *Environment Protection and Biodiversity Conservation Act 1999*.

One species of bird, the Great Egret (*Ardea alba*) recorded within the Study Area is recognised under the migratory provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (see Attachment F). This species was recorded on two occasions from dams located near Nine Mile Creek and at a *Eucalyptus populnea* (Poplar Box) – *Eucalyptus tereticornis* (Queensland Blue Gum) depression north of Kowguran. No nests consistent with this species were recorded during the survey. This species displays nomadic habits with numbers probably fluctuating according to seasonal conditions. It would be expected to occur along Dogwood Creek where birds are likely to occasionally congregate.

A further 14 Migratory species were predicted to occur in the wider Study Area and surrounds based on the Department of the Environment, Water, Heritage and the Arts Protected Matters Search Tool (see Attachment C).

Although one Migratory species of bird was recorded and other Migratory species of bird may potentially utilise resources in the Study Area, the Study Area is not considered 'important habitat' as defined under the *EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines* (Department of the Environment and Heritage 2006), in that the Study Area does not contain:

- habitat used by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- habitat used by a migratory species that is at the limit of the species range
- habitat within an area where the species is declining.

It is therefore unlikely that the proposal would significantly affect Migratory species predicted to occur within the Study Area. As such, significant assessments for these species are considered unnecessary, with the exception of the Satin Flycatcher (*Myiagra cyanoleuca*). The Study Area occurs within the western limit of the distributional range for this species and, consequently, habitat for this species within the Study Area would be considered important habitat as defined under the EPBC Act. Though not recorded within the Study Area during surveys, the species has been previously recorded within the Study Area and surrounds (see Attachment C). Subsequently an impact assessment was undertaken for this

species, concluding that the proposed pipeline would not have a significant impact on this species (see Attachment I).

5.2.1 World heritage properties

World heritage properties include sites of both cultural and/or environmental heritage that are either:

- an Australian property on the World Heritage List kept under the World Heritage Convention, or
- a property declared to be a World Heritage property by the Commonwealth Environment Minister.

No records of world heritage properties listed under the EPBC Act were identified from the Protected Matters Search Tool in the Study Area and surrounds.

Consideration has been given to the potential impacts of the Project on The Great Barrier Reef, the world's largest World Heritage Area. While the Project may affect water quality and/or flow along waterways within and immediately adjacent to the Study Area, it is unlikely these impacts would extend far enough to have any significant impacts on The Great Barrier Reef.

5.2.2 Ramsar wetlands

The Study Area is located in the same catchment as two declared Ramsar sites: the Shoalwater/Corio Bay Area and Narran Lake Nature Reserve. Both sites are situated several hundred kilometres downstream of the Study Area.

While the proposed pipeline may affect water quality and/or flow along waterways within and immediately adjacent to the Study Area, it is unlikely these impacts would extend far enough downstream to affect the aforementioned Ramsar sites.

5.3 Matters of State significance

5.3.1 Endangered and of concern regional ecosystems

Queensland's REs have been assigned both a vegetation management status and biodiversity status, as explained below.

- **Vegetation management status:** the statutory status of an RE as defined under section 22 of the VM Act is either Endangered, Of Concern or Not of Concern. This status is based on an assessment of the pre-clearing and remnant extent of a RE, and as listed in schedules 1-5 of the Vegetation Management Regulation 2000. The vegetation management status only applies to remnant vegetation.
- **Biodiversity status:** the non-statutory status of a RE is defined by the EPA as Endangered, Of Concern or Not of Concern at Present. This status is based assessment of the condition of remnant vegetation in addition to the pre-clearing and remnant extent of a regional ecosystem. Although not the statutory status of the RE, the biodiversity status should be used as a guide for decision making.

Three REs with remnant vegetation within the Study Area have a VM Act status of Endangered or Of Concern (see Table 5-1 and Figure 4-2).

Table 5-2: Endangered or of concern REs in the Study Area

RE Code	RE short description	VM Act status
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	Of Concern
11.3.4	*Eucalyptus tereticornis +/- Eucalyptus spp.* on alluvial plains	Of Concern
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	Endangered

5.3.2 Rare and threatened species of plant

Forty-three Rare and Threatened species of plant listed under the *NC Act* are known or predicted to occur in the Study Area and surrounds (see Attachment G). No Threatened species of plant were however detected during the surveys done for this assessment.

Based on the likelihood-of-occurrence assessment, 25 of the Rare and Threatened species of plant recorded in the Study Area are considered likely to occur (moderate or high likelihood) (see Attachment H and Table 5-2). Seasonal surveys are required to confirm the presence and location of these species in the Study Area.

Table 5-3: Threatened and regionally significant species of plant

Name	Conservation status[1]	Likelihood
Acacia barakulensis	V	Moderate
Acacia chinchillensis	V	Moderate
Acacia curranii	V	Moderate
Acacia handonis	V	Moderate
Acacia tenuinervis	R	Moderate
Apatophyllum teretifolium	R	Moderate
Apatophyllum teretifolium	R	Moderate
Aponogeton queenslandicus	R	Moderate
Aponogeton queenslandicus	R	Moderate
Calytrix gurulmundensis	V	Moderate
Eleocharis blakeana	R	Moderate
Eucalyptus curtisii	R	Moderate
Eucalyptus pachycalyx subsp*. waigensis*	E	Moderate
Eucalyptus rubiginosa	R	Moderate
Fimbristylis vagans	R	Moderate
Grevillea singuliflora	R	Moderate
Homopholis belsonii	E	Moderate

Name	Conservation status[1]	Likelihood
Homoranthus decumbens	V	Moderate
Melaleuca groveana	R	Moderate
Micromyrtus carinata	E	Moderate
Micromyrtus patula	E	Moderate
Notelaea pungens	R	Moderate
Rutidosis glandulosa	R	Moderate
Rutidosis glandulosa	R	Moderate
Westringia cheelii (syn. *W. parvifolia*)	V	Moderate

a. State conservation status. Endangered, Vulnerable, Rare (NC Act). Priority taxa as identified by the Brigalow Belt South Flora Expert Panel (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002b)

5.3.3 Threatened fauna of State significance

Fifteen Rare or Threatened species of animal listed under the NC Act were considered likely to occur within the Study Area and surrounds based on likelihood-of-occurrence assessment (refer Attachment C). All of these species are Priority Taxa for the Brigalow Belt South (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a). Three of these species were detected within the Study Area during the field surveys undertaken for this assessment (see Table 5-4).

Table 5-4: Threatened species of animal predicted to occur within the study area

Name	State conservation status[1]	Likelihood of occurrence
Rough Frog (*Cyclorana verrucosa*)	R	Moderate
Dunmall's Snake (*Furina dunmalli*)	V	Moderate
Brigalow Scaly-foot (*Paradelma orientalis)*	V	Recorded
Golden-tailed Gecko (*Strophurus taenicauda*)	R	Recorded
Common Death Adder (*Acanthophis antarcticus*)	R	Moderate
Yakka Skink (*Egernia rugosa*)	V	Moderate
Square-tailed Kite (*Lophoictinia isura*)	R	Moderate
Black-necked Stork (*Ephippiorhynchus asiaticus*)	R	Moderate
Squatter Pigeon (southern race) (*Geophaps scripta scripta*)	V	Moderate
Glossy Black-cockatoo (*Calyptorhynchus lathami)*	V	Moderate
Powerful Owl (*Ninox strenua*)	V	Moderate
Black-chinned Honeyeater (*Melithreptus gularis*)	R	Moderate
Painted Honeyeater (*Grantiella picta*)	R	Moderate
Little-pied Bat (*Chalinolobus picatus*)	R	Recorded
Eastern Long-eared Bat (*Nyctophilus timoriensis*)	V	Moderate

1. Conservation significance: State – E = Endangered, V = Vulnerable, R = Rare (*NC Act*). Priority taxa as identified by the Brigalow Belt South Flora Expert Panel (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a).

5.4 Matters of regional significance

5.4.1 Biodiversity Planning Assessment (BPA)

The Biodiversity Assessment and Mapping Methodology (Environmental Protection Agency 2002) has been prepared to provide a consistent approach for assessing biodiversity values at the landscape scale in Queensland. The Biodiversity Planning Assessment (BPA) draws upon EPA remnant vegetation mapping and database information and incorporates information about Threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection as well as buffers to wetlands or other types of important areas for ecological processes. BPA areas are assigned one of three biodiversity significance levels:

- state significance — areas assessed as being significant for biodiversity at the bioregional or state scales
- regional significance — areas assessed as being significant for biodiversity at the sub-bioregional scale
- local significance and or other values — local values that are of significance at the local government scale.

All remnant vegetation will qualify into one of these three categories and the Study Area traverses areas of state, regional and local significance (see Figure 4-1). Vegetation along L-Tree Creek near Gurulmundi is the only vegetation assigned state significance.

5.4.2 Priority taxa

Under the Biodiversity Assessment and Mapping Methodology (Environmental Protection Agency 2002), expert panels are convened to review and refine the results of initial determination of significance of the Biodiversity Planning Assessment framework (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a, 2002b) at a Bioregional scale. These panels provide recommendations in relation to habitat for Threatened species (EVR Taxa) and Essential habitat for priority taxa (see Glossary for definition of Priority taxon).

Priority taxa of plant

Four priority taxa species of plant for the Brigalow Belt South (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a) were recorded in the Study Area: *Acacia melvillei* (Yaran), *Acacia omalophylla* (Yarran), *Acacia aprepta* (Miles Mulga) and *Dodonaea macrossanii* (no common name). *Acacia melvillei* was distributed sporadically throughout road reserves and paddocks upon soils that would have historically supported RE 11.9.5 in the northern extent of the study area. *A. omalophylla* occurred as two small, disjunct populations within RE 11.10.7 and fringing RE 11.9.5. *Acacia aprepta* was recorded as a dominant mid-stratum species in paddocks and RE 11.7.4 within the southern extent of the study area. *D. macrossanii* was recorded commonly in RE 11.7.7 within the central extent of the study area.

Priority taxa of animal

Thirty-three non-Threatened Priority taxa species of animal for the Brigalow Belt South (Environmental Protection Agency and Environmental Planning Southwest Queensland

2002a) were considered likely to occur within the Study Area and surrounds based on likelihood-of-occurrence assessment (refer Attachment C). Eight of these species were detected within the Study Area during the field surveys undertaken for this assessment (see Table 5-5).

Table 5-5: Brigalow Belt South Priority taxa fauna

Name	Likelihood of occurrence
Salmon-striped Frog (*Limnodynastes salmini*)	Recorded
Broad-shelled River Turtle (*Chelodina expansa*)	Moderate
Macquarii/ Krefft's Turtle (*Emydura macquarii/ krefftii*)	High
Leaden Delma (*Delma plebeia*)	High
Shingleback Lizard (*Trachydosaurus rugosus asper*)	High
Striped Skink (*Ctenotus ingrami*)	Moderate
Jacky Lizard (*Amphibolurus muricatus*)	High
Eastern Water Dragon (*Physignathus lesueurii*)	Moderate
Pale-headed Snake (*Hoplocephalus bitorquatus*)	High
Spotted Black-snake (*Pseudechis guttatus*)	Moderate
Carpentaria Snake (*Rhinoplocephalus boschmai*)	High
Bush Stone-curlew (*Burhinus grallarius*)	High
Barking Owl (*Ninox connivens*)	Moderate
Grass Owl (*Tyto capensis*)	High
Speckled Warbler (*Chthonicola sagittata*)	Recorded
White-browed Babbler (*Pomatostomus superciliosus*)	Moderate
Grey-crowned Babbler (*Pomatostomus temporalis*)	High (recorded)
Hooded Robin (*Melanodryas cucullata*)	Moderate
Diamond Firetail (*Stagonopleura guttata*)	Moderate
Yellow-bellied Glider (southern subspecies) (*Petaurus australis*)	Moderate
Northern Brown Bandicoot (*Isoodon macrourus*)	High
Rufous Bettong (*Aepyprymnus rufescens*)	Recorded
Black-striped Wallaby (*Macropus dorsalis*)	Recorded
Koala (*Phascolarctos cinereus*)	High
Greater Glider (*Petauroides volans*)	Recorded
Squirrel Glider (*Petaurus norfolcensis*)	Moderate
Yellow-bellied Glider (*Petaurus australis*)	High
Common Ringtail Possum (*Pseudocheirus peregrinus*)	Moderate
Common Brushtail Possum (*Trichosurus vulpecula*)	Recorded
Little bent-wing Bat (*Miniopterus australis*)	Moderate
Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)	Recorded
Central Eastern Broad-nosed Bat (*Scotorepens sp.*)	Moderate
Inland Forest Bat (*Vespadelus baverstocki*)	Moderate

5.4.3 Essential habitat

Essential habitat is an area or location with essential resources for the maintenance of populations of priority taxa (Environmental Protection Agency 2002). Essential Habitat may be defined from known records or considered potential according to expert knowledge of

habitat relationships. Essential Habitat is considered known where the taxon is present (based on accurate records) and there are indications of reproduction, or where a significant number of individuals are present, or important resources (such as nest sites, roost caves, major food sources) are present, or where important movement corridors for breeding and/or non-breeding (including migratory) individuals have been identified. Alternatively, Essential Habitat is considered possible where there exists suitable habitat of a size capable of supporting one or more breeding units, and important resources (such as nest sites, roost caves, major food sources) are present, or the area is proximal to populations, or may act as a potentially important corridor.

Essential habitat is mapped by the EPA under the Biodiversity Planning Assessment framework (Environmental Protection Agency 2003) and are used by NRW in determination of applications to clear vegetation. The Study Area traverses areas of essential habitat mapped east of Miles on near the Warrego Highway crossing and at Gurulmundi on Baileys Road (see Figure 4-1). Much of this essential habitat is incorporated in the Gurulmundi Special Area that incorporates Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway.

5.4.4 State wildlife corridors

A review of the state wildlife corridor mapping (Environmental Protection Agency 2004b) identified vegetation in the Study Area as forming part of a Wildlife Corridor (see Figure 5-2). This wildlife corridor links the Gurulmundi Special Area (Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway) to the Barakula State Forest the east of the Study Area. This state wildlife corridor incorporates large areas of essential habitat for priority taxa and is known habitat for numerous Rare and Threatened species.

6. Potential impacts

This chapter describes the potential impacts of the proposed pipeline on the terrestrial biological environment. Management measures to avoid, remedy and mitigate these potential impacts are discussed in Section 7.

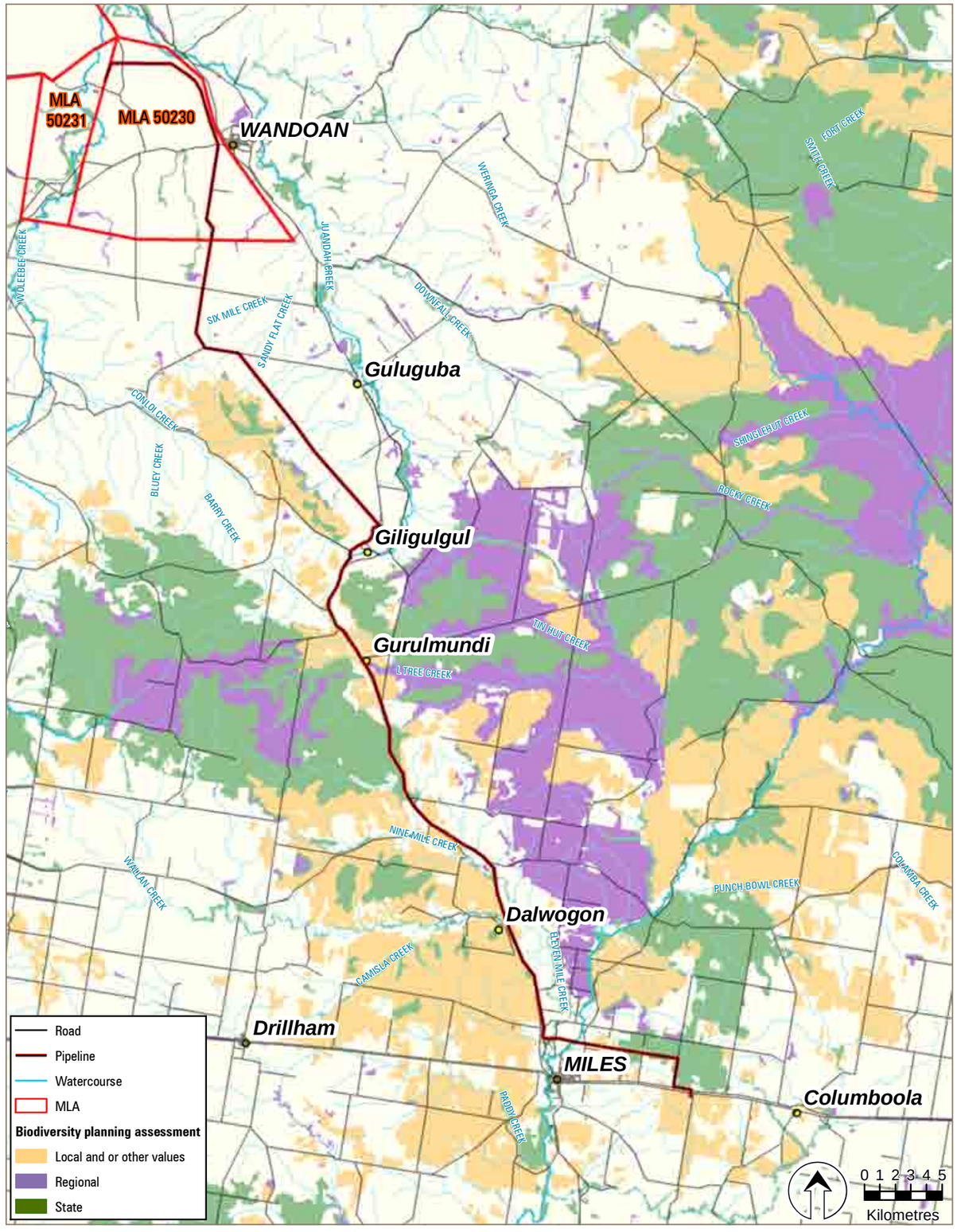
6.1 Loss of vegetation and habitats

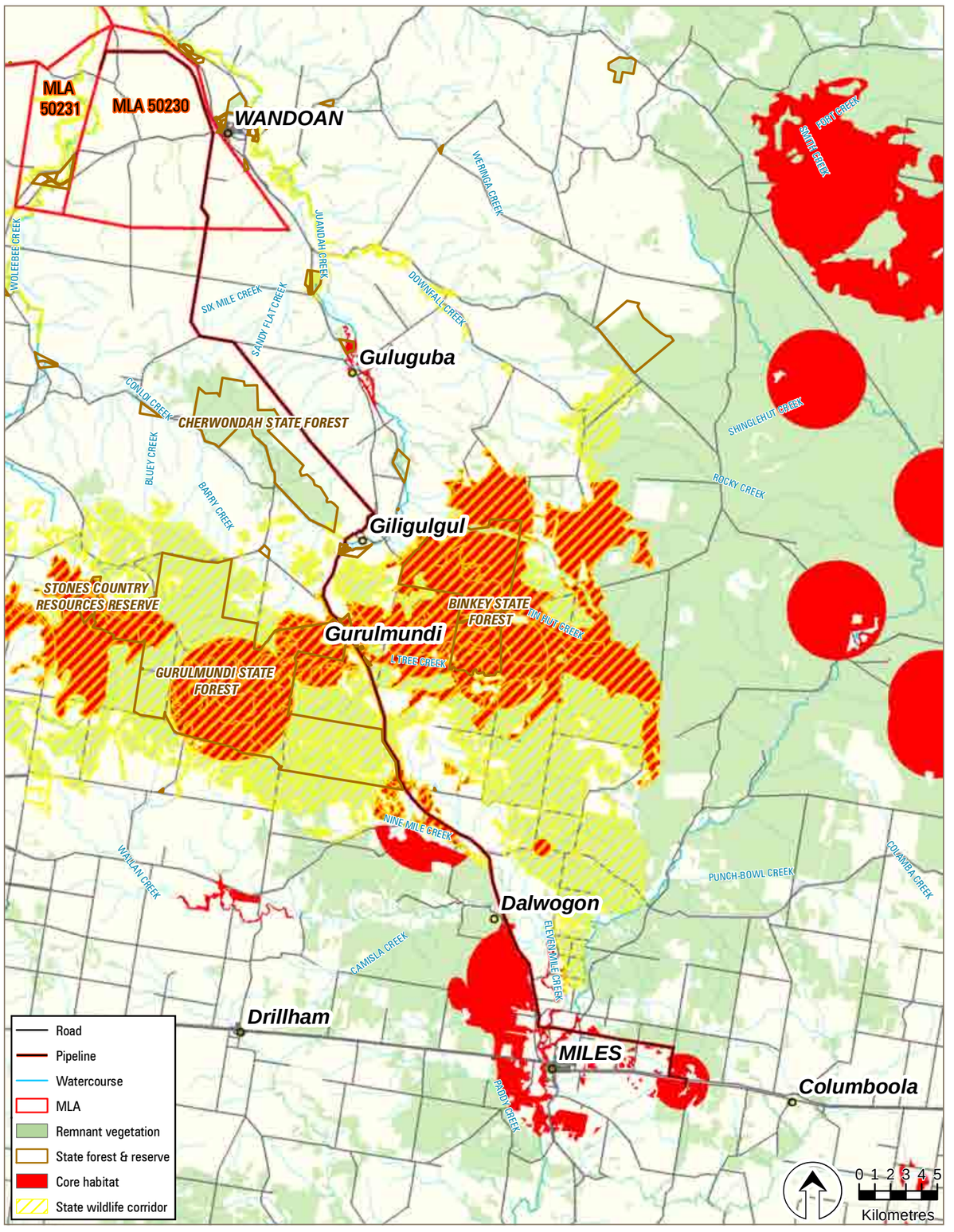
The potential for clearing of native vegetation has been avoided as far as possible through the route selection and preliminary design process, with much of the route following existing road corridors and power line easements. Following the field surveys for this assessment, sections of Gearys Lane were also found to be unformed and vegetated with remnant vegetation, as such the route was modified to follow an existing power line easement approximately 1 km south of Gearys Land. Impacts to riparian vegetation will also be avoided through the use of directional drill (opposed to trenching) in order to cross drainage lines with minimal impact.

Nonetheless, total avoidance of vegetation clearing is not possible and 85.7 ha of remnant vegetation and regrowth (non-remnant) vegetation and associated fauna habitat will be cleared as a result of the proposed pipeline (see Table 6-1). This vegetation is primarily located along the road reserve or easement edge of large patches of vegetation and as such is generally subject to a range of edge effects. Much of the vegetation that will be impacted is however, in moderate to good condition and of remnant vegetation status under the VM Act. Only 0.6 ha of the vegetation is of an Endangered RE (RE 11.9.5) and 3.3 ha is Of Concern (RE 11.3.2 and RE 11.3.4). RE 11.9.5 is consistent with the Brigalow (*Acacia harpophylla*) as listed under the EPBC Act.

Table 6-1: Extant of vegetation clearing resulting from the southern CSM pipeline (based on a 20 m corridor)

RE Code	Remnant status		Total (ha)
	Remnant (ha)	Non-remnant (ha)	
11.3.2	2.1	1.4	3.5
11.3.4	1.3	0.7	2.0
11.3.25	2.7	0.0	2.8
11.5.1	6.9	10.6	17.5
11.5.1A	4.0	6.2	10.2
11.5.4	2.7	3.4	6.2
11.5.21	2.7	0.7	3.4
11.7.2	1.7	0.0	1.7
11.7.4	2.5	0.0	2.5
11.7.6	9.1	3.9	13.1
11.7.7	11.4	0.6	12.1
11.9.5	0.6	0.4	1.0
11.10.7	8.0	1.8	9.9
Total	**55.8**	**30.0**	**85.7**





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Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

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Figure 5-2

State Wildlife Corridors, Core Habitats and Biodiversity Planning Assessment

The vegetation in the Study Area that will be affected by vegetation clearing has potential to provide habitat for 21 Rare or Threatened species of plant and. The majority of the Rare and Threatened species of plant are likely to occur in the vegetation referred to as the Gurulmundi Special Area under the Biodiversity Planning Assessment (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a) which comprises Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway.

Vegetation clearing will also directly affect habitat of the 15 Rare or Threatened species of animal known or likely to occur in the Study Area and surrounds. Three rare and Threatened species of animal were detected in the Study Area during the winter survey period. Impacts to fauna habitats are also likely to be most significance in the vicinity of the Gurulmundi Special Area which is identified as a State Wildlife Corridor and also consists of large areas of essential habitat for priority taxa.

The potential impact to these biodiversity values resulting from vegetation clearing has been reduced by following the existing clearing along roads and easements.

6.2 Habitat fragmentation and barrier effects

Habitat fragmentation is the division of a single area of habitat into two or more smaller areas, with the occurrence of a new habitat type in the area between the fragments (Andren 1994; Ford *et al.* 2001). This new dividing habitat type is often artificial and inhospitable to the species remaining within the fragments. Although the newly created habitat is generally used by some species, those species are usually generalists and are often considered aggressive further decreasing population levels of the species remaining in the fragments. In addition to the loss of total habitat area, the process of fragmentation can impact on species within the newly created fragments in a number of ways, including barrier effects, genetic isolation and edge effects. The degree to which these potential impacts affect the flora and fauna within the newly created fragments depends on a number of variables, including distance between the fragments, local environmental conditions, the species present and mitigation measures. Some of the potential impacts are summarised below:

- **Barrier effects:** Barrier effects occur where particular species are either unable or unwilling to move between suitable areas of fragmented habitat. This could result in either a complete halt to movement or reduced level of movement between fragments.
- **Genetic Isolation:** Genetic isolation occurs where individuals form a population within one fragment are unable to interbreed with individuals from populations in adjoining fragments. Genetic isolation can lead to inbreeding and genetic drift problems for populations isolated within a fragment.
- **Edge effects:** Edge effects are where a zone of changed environmental conditions (i.e. altered light levels, wind speed and/or temperatures) occurs along the edges of habitat fragments.

Cleared areas present a barrier to the movement of some species that occur in woodland habitats (Bennett & Radford 2004; Radford & Bennett 2007). The alignment will however generally following existing clearings through larger patches of woodland and forest habitat such as roads and power line easement. As such, it will not result in new or increased fragmentation of habitats in most of the Study Area.

Vegetation clearing in the unformed sections of Geary's Road and across freehold lands south of the Warrego Highway is likely to result in temporary fragmentation of woodland habitats. Following construction it is unlikely that it will form a permanent barrier to vertebrate species of animal.

6.3 Edge effects

Edge effects are zones of changed environmental conditions (i.e. altered light levels, wind speed and/or temperature) occurring along the edges of habitat fragments. These new environmental conditions can promote the growth of different vegetation types (including weeds) and allow invasion by pest animals specialising in edge habitats. Edge zones can be subject to higher levels of predation by introduced mammalian predators and native avian predators. The distance of edge effects can vary, with edge effects in roads having been recorded at distances greater than 1,000 m from the road surface (Forman et al. 2000). However in a comparison of edge effects in a variety of different habitat types, Bali (2000; 2005) estimated that average edge effects in roads generally occur up to 50 m away from the road edge.

The proposed pipeline alignment will generally be following existing clearings through larger patches of woodland and forest habitat such as roads and power line easement. As such, it is unlikely to result in the introduction of new or novel edge effect to habitats adjoining the proposed route.

Vegetation clearing in the unformed sections of Geary's Road and across freehold lands south of the Warrego Highway is likely to result in the surrounding woodlands being exposed to new edge effects.

6.4 Mortality

Clearing of native vegetation results in direct mortality of plants and less mobile animals in the areas being cleared, including potentially Threatened species. This would directly impact any Threatened species occurring in the areas cleared.

Fauna injury or death has the greatest potential to occur during the construction phase when vegetation and habitats are being cleared. While some mobile species, such as birds, may be able to move away from the path of clearing, other species that are less mobile, or those that are nocturnal and restricted to tree hollows may find it difficult to move rapidly to adjoining areas of suitable habitat. Threatened species that could be affected by the clearing include microchiropteran bats and the Brigalow Scaly Foot.

There may also a chance of animals entering the pipeline trench during construction and being trapped. This would particularly be the case for ground-dwelling fauna including reptiles, amphibians and small mammals.

6.5 Weeds and pest species

Twenty-nine species of weed were recorded in the Study Area (see Attachment E). Amongst these were three declared plants as listed under the *Land Protection (Pest and Stock Route Management) Act 2002* (see Table 6-2).

The construction and operation of the proposed pipeline has the potential to disperse weeds into areas of remnant vegetation where weed species are currently limited. The most likely causes of weed dispersal associated with the proposal would include earthworks, movement

of soil and attachment of seed (and other propagules) to vehicles and machinery. This may, in turn, reduce the habitat quality of the sites for Threatened species.

Twelve species of introduced animals were recorded in the Study Area (see Table 6-2). Amongst these were five declared pest species listed under the *Land Protection (Pest and Stock Route Management) Act 2002*. These pest species are all listed under Class 2, which are pests that are established in Queensland and have, or could have, a substantial adverse economic, environmental or social impact. Management of these pests requires coordination and they are subject to programs led by local government, community or landowners. Landowners must take reasonable steps to keep land free of Class 2 pests.

Table 6-2: Pest animals recorded in the Study Area

Common name	Species	Declared animal class[1]
Cane Toad	*Rhinella marinus* (listed as *Bufo marinus*)	Non-declared animal
Dingo/Wild Dog	*Canis lupus dingo*	Class 2
Red Fox	*Vulpes vulpes*	Class 2
Feral Cat	*Felis catus*	Class 2
Brown Hare	*Lepus capensis*	Non-declared animal
Rabbit	*Oryctolagus cuniculus*	Class 2
House Mouse	*Mus musculus*	Non-declared animal
Feral Pig	*Sus scrofa*	Class 2
Common Starling	*Sturnus vulgaris*	Non-declared animal
Spotted Turtle Dove	*Streptopelia chinensis*	Non-declared animal
Rock dove (Feral Pigeon)	*Columba livia*	Non-declared animal
House Sparrow	*Passer domesticus*	Non-declared animal

1. Declared animal classes as listed under the *Land Protection (Pest and Stock Route Management) Act 2002.* 'Not declared' refers to introduced species that are not listed Class 1-3 or Non-declared animal.

It is likely that the pest species recorded in the Study Area already exist in vegetation and habitats surrounding the Study Area, as such the proposal is unlikely to result in the establishment of pest species into areas where they are currently limited. However, the dispersion of these species may result on increase predation or competition pressures on native wildlife in area into which they re-establish.

6.6 Noise and dust

During construction of the pipeline there will be increased noise in the local area for a short period of time. This may cause disturbance for fauna in the area, although given the proximity of the pipeline to existing roads, it is expected that the impact of this would be minor. Access for maintenance vehicles may cause intermittent disturbance, however, as the pipeline predominantly follows existing roads and transmission easement, the impacts associated with this are likely to be minor.

Dust also has potential to impact surrounding vegetation and fauna habitats during construction. This impact is likely to be temporary and reversible following rehabilitation of the footprint.

6.7 Cumulative impacts

The potential biodiversity impacts of the proposed pipeline have been considered as a consequence of the construction and operation of the proposed pipeline within the existing environment. The incremental effect of multiple sources of impact (past, present and future) are referred to as 'cumulative impacts' (Contant & Wiggins 1991; Council on Environmental Quality 1978) and provide an opportunity to consider the proposed pipeline within a strategic context. This is necessary so that impacts associated with the proposed pipeline and other activities within the region are examined collectively.

Potential developments in the nearby area that may interact with the construction of the pipeline include:

- the Wandoan Coal Project
- other mines that may be opened in the future in the region
- the coal transport corridor for the project.

All such developments are likely to contribute to a greater extent of vegetation clearing in the region and a further fragmentation of habitat.

6.8 Operation of the pipeline

There is a small chance of fauna mortality during the operation of the pipeline through vehicle collision from maintenance vehicles. Generally, rates of vehicle strike mortality are directly proportional to the distance of native vegetation/fauna habitat crossed by a project (Foreman *et al.* 2003) and the number of vehicles present. Considering the nature of the proposed pipeline, this impact is likely to be very low.

7. Mitigation measures

A general principle of environmental management is to, in order of preference:

- avoid environmental impacts
- reduce impacts
- mitigate the impacts
- as a last resort, once the above options have been investigated, compensate for the residual impacts using offsets.

These principles would be followed, where possible, for the proposed pipeline.

7.1 Avoiding environmental impacts

Avoiding environmental impacts has been considered where possible throughout the route selection, planning and preliminary design phases. Following the field surveys for this assessment, sections of Gearys Lane were also found to be unformed and vegetated with remnant vegetation, as such the route was modified to follow an existing power line easement approximately 1 km south of Gearys Lane. There will also be ongoing opportunities to further avoid impacts at a local scale through the detailed design process.

At the route selection stage, four potential pipeline route alignments were identified and evaluated though a comparative assessment including assessment of Threatened species, remnant vegetation communities and watercourses from desk based resources. All southern CSM pipeline options were required to traverse extensive areas of remnant vegetation and associated significant habitats including over the Great Dividing Range. As such, the proposed route has followed existing roads and easements as far as possible to minimise impacts to biodiversity.

7.2 Management of the mitigation process

The mitigation measures associated with the proposed pipeline are discussed below in general terms. As part of the detailed design, and prior to the start of construction, more detailed mitigation measures will be developed and presented in a biodiversity management plan relating to the construction and operation of the pipeline. The plan will include:

- detailed design of mitigation measures such as temporary fencing during construction (as required)
- general impact mitigation
- staff/contractor inductions and continuing education of staff
- pre-clearing surveys and fauna salvage/translocation
- rehabilitation and restitution of adjoining habitat
- weed control
- pest management
- rehabilitation protocols

- monitoring.
- The plan will include clear objectives and actions for the pipeline including:
- minimise human interferences to flora and fauna
- minimisation of vegetation clearing/disturbance
- minimise impact to Threatened species and communities
- minimise impacts to aquatic habitats and species
- ongoing monitoring of impacts on flora and fauna.

The biodiversity management plan will be prepared prior to construction and detail the mitigation measures and required actions. This biodiversity management plan developed for the pipeline will be an important document for the fauna/spotter catcher and aid in enacting the 'avoid and mitigate' principles during the construction phase. The biodiversity management plan would include detailed information such as feral animal and pest control, monitoring activities and further measures developed during detailed design measures (Refer to Table 7-1).

Table 7-1: Summary of mitigation measures

Mitigation measure	Design	Construction	Operation
▪ Further survey is required to increase the likelihood of detecting Rare and Threatened species in the Study Area and surrounds and assess sections of the Study Area that could not be accessed during the winter surveys.	Y		
▪ Refine alignment of pipeline in light of biological knowledge and design constraints in accordance with this report.	Y		
▪ Utilise trenchless technology to cross drainage lines. Directional drilling launch and receiving pad areas would be carefully planned in order to avoid removal of mature trees. If this is not possible, the number of trees to be affected should be minimised. It is envisaged, however, that any directional drilling should take place from within the cleared easement.	Y	Y	
▪ Prepare and implement a flora and fauna management plan.	Y	Y	Y
▪ Provide for designated areas in cleared and degraded land for stockpiles and equipment lay-down to minimise the overall impact of construction and avoid unnecessary vegetation and habitat removal.	Y	Y	
▪ Conduct staff/contractor inductions on site by the ecologist/fauna spotter catcher or environmental advisor.		Y	
▪ Implement dust suppression during construction.		Y	
▪ Implement appropriate erosion and sediment control strategy.		Y	
▪ Utilise preferred seed mixes for revegetation works, ideally to be collected from the Study Area and surrounds.		Y	
▪ Develop procedure for specific targeted species searches for those Threatened species and Priority taxa considered to have potential to occur prior to any staged development. If located, consideration will be given to translocation of individuals according to guidelines from the Australian Network for Plant Conservation (Vallee *et al.* 2004) or fauna guidelines such as those in the Nature Conservation (Koala Conservation) Plan 2006 (Environmental Protection Agency & Queensland Parks and Wildlife Service 2005).		Y	Y

Mitigation measure	Design	Construction	Operation
▪ Prepare weed and feral animal management plans, including vehicle washdown procedures to limit edge effects such as the establishment of aggressive weeds, and the spread of annual and perennial exotic herbs.		Y	Y
▪ Pre-clear the disturbance areas prior to construction activities commencing by trained ecologist or other qualified environmental specialist in order to: ‣ mark the limits of clearing in sensitive areas (e.g. Endangered and Of concern REs) to avoid unnecessary vegetation and habitat removal ‣ place transportable habitat features such as large logs and boulders in adjacent retained areas to allow their continuation as potential fauna refuge sites ‣ implement pre-clearing surveys for fauna. Pre-clearing involves removal of the understorey and smaller non-hollow bearing trees in order to disturb fauna and encourage them away from the clearing area.		Y	
▪ Except for trenching, vegetation clearing would involve only the removal of above-ground plant parts, with root systems and the soil profile left undisturbed.		Y	
▪ Areas not necessary for the operation of the pipeline should be rehabilitated in a progressive manner as construction proceeds. Revegetate areas to improve habitat value and visual amenity, including: ‣ planting of a range of locally occurring native shrubs, trees and groundcover plants, in keeping with the former vegetation types present. Choice of species would be in consultation with the Environmental Protection Agency (EPA) and should include Allocasuarina, Eucalyptus, Angophora and Corymbia species to compensate for any impacts to habitat of the Koala and other hollow dependant species ‣ increasing the overall vegetation cover within the Project Area ‣ incorporating existing natural vegetation where possible ‣ linking vegetation remnants ‣ focusing on riparian vegetation to protect waterways ‣ excluding stock from rehabilitated areas.		Y	Y
▪ Soil that may contain seeds of exotic species would be stockpiled away from drainage lines, and vegetated areas and weed-free soil stockpiles. Weed infested stockpiles would be covered to eliminate the spread of the soil and seed during rainfall and high wind events.		Y	
▪ No materials, spoil or machinery would be stored or parked within the drip-line of any trees.		Y	
▪ The amount of open trenching would be generally limited to 100 m per crew at any one time.	Y	Y	
▪ Trenches would be backfilled so as to cover as much open trench as practicable by the end of each day's work. If this is not possible, the ends of the open trenches would be graded to allow escape for any animals that may venture into the trench. Open trenches should be inspected each morning and any trapped animal removed by someone experienced in handling animals.		Y	

Mitigation measure	Design	Construction	Operation
▪ Implement a flora and fauna monitoring program (as part of the greater Wandoan Coal Project flora and fauna monitoring program) aiming to better understand and manage impacts and rehabilitation actions to flora and fauna throughout the Study Area. Monitoring would also include exotic weeds and feral animals. The detailed monitoring plans would be incorporated into the flora and fauna management plan for the Project.		Y	Y

7.2.1 Vegetation and habitat loss

Disturbance to areas of native vegetation and habitat have been avoided as far as possible through the route selection process and the use of direction drilling (or other trenchless pipe laying technology) to cross drainage lines. Nonetheless, total avoidance of remnant and regrowth vegetation, and associated habitats, is not possible.

Remnant and regrowth vegetation of moderate to high conservation significance should be identified as sensitive areas that are 'no-go' areas. These areas should be marked on maps provided to contractor staff, as well as on the ground using suitable fencing. No direct disturbance should occur in these areas, including vehicle access. A trained ecologist should accompany clearing crews in order to ensure disturbance in sensitive areas is minimised. The adoption of these measures should limit the extent of habitat disturbance, prevent soil compaction and damage to trees.

Temporary works area, such as access tracks or plant and material stockpile areas, should be located so as to minimise further impacts to the ecological values of the local area. These should adopt the following performance objectives:

- no vegetation communities listed as Endangered at either the national or state level should be affected outside of the 20 m construction corridor
- impacts on state listed vegetation "of concern" should be minimised
- fragmentation of remnants of vegetation/habitat should be avoided and where possible disturbance should be located at the edge of existing remnants
- where possible, access tracks and other infrastructure should be located in already disturbed areas.

Revegetation of disturbed areas should be undertaken following construction to rehabilitate ecological values where possible (in areas dominated by remnant and regrowth vegetation prior to construction) or to mitigate erosion and sediment issues in other areas (such as paddocks).

Revegetation in the areas of ecological value should aim to enhance the suitability of the site for wildlife (within operational safety bounds) and should follow the principles of at the site, block and landscape levels (Bennett *et al.* 2000):

Actions at the site level

- Use locally indigenous plant species.

- Match plant species to the landform.
- Establish natural layers in the vegetation.
- Fine-scale patchiness of vegetation:
  - promote patchiness of vegetation by planting.
- Provide ground-layer components as resources for wildlife:
  - ground-layer components assist restoration of ecosystem processes.
- Management of vegetation:
  - manage the composition and structure of revegetated habitats
  - control disturbance and degradation.

Habitats at the block level

- Size:
  - establish larger blocks for large populations
  - ensure habitats meet the area requirements of particular species
  - create large patches for diverse animal communities.
- Shape:
  - increase width to reduce edge effects
  - design the shape and width of revegetation to meet species' requirements.
- Location of blocks:
  - position revegetation to increase opportunities for recolonisation
  - build on to existing natural vegetation
  - locate new habitats away from known sources of disturbance.
- Manage for diversity of vegetation.

Planning and design at the landscape level

- The amount of suitable habitat in the landscape:
  - increase the total area of suitable habitat in the landscape
  - establish multiple populations
  - provide for species that use different habitats.
- Enhance connectivity in the landscape:
  - achieve connectivity by different configurations of habitat
  - give priority to streams and watercourses as natural corridors
  - recognise different kinds of movements through links.
- Ensure representation of ecosystems:
  - re-establish poorly represented habitats
  - restore remnants of depleted vegetation types.

7.2.2 Mortality

Where clearing of vegetation and fauna habitats will take place, clearing protocols should be put in place, including preparing an inventory of significant habitat trees and hollows to be removed, and checking hollow-bearing trees for the presence of bird nests and arboreal animals, such as possums, glider and bats, prior to felling or pushing. Animals found to be occupying trees should be safely removed where possible before the clearing of trees. A qualified ecologist should relocate removed animals locally into nearby habitat. The ecologist should be trained as a Koala spotter as required under the NC Act.

7.3 Offsets

Residual impacts are those that remain after implementation of the proposed pipeline and all associated mitigation and other environmental management measures have been undertaken. Residual impacts for proposed pipeline include the removal of 55.8 ha remnant vegetation and 30.0 ha of regrowth (non-remnant) vegetation and associated habitat. Where there is residual loss or degradation of vegetation and habitat after detailed design, and determination of mitigation measures, compensation in the form of compensatory habitat, land rehabilitation and/or contribution to research can be employed (i.e. offsets).

A Green Offsets Package for the proposed pipeline should be developed in consultation with EPA and DEWHA giving consideration to relevant State and Commonwealth policies relating to offsets (outlined below).

Queensland Government Environmental Offsets Policy

The Queensland Government Environmental Offsets Policy aims to provide a supporting framework for environmental offsets in Queensland including principles and guidelines for using environmental offsets and guidance on when offsets should be uses. The Queensland Government Environmental Offsets Policy applies to decisions on development approvals under a range of approval processes including the IP Act, SDPWO Act and the EP Act.

The Queensland Government Environmental Offsets Policy outlines seven principles for seven policy principles that direct the way offsets must be used to contribute to environmental sustainable development (ESD) as follows:

1. Offsets will not replace or undermine existing environmental standards or regulatory requirements, or be used to allow development in areas otherwise prohibited through legislation or policy.
2. Environmental impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact.
3. Offsets must achieve an equivalent or better environmental outcome.
4. Offsets must provide environmental values as similar as possible to those being lost.
5. Offset provision should minimise the time-lag between the impact and delivery of the offset.
6. Offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values.
7. Offsets must be legally secured for the duration of the offset requirement.

The Green Offsets Package developed for the Project will follow these principles and the guidelines of the Queensland Government Environmental Offsets Policy.

State policy for vegetation management offsetting

The requirements for offsets under state legislation fall under the subordinate policies of the VM Act and NC Act, specifically the:

- Regional Vegetation Management Code (Department of Natural Resources and Water 2006)
- Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007)
- Policy 2 of the Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006-2016 (The Koala Plan) (Environmental Protection Agency & Queensland Parks and Wildlife Service 2005).

The offsets strategy would be determined following detailed design of the proposed pipeline and based on the residual impacts once all reasonable alternatives to avoid impacts have been exhausted. This is also necessary in order to determine the minimum requirements for offsetting following the 'maintain existing extent' test for REs, essential habitat and conservation status thresholds under the Regional Vegetation Management Code for The Brigalow Belt and New England Tablelands Bioregions (Department of Natural Resources and Water 2006).

Environmental offsets for impact on Matters of National Environmental Significance

Environmental offsets for impacts on Matters of National Environmental Significance may be used to maintain or enhance the health, diversity and productivity of the environment as it relates to Matters of National Environmental Significance. Environmental offsets are not applicable to all approvals under the EPBC Act and their requirement is assessed on a case-by-case basis.

The Australian Government has identified eight principles for the use of environmental offsets under the EPBC Act. These eight principles will be used to assess any proposed environmental offsets to ensure consistency, transparency and equity under the EPBC Act. The Australian Government's position is that:

1. Environmental offsets should target the matter protected by the EPBC Act that is being impacted.
2. A flexible approach should be taken to the design and use of environmental offsets to achieve long-term and certain conservation outcomes which are cost effective for proponents.
3. Environmental offsets should deliver a real conservation outcome.
4. Environmental offsets should be developed as a package of actions - which may include both direct and indirect offsets.
5. Environmental offsets should, as a minimum, be commensurate with the magnitude of the impacts of the development and ideally deliver outcomes that are 'like for like'.
6. Environmental offsets should be located within the same general area as the development activity.
7. Environmental offsets should be delivered in a timely manner and be long lasting.
8. Environmental offsets should be enforceable, monitored and audited (Department of the Environment and Water Resources 2007).

The DEWHA define offsets as ‘actions taken outside a development site that compensate for the impacts of that development – including direct, indirect or consequential impacts (Department of the Environment and Water Resources 2007). Actions that constitute a suitable offset will differ between projects and there is no prescriptive formula for what constitutes an adequate offset. As such, the DEWHA will be negotiated with through the development of the Green Offsets Package to ensure all relevant requirements are met.

7.4 Further survey

Surveys of the southern CSM water supply pipeline were completed in later Winter 2008. As outlined in the limitations, the weather conditions weather conditions during the late winter survey period were generally cool and sub-optimal for detecting herpetofauna (reptiles and frogs). The cool dry weather and general season (late winter) is also a time of reduced vegetative growth and reproductive activity for many species of plant, particularly grasses and other herbaceous ground cover species. In addition, not all properties could be adequately accessed at the time of survey to allow for establishment of fauna trapping sites. Species of animal across these areas were therefore inferred from habitat assessment or desk based resources and should be verified during seasonal surveys.

As such, seasonal targeted survey for flora and fauna will be completed along this section of the Study Area during suitable survey conditions.

8. Significance of impacts

A number of Threatened REs, communities, species of plant and species of animal have been recorded in the Study Area or are considered likely to occur (moderate or high likelihood), and may be affected by the proposed pipeline.

Impacts on Threatened species and communities listed under the EPBC Act are required to be assessed following the *Principal Significant Impact Guidelines*. An assessment of the significance of the impact to State-listed REs and Threatened species was also undertaken. Significance assessments for these communities and species are included in Attachment I.

It is acknowledge that field surveys were undertaken at a sub-optimal time of year (late winter) for detection of many species of plant and animal and that some sections of the Study Area were not accessed during this survey period. As such, seasonal surveys are proposed to increase the likelihood of detecting Threatened species if they are present in the Study Area, and define the size of the local population and extent of their habitat in the Study Area. The conclusions of the impact assessments will therefore be reviewed and revised if necessary following the seasonal surveys.

For many of the Threatened species considered likely to occur, a local population would be considered an important population in accordance with the definition under the EPBC Act if they were recorded in the Study Area. This would apply particularly to plants that occur in the Gurulmundi Special Area, the state wildlife corridors or areas mapped as essential habitat for priority taxa under the Biodiversity Planning Assessment (Environmental Protection Agency 2002). As such, if detected during further surveys, direct impacts to these species are likely to change the conclusions of the significant assessments.

A summary of significance assessments undertaken for Threatened biodiversity based on the investigations undertake to date is provided below in Table 8-1. The impact assessments conclude that the proposed pipeline is not likely to have a significant impact on Threatened species or communities, nor would it interfere with their recovery, assuming suitable mitigation measures are put in place.

Table 8-1: Summary of Threatened biodiversity for which significance assessments were undertaken and their likelihood of being significantly affected by the Project

Name	EPBC Act [1] Status	NC Act Status [2]	VM Act	Likely to be significantly affected	Reason for the outcome
REs					
RE 11.9.5	E	—	E	No	Small extent to be affected in Study Area (1 ha)
Ecological communities					
Brigalow (*Acacia harpophylla* dominant co-dominant)	E	—	—	No	Small extent to be affected in Study Area (<1 ha)

Name	EPBC Act [1] Status	NC Act Status [2]	VM Act	Likely to be significantly affected	Reason for the outcome
Plants					
Westringia cheelii	V	V	—	No	Not recorded therefore size and extent of population likely to be limited.
Acacia barakulensis	—	V	—	No	Not recorded therefore size and extent of population likely to be limited.
Acacia curranii	V	V	—	No	Not recorded therefore size and extent of population likely to be limited.
Acacia handonis	V	V	—	No	Not recorded therefore size and extent of population likely to be limited.
Calytrix gurulmundensis	V	V	—	No	Not recorded therefore size and extent of population likely to be limited.
Eucalyptus pachycalyx subsp. waajensis	—	E	—	No	Not recorded therefore size and extent of population likely to be limited.
Homoranthus decumbens	V	V		No	Not recorded therefore size and extent of population likely to be limited.
Micromyrtus carinata	—	E	—	No	Not recorded therefore size and extent of population likely to be limited.
Micromyrtus patula	—	E	—	No	Not recorded therefore size and extent of population likely to be limited.
Homopholis belsonii	V	E		No	Not recorded therefore size and extent of population likely to be limited.
Reptiles					
Brigalow Scaly-foot (*Paradelma orientalis*)	V	V	—	No	Low density of animals recorded (1) and similar suitable habitat available in the surrounding landscape
Yakka Skink (*Egernia rugosa*)	V	V	—	No	Not recorded within Study Area and no important habitat present
Dunmall's Snake (*Furina dunmalli*)	V	V	—	No	Not recorded within Study Area and no important habitat present

Name	EPBC Act [1] Status	NC Act Status [2]	VM Act	Likely to be significantly affected	Reason for the outcome
Birds					
Squatter Pigeon (southern race) (*Geophaps scripta scripta*)	V	V	—	No	Not recorded within Study Area and no important habitat present
Satin Flycatcher (*Myiagra cyanoleuca*)	M	—	—	No	Not recorded within Study Area and no important habitat present
Powerful Owl (*Ninox strenua*)	—	V	—	No	Not recorded within Study Area and no important habitat present
Glossy Black-cockatoo (*Calyptorhynchus lathami*)	—	V	—	No	Low density of animals recorded (2), similar suitable habitat available in the surrounding landscape, and no evidence of breeding detected within Study Area
Mammals					
Eastern Long-eared Bat (*Nyctophilus timoriensis*)	V	V	—	No	Not recorded within Study Area and no important habitat present

1. Conservation status – State as listed under the EPBC Act: E = Endangered, V = Vulnerable.

9. Conclusions

The proposed southern CSM water supply pipeline will traverse a range of land uses and areas of different biodiversity value. Country in the Study Area north of Giligulgul has been largely cleared for grazing and dryland agriculture. Between Giligulgul and Miles however, the Study Area traverses the Great Dividing Range. Soils and geology associated with the Great Dividing Range are less arable and are dominated by shallow rocky or deeply weather soils. As such, country through this section of the Study Area has not been subject to as extensive broad scale and routine clearing as in the north. Vegetation associated with the Great Dividing Range forms part of a State Wildlife Corridor and also includes areas of Essential Habitat mapped under the Biodiversity Planning Assessment framework (Environmental Protection Agency 2002). Vegetation associated with the Great Dividing Range is also referred to as the Gurulmundi Special Area under the Biodiversity Planning Assessment which comprises Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway. The Gurulmundi Special Area is known to provide habitat for numerous Rare and Threatened species.

Only one Endangered RE was identified in the Study Area, RE 11.9.5. This RE is consistent with the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community listed under the EPBC Act and only 0.6 ha of this community will be affected by the proposed pipeline. Three Rare or Threatened species of animal were also recorded in the Study Area:

- Brigalow Scaly-foot (*Paradelma orientalis*)
- Little Pied Bat (Chalinolobus picatus)
- Golden-tailed Gecko (*Diplodactylus taenicauda* syn. *Strophurus taenicauda*).

No Threatened species of plant was recorded. However, surveys were not done in the optimum period to identify many of the Threatened species of plant that may occur in the Study Area. In addition to the Threatened species recorded, 21 Rare or Threatened species of plant and 15 Rare or Threatened species of animal were considered likely to occur in the Study Area and surrounds. Additional targeted seasonal surveys will be done to determine the location size and extent of Threatened species likely to be affected by the proposal.

Despite the efforts to avoid impacts to native vegetation and associated habitats, the proposed pipeline will result in clearing 55.8 ha of remnant vegetation and 30.0 ha of non-remnant vegetation (regrowth). This vegetation is primarily located along the road reserve or easement edge of large patches of vegetation and as such is generally subject to a range of edge effects. Much of the vegetation that will be impacted is however, in moderate to good condition and of remnant vegetation status under the VM Act. Only 0.6 ha of the vegetation is of an Endangered RE (RE 11.9.5) and 3.3 ha is Of Concern (RE 11.3.2 and RE 11.3.4).

Assessment of the significance of impacts associated with the proposed pipeline was done for: Threatened species that were recorded in the Study Area or considered likely to occur (moderate or high likelihood of occurrence); Migratory species (for which the Study Area is at their distributional range limit); and Endangered ecological communities and Endangered REs. Based on the investigations undertaken to date, the proposed pipeline is considered unlikely to result in a significant impact to any Threatened species or communities. However, many of the Threatened species considered likely to occur, a local population should be

considered an important population in accordance with the definition under the EPBC Act if they were recorded in the Study Area. As such, if detected during further surveys, direct impacts to these species are likely to change the conclusions of the significant assessments to be significant and measures to avoid such impacts would be required.

The impact assessments concluded that the proposed pipeline is unlikely to result in a significant impact to any Threatened species of plant or animal, RE or ecological community. Nonetheless, the impacts of the proposed pipeline are acknowledged and should be reduced where possible during detailed design. Detailed mitigation measures should be developed and presented in a biodiversity management plan relating to the construction and operation of the pipeline. Furthermore, the residual impacts of the proposed pipeline should be accounted for in the Green Offsets Package developed for the Wandoan Coal Project.

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Glossary

Term	Definition
Biodiversity	The biological diversity of life is commonly regarded as being made up of the following three components: ▪ genetic diversity – the variety of genes (or units of heredity) in any population ▪ species diversity – the variety of species ▪ ecosystem diversity – the variety of communities or ecosystems.
Critically Endangered	Designated as 'Critically Endangered' under the EPBC Act. Refer to definition of 'EPBC Act conservation status' for meaning of critically endangered under the Act.
Declared pests	An animal or plant may be declared under the Land Protection (Pest and Stock Route Management) Act 2002.
Ecological community	An assemblage of species occupying a particular area.
Endangered	Designated as 'Endangered' under the EPBC Act, NC Act and/or VM Act. Refer to definitions of 'EPBC Act conservation status', 'NC Act conservation status' and 'VM Act conservation status' for meaning of Endangered under each Act.
EPBC Act conservation status	Under the EPBC Act 1999, listed threatened species and ecological communities are assigned a conservation status of 'Extinct in the Wild', 'Critically Endangered', 'Endangered' or 'Vulnerable'. Definitions of these terms under the EPBC Act areas follows: Extinct in the Wild ▪ it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or ▪ it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form. Critically Endangered ▪ it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria. Endangered ▪ it is not critically endangered; and ▪ it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria. Vulnerable ▪ it is not critically endangered or endangered; and ▪ it is facing a high risk of extinction in the wild in the medium- term future, as determined in accordance with the prescribed criteria.
Habitat	An area or areas permanently, periodically or occasionally occupied by a species, population or ecological community, including any and all biotic and abiotic features of the area or areas occupied.
Heterogeneous RE polygon	An area (polygon) delineated on a map of regional ecosystems (REs) comprising a mixture of RE types. Mapping of heterogeneous polygons allows areas of vegetation that would normally be too small to map, to be shown at the scale which REs are normally mapped. These small areas, such as narrow stripe of riparian vegetation, often support significant biodiversity or require special management considerations (Neldner et al. 2005).
Homogeneous	An area (polygon) delineated on a map of regional ecosystems (REs)

Term	Definition
RE polygon	comprising a single RE.
Migratory species	Species listed as 'Migratory' under the EPBC Act.
Naturalness and ecological condition	The apparent naturalness or health/ condition of an ecological community, as assessed against the following criteria: ▪ disturbance – described in terms of its cause (natural or human), its degree or severity, its extent and distribution within the community ▪ weed content – description of species abundance, horizontal and vertical distribution of each species ▪ ecological viability – measure of a community's ability to survive in the longer term ▪ ecological health – measure of regeneration, size structure and number of dead or dying plants within a community ▪ ecological relationships – the sequential relationship of one community to another, such as diurnal systems.
Near Threatened	Designated as 'Near Threatened' under the NC Act. Refer to definition of 'NC Act conservation status' for meaning of Near Threatened under the NC Act. Capitalisation of the term 'Near Threatened' in this report refers to those species listed as such under the NC Act.
NC Act conservation status	Under the NC Act, protected species are assigned a conservation status of 'Extinct in the Wild', 'Endangered', 'Vulnerable', 'Near Threatened', or 'Least Concern'. Definitions of these terms under the NC Act are as follows: Extinct in the Wild ▪ there have been thorough searches conducted for the wildlife; and, ▪ it has not been seen in the wild over a period that is appropriate for the life cycle or form of the wildlife. Endangered ▪ there have not been thorough searches conducted for the wildlife and the wildlife has not been seen in the wild over a period that is appropriate for the life cycle or form of the wildlife; or ▪ the habitat or distribution of the wildlife has been reduced to an extent that the wildlife may be in danger of extinction; or ▪ the population size of the wildlife has declined, or is likely to decline, to an extent that the wildlife may be in danger of extinction; or ▪ the survival of the wildlife in the wild is unlikely if a threatening process continues. Vulnerable ▪ its population is decreasing because of threatening processes, or ▪ its population has been seriously depleted and its protection is not secured, or ▪ its population, while abundant, is at risk because of threatening processes, or ▪ its population is low or localised or depends on limited habitat that is at risk because of threatening processes. Near Threatened ▪ the population size or distribution of the wildlife is small and may become smaller; or ▪ the population size of the wildlife has declined, or is likely to decline, at a

Term	Definition
	rate higher than the usual rate for population changes for the wildlife; or ▪ the survival of the wildlife in the wild is affected to an extent that the wildlife is in danger of becoming vulnerable. Rare ▪ Species currently listed as rare will require re-assessment to determine which of the new Threatened species categories most adequately describe their status. The category Rare will be phased out by 2010 under an amendment made in 2005 to the Nature Conservation Act 1992. Least Concern ▪ the wildlife is common or abundant and is likely to survive in the wild. Native wildlife may be prescribed as least concern wildlife even if: ▪ the wildlife is the subject of a threatening process; or ▪ the population size or distribution of the wildlife has declined; or ▪ there is insufficient information about the wildlife to conclude whether the wildlife is common or abundant or likely to survive in the wild.
Non-remnant vegetation	Vegetation that is not mapped as remnant vegetation by the EPA and/or which fails to meet the EPA's criteria for 'remnant vegetation' (see definition of 'Remnant vegetation', below). This includes regrowth, heavily thinned or logged vegetation and significantly disturbed vegetation that fails to meet the structural and/ or floristic characteristics of remnant vegetation. It also includes urban and cropping land. Non-remnant vegetation may retain significant biodiversity values (Neldner *et al.* 2005).
Not of Concern	Designated as 'Not of Concern' under the VM Act. Refer to definition of 'VM Act status' for meaning of 'Not of Concern' under the Act.
Of Concern	Designated as 'of concern' under the VM Act. Refer to definition of 'VM Act status' for meaning of 'of concern' under the Act.
Rare	Listed as Rare under the NC Act. Refer to 'NC Act conservation status' for meaning of Rare under the NC Act. Capitalisation of the term 'Rare' in this report refers to those species listed under the NC Act.
Priority taxa	Flora or fauna taxa currently listed as Threatened under State or Commonwealth legislation (Presumed Extinct, Endangered, Vulnerable, Rare or of Cultural Significance), or identified in various Action Plans as being of concern (Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened and Conservation Dependent, for example, Garnett & Crowley 2000), most transcontinental migrants listed under international agreements (for example, CAMBA and JAMBA), as well as taxa at risk or of management concern within specific bioregions based on the written opinion of experts (for example, McFarland 1997), or taxa of scientific interest as relictual, endemic or locally significant populations (such as a flying fox camp or heronry) based on the written opinion of experts (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a, 2002b).
Regional Ecosystem (RE)	A vegetation community, within a bioregion, that is consistently associated with a particular combination of geology, landform and soil. REs may be classified under schedules 1-3 of the Vegetation Management regulation as either endangered, of concern or not of concern. Refer to 'VM Act conservation status' for meaning of endangered, of concern or not of concern under the VC Act. Capitalisation of these terms in reference to REs in this report refers to the RE status under the VM Act.
Remnant vegetation	Remnant woody vegetation is defined as vegetation where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy (Neldner *et al.* 2005).

Term	Definition
Study Area and surrounds	The Project site and any additional areas that could potentially be affected by the proposal either directly or indirectly, such as ancillary construction areas. The Study Area for this ecological impact assessment includes: ▪ the three MLA areas (50229, 50230 and 50231) ▪ accommodation facilities proposed to house the majority of the workforce north of Wandoan (outside of the MLA areas) ▪ a new high pressure gas pipeline from the Peat-Scotia gas line to the mine running 26 km to the north east. Reference to the study area and surrounds includes an area within approximately 20 km of the Study Area.
Threatened	A term used with reference to ecological communities, REs or species of that are Endangered, Vulnerable or Of Concern as listed under the NC Act, the VM Act or the EPBC Act (see NC Act conservation significance, the VM Act conservation significance and EPBC Act conservation significance for more details)
VM Act conservation status	Under the VM Act, REs may be classified as either 'Endangered', 'Of Concern' or 'Not of Concern'. Definitions of these terms under the VM Act are provided below. Endangered ▪ less than 10% of pre-clearing extent of remnant vegetation (see following definition) exists in the bioregion, or 10 to 30 % of pre-clearing extent remains and the remnant vegetation is less than 10 000 hectares. In addition, for biodiversity planning purposes the Environmental Protection Agency also classifies a regional ecosystem as endangered if: ▪ less than 10% of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss or ▪ 10-30% of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or it is a rare regional ecosystem subject to a threatening process. Of Concern ▪ 10 to 30% of pre-clearing extent of remnant vegetation exists in the bioregion, or more than 30% of pre-clearing extent remains and the remnant vegetation is less than 10 000 hectares. In addition, for biodiversity planning purposes the Queensland Environmental Protection Agency also classifies a regional ecosystem as of concern if: ▪ 10-30% of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss[4]. Not of Concern ▪ more than 30% of pre-clearing extent of remnant vegetation exists in the bioregion, and it is greater than 10, 00 hectares. In addition, for biodiversity planning purposes the Queensland Environmental Protection Agency also classifies a regional ecosystem as not of concern if the degradation criteria listed above for endangered or of concern regional ecosystems are not met.
Vulnerable	Designated as 'Vulnerable' under the EPBC Act and/or NC Act. Refer to definitions of 'EPBC Act conservation status' and 'NC Act conservation status' for meaning of 'Vulnerable' under these Acts.

Attachment A

Weather conditions during field surveys

Table A-1: Weather conditions recorded at Miles Post Office weather station during surveys of the southern CSM pipeline route. Data sourced form Australia Bureau of Meteorology, 2008

Year	Month	Date	Temps		Rain	9:00 am				3:00 pm			
			Min	Max		RH	Cld	Dir	Spd	RH	Cld	Dir	Spd
			°C	°C	mm	%	8th	km/h		%	8th	km/h	
2008	August	11	0.2	15.2	0	41		SSW	9	21		SSW	17
2008	August	12	-3.2	16.2	0	42		S	13	25		S	13
2008	August	13	3.5	16	0	54		S	6	29		SSW	13
2008	August	14	-1.3	16.4	0	56		SSE	6	26		SW	15
2008	August	15	0.7	17.6	0	44		S	13	22		SW	13
2008	August	16	-2	16.9	0	48		SSW	11	21		SW	17
2008	August	17	-1.2	18.5	0	54		S	11	29		SSW	15
2008	August	18	5.7	15.3	0	62		Calm		37		SSW	9
2008	August	19	-2.5	18.7	0	42		S	13	13		S	11
2008	August	20	-2.9	22.8	0	42		N	6	26		SSE	7
2008	August	21	6.1	22.4	0	67		Calm		38		N	6
2008	August	22	11.2	22.4	0.4	75		NNW	13	16		W	19

Min = minimum daily temperature; Max = maximum daily temperature; RH = relative humidity; Cld = cloud cover (in eights); Dir = wind direction; Spd = wind speed.

Attachment B

Database search results – flora

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Acanthaceae	*Brunoniella australis*	blue trumpet	Y	C		WO
Acanthaceae	*Dipteracanthus australasicus subsp. corynothecus*		Y	C		WO HERBRECS
Acanthaceae	*Hypoestes floribunda*		Y	C		WO HERBRECS
Acanthaceae	*Pseuderanthemum variabile*	pastel flower	Y	C		WO HERBRECS
Acanthaceae	*Rostellularia adscendens*		Y	C		WO
Acanthaceae	*Rostellularia adscendens var. clementii*		Y	C		WO HERBRECS
Adiantaceae	*Cheilanthes distans*	bristly cloak fern	Y	C		WO
Adiantaceae	*Cheilanthes sieberi*		Y	C		WO HERBRECS CORVEG
Adiantaceae	*Cheilanthes sieberi subsp. sieberi*		Y	C		WO
Adiantaceae	*Cheilanthes sp.*					CORVEG
Adiantaceae	*Pellaea falcata*		Y	C		WO
Aizoaceae	*Tetragonia tetragonioides*	New Zealand spinach	Y	C		WO HERBRECS
Aizoaceae	*Trianthema portulacastrum*		N	-		HERBRECS
Aizoaceae	*Trianthema triquetra*		Y	C		HERBRECS
Alismataceae	*Damasonium minus*	starfruit	Y	C		WO
Amaranthaceae	*Alternanthera ficoidea*		N	-		WO
Amaranthaceae	*Alternanthera nana*	hairy joyweed	Y	C		WO HERBRECS
Amaranthaceae	*Alternanthera pungens*	khaki weed	N	-		WO HERBRECS
Amaranthaceae	*Deeringia amaranthoides*	redberry	Y	C		WO HERBRECS
Amaranthaceae	*Gomphrena celosioides*	gomphrena weed	N	-		WO HERBRECS
Amaranthaceae	*Guilleminea densa*		N	-		HERBRECS
Amaranthaceae	*Nyssanthes erecta*		Y	C		WO HERBRECS
Amaranthaceae	*Ptilotus exaltatus var. semilanatus*		Y	C		WO HERBRECS
Amaranthaceae	*Ptilotus macrocephalus*	green pussytails	Y	C		WO HERBRECS
Apiaceae	*Actinotus gibbonsii*	dwarf flannel flower	Y	C		WO HERBRECS
Apiaceae	*Cyclospermum leptophyllum*		N	-		WO HERBRECS
Apiaceae	*Daucus glochidiatus*		Y	C		HERBRECS
Apiaceae	*Platysace ericoides*	heath platysace	Y	C		WO HERBRECS
Apocynaceae	*Alstonia constricta*	bitterbark	Y	C		WO
Apocynaceae	*Carissa ovata*	currantbush	Y	C		WO HERBRECS
Apocynaceae	*Gomphocarpus physocarpus*		N	-		HERBRECS
Apocynaceae	*Hoya australis subsp. australis*		Y	C		WO
Apocynaceae	*Marsdenia micradenia*	gymnema	Y	C		WO
Apocynaceae	*Marsdenia viridiflora*		Y	C		WO HERBRECS
Apocynaceae	*Marsdenia viridiflora subsp. viridiflora*		Y	C		WO
Apocynaceae	*Parsonsia*		Y	C		WO
Apocynaceae	*Parsonsia eucalyptophylla*	gargaloo	Y	C		WO HERBRECS
Apocynaceae	*Parsonsia lanceolata*		Y	C		HERBRECS
Apocynaceae	*Parsonsia leichhardtii*	black silkpod	Y	C		WO
Apocynaceae	*Parsonsia rotata*	veinless silkpod	Y	C		WO HERBRECS
Apocynaceae	*Sarcostemma viminale subsp. brunonianum*		Y	C		WO HERBRECS
Apocynaceae	*Secamone elliptica*		Y	C		WO
Aponogetonaceae	***Aponogeton queenslandicus***		**Y**	**R**		**HERBRECS**
Araliaceae	*Astrotricha biddulphiana*		Y	C		WO
Araliaceae	*Hydrocotyle acutiloba*		Y	C		WO
Araliaceae	*Hydrocotyle sp.*		Y	C		WO
Araliaceae	*Trachymene ochracea*	white parsnip	Y	C		WO HERBRECS
Asteraceae	*Acanthospermum hispidum*		N	-		HERBRECS
Asteraceae	*Arctotheca calendula*		N	-		HERBRECS
Asteraceae	*Arctotis stoechadifolia*		N	-		HERBRECS
Asteraceae	*Bidens bipinnata*		N	-		HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Asteraceae	*Brachyscome ciliaris var. subintegrifolia*		Y	C		HERBRECS
Asteraceae	*Brachyscome dentata*		Y	C		WO
Asteraceae	*Brachyscome melanocarpa*		Y	C		WO
Asteraceae	*Brachyscome microcarpa*		Y	C		WO
Asteraceae	*Brachyscome multifida*		Y	C		HERBRECS
Asteraceae	*Brachyscome multifida var. dilatata*		Y	C		WO HERBRECS
Asteraceae	*Brachyscome multifida var. multifida*		Y	C		WO
Asteraceae	*Brachyscome sp.*		Y	C		WO CORVEG
Asteraceae	*Brachyscome trachycarpa*		Y	C		WO HERBRECS
Asteraceae	*Brachyscome whitei*		Y	C		WO HERBRECS
Asteraceae	*Calotis cuneata*		Y	C		HERBRECS
Asteraceae	*Calotis cuneifolia*	burr daisy	Y	C		WO HERBRECS
Asteraceae	*Calotis dentex*	white burr daisy	Y	C		WO
Asteraceae	*Calotis hispidula*	bogan flea	Y	C		WO
Asteraceae	*Calotis lappulacea*		Y	C		HERBRECS
Asteraceae	*Calyptocarpus vialis*	creeping cinderella weed	N	-		WO
Asteraceae	*Camptacra barbata*		Y	C		WO HERBRECS
Asteraceae	*Cassinia laevis*		Y	C		WO HERBRECS
Asteraceae	*Centaurea melitensis*		N	-		HERBRECS
Asteraceae	*Centipeda minima*		Y	C		HERBRECS
Asteraceae	*Chrysocephalum apiculatum*	yellow buttons	Y	C		WO HERBRECS
Asteraceae	*Cirsium vulgare*	spear thistle	N	-		WO
Asteraceae	*Conyza sp.*		Y	C		WO CORVEG
Asteraceae	*Cyanthillium cinereum*		Y	C		WO
Asteraceae	*Eclipta platyglossa*		Y	C		WO
Asteraceae	*Eclipta prostrata*	white eclipta	Y	C		WO
Asteraceae	*Epaltes australis*	spreading nutheads	Y	C		WO
Asteraceae	*Euchiton*		Y	C		WO
Asteraceae	*Euchiton sphaericus*		Y	C		WO
Asteraceae	*Flaveria australasica*	speedy weed	Y	C		WO HERBRECS
Asteraceae	*Gamochaeta pensylvanica*		N	-		WO HERBRECS CORVEG
Asteraceae	*Glossocardia bidens*	native cobbler's pegs	Y	C		WO HERBRECS
Asteraceae	*Helianthus annuus*		N	-		HERBRECS
Asteraceae	*Helichrysum collinum*		Y	C		WO
Asteraceae	*Hypochaeris albiflora*		N	-		WO HERBRECS
Asteraceae	*Lagenophora gracilis*		Y	C		WO
Asteraceae	*Leiocarpa brevicompta*		Y	C		HERBRECS
Asteraceae	*Leiocarpa semicalva subsp. tenuifolia*		Y	C		WO HERBRECS
Asteraceae	*Leptorhynchos baileyi*		Y	C		WO HERBRECS
Asteraceae	*Minuria integerrima*	smooth minuria	Y	C		WO
Asteraceae	*Olearia canescens*		Y	C		WO HERBRECS
Asteraceae	*Olearia ramosissima*		Y	C		WO
Asteraceae	*Olearia ramulosa*		Y	C		WO HERBRECS
Asteraceae	*Ozothamnus cassinioides*		Y	C		WO
Asteraceae	*Ozothamnus diosmifolius*	white dogwood	Y	C		WO HERBRECS
Asteraceae	*Ozothamnus diosmifolius*		Y	C		WO
Asteraceae	*Ozothamnus diotophyllus*		Y	C		WO HERBRECS
Asteraceae	*Parthenium hysterophorus*	parthenium weed	N	-		WO HERBRECS
Asteraceae	*Podolepis longipedata*	tall copper-wire daisy	Y	C		WO HERBRECS
Asteraceae	*Pterocaulon sphacelatum*	applebush	Y	C		WO
Asteraceae	*Pycnosorus chrysanthes*		Y	C		HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Asteraceae	*Rhodanthe polyphylla*		Y	C		HERBRECS
Asteraceae	***Rutidosis glandulosa***		**Y**	**R**		**WO**
Asteraceae	***Rutidosis lanata***		**Y**	**E**		**WO HERBRECS**
Asteraceae	*Rutidosis murchisonii*		Y	C		WO HERBRECS
Asteraceae	*Rutidosis sp.*		Y	C		HERBRECS
Asteraceae	*Senecio hispidulus*		Y	C		WO
Asteraceae	*Senecio pinnatifolius*		Y	C		HERBRECS
Asteraceae	*Senecio pinnatifolius var. pinnatifolius*		Y	C		WO
Asteraceae	*Sigesbeckia fugax*		Y	C		WO HERBRECS
Asteraceae	*Sigesbeckia orientalis*	Indian weed	Y	C		WO
Asteraceae	*Solenogyne bellioides*		Y	C		WO HERBRECS
Asteraceae	*Soliva anthemifolia*	dwarf jo jo weed	N	-		WO
Asteraceae	*Sonchus oleraceus*	common sowthistle	N	-		WO HERBRECS
Asteraceae	***Stemmacantha australis***	**Austral Cornflower, Native thistle**	**Y**	**V**	**V**	**EPBC Tool**
Asteraceae	*Verbesina encelioides*	crownbeard	N	-		WO
Asteraceae	*Vittadinia pterochaeta*		Y	C		HERBRECS
Asteraceae	*Vittadinia pustulata*		Y	C		WO HERBRECS
Asteraceae	*Vittadinia sulcata*	native daisy	Y	C		WO HERBRECS
Asteraceae	*Wedelia spilanthoides*		Y	C		WO HERBRECS
Bignoniaceae	*Pandorea pandorana*	wonga vine	Y	C		WO
Boraginaceae	*Cynoglossum australe*		Y	C		HERBRECS
Boraginaceae	*Echium plantagineum*		N	-		HERBRECS
Boraginaceae	*Ehretia membranifolia*	weeping koda	Y	C		WO
Boraginaceae	*Halgania brachyrhyncha*		Y	C		HERBRECS
Boraginaceae	*Heliotropium europaeum*		N	-		HERBRECS
Brassicaceae	*Brassica sp.*		Y	C		WO
Brassicaceae	*Lepidium africanum*		N	-		HERBRECS
Brassicaceae	*Lepidium bonariense*		N	-		HERBRECS
Brassicaceae	*Lepidium didymum*		N	-		HERBRECS
Brassicaceae	*Rapistrum rugosum*		N	-		HERBRECS
Brassicaceae	*Rorippa eustylis*		Y	C		WO
Brassicaceae	*Sisymbrium thellungii*	African turnip-weed	N	-		WO HERBRECS
Byblidaceae	*Byblis liniflora*		Y	C		WO HERBRECS
Byttneriaceae	*Commersonia leichhardtii*		Y	C		WO
Byttneriaceae	*Commersonia pedleyi*		Y	C		WO HERBRECS
Byttneriaceae	*Hannafordia shanesii*		Y	C		WO
Byttneriaceae	*Keraudrenia collina*		Y	C		WO
Byttneriaceae	*Keraudrenia hookeriana*		Y	C		HERBRECS
Byttneriaceae	*Seringia corollata*		Y	C		WO
Cactaceae	*Opuntia stricta*		N	-		WO
Cactaceae	*Opuntia tomentosa*	velvety tree pear	N	-		WO
Caesalpiniaceae	*Labichea digitata*		Y	C		WO HERBRECS
Caesalpiniaceae	*Lysiphyllum carronii*		Y	C		HERBRECS
Caesalpiniaceae	*Petalostylis labicheoides*		Y	C		WO HERBRECS
Caesalpiniaceae	***Senna acclinis***		**Y**	**R**		**WO**
Caesalpiniaceae	***Senna acclinis***		**Y**	**R**		**HERBRECS**
Caesalpiniaceae	*Senna aciphylla*					CORVEG
Caesalpiniaceae	*Senna artemisioides*		Y	C		WO
Caesalpiniaceae	*Senna artemisioides subsp. zygophylla*		Y	C		WO HERBRECS
Caesalpiniaceae	*Senna barclayana*		Y	C		WO HERBRECS
Caesalpiniaceae	*Senna coronilloides*		Y	C		WO HERBRECS

Family	Species	Common name	Native	Conservation status		Data source
				State	National	
Caesalpiniaceae	***Senna sophera var. (40Mile***		***Y***	***C***		***WO HERBRECS***
Callitrichaceae	*Callitriche sonderi*		Y	C		WO
Campanulaceae	*Lobelia andrewsii*		Y	C		HERBRECS
Campanulaceae	*Wahlenbergia communis*	tufted bluebell	Y	C		WO HERBRECS
Campanulaceae	*Wahlenbergia graniticola*	granite bluebell	Y	C		WO HERBRECS
Campanulaceae	*Wahlenbergia planiflora subsp. longipila*		Y	C		WO
Capparaceae	*Apophyllum anomalum*	broom bush	Y	C		WO HERBRECS
Capparaceae	*Capparis arborea*	brush caper berry	Y	C		WO HERBRECS
Capparaceae	*Capparis canescens*		Y	C		WO HERBRECS
Capparaceae	*Capparis lasiantha*	nipan	Y	C		WO HERBRECS
Capparaceae	*Capparis loranthifolia*		Y	C		WO
Capparaceae	*Capparis loranthifolia var. bancroftii*		Y	C		HERBRECS
Capparaceae	*Capparis mitchellii*		Y	C		WO HERBRECS
Caryophyllaceae	*Polycarpaea corymbosa var. minor*		Y	C		WO HERBRECS
Casuarinaceae	*Allocasuarina*		Y	C		WO
Casuarinaceae	*Allocasuarina inophloia*		Y	C		WO HERBRECS CORVEG
Casuarinaceae	*Allocasuarina littoralis*		Y	C		WO
Casuarinaceae	*Allocasuarina luehmannii*	bull oak	Y	C		WO HERBRECS CORVEG
Casuarinaceae	*Allocasuarina torulosa*		Y	C		WO
Casuarinaceae	*Casuarina cristata*	belah	Y	C		WO HERBRECS
Casuarinaceae	*Casuarina cunninghamiana*		Y	C		HERBRECS
Celastraceae	***Apatophyllum teretifolium***		**Y**	**R**		**WO**
Celastraceae	*Denhamia oleaster*		Y	C		WO
Celastraceae	***Denhamia parvifolia***		**Y**	**V**	**V**	**WO**
Celastraceae	*Denhamia pittosporoides*		Y	C		HERBRECS
Celastraceae	*Denhamia pittosporoides subsp. pittosporoides*		Y	C		WO
Celastraceae	*Elaeodendron australe var. australe*		Y	C		WO
Celastraceae	*Elaeodendron australe var. integrifolium*		Y	C		WO HERBRECS
Celastraceae	*Maytenus bilocularis*		Y	C		HERBRECS
Celastraceae	*Maytenus cunninghamii*	yellow berry bush	Y	C		WO HERBRECS
Celastraceae	*Maytenus disperma*	orange boxwood	Y	C		WO
Celastraceae	*Maytenus silvestris*	narrow-leaved orange bark	Y	C		WO
Celastraceae	*Siphonodon australis*	ivorywood	Y	C		WO
Centrolepidaceae	*Centrolepis exserta*		Y	C		WO
Chenopodiaceae	*Atriplex muelleri*	lagoon saltbush	Y	C		WO HERBRECS
Chenopodiaceae	*Atriplex semibaccata*		Y	C		HERBRECS
Chenopodiaceae	*Chenopodium carinatum*	green crumbweed	Y	C		WO HERBRECS
Chenopodiaceae	*Dysphania rhadinostachya subsp. inflata*		Y	C		WO HERBRECS
Chenopodiaceae	*Dysphania valida*		Y	C		WO HERBRECS
Chenopodiaceae	*Einadia hastata*		Y	C		WO HERBRECS
Chenopodiaceae	*Einadia nutans*		Y	C		WO HERBRECS
Chenopodiaceae	*Enchylaena tomentosa*		Y	C		WO HERBRECS
Chenopodiaceae	*Enchylaena tomentosa var. tomentosa*		Y	C		WO
Chenopodiaceae	*Maireana enchylaenoides*		Y	C		WO
Chenopodiaceae	*Maireana microcarpa*		Y	C		WO
Chenopodiaceae	*Maireana microphylla*		Y	C		WO HERBRECS
Chenopodiaceae	*Rhagodia parabolica*		Y	C		WO
Chenopodiaceae	*Rhagodia spinescens*		Y	C		HERBRECS
Chenopodiaceae	*Salsola kali*	soft roly-poly	Y	C		WO HERBRECS
Chenopodiaceae	*Sclerolaena bicornis var. horrida*		Y	C		WO
Chenopodiaceae	*Sclerolaena birchii*	galvanised burr	Y	C		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Chenopodiaceae	*Sclerolaena calcarata*	red burr	Y	C		WO
Chenopodiaceae	*Sclerolaena muricata*		Y	C		WO HERBRECS
Chenopodiaceae	*Sclerolaena muricata*		Y	C		HERBRECS
Chenopodiaceae	*Sclerolaena muricata var. muricata*		Y	C		WO
Chenopodiaceae	*Sclerolaena tetracuspis*		Y	C		HERBRECS
Clusiaceae	*Hypericum gramineum*		Y	C		WO
Commelinaceae	*Commelina diffusa*	wandering jew	Y	C		WO
Commelinaceae	*Murdannia graminea*	murdannia	Y	C		WO
Convolvulaceae	*Convolvulus arvensis*		N	-		WO HERBRECS
Convolvulaceae	*Convolvulus clementii*		Y	C		HERBRECS
Convolvulaceae	*Convolvulus graminetinus*		Y	C		WO HERBRECS
Convolvulaceae	*Cuscuta campestris*		N	-		HERBRECS
Convolvulaceae	*Evolvulus alsinoides*		Y	C		WO
Convolvulaceae	*Evolvulus alsinoides var. villosicalyx*		Y	C		WO
Convolvulaceae	*Operculina aequisepala*		Y	C		WO
Crassulaceae	*Bryophyllum delagoense*		N	-		WO HERBRECS
Crassulaceae	*Bryophyllum fedtschenkoi*		N	-		WO
Crassulaceae	*Graptopetalum paraguayense subsp. paraguayense*		N	-		WO
Cucurbitaceae	*Citrullus lanatus*		N	-		HERBRECS
Cucurbitaceae	*Sicyos australis*	star cucumber	Y	C		WO
Cupressaceae	***Callitris baileyi***		**Y**	**R**		**HERBRECS**
Cupressaceae	*Callitris endlicheri*	black cypress pine	Y	C		WO HERBRECS CORVEG
Cupressaceae	*Callitris glaucophylla*	white cypress pine	Y	C		WO HERBRECS CORVEG
Cupressaceae	*Callitris glaucophylla*		Y	C		WO
Cupressaceae	*Callitris sp.*		Y	C		WO
Cyperaceae	*Abildgaardia ovata*		Y	C		WO HERBRECS
Cyperaceae	*Carex appressa*		Y	C		HERBRECS
Cyperaceae	*Carex inversa*	knob sedge	Y	C		WO HERBRECS
Cyperaceae	*Cyperus betchei*		Y	C		HERBRECS
Cyperaceae	*Cyperus betchei subsp. betchei*		Y	C		WO
Cyperaceae	*Cyperus compressus*		N	-		WO
Cyperaceae	*Cyperus concinnus*		Y	C		WO
Cyperaceae	*Cyperus curvistylis*		Y	C		WO
Cyperaceae	*Cyperus exaltatus*		Y	C		HERBRECS
Cyperaceae	*Cyperus flaccidus*		Y	C		WO
Cyperaceae	*Cyperus fulvus*		Y	C		WO
Cyperaceae	*Cyperus gracilis*		Y	C		WO HERBRECS
Cyperaceae	*Cyperus gunnii*		Y	C		HERBRECS
Cyperaceae	*Cyperus isabellinus*		Y	C		WO
Cyperaceae	*Cyperus nervulosus*		Y	C		WO
Cyperaceae	*Cyperus procerus*		Y	C		HERBRECS
Cyperaceae	*Cyperus pulchellus*		Y	C		WO
Cyperaceae	*Cyperus pygmaeus*	dwarf sedge	Y	C		WO
Cyperaceae	*Cyperus sanguinolentus*		Y	C		WO
Cyperaceae	*Cyperus sp.*		Y	C		WO CORVEG
Cyperaceae	*Cyperus squarrosus*	bearded flatsedge	Y	C		WO
Cyperaceae	*Cyperus trinervis*		Y	C		WO
Cyperaceae	***Eleocharis blakeana***		**Y**	**R**		**WO**
Cyperaceae	*Eleocharis cylindrostachys*		Y	C		WO HERBRECS
Cyperaceae	*Eleocharis philippinensis*		Y	C		WO
Cyperaceae	*Eleocharis pusilla*	small spikerush	Y	C		WO

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Cyperaceae	*Eleocharis sphacelata*	tall spikerush	Y	C		WO
Cyperaceae	*Fimbristylis aestivalis var. aestivalis*		Y	C		WO
Cyperaceae	*Fimbristylis dichotoma*	common fringe-rush	Y	C		WO
Cyperaceae	*Fimbristylis littoralis*		Y	C		WO
Cyperaceae	*Fimbristylis nuda*		Y	C		WO
Cyperaceae	***Fimbristylis vagans***		**Y**	**R**		**WO**
Cyperaceae	*Fimbristylis velata*		Y	C		WO
Cyperaceae	*Fuirena incrassata*		Y	C		WO
Cyperaceae	*Gahnia aspera*		Y	C		WO HERBRECS
Cyperaceae	*Gahnia sieberiana*	sword grass	Y	C		WO CORVEG
Cyperaceae	*Lepidosperma laterale*		Y	C		WO
Cyperaceae	*Lepidosperma laterale var. laterale*		Y	C		WO
Cyperaceae	*Lepironia articulata*		Y	C		WO
Cyperaceae	*Lipocarpha microcephala*		Y	C		WO
Cyperaceae	*Schoenus apogon*		Y	C		HERBRECS
Cyperaceae	*Schoenus apogon var. apogon*		Y	C		WO
Cyperaceae	*Schoenus kennyi*		Y	C		WO
Cyperaceae	*Schoenus lepidosperma subsp. pachylepis*		Y	C		HERBRECS
Cyperaceae	*Schoenus moorei*		Y	C		WO HERBRECS
Cyperaceae	*Schoenus sp.*		Y	C		WO CORVEG
Cyperaceae	*Schoenus subaphyllus*		Y	C		WO
Cyperaceae	*Scleria mackaviensis*		Y	C		WO HERBRECS
Cyperaceae	*Scleria sp.*		Y	C		WO CORVEG
Cyperaceae	*Scleria sphacelata*		Y	C		WO HERBRECS CORVEG
Dicranaceae	*Sclerodontium clavinerve*		Y	C		WO HERBRECS
Dilleniaceae	*Hibbertia cistoidea*		Y	C		WO HERBRECS
Dilleniaceae	*Hibbertia linearis var. obtusifolia*		Y	C		WO HERBRECS
Dilleniaceae	*Hibbertia stricta*		Y	C		WO HERBRECS
Dilleniaceae	*Hibbertia stricta var. hirtiflora*		Y	C		WO
Dilleniaceae	*Hibbertia stricta var. stricta*		Y	C		WO
Droseraceae	*Drosera angustifolia*		Y	C		WO
Droseraceae	*Drosera auriculata*		Y	C		WO
Droseraceae	*Drosera burmanni*		Y	C		WO
Droseraceae	*Drosera glanduligera*		Y	C		WO HERBRECS
Droseraceae	*Drosera indica*		Y	C		WO
Droseraceae	*Drosera peltata*	pale sundew	Y	C		WO HERBRECS
Ebenaceae	*Diospyros australis*	black plum	Y	C		WO
Ebenaceae	*Diospyros humilis*	small-leaved ebony	Y	C		WO
Ericaceae	*Agiortia pleiosperma*		Y	C		WO HERBRECS
Ericaceae	*Brachyloma daphnoides*		Y	C		WO
Ericaceae	*Brachyloma daphnoides subsp. daphnoides*		Y	C		WO
Ericaceae	*Leucopogon biflorus*		Y	C		WO HERBRECS
Ericaceae	*Leucopogon blakei*		Y	C		WO HERBRECS
Ericaceae	*Leucopogon flexifolius*		Y	C		WO
Ericaceae	*Leucopogon imbricatus*		Y	C		HERBRECS
Ericaceae	*Leucopogon mitchellii*		Y	C		WO HERBRECS
Ericaceae	*Leucopogon muticus*		Y	C		WO
Ericaceae	*Lissanthe pluriloculata*		Y	C		WO HERBRECS
Ericaceae	*Melichrus*		Y	C		WO
Ericaceae	*Melichrus adpressus*		Y	C		WO HERBRECS
Ericaceae	*Melichrus sp.*		Y	C		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Ericaceae	*Melichrus sp.*		Y	C		WO
Ericaceae	*Melichrus urceolatus*	honey gorse	Y	C		WO HERBRECS
Ericaceae	*Monotoca scoparia*	prickly broom heath	Y	C		WO CORVEG
Ericaceae	*Styphelia viridis subsp. breviflora*		Y	C		WO
Erythroxylaceae	*Erythroxylum sp.*		Y	C		WO
Euphorbiaceae	*Acalypha capillipes*	small-leaved acalypha	Y	C		WO
Euphorbiaceae	*Acalypha eremorum*	soft acalypha	Y	C		WO HERBRECS
Euphorbiaceae	*Bertya oleifolia*		Y	C		WO HERBRECS
Euphorbiaceae	*Chamaesyce dallachyana*	mat spurge	Y	C		WO HERBRECS
Euphorbiaceae	*Chamaesyce drummondii*	caustic-weed	Y	C		WO
Euphorbiaceae	*Chamaesyce hirta*	asthma plant	N	-		WO HERBRECS
Euphorbiaceae	*Croton insularis*	Queensland cascarilla	Y	C		WO HERBRECS
Euphorbiaceae	*Croton phebalioides*	narrow-leaved croton	Y	C		WO HERBRECS
Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*		Y	C		WO HERBRECS
Euphorbiaceae	*Monotaxis macrophylla*		Y	C		WO HERBRECS
Euphorbiaceae	*Ricinus communis*	castor oil bush	N	-		WO HERBRECS
Fabaceae	*Aotus subglauca var. filiformis*		Y	C		WO
Fabaceae	*Aotus subglauca var. subglauca*		Y	C		WO
Fabaceae	*Bossiaea*		Y	C		WO
Fabaceae	*Bossiaea brownii*		Y	C		WO
Fabaceae	*Bossiaea rhombifolia subsp. concolor*		Y	C		WO
Fabaceae	*Bossiaea scortechinii*		Y	C		WO HERBRECS
Fabaceae	*Chorizema parviflorum*	eastern flame pea	Y	C		WO HERBRECS
Fabaceae	*Crotalaria mitchellii*		Y	C		HERBRECS
Fabaceae	*Cullen patens*	bullamon lucerne	Y	C		WO HERBRECS
Fabaceae	*Daviesia acicularis*		Y	C		WO
Fabaceae	*Daviesia filipes*		Y	C		WO
Fabaceae	*Daviesia genistifolia*	broom bitter pea	Y	C		WO
Fabaceae	*Daviesia ulicifolia subsp. stenophylla*		Y	C		WO
Fabaceae	*Daviesia villifera*	prickly daviesia	Y	C		WO
Fabaceae	*Desmodium brachypodum*	large ticktrefoil	Y	C		WO HERBRECS
Fabaceae	*Desmodium campylocaulon*		Y	C		WO
Fabaceae	*Desmodium rhytidophyllum*		Y	C		WO
Fabaceae	*Desmodium varians*	slender tick trefoil	Y	C		WO HERBRECS
Fabaceae	*Dillwynia retorta*		Y	C		HERBRECS
Fabaceae	*Glycine clandestina*		Y	C		WO
Fabaceae	*Glycine clandestina var. clandestina*		Y	C		WO
Fabaceae	*Glycine clandestina var. sericea*		Y	C		WO
Fabaceae	*Glycine tabacina*	glycine pea	Y	C		WO
Fabaceae	*Glycine tomentella*	woolly glycine	Y	C		WO HERBRECS
Fabaceae	*Gompholobium foliolosum*	fern-leaved burtonia	Y	C		WO
Fabaceae	*Hardenbergia violacea*		Y	C		WO HERBRECS
Fabaceae	*Hovea angustissima*		Y	C		WO
Fabaceae	*Hovea angustissima*		Y	C		WO
Fabaceae	*Hovea longipes*	brush hovea	Y	C		WO HERBRECS
Fabaceae	*Hovea lorata*		Y	C		WO
Fabaceae	*Hovea pannosa*	rusty bush pea	Y	C		WO
Fabaceae	*Hovea planifolia*		Y	C		WO
Fabaceae	*Hovea tholiformis*		Y	C		WO
Fabaceae	*Indigofera linnaei*		Y	C		HERBRECS
Fabaceae	*Jacksonia rhadinoclona*	Miles dogwood	Y	C		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
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Fabaceae	*Jacksonia scoparia*		Y	C		WO HERBRECS
Fabaceae	*Jacksonia stackhousei*	wallum dogwood	Y	C		WO HERBRECS
Fabaceae	*Kennedia procurrens*	purple running pea	Y	C		WO
Fabaceae	*Lotus australis*		Y	C		HERBRECS
Fabaceae	*Medicago minima*		N	-		HERBRECS
Fabaceae	*Medicago polymorpha*		N	-		HERBRECS
Fabaceae	*Medicago truncatula*		N	-		HERBRECS
Fabaceae	*Melilotus indicus*	hexham scent	N	-		WO HERBRECS
Fabaceae	*Mirbelia aotoides*		Y	C		WO HERBRECS
Fabaceae	*Mirbelia pungens*		Y	C		WO HERBRECS
Fabaceae	*Mirbelia speciosa subsp. ringrosei*		Y	C		WO
Fabaceae	*Pultenaea foliolosa*		Y	C		WO
Fabaceae	*Pultenaea microphylla*		Y	C		WO
Fabaceae	*Pultenaea petiolaris*		Y	C		WO HERBRECS
Fabaceae	*Pultenaea spinosa*		Y	C		WO
Fabaceae	*Rhynchosia minima var. australis*		Y	C		WO HERBRECS
Fabaceae	*Swainsona luteola*		Y	C		HERBRECS
Fabaceae	*Tephrosia dietrichiae*		Y	C		HERBRECS
Fabaceae	*Trifolium subterraneum*		N	-		HERBRECS
Fabaceae	*Vicia sativa subsp. nigra*		N	-		WO HERBRECS
Fabaceae	*Zornia dyctiocarpa var. dyctiocarpa*		Y	C		WO
Gentianaceae	*Schenkia australis*		Y	C		HERBRECS
Geraniaceae	*Erodium crinitum*		Y	C		HERBRECS
Geraniaceae	*Geranium solanderi*		Y	C		HERBRECS
Geraniaceae	*Geranium solanderi var. solanderi*	native geranium	Y	C		WO
Goodeniaceae	*Brunonia australis*	blue pincushion	Y	C		WO HERBRECS
Goodeniaceae	*Dampiera adpressa*		Y	C		WO HERBRECS
Goodeniaceae	*Dampiera discolor*		Y	C		WO
Goodeniaceae	*Dampiera discolor*		Y	C		HERBRECS
Goodeniaceae	*Dampiera ferruginea*	velvet beauty-bush	Y	C		WO
Goodeniaceae	*Dampiera stricta*		Y	C		WO
Goodeniaceae	*Goodenia bellidifolia subsp. argentea*		Y	C		WO
Goodeniaceae	*Goodenia delicata*		Y	C		WO
Goodeniaceae	*Goodenia delicata*		Y	C		HERBRECS
Goodeniaceae	*Goodenia fascicularis*		Y	C		WO
Goodeniaceae	*Goodenia fascicularis*		Y	C		HERBRECS
Goodeniaceae	*Goodenia glabra*		Y	C		WO
Goodeniaceae	*Goodenia glabra*		Y	C		HERBRECS
Goodeniaceae	*Goodenia gracilis*		Y	C		WO
Goodeniaceae	*Goodenia macbarronii*	narrow goodenia	Y	C		WO
Goodeniaceae	*Goodenia rosulata*		Y	C		HERBRECS
Goodeniaceae	*Goodenia rotundifolia*		Y	C		WO
Goodeniaceae	*Scaevola spinescens*	prickly fan flower	Y	C		WO HERBRECS
Goodeniaceae	*Velleia lyrata*		Y	C		WO HERBRECS
Goodeniaceae	*Velleia paradoxa*	spur velleia	Y	C		WO
Haloragaceae	*Gonocarpus*		Y	C		WO
Haloragaceae	*Gonocarpus micranthus subsp. ramosissimus*		Y	C		WO
Haloragaceae	***Gonocarpus urceolatus***		**Y**	**V**		**WO HERBRECS**
Haloragaceae	*Haloragis aspera*		Y	C		HERBRECS
Haloragaceae	*Haloragis heterophylla*	rough raspweed	Y	C		WO HERBRECS
Haloragaceae	*Myriophyllum crispatum*		Y	C		WO

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Haloragaceae	*Myriophyllum striatum*		Y	C		WO
Haloragaceae	*Myriophyllum verrucosum*	water milfoil	Y	C		WO HERBRECS
Hemerocallidaceae	*Dianella*		Y	C		WO
Hemerocallidaceae	*Dianella brevipedunculata*		Y	C		WO
Hemerocallidaceae	*Dianella caerulea*		Y	C		WO
Hemerocallidaceae	*Dianella caerulea var. protensa*		Y	C		WO
Hemerocallidaceae	*Dianella longifolia var. longifolia*		Y	C		WO
Hemerocallidaceae	*Dianella longifolia var. stenophylla*		Y	C		WO
Hemerocallidaceae	*Dianella longifolia var. stupata*		Y	C		HERBRECS
Hemerocallidaceae	*Dianella rara*		Y	C		WO
Hemerocallidaceae	*Dianella revoluta*		Y	C		WO HERBRECS
Hemerocallidaceae	*Dianella revoluta var. revoluta*		Y	C		WO
Hemerocallidaceae	*Dianella revoluta var. tenuis*		Y	C		WO
Heterodeaceae	*Heterodea muelleri*		Y	C		HERBRECS
Hypoxidaceae	*Hypoxis hygrometrica var. villosisepala*		Y	C		WO
Iridaceae	*Patersonia glabrata*		Y	C		WO
Iridaceae	*Sisyrinchium sp.*	scourweed	N	-		WO
Johnsoniaceae	*Tricoryne anceps subsp. anceps*		Y	C		WO
Johnsoniaceae	*Tricoryne elatior*	yellow autumn lily	Y	C		WO
Juncaceae	*Juncus aridicola*	tussock rush	Y	C		WO HERBRECS
Juncaceae	*Juncus psammophilus*		Y	C		WO HERBRECS
Juncaceae	*Juncus subsecundus*		Y	C		WO
Juncaceae	*Juncus usitatus*		Y	C		WO HERBRECS
Juncaginaceae	*Triglochin dubium*		Y	C		WO HERBRECS
Lamiaceae	*Ajuga australis*		Y	C		HERBRECS
Lamiaceae	*Moluccella laevis*		N	-		HERBRECS
Lamiaceae	*Plectranthus graveolens*	flea bush	Y	C		WO
Lamiaceae	*Plectranthus parviflorus*		Y	C		WO
Lamiaceae	*Prostanthera cryptandroides subsp. euphrasioides*		Y	C		WO HERBRECS
Lamiaceae	*Prostanthera leichhardtii*		Y	C		WO HERBRECS
Lamiaceae	*Prostanthera lithospermoides*		Y	C		HERBRECS
Lamiaceae	*Prostanthera ringens*		Y	C		WO HERBRECS CORVEG
Lamiaceae	*Prostanthera saxicola var. bracteolata*		Y	C		HERBRECS
Lamiaceae	*Prostanthera sp.*		Y	C		WO
Lamiaceae	*Prostanthera sp.*		Y	C		HERBRECS
Lamiaceae	*Spartothamnella juncea*	native broom	Y	C		WO HERBRECS
Lamiaceae	*Spartothamnella puberula*		Y	C		WO HERBRECS
Lamiaceae	*Teucrium sp.*		Y	C		HERBRECS
Lamiaceae	*Westringia cheelii*		Y	C		WO HERBRECS
Lamiaceae	***Westringia parvifolia***		**Y**	**V**	**V**	**EPBC Tool**
Lauraceae	*Cryptocarya meisneriana*	thick-leaved cryptocarya	Y	C		WO
Laxmanniaceae	*Arthropodium strictum*		Y	C		HERBRECS
Laxmanniaceae	*Eustrephus latifolius*	wombat berry	Y	C		WO
Laxmanniaceae	*Laxmannia*		Y	C		WO
Laxmanniaceae	*Laxmannia compacta*		Y	C		WO
Laxmanniaceae	*Laxmannia gracilis*	slender wire lily	Y	C		WO HERBRECS
Laxmanniaceae	*Lomandra confertifolia subsp. pallida*		Y	C		WO
Laxmanniaceae	*Lomandra filiformis*		Y	C		WO HERBRECS
Laxmanniaceae	*Lomandra filiformis subsp. filiformis*		Y	C		WO
Laxmanniaceae	*Lomandra laxa*	broad-leaved matrush	Y	C		WO
Laxmanniaceae	*Lomandra leucocephala*		Y	C		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
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Laxmanniaceae	*Lomandra leucocephala subsp. leucocephala*		Y	C		WO
Laxmanniaceae	*Lomandra longifolia*		Y	C		WO CORVEG
Laxmanniaceae	*Lomandra multiflora*		Y	C		WO
Laxmanniaceae	*Lomandra multiflora subsp. multiflora*		Y	C		WO
Laxmanniaceae	*Lomandra patens*		Y	C		WO
Laxmanniaceae	*Lomandra sp.*		Y	C		WO CORVEG
Laxmanniaceae	*Thysanotus tuberosus*		Y	C		HERBRECS
Lentibulariaceae	*Utricularia sp.*		Y	C		HERBRECS
Loganiaceae	*Logania albiflora*		Y	C		WO
Loganiaceae	*Mitrasacme paludosa*		Y	C		WO HERBRECS
Loranthaceae	*Amyema*		Y	C		WO
Loranthaceae	*Amyema bifurcata*		Y	C		WO HERBRECS
Loranthaceae	*Amyema biniflora*		Y	C		WO HERBRECS
Loranthaceae	*Amyema congener*		Y	C		WO
Loranthaceae	*Amyema congener subsp. congener*		Y	C		WO
Loranthaceae	*Amyema congener subsp. rotundifolia*		Y	C		WO HERBRECS
Loranthaceae	*Amyema gaudichaudii*		Y	C		WO
Loranthaceae	*Amyema linophylla subsp. orientalis*		Y	C		WO HERBRECS
Loranthaceae	*Amyema maidenii subsp. angustifolia*		Y	C		WO
Loranthaceae	*Amyema miquelii*		Y	C		WO HERBRECS
Loranthaceae	*Amyema pendula subsp. longifolia*		Y	C		WO
Loranthaceae	*Amyema pendulum*		Y	C		WO
Loranthaceae	*Amyema quandang*		Y	C		HERBRECS
Loranthaceae	*Amyema quandang var. bancroftii*	broad-leaved grey mistletoe	Y	C		WO HERBRECS
Loranthaceae	*Dendrophthoe glabrescens*		Y	C		WO HERBRECS
Loranthaceae	*Lysiana exocarpi subsp. tenuis*		Y	C		WO HERBRECS
Loranthaceae	*Lysiana subfalcata*		Y	C		WO HERBRECS
Loranthaceae	*Muellerina bidwillii*		Y	C		WO HERBRECS
Lythraceae	*Ammannia multiflora*	jerry-jerry	Y	C		WO HERBRECS
Lythraceae	*Rotala mexicana*		Y	C		WO HERBRECS
Malvaceae	*Abutilon fraseri*		Y	C		HERBRECS
Malvaceae	*Abutilon oxycarpum*		Y	C		WO HERBRECS
Malvaceae	*Abutilon oxycarpum*		Y	C		WO
Malvaceae	*Anoda cristata*	anoda weed	N	-		WO HERBRECS
Malvaceae	*Hibiscus sp.*		Y	C		HERBRECS
Malvaceae	*Hibiscus sturtii*		Y	C		WO HERBRECS
Malvaceae	*Hibiscus sturtii var. sturtii*		Y	C		WO
Malvaceae	*Malva parviflora*		N	-		HERBRECS
Malvaceae	*Malvastrum americanum var. americanum*		N	-		WO HERBRECS
Malvaceae	*Sida cordifolia*		N	-		WO
Malvaceae	*Sida corrugata*		Y	C		WO HERBRECS
Malvaceae	*Sida fibulifera*		Y	C		WO
Malvaceae	*Sida filiformis*		Y	C		WO HERBRECS
Malvaceae	*Sida hackettiana*		Y	C		HERBRECS
Malvaceae	*Sida sp.*		Y	C		WO HERBRECS CORVEG
Malvaceae	*Sida subspicata*	spiked sida	Y	C		WO
Malvaceae	*Sida trichopoda*		Y	C		WO
Marsileaceae	*Marsilea drummondii*		Y	C		HERBRECS
Marsileaceae	*Marsilea mutica*	shiny nardoo	Y	C		WO
Meliaceae	*Owenia acidula*	emu apple	Y	C		WO HERBRECS
Menispermaceae	*Tinospora smilacina*	snakevine	Y	C		WO

Family	*Species*	Common name	Native	Conservation status		Data source
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Menyanthaceae	*Nymphoides crenata*	wavy marshwort	Y	C		WO HERBRECS
Mimosaceae	*Acacia amblygona*	fan-leaf wattle	Y	C		WO HERBRECS
Mimosaceae	*Acacia aneura var. major*		Y	C		WO
Mimosaceae	*Acacia aprepta*	Miles mulga	Y	C		WO HERBRECS
Mimosaceae	*Acacia aprepta*					CORVEG
Mimosaceae	*Acacia aulacocarpa*		Y	C		WO
Mimosaceae	*Acacia bancroftiorum*		Y	C		WO
Mimosaceae	***Acacia barakulensis***		**Y**	**V**		**WO**
Mimosaceae	*Acacia blakei*		Y	C		HERBRECS
Mimosaceae	*Acacia blakei subsp. blakei*		Y	C		WO
Mimosaceae	*Acacia burbidgeae*		Y	C		WO HERBRECS
Mimosaceae	*Acacia burrowii*		Y	C		WO HERBRECS CORVEG
Mimosaceae	*Acacia buxifolia subsp. pubiflora*		Y	C		WO HERBRECS
Mimosaceae	*Acacia caroleae*		Y	C		WO
Mimosaceae	*Acacia caroleae*		Y	C		HERBRECS
Mimosaceae	***Acacia chinchillensis***		**Y**	**V**	**V**	**WO**
Mimosaceae	*Acacia complanata*	flatstem wattle	Y	C		WO
Mimosaceae	*Acacia complanata*		Y	C		HERBRECS
Mimosaceae	*Acacia conferta*		Y	C		WO
Mimosaceae	*Acacia conferta*		Y	C		HERBRECS
Mimosaceae	*Acacia conferta*					CORVEG
Mimosaceae	*Acacia crassa*		Y	C		WO HERBRECS
Mimosaceae	*Acacia crassa subsp. crassa*		Y	C		WO
Mimosaceae	*Acacia crassa subsp. longicoma*		Y	C		WO HERBRECS
Mimosaceae	*Acacia cultriformis*		Y	C		WO
Mimosaceae	***Acacia curranii***	**curly-bark wattle**	**Y**	**V**	**V**	**WO HERBRECS**
Mimosaceae	*Acacia deanei*		Y	C		HERBRECS
Mimosaceae	*Acacia deanei subsp. deanei*		Y	C		WO
Mimosaceae	*Acacia debilis*		Y	C		WO HERBRECS
Mimosaceae	*Acacia decora*		Y	C		HERBRECS
Mimosaceae	*Acacia everistii*		Y	C		HERBRECS
Mimosaceae	*Acacia excelsa*		Y	C		WO HERBRECS
Mimosaceae	*Acacia excelsa subsp. excelsa*		Y	C		WO
Mimosaceae	*Acacia falcata*	sickle wattle	Y	C		WO HERBRECS
Mimosaceae	*Acacia flexifolia*		Y	C		HERBRECS
Mimosaceae	***Acacia gittinsii***		**Y**	**R**		**WO**
Mimosaceae	*Acacia glaucocarpa*	hickory wattle	Y	C		WO
Mimosaceae	*Acacia hakeoides*	hakea wattle	Y	C		WO HERBRECS
Mimosaceae	***Acacia handonis***		**Y**	**V**	**V**	**WO**
Mimosaceae	*Acacia harpophylla*	brigalow	Y	C		WO HERBRECS
Mimosaceae	*Acacia hyaloneura*		Y	C		WO
Mimosaceae	*Acacia implexa*	lightwood	Y	C		WO HERBRECS
Mimosaceae	*Acacia ixiophylla*		Y	C		WO HERBRECS
Mimosaceae	*Acacia johnsonii*		Y	C		WO HERBRECS
Mimosaceae	*Acacia jucunda*		Y	C		WO
Mimosaceae	*Acacia julifera*		Y	C		WO HERBRECS
Mimosaceae	*Acacia julifera subsp. julifera*		Y	C		WO
Mimosaceae	*Acacia juncifolia*		Y	C		WO HERBRECS
Mimosaceae	*Acacia leichhardtii*		Y	C		WO
Mimosaceae	*Acacia leiocalyx*		Y	C		WO HERBRECS CORVEG
Mimosaceae	*Acacia leiocalyx subsp. leiocalyx*		Y	C		WO

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Mimosaceae	*Acacia leptostachya*	Townsville wattle	Y	C		WO
Mimosaceae	*Acacia longispicata*		Y	C		WO HERBRECS
Mimosaceae	*Acacia loroloba*	Ma Ma Creek wattle	Y	C		WO
Mimosaceae	*Acacia macradenia*	zig-zag wattle	Y	C		WO HERBRECS
Mimosaceae	*Acacia melvillei*		Y	C		WO HERBRECS
Mimosaceae	*Acacia microsperma*		Y	C		HERBRECS
Mimosaceae	*Acacia muelleriana*		Y	C		WO HERBRECS
Mimosaceae	*Acacia neriifolia*	pechey wattle	Y	C		WO HERBRECS
Mimosaceae	*Acacia omalophylla*		Y	C		WO HERBRECS
Mimosaceae	*Acacia oswaldii*	miljee	Y	C		WO HERBRECS
Mimosaceae	*Acacia pendula*	myall	Y	C		WO HERBRECS
Mimosaceae	*Acacia penninervis*		Y	C		WO HERBRECS
Mimosaceae	*Acacia pravifolia*		Y	C		HERBRECS
Mimosaceae	*Acacia pustula*		Y	C		WO
Mimosaceae	*Acacia salicina*	doolan	Y	C		WO HERBRECS
Mimosaceae	*Acacia semilunata*	crescent-leaved wattle	Y	C		WO HERBRECS CORVEG
Mimosaceae	*Acacia semirigida*		Y	C		WO
Mimosaceae	*Acacia sertiformis*		Y	C		WO
Mimosaceae	*Acacia shirleyi*	lancewood	Y	C		WO HERBRECS CORVEG
Mimosaceae	*Acacia sp.*		Y	C		WO CORVEG
Mimosaceae	*Acacia sparsiflora*		Y	C		WO HERBRECS
Mimosaceae	*Acacia spectabilis*	pilliga wattle	Y	C		WO HERBRECS
Mimosaceae	*Acacia striatifolia*		Y	C		WO
Mimosaceae	***Acacia tenuinervis***		**Y**	**R**		**WO HERBRECS**
Mimosaceae	*Acacia triptera*		Y	C		WO HERBRECS CORVEG
Mimosaceae	*Acacia victoriae*		Y	C		HERBRECS
Mimosaceae	*Acacia victoriae subsp. victoriae*		Y	C		WO
Mimosaceae	*Neptunia gracilis*		Y	C		WO HERBRECS
Molluginaceae	*Glinus lotoides*	hairy carpet weed	Y	C		WO
Moraceae	*Ficus platypoda*		Y	C		WO
Moraceae	*Ficus virens var. sublanceolata*		Y	C		WO
Moraceae	*Trophis scandens*		Y	C		WO
Moraceae	*Trophis scandens subsp. scandens*		Y	C		WO
Myoporaceae	*Eremophila*		Y	C		WO
Myoporaceae	*Eremophila debilis*	winter apple	Y	C		WO HERBRECS
Myoporaceae	*Eremophila deserti*		Y	C		WO HERBRECS
Myoporaceae	*Eremophila longifolia*		Y	C		HERBRECS
Myoporaceae	*Eremophila mitchellii*		Y	C		WO HERBRECS
Myoporaceae	*Myoporum acuminatum*	coastal boobialla	Y	C		WO
Myoporaceae	*Myoporum sp.*		Y	C		WO HERBRECS
Myrsinaceae	*Myrsine variabilis*		Y	C		WO
Myrtaceae	*Angophora floribunda*	rough-barked apple	Y	C		WO HERBRECS CORVEG
Myrtaceae	*Angophora leiocarpa*	rusty gum	Y	C		WO HERBRECS
Myrtaceae	*Babingtonia densifolia*		Y	C		WO
Myrtaceae	***Calytrix gurulmundensis***		**Y**	**V**	**V**	**WO HERBRECS**
Myrtaceae	*Calytrix tetragona*	fringe myrtle	Y	C		WO HERBRECS
Myrtaceae	*Corymbia abergiana*		Y	C		HERBRECS
Myrtaceae	*Corymbia bloxsomei*		Y	C		WO
Myrtaceae	*Corymbia bloxsomei*		Y	C		HERBRECS
Myrtaceae	*Corymbia citriodora*	spotted gum	Y	C		WO
Myrtaceae	*Corymbia citriodora subsp. variegata*		Y	C		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Myrtaceae	*Corymbia clarksoniana*		Y	C		WO
Myrtaceae	*Corymbia intermedia*	pink bloodwood	Y	C		WO
Myrtaceae	*Corymbia polycarpa*	long-fruited bloodwood	Y	C		WO
Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash	Y	C		WO CORVEG
Myrtaceae	*Corymbia trachyphloia*		Y	C		WO HERBRECS
Myrtaceae	*Corymbia trachyphloia subsp. amphistomatica*		Y	C		WO HERBRECS
Myrtaceae	*Corymbia trachyphloia subsp. trachyphloia*		Y	C		WO
Myrtaceae	*Corymbia watsoniana*		Y	C		WO
Myrtaceae	*Corymbia watsoniana subsp. capillata*		Y	C		WO
Myrtaceae	*Corymbia watsoniana subsp. watsoniana*		Y	C		WO
Myrtaceae	*Eucalyptus*		Y	C		WO
Myrtaceae	*Eucalyptus acmenoides*		Y	C		WO
Myrtaceae	*Eucalyptus apothalassica*		Y	C		WO HERBRECS
Myrtaceae	***Eucalyptus argophloia***	**Queensland western white gum**	**Y**	**V**	**V**	**WO EPBC Tool**
Myrtaceae	*Eucalyptus baileyana*		Y	C		HERBRECS
Myrtaceae	*Eucalyptus bakeri*	Baker's mallee	Y	C		WO HERBRECS
Myrtaceae	*Eucalyptus biturbinata*		Y	C		WO
Myrtaceae	*Eucalyptus camaldulensis*		Y	C		WO HERBRECS
Myrtaceae	*Eucalyptus chloroclada*	Baradine red gum	Y	C		WO HERBRECS CORVEG
Myrtaceae	*Eucalyptus conica*	fuzzy box	Y	C		WO
Myrtaceae	*Eucalyptus crebra*	narrow-leaved red ironbark	Y	C		WO HERBRECS CORVEG
Myrtaceae	*Eucalyptus crebra*		Y	C		WO
Myrtaceae	***Eucalyptus curtisii***	**Plunkett mallee**	**Y**	**R**		**WO HERBRECS**
Myrtaceae	*Eucalyptus dealbata*	tumble-down red gum	Y	C		WO
Myrtaceae	*Eucalyptus decorticans*		Y	C		WO
Myrtaceae	*Eucalyptus dura*		Y	C		WO
Myrtaceae	*Eucalyptus elegans*		Y	C		WO HERBRECS
Myrtaceae	*Eucalyptus exserta*	Queensland peppermint	Y	C		WO HERBRECS CORVEG
Myrtaceae	*Eucalyptus fibrosa*		Y	C		WO HERBRECS CORVEG
Myrtaceae	*Eucalyptus fibrosa subsp. fibrosa*		Y	C		WO
Myrtaceae	*Eucalyptus fibrosa subsp. nubila*		Y	C		WO HERBRECS
Myrtaceae	*Eucalyptus longirostrata*		Y	C		WO
Myrtaceae	*Eucalyptus melanophloia*		Y	C		WO HERBRECS
Myrtaceae	*Eucalyptus melliodora*	yellow box	Y	C		WO
Myrtaceae	*Eucalyptus microcarpa*	inland grey box	Y	C		WO HERBRECS
Myrtaceae	*Eucalyptus moluccana*	gum-topped box	Y	C		WO
Myrtaceae	*Eucalyptus orgadophila*		Y	C		HERBRECS
Myrtaceae	***Eucalyptus pachycalyx subsp. waajensis***		**Y**	**E**		**WO**
Myrtaceae	*Eucalyptus panda*		Y	C		WO HERBRECS
Myrtaceae	*Eucalyptus pilligaensis*	narrow-leaved grey box	Y	C		WO HERBRECS
Myrtaceae	*Eucalyptus populnea*	poplar box	Y	C		WO HERBRECS
Myrtaceae	*Eucalyptus propinqua*	small-fruited grey gum	Y	C		WO
Myrtaceae	***Eucalyptus rubiginosa***		**Y**	**R**		**WO**
Myrtaceae	*Eucalyptus sideroxylon subsp. (Waaje*		Y	C		WO
Myrtaceae	*Eucalyptus tenuipes*	narrow-leaved white mahogany	Y	C		WO HERBRECS CORVEG
Myrtaceae	*Eucalyptus tereticornis*		Y	C		WO HERBRECS CORVEG
Myrtaceae	*Eucalyptus tereticornis subsp. tereticornis*		Y	C		WO
Myrtaceae	*Eucalyptus thozetiana*		Y	C		WO HERBRECS
Myrtaceae	***Eucalyptus virens***		**Y**	**V**	**V**	**EPBC Tool**
Myrtaceae	*Eucalyptus viridis*		Y	C		HERBRECS
Myrtaceae	*Eucalyptus viridis var. viridis*		Y	C		WO

Family	*Species*	Common name	Native	Conservation status		Data source
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Myrtaceae	*Eucalyptus woollsiana*		Y	C		HERBRECS
Myrtaceae	*Harmogia densifolia*		Y	C		WO HERBRECS
Myrtaceae	*Homalocalyx polyandrus*		Y	C		WO HERBRECS
Myrtaceae	***Homoranthus decumbens***		**Y**	**V**	**V**	**WO EPBC Tool**
Myrtaceae	*Homoranthus melanostictus*		Y	C		WO HERBRECS
Myrtaceae	*Kardomia jucunda*		Y	C		WO HERBRECS
Myrtaceae	*Kunzea opposita*		Y	C		WO HERBRECS
Myrtaceae	*Leptospermum lamellatum*		Y	C		WO
Myrtaceae	*Leptospermum polygalifolium*	tantoon	Y	C		WO HERBRECS CORVEG
Myrtaceae	*Lysicarpus angustifolius*	budgeroo	Y	C		WO HERBRECS CORVEG
Myrtaceae	*Melaleuca*		Y	C		HERBRECS
Myrtaceae	*Melaleuca bracteata*		Y	C		WO
Myrtaceae	*Melaleuca decora*		Y	C		WO
Myrtaceae	*Melaleuca densispicata*		Y	C		WO HERBRECS
Myrtaceae	***Melaleuca groveana***		**Y**	**R**		**WO**
Myrtaceae	*Melaleuca lanceolata*		Y	C		WO HERBRECS
Myrtaceae	*Melaleuca linariifolia*	snow-in summer	Y	C		WO
Myrtaceae	*Melaleuca nodosa*		Y	C		WO HERBRECS
Myrtaceae	*Melaleuca pallescens*		Y	C		WO HERBRECS
Myrtaceae	*Melaleuca squamophloia*		Y	C		WO HERBRECS
Myrtaceae	*Melaleuca thymifolia*	thyme honeymyrtle	Y	C		WO HERBRECS
Myrtaceae	*Melaleuca uncinata*		Y	C		WO HERBRECS
Myrtaceae	*Micromyrtus albicans*		Y	C		WO
Myrtaceae	***Micromyrtus carinata***	**Gurulmundi heath-myrtle**	**Y**	**E**		**WO HERBRECS**
Myrtaceae	***Micromyrtus patula***		**Y**	**E**		**WO**
Myrtaceae	*Micromyrtus sessilis*		Y	C		WO HERBRECS
Nyctaginaceae	*Boerhavia*		Y	C		WO
Nyctaginaceae	*Boerhavia dominii*		Y	C		WO HERBRECS
Nymphaeaceae	*Nymphaea gigantea*		Y	C		WO
Olacaceae	*Olax stricta*		Y	C		WO
Oleaceae	*Jasminum didymum*		Y	C		WO
Oleaceae	*Jasminum didymum subsp. lineare*		Y	C		WO HERBRECS
Oleaceae	*Jasminum didymum subsp. racemosum*		Y	C		HERBRECS
Oleaceae	*Jasminum simplicifolium*		Y	C		WO
Oleaceae	*Jasminum simplicifolium subsp. australiense*		Y	C		WO HERBRECS
Oleaceae	*Notelaea microcarpa*		Y	C		WO
Oleaceae	*Notelaea microcarpa var. microcarpa*		Y	C		WO HERBRECS
Oleaceae	***Notelaea pungens***		**Y**	**R**		**WO**
Oleaceae	*Notelaea sp.*		Y	C		WO
Oleaceae	*Olea europaea subsp. europaea*		N	-		HERBRECS
Onagraceae	*Gaura lindheimeri*		N	-		WO HERBRECS
Onagraceae	*Gaura parviflora*	clockweed	N	-		WO
Onagraceae	*Oenothera affinis*		N	-		HERBRECS
Ophioglossaceae	*Ophioglossum gramineum*		Y	C		WO
Ophioglossaceae	*Ophioglossum reticulatum*		Y	C		WO HERBRECS
Orchidaceae	*Caladenia caerulea*		Y	C		WO HERBRECS
Orchidaceae	*Caladenia caerulea var. caerulea*		Y	C		WO
Orchidaceae	*Calochilus campestris*		Y	C		HERBRECS
Orchidaceae	*Cymbidium canaliculatum*		Y	C		WO HERBRECS
Orchidaceae	*Cymbidium suave*		Y	C		HERBRECS
Orchidaceae	*Dipodium hamiltonianum*	yellow hyacinth orchid	Y	C		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
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Orchidaceae	***Diuris tricolor***		**Y**	**C**	**V**	**WO HERBRECS EPBC Tool**
Orchidaceae	*Microtis parviflora*	slender onion orchid	Y	C		WO HERBRECS
Orchidaceae	*Pterostylis*		Y	C		WO
Orchidaceae	*Pterostylis bicolor*		Y	C		WO
Orchidaceae	*Pterostylis cobarensis*		Y	C	V	WO EPBC Tool
Orchidaceae	*Pterostylis mitchellii*		Y	C		WO
Orchidaceae	*Pterostylis mutica*		Y	C		HERBRECS
Orchidaceae	*Pterostylis ophioglossa*		Y	C		WO
Oxalidaceae	*Oxalis corniculata*		N	-		WO CORVEG
Oxalidaceae	*Oxalis perennans*		Y	C		WO HERBRECS CORVEG
Oxalidaceae	*Oxalis radicosa*		Y	C		WO HERBRECS
Oxalidaceae	*Oxalis thompsoniae*		Y	C		WO HERBRECS
Papaveraceae	*Argemone ochroleuca subsp. ochroleuca*		N	-		HERBRECS
Papaveraceae	*Argemone ochroleuca subsp. ochroleuca*	mexican poppy	N	-		WO
Petiveriaceae	*Rivina humilis*		N	-		WO
Philydraceae	*Philydrum lanuginosum*	frogsmouth	Y	C		WO
Phyllanthaceae	*Bridelia leichhardtii*		Y	C		HERBRECS
Phyllanthaceae	*Phyllanthus fuernrohrii*		Y	C		WO
Phyllanthaceae	*Phyllanthus gunnii*		Y	C		WO
Phyllanthaceae	*Phyllanthus occidentalis*		Y	C		WO
Phyllanthaceae	*Phyllanthus sp.*		Y	C		WO CORVEG
Phyllanthaceae	*Phyllanthus virgatus*		Y	C		WO HERBRECS
Phyllanthaceae	*Poranthera microphylla*	small poranthera	Y	C		WO HERBRECS
Phytolaccaceae	*Phytolacca octandra*	inkweed	N	-		WO
Picrodendraceae	*Micrantheum ericoides*		Y	C		WO
Picrodendraceae	*Petalostigma pachyphyllum*		Y	C		WO
Picrodendraceae	*Petalostigma pubescens*	quinine tree	Y	C		WO HERBRECS
Pittosporaceae	*Auranticarpa rhombifolia*		Y	C		WO HERBRECS
Pittosporaceae	*Bursaria spinosa*		Y	C		WO
Pittosporaceae	*Bursaria spinosa subsp. spinosa*		Y	C		WO
Pittosporaceae	*Pittosporum angustifolium*		Y	C		WO HERBRECS
Pittosporaceae	*Pittosporum lancifolium*		Y	C		WO
Pittosporaceae	*Pittosporum spinescens*		Y	C		WO HERBRECS
Plantaginaceae	*Plantago cunninghamii*	sago weed	Y	C		WO HERBRECS
Poaceae	*Alloteropsis semialata*		Y	C		HERBRECS
Poaceae	*Amphipogon caricinus*		Y	C		WO
Poaceae	*Amphipogon caricinus var. scaber*		Y	C		WO HERBRECS
Poaceae	*Ancistrachne uncinulata*	hooky grass	Y	C		WO HERBRECS
Poaceae	*Aristida*		Y	C		WO
Poaceae	*Aristida benthamii*		Y	C		WO
Poaceae	*Aristida benthamii var. benthamii*		Y	C		WO
Poaceae	*Aristida blakei*		Y	C		WO HERBRECS
Poaceae	*Aristida calycina*		Y	C		WO HERBRECS CORVEG
Poaceae	*Aristida calycina var. calycina*		Y	C		WO
Poaceae	*Aristida calycina var. praealta*		Y	C		WO HERBRECS
Poaceae	*Aristida caput-medusae*		Y	C		WO HERBRECS CORVEG
Poaceae	*Aristida echinata*		Y	C		WO HERBRECS
Poaceae	*Aristida gracilipes*		Y	C		HERBRECS
Poaceae	*Aristida holathera*		Y	C		HERBRECS
Poaceae	*Aristida holathera var. holathera*		Y	C		WO
Poaceae	*Aristida jerichoensis*		Y	C		HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
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Poaceae	*Aristida jerichoensis var. jerichoensis*		Y	C		WO
Poaceae	*Aristida jerichoensis var. subspinulifera*		Y	C		WO HERBRECS
Poaceae	*Aristida latifolia*		Y	C		HERBRECS
Poaceae	*Aristida leichhardtiana*		Y	C		WO HERBRECS
Poaceae	*Aristida leptopoda*		Y	C		HERBRECS
Poaceae	*Aristida personata*		Y	C		WO
Poaceae	*Aristida queenslandica*		Y	C		WO
Poaceae	*Aristida queenslandica var. dissimilis*		Y	C		WO
Poaceae	*Aristida queenslandica var. queenslandica*		Y	C		WO
Poaceae	*Aristida ramosa*	purple wiregrass	Y	C		WO HERBRECS CORVEG
Poaceae	*Aristida sciuroides*		Y	C		WO
Poaceae	*Aristida spuria*		Y	C		WO
Poaceae	*Aristida vagans*		Y	C		WO
Poaceae	*Arundinella nepalensis*	reedgrass	Y	C		WO HERBRECS CORVEG
Poaceae	*Astrebla elymoides*		Y	C		HERBRECS
Poaceae	*Astrebla lappacea*		Y	C		HERBRECS
Poaceae	*Astrebla sp.*		Y	C		WO
Poaceae	*Austrodanthonia induta*		Y	C		WO
Poaceae	*Austrodanthonia tenuior*		Y	C		WO
Poaceae	*Austrostipa ramosissima*	bamboo grass	Y	C		WO HERBRECS
Poaceae	*Austrostipa verticillata*	slender bamboo grass	Y	C		WO HERBRECS
Poaceae	*Avena sterilis subsp. ludoviciana*		N	-		HERBRECS
Poaceae	*Bothriochloa bladhii*		Y	C		HERBRECS
Poaceae	*Bothriochloa bladhii subsp. bladhii*		Y	C		WO
Poaceae	*Bothriochloa decipiens*		Y	C		WO
Poaceae	*Bothriochloa decipiens var. decipiens*		Y	C		WO
Poaceae	*Bromus catharticus*		N	-		HERBRECS
Poaceae	*Calyptochloa gracillima*		Y	C		WO
Poaceae	*Capillipedium parviflorum*		Y	C		HERBRECS
Poaceae	*Capillipedium spicigerum*		Y	C		HERBRECS
Poaceae	*Cenchrus incertus*		N	-		WO HERBRECS
Poaceae	*Chloris divaricata*		Y	C		HERBRECS
Poaceae	*Chloris divaricata var. divaricata*	slender chloris	Y	C		WO
Poaceae	*Chloris gayana*		N	-		HERBRECS
Poaceae	*Chloris truncata*		Y	C		WO HERBRECS
Poaceae	*Chloris ventricosa*	tall chloris	Y	C		WO HERBRECS
Poaceae	*Chrysopogon fallax*		Y	C		WO HERBRECS
Poaceae	*Cleistochloa rigida*		Y	C		WO
Poaceae	*Cleistochloa subjuncea*		Y	C		WO HERBRECS CORVEG
Poaceae	*Cymbopogon bombycinus*	silky oilgrass	Y	C		WO
Poaceae	*Cymbopogon obtectus*		Y	C		WO HERBRECS
Poaceae	*Cymbopogon refractus*	barbed-wire grass	Y	C		WO HERBRECS CORVEG
Poaceae	*Cynodon nlemfuensis*		N	-		HERBRECS
Poaceae	*Cynodon nlemfuensis var. robustus*		N	-		WO
Poaceae	*Dactyloctenium radulans*		Y	C		HERBRECS
Poaceae	*Dichanthium sericeum*		Y	C		HERBRECS
Poaceae	*Dichanthium sericeum subsp. sericeum*		Y	C		WO
Poaceae	*Dichelachne crinita*		Y	C		HERBRECS
Poaceae	*Digitaria*		Y	C		WO
Poaceae	*Digitaria breviglumis*		Y	C		WO
Poaceae	*Digitaria brownii*		Y	C		WO HERBRECS CORVEG

Family	*Species*	Common name	Native	Conservation status		Data source
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Poaceae	*Digitaria ciliaris*		N	-		HERBRECS
Poaceae	*Digitaria didactyla*	Queensland blue couch	N	-		WO
Poaceae	*Digitaria diffusa*		Y	C		WO HERBRECS
Poaceae	*Digitaria diminuta*		Y	C		HERBRECS
Poaceae	*Digitaria divaricatissima*		Y	C		HERBRECS
Poaceae	*Digitaria eriantha*		N	-		WO HERBRECS
Poaceae	*Digitaria hystrichoides*		Y	C		HERBRECS
Poaceae	*Digitaria longiflora*		Y	C		WO HERBRECS
Poaceae	*Digitaria orbata*		Y	C		HERBRECS
Poaceae	*Digitaria parviflora*		Y	C		WO
Poaceae	*Digitaria ramularis*		Y	C		WO
Poaceae	*Echinochloa inundata*		Y	C		HERBRECS
Poaceae	*Elymus multiflorus*		Y	C		HERBRECS
Poaceae	*Enneapogon intermedius*		Y	C		WO HERBRECS
Poaceae	*Enneapogon lindleyanus*		Y	C		WO
Poaceae	*Enneapogon truncatus*		Y	C		WO CORVEG
Poaceae	*Enteropogon acicularis*	curly windmill grass	Y	C		WO HERBRECS
Poaceae	*Enteropogon paucispiceus*		Y	C		WO HERBRECS
Poaceae	*Enteropogon ramosus*		Y	C		WO HERBRECS
Poaceae	*Enteropogon unispiceus*		Y	C		WO HERBRECS
Poaceae	*Entolasia sp.*		Y	C		HERBRECS
Poaceae	*Entolasia stricta*	wiry panic	Y	C		WO CORVEG
Poaceae	*Eragrostis alveiformis*		Y	C		HERBRECS
Poaceae	*Eragrostis cilianensis*		N	-		HERBRECS
Poaceae	*Eragrostis elongata*		Y	C		WO HERBRECS
Poaceae	*Eragrostis lacunaria*	purple lovegrass	Y	C		WO HERBRECS CORVEG
Poaceae	*Eragrostis leptostachya*		Y	C		HERBRECS
Poaceae	*Eragrostis longipedicellata*		Y	C		HERBRECS
Poaceae	*Eragrostis megalosperma*		Y	C		HERBRECS
Poaceae	*Eragrostis minor*		N	-		HERBRECS
Poaceae	*Eragrostis parviflora*	weeping lovegrass	Y	C		WO HERBRECS
Poaceae	*Eragrostis sororia*		Y	C		WO HERBRECS CORVEG
Poaceae	*Eragrostis sp.*		Y	C		HERBRECS
Poaceae	*Eragrostis spartinoides*		Y	C		WO
Poaceae	*Eragrostis speciosa*		Y	C		HERBRECS
Poaceae	*Eragrostis tenellula*	delicate lovegrass	Y	C		WO
Poaceae	*Eremochloa bimaculata*	poverty grass	Y	C		WO
Poaceae	*Eriachne mucronata*		Y	C		WO HERBRECS
Poaceae	*Eriachne mucronata*		Y	C		WO
Poaceae	*Eriachne rara*		Y	C		WO
Poaceae	*Eriochloa crebra*		Y	C		HERBRECS
Poaceae	*Eriochloa procera*	slender cupgrass	Y	C		WO
Poaceae	*Eriochloa pseudoacrotricha*		Y	C		WO HERBRECS
Poaceae	*Eulalia aurea*	silky browntop	Y	C		WO HERBRECS
Poaceae	*Heteropogon contortus*		Y	C		HERBRECS
Poaceae	***Homopholis belsonii***		**Y**	**E**		**HERBRECS EPBC Tool**
Poaceae	*Hordeum glaucum*		N	-		HERBRECS
Poaceae	*Iseilema membranaceum*		Y	C		HERBRECS
Poaceae	*Leptochloa decipiens*		Y	C		WO
Poaceae	*Leptochloa decipiens subsp. asthenes*		Y	C		WO HERBRECS
Poaceae	*Leptochloa decipiens subsp. peacockii*		Y	C		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Poaceae	*Leptochloa fusca subsp. fusca*		Y	C		WO
Poaceae	*Megathyrsus maximus*		N	-		WO
Poaceae	*Megathyrsus maximus var. pubiglumis*		N	-		WO HERBRECS
Poaceae	*Melinis repens*	red natal grass	N	-		WO HERBRECS
Poaceae	*Microlaena stipoides*		Y	C		WO
Poaceae	*Oplismenus*		Y	C		WO
Poaceae	*Oplismenus aemulus*	creeping shade grass	Y	C		WO
Poaceae	*Oplismenus hirtellus*		Y	C		WO CORVEG
Poaceae	*Panicum buncei*		Y	C		WO HERBRECS
Poaceae	*Panicum coloratum*		N	-		HERBRECS
Poaceae	*Panicum decompositum*		Y	C		HERBRECS
Poaceae	*Panicum effusum*		Y	C		WO HERBRECS CORVEG
Poaceae	*Panicum laevinode*	pepper grass	Y	C		WO HERBRECS
Poaceae	*Panicum larcomianum*		Y	C		WO
Poaceae	*Panicum queenslandicum*					CORVEG
Poaceae	*Panicum queenslandicum var. queenslandicum*		Y	C		WO
Poaceae	*Panicum simile*		Y	C		WO
Poaceae	*Paspalidium albovillosum*		Y	C		WO HERBRECS
Poaceae	*Paspalidium caespitosum*	brigalow grass	Y	C		WO HERBRECS
Poaceae	*Paspalidium constrictum*		Y	C		WO HERBRECS
Poaceae	*Paspalidium disjunctum*		Y	C		WO
Poaceae	*Paspalidium distans*	shotgrass	Y	C		WO HERBRECS
Poaceae	*Paspalidium gracile*	slender panic	Y	C		WO HERBRECS CORVEG
Poaceae	*Paspalum dilatatum*	paspalum	N	-		WO HERBRECS
Poaceae	*Paspalum urvillei*	vasey grass	N	-		WO HERBRECS
Poaceae	*Pennisetum ciliare*		N	-		WO HERBRECS
Poaceae	*Pennisetum glaucum*		N	-		HERBRECS
Poaceae	*Perotis rara*		Y	C		HERBRECS
Poaceae	*Poaceae*		Y	C		WO HERBRECS
Poaceae	*Pseudoraphis spinescens*	spiny mudgrass	Y	C		WO
Poaceae	*Sarga leiocladum*		Y	C		WO HERBRECS
Poaceae	*Schizachyrium fragile*		Y	C		HERBRECS
Poaceae	*Setaria italica*		N	-		HERBRECS
Poaceae	*Setaria oplismenoides*		Y	C		WO HERBRECS
Poaceae	*Setaria paspalidioides*		Y	C		WO
Poaceae	*Setaria sphacelata*		N	-		WO HERBRECS
Poaceae	*Setaria surgens*		Y	C		WO HERBRECS
Poaceae	*Sporobolus actinocladus*	katoora grass	Y	C		WO HERBRECS
Poaceae	*Sporobolus caroli*	fairy grass	Y	C		WO HERBRECS CORVEG
Poaceae	*Sporobolus creber*		Y	C		WO HERBRECS
Poaceae	*Sporobolus elongatus*		Y	C		WO
Poaceae	*Sporobolus mitchellii*	rat's tail couch	Y	C		WO
Poaceae	*Sporobolus scabridus*		Y	C		WO HERBRECS
Poaceae	*Sporobolus sessilis*		Y	C		WO HERBRECS
Poaceae	*Thellungia advena*	coolibah grass	Y	C		WO HERBRECS
Poaceae	*Themeda triandra*	kangaroo grass	Y	C		WO HERBRECS
Poaceae	*Thyridolepis mitchelliana*	mulga mitchell grass	Y	C		WO HERBRECS
Poaceae	*Thyridolepis xerophila*		Y	C		HERBRECS
Poaceae	*Tragus australianus*	small burr grass	Y	C		WO HERBRECS CORVEG
Poaceae	*Triodia*		Y	C		WO
Poaceae	*Triodia mitchellii*	buck spinifex	Y	C		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Poaceae	*Triodia scariosa*		Y	C		WO HERBRECS
Poaceae	*Tripogon loliiformis*	five minute grass	Y	C		WO CORVEG
Poaceae	*Triraphis mollis*		Y	C		HERBRECS
Poaceae	*Urochloa mosambicensis*	sabi grass	N	-		WO
Poaceae	*Urochloa mosambicensis*		N	-		HERBRECS
Poaceae	*Urochloa panicoides*		N	-		HERBRECS
Poaceae	*Urochloa subquadripara*		N	-		HERBRECS
Poaceae	*Urochloa whiteana*		Y	C		WO
Poaceae	*Walwhalleya subxerophila*		Y	C		WO HERBRECS
Polygalaceae	*Comesperma patentifolium*		Y	C		WO
Polygonaceae	*Emex australis*		N	-		HERBRECS
Polygonaceae	*Fallopia convolvulus*		N	-		HERBRECS
Polygonaceae	*Muehlenbeckia florulenta*		Y	C		HERBRECS
Polygonaceae	*Persicaria lapathifolia*		Y	C		HERBRECS
Polygonaceae	*Rumex brownii*	swamp dock	Y	C		WO HERBRECS
Pontederiaceae	*Eichhornia crassipes*	water hyacinth	N	-		WO HERBRECS
Pontederiaceae	*Monochoria cyanea*		Y	C		WO HERBRECS
Portulacaceae	*Calandrinia stagnensis*		Y	C		HERBRECS
Portulacaceae	*Grahamia australiana*		Y	C		WO HERBRECS
Portulacaceae	*Portulaca bicolor*		Y	C		WO HERBRECS
Potamogetonaceae	*Potamogeton tricarinatus*	floating pondweed	Y	C		WO HERBRECS
Primulaceae	*Anagallis arvensis*	blue pimpernel	N	-		WO HERBRECS
Proteaceae	*Grevillea decora*		Y	C		HERBRECS
Proteaceae	*Grevillea floribunda*		Y	C		WO HERBRECS
Proteaceae	*Grevillea floribunda subsp. floribunda*		Y	C		WO
Proteaceae	*Grevillea helmsiae*		Y	C		WO
Proteaceae	*Grevillea longistyla*		Y	C		WO HERBRECS
Proteaceae	***Grevillea singuliflora***		**Y**	**R**		**WO HERBRECS**
Proteaceae	*Grevillea striata*	beefwood	Y	C		WO HERBRECS
Proteaceae	*Hakea lorea*		Y	C		HERBRECS
Proteaceae	*Hakea lorea subsp. lorea*		Y	C		WO
Proteaceae	*Hakea purpurea*		Y	C		WO HERBRECS
Proteaceae	*Persoonia sericea*	silky geebung	Y	C		WO
Proteaceae	*Persoonia subtilis*		Y	C		WO
Proteaceae	*Xylomelum benthamii*		Y	C		WO
Proteaceae	*Xylomelum cunninghamianum*		Y	C		WO
Psilotaceae	*Psilotum nudum*	skeleton fork fern	Y	C		WO
Ptychomitriaceae	*Ptychomitrium*		Y	C		WO
Ranunculaceae	*Clematis*		Y	C		HERBRECS
Ranunculaceae	*Clematis decipiens*		Y	C		HERBRECS
Ranunculaceae	*Clematis microphylla*		Y	C		HERBRECS
Rhamnaceae	*Alphitonia excelsa*	soap tree	Y	C		WO HERBRECS CORVEG
Rhamnaceae	*Cryptandra armata*		Y	C		WO HERBRECS
Rhamnaceae	***Cryptandra ciliata***		**Y**	**R**		**HERBRECS**
Rhamnaceae	*Cryptandra longistaminea*		Y	C		WO
Rhamnaceae	*Pomaderris lanigera*		Y	C		WO
Rhamnaceae	*Pomaderris queenslandica*		Y	C		HERBRECS
Rubiaceae	*Asperula conferta*		Y	C		HERBRECS
Rubiaceae	*Asperula cunninghamii*	twining woodruff	Y	C		WO HERBRECS
Rubiaceae	*Cyclophyllum coprosmoides*		Y	C		WO
Rubiaceae	*Cyclophyllum coprosmoides var. coprosmoides*		Y	C		WO

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Rubiaceae	*Dentella browniana*		Y	C		WO
Rubiaceae	*Dentella repens*	dentella	Y	C		WO HERBRECS
Rubiaceae	*Everistia vacciniifolia*		Y	C		WO
Rubiaceae	*Everistia vacciniifolia*		Y	C		WO
Rubiaceae	*Oldenlandia galioides*		Y	C		WO
Rubiaceae	*Oldenlandia mitrasacmoides subsp. trachymenoides*		Y	C		HERBRECS
Rubiaceae	*Opercularia diphylla*		Y	C		WO
Rubiaceae	*Pomax umbellata*		Y	C		WO HERBRECS CORVEG
Rubiaceae	*Psydrax johnsonii*		Y	C		WO HERBRECS
Rubiaceae	*Psydrax odorata*		Y	C		WO HERBRECS
Rubiaceae	*Psydrax odorata*		Y	C		WO
Rubiaceae	*Psydrax oleifolia*		Y	C		WO HERBRECS
Rubiaceae	*Richardia brasiliensis*	white eye	N	-		WO
Rubiaceae	*Richardia scabra*		N	-		HERBRECS
Rubiaceae	*Triflorensia ixoroides*		Y	C		WO
Rutaceae	*Acronychia pauciflora*	soft acronychia	Y	C		WO
Rutaceae	*Boronia bipinnata*	rock boronia	Y	C		WO HERBRECS
Rutaceae	*Boronia bipinnata*					CORVEG
Rutaceae	*Boronia glabra*		Y	C		WO HERBRECS
Rutaceae	*Boronia occidentalis*		Y	C		WO HERBRECS
Rutaceae	*Boronia rosmarinifolia*	forest boronia	Y	C		WO
Rutaceae	*Boronia splendida*		Y	C		HERBRECS
Rutaceae	*Citrus glauca*		Y	C		WO HERBRECS
Rutaceae	*Dinosperma erythrococcum*		Y	C		WO
Rutaceae	*Flindersia australis*	crow's ash	Y	C		WO
Rutaceae	*Flindersia collina*	broad-leaved leopard tree	Y	C		WO
Rutaceae	*Geijera parviflora*	wilga	Y	C		WO HERBRECS
Rutaceae	*Geijera salicifolia*	brush wilga	Y	C		WO
Rutaceae	*Phebalium nottii*	pink phebalium	Y	C		WO HERBRECS
Rutaceae	*Phebalium squamulosum subsp. gracile*		Y	C		WO HERBRECS
Rutaceae	*Philotheca difformis*		Y	C		HERBRECS
Rutaceae	*Philotheca difformis subsp. difformis*		Y	C		WO
Rutaceae	***Philotheca sporadica***		**Y**	**V**	**V**	**EPBC Tool**
Rutaceae	*Zieria aspalathoides*		Y	C		HERBRECS
Rutaceae	*Zieria aspalathoides subsp. aspalathoides*		Y	C		WO
Santalaceae	*Anthobolus leptomerioides*		Y	C		WO
Santalaceae	*Anthobolus leptomerioides*		Y	C		HERBRECS
Santalaceae	*Choretrum candollei*	white sour bush	Y	C		WO
Santalaceae	*Exocarpos cupressiformis*	native cherry	Y	C		WO
Santalaceae	*Exocarpos strictus*	dwarf cherry	Y	C		WO
Santalaceae	*Santalum lanceolatum*		Y	C		WO HERBRECS
Sapindaceae	*Alectryon connatus*	grey birds-eye	Y	C		WO HERBRECS
Sapindaceae	*Alectryon diversifolius*	scrub boonaree	Y	C		WO HERBRECS
Sapindaceae	*Alectryon oleifolius*		Y	C		WO
Sapindaceae	*Alectryon oleifolius subsp. elongatus*		Y	C		WO
Sapindaceae	*Atalaya hemiglauca*		Y	C		WO
Sapindaceae	*Dodonaea biloba*		Y	C		WO HERBRECS
Sapindaceae	*Dodonaea filifolia*		Y	C		WO
Sapindaceae	*Dodonaea heteromorpha*		Y	C		WO HERBRECS
Sapindaceae	*Dodonaea lanceolata var. subsessilifolia*		Y	C		WO
Sapindaceae	*Dodonaea macrossanii*		Y	C		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Sapindaceae	*Dodonaea peduncularis*		Y	C		WO HERBRECS
Sapindaceae	*Dodonaea triangularis*		Y	C		WO HERBRECS CORVEG
Sapindaceae	*Dodonaea vestita*		Y	C		WO HERBRECS
Sapindaceae	*Dodonaea viscosa subsp. spatulata*		Y	C		WO HERBRECS
Sapindaceae	*Elattostachys xylocarpa*	white tamarind	Y	C		WO
Sapotaceae	*Planchonella cotinifolia*		Y	C		WO HERBRECS
Sapotaceae	*Pouteria cotinifolia*		Y	C		WO
Sapotaceae	*Pouteria cotinifolia var. pubescens*		Y	C		WO
Scrophulariaceae	*Gratiola pedunculata*		Y	C		WO
Scrophulariaceae	*Lindernia alsinoides*		Y	C		WO HERBRECS
Scrophulariaceae	*Lindernia sp.*		Y	C		WO HERBRECS
Scrophulariaceae	*Lindernia sp.*		Y	C		WO
Scrophulariaceae	*Misopates orontium*	lesser snapdragon	N	-		WO HERBRECS
Solanaceae	*Cestrum parqui*		N	-		HERBRECS
Solanaceae	*Duboisia leichhardtii*		Y	C		HERBRECS
Solanaceae	*Lycium ferocissimum*	African boxthorn	N	-		WO
Solanaceae	*Nicotiana forsteri*		Y	C		WO HERBRECS
Solanaceae	*Nicotiana megalosiphon*		Y	C		HERBRECS
Solanaceae	*Physalis ixocarpa var. ixocarpa*		N	-		WO
Solanaceae	*Solanum brownii*	violet nightshade	Y	C		WO HERBRECS
Solanaceae	*Solanum ellipticum*	potato bush	Y	C		WO HERBRECS
Solanaceae	*Solanum ferocissimum*		Y	C		WO HERBRECS
Solanaceae	*Solanum jucundum*		Y	C		WO HERBRECS
Solanaceae	*Solanum mitchellianum*		Y	C		WO HERBRECS
Solanaceae	*Solanum nemophilum*		Y	C		WO HERBRECS
Solanaceae	*Solanum opacum*	green berry nightshade	Y	C		WO HERBRECS
Solanaceae	*Solanum parvifolium*		Y	C		WO HERBRECS
Solanaceae	*Solanum parvifolium subsp. parvifolium*		Y	C		WO
Solanaceae	*Solanum semiarmatum*	prickly nightshade	Y	C		WO
Solanaceae	*Solanum stelligerum*	devil's needles	Y	C		WO
Solanaceae	*Solanum tetrathecum*		Y	C		WO HERBRECS
Sparrmanniaceae	*Corchorus trilocularis*		Y	C		HERBRECS
Sparrmanniaceae	*Grewia latifolia*	dysentery plant	Y	C		WO HERBRECS
Stackhousiaceae	*Stackhousia viminea*	slender stackhousia	Y	C		WO
Sterculiaceae	*Brachychiton australis*	broad-leaved bottle tree	Y	C		WO HERBRECS
Sterculiaceae	*Brachychiton populneus subsp. populneus*		Y	C		WO
Sterculiaceae	*Brachychiton populneus subsp. trilobus*		Y	C		WO HERBRECS
Sterculiaceae	*Brachychiton rupestris*		Y	C		WO
Stylidiaceae	*Stylidium debile*	frail trigger plant	Y	C		WO HERBRECS
Stylidiaceae	*Stylidium ecorne*		Y	C		WO
Stylidiaceae	*Stylidium eglandulosum*		Y	C		HERBRECS
Stylidiaceae	*Stylidium eriorhizum*		Y	C		WO
Surianaceae	***Cadellia pentastylis***	**ooline**	**Y**	**V**	**V**	**WO HERBRECS**
Thymelaeaceae	*Pimelea linifolia*		Y	C		WO HERBRECS
Thymelaeaceae	*Pimelea linifolia subsp. linifolia*		Y	C		WO
Thymelaeaceae	*Pimelea neoanglica*	poison pimelea	Y	C		WO
Thymelaeaceae	*Pimelea sp.*		Y	C		WO HERBRECS
Thymelaeaceae	*Pimelea trichostachya*		Y	C		HERBRECS
Verbenaceae	*Phyla canescens*		N	-		WO HERBRECS
Verbenaceae	*Verbena africana*		Y	C		WO HERBRECS
Verbenaceae	*Verbena aristigera*	Mayne's pest	N	-		WO HERBRECS

Family	*Species*	Common name	Native	Conservation status		Data source
				State	National	
Verbenaceae	*Verbena gaudichaudii*		Y	C		HERBRECS
Verbenaceae	*Verbena halei*		N	-		WO HERBRECS
Violaceae	*Hybanthus monopetalus*		Y	C		WO
Violaceae	*Hybanthus stellarioides*		Y	C		WO
Viscaceae	*Korthalsella taenioides*		Y	C		HERBRECS
Viscaceae	*Viscum articulatum*	flat mistletoe	Y	C		WO HERBRECS
Viscaceae	*Viscum bancroftii*		Y	C		HERBRECS
Viscaceae	*Viscum whitei*		Y	C		HERBRECS
Viscaceae	*Viscum whitei subsp. whitei*		Y	C		WO
Vitaceae	*Cissus hypoglauca*		Y	C		WO
Vitaceae	*Cissus opaca*		Y	C		WO
Vitaceae	*Clematicissus opaca*		Y	C		HERBRECS
Xanthorrhoeaceae	*Xanthorrhoea*		Y	C		WO
Xanthorrhoeaceae	*Xanthorrhoea glauca subsp. angustifolia*		Y	C		HERBRECS
Xanthorrhoeaceae	*Xanthorrhoea johnsonii*		Y	C		WO HERBRECS
Zygophyllaceae	*Roepera apiculata*		Y	C		HERBRECS
Zygophyllaceae	*Roepera glauca*		Y	C		HERBRECS
Zygophyllaceae	*Tribulus micrococcus*	yellow vine	Y	C		WO

Notes

Native: Y = Yes, native. N = No, introduced

Conservation significance: State as listed under the Nature Conservation (Wildlife) Regulation 2006. LC = Of least concern, NT = Near Threatened, R= Rare, V = Vulnerable.

National as listed under the Environment Protection and Biodiversity Conservation Act 1999. V = Vulnerable. E = Endangered

Source HERBRECS

CORVEG

WO = Wildlife Online

EPBC Tool = Protected Matters Search Tool

Appendix C

Database Search Results – Fauna

Table C-1: Database search results – fauna

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Birds	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater	LC			BA
Birds	*Acanthiza apicalis*	Inland Thornbill	LC			BA
Birds	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	LC			BA
Birds	*Acanthiza lineata*	Striated Thornbill	LC			BA
Birds	*Acanthiza nana*	Yellow Thornbill	LC			BA
Birds	*Acanthiza pusilla*	Brown Thornbill	LC			BA
Birds	*Acanthiza reguloides*	Buff-rumped Thornbill	LC			BA
Birds	*Acanthiza uropygialis*	Chestnut-rumped Thornbill	LC			BA
Birds	*Accipiter cirrhocephalus*	Collared Sparrowhawk	LC			BA
Birds	*Accipiter fasciatus*	Brown Goshawk	LC			BA
Birds	*Accipiter novaehollandiae*	Grey Goshawk	R	-	EVR Priority Taxa	BBS
Birds	*Acrocephalus stentoreus*	Clamorous Reed-Warbler	LC	M		BA
Birds	*Aegotheles cristatus*	Australian Owlet-nightjar	LC			BA
Birds	*Alisterus scapularis*	Australian King-Parrot	LC			BA
Birds	*Amytornis striatus*	Striated Grass Wren	R	-		LEWIS
Birds	*Anas gracilis*	Grey Teal	LC			BA
Birds	*Anas rhynchotis*	Australasian Shoveler	LC			BA
Birds	*Anas superciliosa*	Pacific Black Duck	LC			BA
Birds	*Anhinga melanogaster*	Darter	LC			BA
Birds	*Anseranas semipalmata*	Magpie Goose	LC	M		WO, DEWHA
Birds	*Anthus novaeseelandiae*	Richard's Pipit	LC			BA
Birds	*Aprosmictus erythropterus*	Red-winged Parrot	LC			BA
Birds	*Apus pacificus*	Fork-tailed Swift	LC	M		WO, DEWHA
Birds	*Aquila audax*	Wedge-tailed Eagle	LC			BA
Birds	*Ardea alba*	Great Egret	LC	M		DEWHA BA

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Birds	*Ardea ibis*	Cattle Egret	LC	M		DEWHA
Birds	*Ardea intermedia*	Intermediate Egret	LC			BA
Birds	*Ardea pacifica*	White-necked Heron	LC			BA
Birds	*Ardeotis australis*	Australian Bustard	LC			QldMus BA
Birds	*Artamus leucorynchus*	White-breasted Woodswallow	LC			BA
Birds	*Artamus minor*	Little Woodswallow	LC			BA
Birds	*Artamus personatus*	Masked Woodswallow	LC			BA
Birds	*Artamus superciliosus*	White-browed Woodswallow	LC			BA
Birds	*Aviceda subcristata*	Pacific Baza	LC			BA
Birds	*Aythya australis*	Hardhead	LC			BA
Birds	*Brachyurophis australis*	Australian Coral Snake	LC			QldMus
Birds	*Burhinus grallarius*	Bush Stone-curlew	P		Non-EVR Priority Taxa	WO BA
Birds	*Cacatua galerita*	Sulphur-crested Cockatoo	LC			BA
Birds	*Cacatua leadbeateri*	Pink Cockatoo	V	-	EVR Priority Taxa	BBS
Birds	*Cacatua roseicapilla*	Galah	LC			BA
Birds	*Cacatua sanguinea*	Little Corella	LC			BA
Birds	*Cacomantis flabelliformis*	Fan-tailed Cuckoo	LC			BA
Birds	*Cairina moschata*	Muscovy Duck	I			BA
Birds	*Calyptorhynchus banksii*	Red-tailed Black-Cockatoo	LC			BA
Birds	*Calyptorhynchus funereus*	Yellow-tailed Black-Cockatoo	LC			BA
Birds	*Calyptorhynchus lathami*	Glossy Black Cockatoo	V	-	EVR Priority Taxa	BBS BA
Birds	*Centropus phasianinus*	Pheasant Coucal	LC			BA
Birds	*Certhionyx niger*	Black Honeyeater	LC			BA
Birds	*Chenonetta jubata*	Australian Wood Duck	LC			BA
Birds	*Chlamydera maculata*	Spotted Bowerbird	LC			BA
Birds	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo	LC			BA

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Birds	*Chrysococcyx lucidus*	Shining Bronze-Cuckoo	LC			BA
Birds	*Chrysococcyx osculans*	Black-eared Cuckoo	LC			BA
Birds	*Chthonicola sagittata*	Speckled Warbler	P		Non-EVR Priority Taxa	WO BA
Birds	*Cincloramphus cruralis*	Brown Songlark	LC	M		BA
Birds	*Cincloramphus mathewsi*	Rufous Songlark	LC			BA
Birds	*Circus assimilis*	Spotted Harrier	LC			BA
Birds	*Climacteris picumnus*	Brown Treecreeper	P	-	Non-EVR Priority Taxa	BBS
Birds	*Colluricincla harmonica*	Grey Shrike-thrush	LC			BA
Birds	*Columba livia*	Rock Dove	LC			BA
Birds	*Coracina maxima*	Ground Cuckoo-Shrike	LC			BA
Birds	*Coracina novaehollandiae*	Black-faced Cuckoo-Shrike	LC			BA
Birds	*Coracina papuensis*	White-bellied Cuckoo-Shrike	LC			BA
Birds	*Coracina tenuirostris*	Cicadabird	LC			BA
Birds	*Corcorax melanorhamphos*	White-winged Chough	LC			BA
Birds	*Corvus bennetti*	Little Crow	LC			BA
Birds	*Corvus coronoides*	Australian Raven	LC			BA
Birds	*Corvus orru*	Torresian Crow	I			BA
Birds	*Coturnix pectoralis*	Stubble Quail	LC			BA
Birds	*Coturnix ypsilophora*	Brown Quail	LC			BA
Birds	*Cracticus nigrogularis*	Pied Butcherbird	LC			BA
Birds	*Cracticus torquatus*	Grey Butcherbird	LC			BA
Birds	*Cuculus pallidus*	Pallid Cuckoo	LC			BA
Birds	*Cygnus atratus*	Black Swan	LC			BA
Birds	*Dacelo novaeguineae*	Laughing Kookaburra	LC			BA
Birds	*Daphoenositta chrysoptera*	Varied Sittella	LC			BA
Birds	*Dendrocygna arcuata*	Wandering Whistling-Duck	LC			BA

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Birds	*Dendrocygna eytoni*	Plumed Whistling-Duck	LC			BA
Birds	*Dicaeum hirundinaceum*	Mistletoebird	LC			BA
Birds	*Dromaius novaehollandiae*	Emu	LC			BA
Birds	*Egretta garzetta*	Little Egret	LC			BA
Birds	*Egretta novaehollandiae*	White-faced Heron	LC			BA
Birds	*Elanus notatus*	Black-shouldered Kite	LC			BA
Birds	*Elseyornis melanops*	Black-fronted Dotterel	LC			BA
Birds	*Entomyzon cyanotis*	Blue-faced Honeyeater	LC			BA
Birds	*Eopsaltria australis*	Eastern Yellow Robin	LC			BA
Birds	*Ephippiorhynchus asiaticus*	Black-necked Stork	R	-	EVR Priority Taxa	WO
Birds	*Ephthianura tricolor*	Crimson Chat	LC			BA
Birds	*Epthianura crocea crocea*	Yellow Chat	V	-		LEWIS
Birds	*Erythrotriorchis radiatus*	Red Goshawk	E	V	EVR Priority Taxa	BBS DEWHA
Birds	*Eudynamis scolopacea*	Common Koel	LC			QM, BA
Birds	*Eurystomus orientalis*	Dollarbird	LC			BA
Birds	*Falco berigora*	Brown Falcon	LC			BA
Birds	*Falco cenchroides*	Nankeen Kestrel	LC			BA
Birds	*Falco hypoleucos*	Grey Falcon	R	-	EVR Priority Taxa	BBS
Birds	*Fulica atra*	Eurasian Coot	LC			BA
Birds	*Gallinago hardwickii*	Latham's Snipe	LC	M		DEWHA
Birds	*Gallinula tenebrosa*	Dusky Moorhen	LC			BA
Birds	*Geopelia cuneata*	Diamond Dove	LC			BA
Birds	*Geopelia humeralis*	Bar-shouldered Dove	LC			BA
Birds	*Geopelia striata*	Peaceful Dove	LC			BA
Birds	*Geophaps scripta*	Squatter Pigeon	V	V	EVR Priority Taxa	BA, QldMus, DEWHA
Birds	*Gerygone fusca*	Western Gerygone	LC			BA
Birds	*Gerygone olivacea*	White-throated Gerygone	LC			BA

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Birds	*Glossopsitta concinna*	Musk Lorikeet	LC			BA
Birds	*Glossopsitta pusilla*	Little Lorikeet	LC			BA
Birds	*Grallina cyanoleuca*	Magpie-Lark	LC			BA
Birds	*Grantiella picta*	Painted Honeyeater	R	-	EVR Priority Taxa	BBS BA
Birds	*Grus rubicunda*	Brolga	LC	M		BA
Birds	*Gymnorhina tibicen*	Australian Magpie	LC			BA
Birds	*Haliaeetus leucogaster*	White-bellied Sea-eagle	LC	M		DEWHA BA
Birds	*Haliastur sphenurus*	Whistling Kite	LC			BA
Birds	*Hieraaetus morphnoides*	Little Eagle	LC	M		BA
Birds	*Hirundapus caudacutus*	White-throated Needletail	LC	M		WO DEWHA BA
Birds	*Hirundo ariel*	Fairy Martin	LC			BA QldMus
Birds	*Hirundo neoxena*	Welcome Swallow	LC			BA
Birds	*Hirundo nigricans*	Tree Martin	LC			BA
Birds	*Lalage sueurii*	White-winged Triller	LC			BA
Birds	*Lathamus discolor*	Swift Parrot	E	E & M	EVR Priority Taxa	DEWHA, BBS
Birds	*Lichenostomus chrysops*	Yellow-faced Honeyeater	LC			BA
Birds	*Lichenostomus leucotis*	White-eared Honeyeater	LC			BA
Birds	*Lichenostomus penicillatus*	White-plumed Honeyeater	LC			BA
Birds	*Lichenostomus virescens*	Singing Honeyeater	LC			BA
Birds	*Lichmera indistincta*	Brown Honeyeater	LC			BA
Birds	*Lophoictinia isura*	Square-tailed Kite	R	-	EVR Priority Taxa	BBS
Birds	*Macropus dorsalis*	Black-striped Wallaby	P	-	Non-EVR Priority Taxa	WO
Birds	*Malurus cyaneus*	Superb Fairy-wren	LC			BA
Birds	*Malurus lamberti*	Variegated Fairy-wren	LC			BA
Birds	*Malurus leucopterus*	White-winged Fairy-wren	LC			BA
Birds	*Malurus melanocephalus*	Red-backed Fairy-wren	LC			BA

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Birds	*Manorina flavigula*	Yellow-throated Miner	LC			BA
Birds	*Manorina melanocephala*	Noisy Miner	LC			BA
Birds	*Melanodryas cucullata*	Hooded Robin	P	-	Non-EVR Priority Taxa	BBS
Birds	*Melithreptus brevirostris*	Brown-headed Honeyeater	LC			BA
Birds	*Melithreptus gularis*	Black-chinned Honeyeater	R	-	EVR Priority Taxa	BBS
Birds	*Melithreptus lunatus*	White-naped Honeyeater	LC			BA
Birds	*Merops ornatus*	Rainbow Bee-eater	LC	M		WO DEWHA BA
Birds	*Milvus migrans*	Black Kite	LS			BA
Birds	*Mirafra javanica*	Singing Bushlark	LC			BA
Birds	*Monarcha melanopsis*	black-faced monarch	LC	M		WO, DEWHA
Birds	*Myiagra cyanoleuca*	satin flycatcher	LC	M		WO, DEWHA
Birds	*Myiagra inquieta*	Restless Flycatcher	LC			BA
Birds	*Myiagra rubecula*	Leaden Flycatcher	LC			BA
Birds	*Myzomela sanguinolenta*	Scarlet Honeyeater	LC			BA
Birds	*Neochmia modesta*	Plum-headed Finch	LC			BA
Birds	*Neochmia ruficauda ruficauda*	Star Finch (eastern)	E	E	EVR Priority Taxa	DEWHA
Birds	*Neophema pulchella*	Turquoise Parrot	R	-	EVR Priority Taxa	BBS
Birds	*Nettapus coromandelianus*	Cotton Pygmy-Goose	R	M	EVR Priority Taxa	BA, WO, DEWHA
Birds	*Ninox connivens*	Barking Owl	P	-	Non-EVR Priority Taxa	BBS
Birds	*Ninox novaeseelandiae*	Southern Boobook	LC			BA
Birds	*Ninox strenua*	Powerful Owl	V	-	EVR Priority Taxa	BBS
Birds	*Northiella haematogaster*	Blue Bonnet	LC			BA
Birds	*Nycticorax caledonicus*	Nankeen Night Heron	LC			BA
Birds	*Nymphicus hollandicus*	Cockatiel	LC			BA
Birds	*Oriolus sagittatus*	Olive-backed Oriole	LC			BA
Birds	*Pachycephala pectoralis*	Golden Whistler	LC			BA

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Birds	*Pachycephala rufiventris*	Rufous Whistler	LC			BA
Birds	*Pardalotus punctatus*	Spotted Pardalote	LC			BA
Birds	*Pardalotus rubricatus*	Red-browed Pardalote	LC			BA
Birds	*Pardalotus striatus*	Striated Pardalote	LC			BA
Birds	*Passer domesticus*	House Sparrow	I			BA
Birds	*Pedionomus torquatus*	Plains Wanderer	V	V	EVR Priority Taxa	BBS
Birds	*Pelecanus conspicillatus*	Australian Pelican	LC			BA
Birds	*Petroica goodenovii*	Red-capped Robin	LC			BA
Birds	*Petroica rosea*	Rose Robin	LC			BA
Birds	*Phalacrocorax carbo*	Great Cormorant	LC			BA
Birds	*Phalacrocorax melanoleucos*	Little Pied Cormorant	LC			BA
Birds	*Phalacrocorax sulcirostris*	Little Black Cormorant	LC			BA
Birds	*Phaps chalcoptera*	Common Bronzewing	LC			BA
Birds	*Philemon citreogularis*	Little Friarbird	LC			BA
Birds	*Philemon corniculatus*	Noisy Friarbird	LC			BA
Birds	*Platelea flavipes*	Yellow-billed Spoonbill	LC			BA
Birds	*Platelea regia*	Royal Spoonbill	LC			BA
Birds	*Platycercus adscitus*	Pale-headed Rosella	LC			BA
Birds	*Platycercus eximius*	Eastern Rosella	LC			BA
Birds	*Plectorhyncha lanceolata*	Striped Honeyeater	LC			BA
Birds	*Podargus strigoides*	Tawny Frogmouth	LC			BA
Birds	*Poephila cincta cincta*	Black-throated Finch	V	V	EVR Priority Taxa	BBS
Birds	*Pomatostomus superciliosus*	White-browed Babbler	P	-	Non-EVR Priority Taxa	BBS
Birds	*Pomatostomus temporalis*	Grey-crowned Babbler	P		Non-EVR Priority Taxa	WO BA
Birds	*Psephotus haematonotus*	Red-rumped Parrot	LC			BA
Birds	*Psephotus varius*	Mulga Parrot	LC			BA

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Birds	*Pyrrholaemus brunneus*	Redthroat	R	-	-	LEWIS
Birds	*Rhipidura fuliginosa*	Grey Fantail	LC			BA
Birds	*Rhipidura leucophrys*	Willie Wagtail	LC			BA
Birds	*Rostratula benghalensis*	Painted Snipe	R	V&M	EVR Priority Taxa	DEWHA
Birds	*Scythrops novaehollandiae*	Channel-billed Cuckoo	LC			BA
Birds	*Smicrornis brevirostris*	Weebill	LC			BA
Birds	*Sphecotheres viridis*	Figbird	LC			BA
Birds	*Stagonopleura guttata*	Diamond Firetail	P	-	Non-EVR Priority Taxa	WO BA
Birds	*Stictonetta naevosa*	Freckled Duck	R	-	EVR Priority Taxa	BBS
Birds	*Strepera graculina*	Pied Currawong	LC			BA
Birds	*Streptopelia chinensis*	Spotted Turtle-Dove	LC			BA
Birds	*Struthidea cinerea*	Apostlebird	LC			QldMus BA
Birds	*Sturnus vulgaris*	Common Starling	I			BA
Birds	*Tachybaptus novaehollandiae*	Australasian Grebe	LC			BA
Birds	*Taeniopygia bichenovii*	Double-barred Finch	LC			BA
Birds	*Taeniopygia guttata*	Zebra Finch	LC			BA
Birds	*Threskiornis molucca*	Australian White Ibis	LC			BA
Birds	*Threskiornis spinicollis*	Straw-necked Ibis				BA
Birds	*Todiramphus macleayii*	Forest Kingfisher	LC			BA
Birds	*Todiramphus sanctus*	Sacred Kingfisher	LC			BA
Birds	*Trichoglossus chlorolepidotu*	Scaly-breasted Lorikeet	LC			BA
Birds	*Trichoglossus haematodus*	Rainbow Lorikeet				BA
Birds	*Turnix melanogaster*	Black-breasted Button Quail	V	V	EVR Priority Taxa	BBS
Birds	*Turnix velox*	Little Button-quail	LC			BA
Birds	*Tyto alba*	Barn Owl	LC			BA
Birds	*Tyto capensis*	Grass Owl	P	-	Non-EVR Priority Taxa	BBS

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Birds	*Tyto novaehollandiae*	Masked Owl	P	-	Non-EVR Priority Taxa	BBS
Birds	*Vanellus miles*	Masked Lapwing	LC			BA
Birds	*Xanthomyza phrygia*	Regent Honeyeater	E	E	EVR Priority Taxa	BBS
Birds	*Zosterops lateralis*	Silvereye	LC			BA
Birds		Domestic Goose	I			BA
Frogs	*Adelotus brevis*	Tusked Frog	V	-	EVR Priority Taxa	BBS
Frogs	*Cyclorana alboguttata*	Green-stripe Frog	LC			QldMus
Frogs	*Cyclorana brevipes*	Superb Collared-frog	LC			QldMus
Frogs	*Cyclorana verrucosa*	Warty Waterholding frog	R	-	EVR Priority Taxa	BBS WO
Frogs	*Limnodynastes ornatus*	Ornate Burrowing Frog	LC			QldMus
Frogs	*Limnodynastes salmini*	Salmon-striped Frog	P	-	Non-EVR Priority Taxa	WO
Frogs	*Litoria fallax*	Eastern Sedgefrog	LC			QldMus
Frogs	*Litoria latopalmata*	Broad-palmed Rocketfrog	LC			QldMus
Frogs	*Litoria peronii*	Green-spotted Tree Frog	LC			QldMus
Frogs	*Litoria rubella*	Naked Treefrog	R			QldMus
Frogs	*Uperoleia rugosa*	Chubby Gungan	LC			QldMus
Mammals	*Aepyprymnus rufescens*	Rufous Bettong	P	-	Non-EVR Priority Taxa	WO
Mammals	*Chalinolobus dweryi*	Large-eared Pied Bat	R	V	EVR Priority Taxa	DEWHA
Mammals	*Chalinolobus nigrogriseus*	Hoary Wattled Bat	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Chalinolobus picatus*	Little Pied bat	R	-	EVR Priority Taxa	WO
Mammals	*Dasyurus hallucatus*	Northern Quoll	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Dasyurus maculatus maculatus*	Spotted-tail Quoll	V	E	EVR Priority Taxa	BBS
Mammals	*Equus caballus*	Brumby	I			QldMus
Mammals	*Isoodon macrourus*	Northern Brown Bandicoot	P	-	Non-EVR Priority	BBS

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
					Taxa	
Mammals	*Kerivoula papuensis*	Golden-tipped Bat	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Miniopterus australis*	Little Bent-wing Bat	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Miniopterus schreibersii oceanenis*	Eastern Bent-wing Bat	P	-	Non-EVR Priority Taxa	BBS
mammals	*Nyctophilus timoriensis*	eastern long-eared bat	-	V		WO, DEWHA
Mammals	*Nyctophilus timoriensis*	Greater Long-eared Bat	V	V	EVR Priority Taxa	BBS
Mammals	*Ornithorhynchus anatinus*	Platypus	CS	-	Non-EVR Priority Taxa	BBS
Mammals	*Perameles nasuta*	Long-nosed Bandicoot	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Petauroides volans*	Greater Glider	P		Non-EVR Priority Taxa	WO
Mammals	*Petaurus australis australis*	Yellow-bellied Glider (sth sp)	P	-	EVR Priority Taxa	BBS
Mammals	*Petaurus norfolcensis*	Squirrel Glider	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Phascogale tapoatafa*	Brush-tailed Phascogale	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Phascolarctos cinereus*	Koala	CS		Non-EVR Priority Taxa	WO
Mammals	*Planigale tenuirostris*	Narrow-nosed Planigale	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Pseudocheirus peregrinus*	Common Ringtail Possum	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Pseudomys patrius*	Eastern Pebble Mound Mouse	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	EVR Priority Taxa	DEWHA, BBS
Mammals	*Saccolaimus flaviventris*	Yellow-bellied sheathtail	LC			QldMus
Mammals	*Scotorepens sp.*	Central Eastern Broad-nosed Bat	P	-	Non-EVR Priority Taxa	BBS

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Mammals	*Sminthopsis macroura*	Stripe-faced dunnart	LC			QldMus
Mammals	*Tachyglossus aculeatus*	Short-beaked echidna	LC			QldMus
Mammals	*Trichosurus vulpecula*	Common Brushtail Possum	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Vespadelus baverstocki*	Inland Forest Bat	P	-	Non-EVR Priority Taxa	BBS
Mammals	*Vespadelus regulus*	Southern Forest Bat	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Acanthophis antarcticus*	Common Death Adder	R	-	EVR Priority Taxa	BBS
Reptiles	*Amphibolurus muricatus*	Jacky Lizard	-	-	Non-EVR Priority Taxa	BBS BA
Reptiles	*Anomalopus brevicollis*	Slider Skink	R	-	Non-EVR Priority Taxa	BBS
Reptiles	*Anomalopus mackayi*	Five-clawed Worm Skink	E	V	EVR Priority Taxa	DEWHA BBS
Reptiles	*Aspidites ramsayi*	Woma	R	-	EVR Priority Taxa	BBS
Reptiles	*Carlia pectoralis*	Open-litter Rainbow-skin	LC			QldMus
Reptiles	*Chelodina expansa*	Broad Shelled River Turtle	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Chlamydosaurus kingii*	Frilled Necked Lizard	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Cryptophis nigrescens*	Small-eyed Snake	LC			QldMus
Reptiles	*Ctenotus ingrami*	Ctenotus Skink	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Cyclodomorphus gerrardii*	Pink Tongued Lizard	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Delma inornata*	Legless Lizard	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Delma plebeia*	Leaden Delma	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Delma torquata*	Collared Delma	V	V	EVR Priority Taxa	BBS
Reptiles	*Demansia psammophis*	Yellow-faced Whip Snake	LC			QldMus

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Reptiles	*Denisonia maculata*	Ornamental Snake	V	-	EVR Priority Taxa	BBS
Reptiles	*Diplodactylus steindachneri*	Box-patterned Gecko	LC			QldMus
Reptiles	*Diplodactylus stenodactylus*	Crowned Gecko	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Egernia rugosa*	Yakka Skink	V	V	EVR Priority Taxa	WO, DEWHA
Reptiles	*Emydura macquarii*	Kreffts Turtle	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Furina diadema*	Red-naped Snake	LC			QldMus
Reptiles	*Furina dunmalli*	Dunmall's Snake	V	V	EVR Priority Taxa	QldMus, DEWHA, BBS
Reptiles	*Gehyra dubia*	Dubious Dtella	LC			QldMus
Reptiles	*Hemiaspis damelii*	Grey Snake	E	-	EVR Priority Taxa	BBS
Reptiles	*Hoplocephalus bitorquatus*	Pale-headed Snake	LC	-	Non-EVR Priority Taxa	QldMus, WO
Reptiles	*Lialis burtonis*	Burton's Snake Lizard	LC			QldMus
Reptiles	*Nephrurus milii*	Thick-tailed Gecko	LC			QldMus
Reptiles	*Paradelma orientalis*	Brigalow scaly-foot	V	V	EVR Priority Taxa	WO, DEWHA, QldMus
Reptiles	*Parasuta dwyeri*	Dwyer's Snake	LC			QldMus
Reptiles	*Physignathus lesueurii*	Eastern Water Dragon	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Pogona barbata*	Common Bearded Dragon	LC			QldMus
Reptiles	*Pseudechis australis*	Mulga Snake	LC			QldMus
Reptiles	*Pseudechis guttatus*	Spotted Black Snake	P	-	Non-EVR Priority Taxa	BBS
Reptiles	*Ramphotyphlop proximus*	Proximus Blind Snake	LC			QldMus
Reptiles	*Ramphotyphlop wiedii*	Brown-snouted Blind Snake	LC			QldMus
Reptiles	*Rheodytes leukops*	Fitzroy Tortoise	V	V	EVR Priority Taxa	DEWHA
Reptiles	*Rhinoplocephalus boschmai*	Carpentaria Whip Snake	LC		Non-EVR Priority Taxa	WO, QM
Reptiles	*Strophurus taenicauda*	Golden-tailed Gecko	R	-	EVR Priority Taxa	QldMus BBS

Class	Scientific name	Common name	NC Act	EPBC Act	Priority taxa	Source
Reptiles	*Tiliqua rugosa aspera*	Shingle-back (eastern subspecies)	LC		Non-EVR Priority Taxa	WO
Reptiles	*Tympanocryptis lineata pinguicolla*	Grassland Earless Dragon	E	E	EVR Priority Taxa	BBS
Reptiles	*Uperoleia fusca*	Sandy Gungan	P	-	Non-EVR Priority Taxa	BBS

Conservation Status:

1 **NC Act-** V= Vulnerable, E= Endangered, R= Rare, LC= Least Concern, CS= Culturally Significant, *= Introduced

2 **EPBC Act-** V= Vulnerable, E= Endangered, M= Migratory

3 **Source:**

DEWHA- Department of the Environment, Water, Heritage and the Arts (Protected Matters Search Tool)

QM- Queensland Museum

BBS- Brigalow Belt South Expert Panel Report (Fauna) - Environmental Protection Authority 2002.

WO- Wildlife Online (Wildnet)

BA- Birds Australia

Attachment D

Fauna survey effort

Table D-1: Standard trapping sites

Site No	Easting	Northing	Site reference
1	707019	7072464	Unfragmented *C. citriodora*/ *Angophora leiocarpa* Forest near Gurulmundi
2	704595	7076092	Unfragmented *Angophora leiocarpa* and Baradene Red Gum Forest with dense Buloke Mid Stratum
3	706050	7081500	Acacia harp + Casuarina cristata roadside remnant off Baileys Lane
4	714965	7061086	Poplar Box on Leichhardt Hwy near 11 mile creek
5	722124	7051697	Miles Mulga Site near Miles of Geary's Road

Table D-2: Additional herpetofauna survey sites

Site No	Easting	Northing	Name/reference
WH1	706123	7074407	L tree Creek
WH2	705626	7074779	North Gurulmundi
WH3	718497	7051768	Southern Leichhardt Hwy 1
WH4	718243	7053106	Southern Leichhardt Hwy 2
WH5	717937	7054313	Southern Leichhardt Hwy 3
WH6	717057	7055809	Southern Leichhardt Hwy 4
WH7	704242	7079528	Giligulgul South
WH8	704347	7080069	Giligulgul South
WH9	715920	7057990	Leichhardt Hwy South of Wallan Creek
WH10	715506	7059418	North Wallan Creek on Leichhardt hwy
WH11	713797	7062530	Sth Nine Mile Creek on Leichhardt Hwy
WH12	711980	7063580	Near Kowguran on Leichhardt Hwy
WH13	709536	7065644	North Kowguran on Leichhardt Hwy
WH14	708000	7668450	3 km Sth Baileys Road on Leichhardt Hwy
WH15	708733	7067504	Leichhardt Hwy
WH16	725455	7051344	Eastern part of Gearys Road near Miles
WH17	724632	7051445	Middle Reaches of Gearys Road near Miles
WH18	728064	7047918	Warrigo Hwy east of Miles
WH19	707843	7070296	Northern portion Leichhardt Hwy before Baileys Road
WH20	726640	7050930	Far Eastern End Gearys Lane near Miles
WH21	721291	7051916	Dogwood Creek where proposed route crosses
WH22	794304	7094346	Peakes Road with intersection of Hansens Road

Table D-3: Anabat survey sites

Site No	Easting	Northing	Date	Habitat description
A1	794279	7094392	12.8.08	Remnant Brigalow
A2	795933	7094055	12.8.08	Non-remnant Brigalow
A3	709536	7065644	16.8.08	QLD Blue Gum/Poplar Box depression with stock dams
A4	716403	7057217	17.8.08	Blue-leaved ironbark with *Callitris/Acacia* Understorey

Table D-4: Harp trap survey sites

Site No	Easting	Northing	Name reference	Date out	Date in
H1	706129	7074407	L Tree Creek Gurulmundi	12.8.08	15.8.08
H2	705625	7074786	Gurulmundi North	13.8.08	15.8.08
H3	715705	7058536	Wallan Creek	16.8.08	18.8.08

Appendix E

Flora survey results

E1. Appendix E – Introduction

Appendix E provides the results of the flora surveys done along the Southern coal seam methane water supply pipeline. These results comprise:

- a comprehensive species list of all species of plant recorded in the study area sorted by regional ecosystem (RE) (Table E-1).
- 1:50,000 scale mapping of REs as mapped by the EPA in addition to non-remnant vegetation sampled in the study area, the location of flora survey points and the location of significant species of plant recorded in the study area.

FAMILY	Scientific Name	Common Name	Native	BBS Sig.	Surveyed Regional Ecosystems												
					11.3.2	11.3.25	11.5.1	11.5.1a	11.5.4	11.5.21	11.7.2	11.7.4	11.7.6	11.7.7	11.9.5	11.9.7	11.11.1	Cleared Areas
ACANTHACEAE	*Brunoniella australis*	Blue Trumpet	Y		1	2		3			1		2	1	2	3		1
	Hypoestes floribunda		Y												1			
ADIANTACEAE	*Cheilanthes distans*		Y						2	2							1	
	Cheilanthes sieberi var. sieberi	Mulga Fern	Y				2	3	2	2	2	3	1	1	1		2	1
AIZOACEAE	*Tetragonia tetragonoides*	Warrigal Greens	Y												1			2
	Trianthema triquerta	Red Spinach	Y												1	2		
AMARANTHACEAE	*Achyranthes aspera*	Chaff Flower	Y						1									
	Alternanthera denticulata	Lesser Joyweed	Y															
	Alternanthera nana		Y		2	1												
	Alternanthera nodiflora	Joyweed	N															
	Gomphrena celosioides	Gomphrena Weed	N		2	1		1										
APIACEAE	*Cyclospermum leptophyllum*	Slender Celery	Y			1												1
	Dichondra repens	Kidney Weed	Y			1												
	Hydrocotyle laxiflora	Pennyweed	Y			2												
	Trachymene incisa	Wild Parsnip	Y								2	2						
APOCYNACEAE	*Alstonia constricta*	Bitter Bark	Y											1	2			
	Carissa ovata	Kunkerberry	Y											1	1			
	Parsonsia eucalyptophylla	Gnarloo	Y												2			
ASCLEPIADACEAE	*Marsdenia viridiflora ssp. viridiflora*	Native Pear	Y												1	1		
	Tylophora grandiflora	Small-leaved Tylophora	Y												1			
ASTERACEAE	*Callotis lappulacea*	Yellow Burr Daisy	Y											2		1	1	2
	Calotis cuneifolia	Purple Burr Daisy	Y		2	2					1	2		1	1	2	2	2
	Calotis scabiosifolia var. scabiosifolia	Rough Burr Daisy	Y		2	1								1		1		1
	Calotis tenuissima		Y					1						1	1			
	Campactra barbarta		Y											1				
	Centipedea minima		Y			2												
	Chrysocephalum apiculatum	Yellow Buttons	Y		2	1	2	1				2		2			2	
	Cirsium vulgare	Scoth Thistle	N			1												1
	Emex australis	Spiny Emex	Y					1				1			2	1		
	Emilia sonchifolia	Milk Thistle	Y									2						
	Epaltes australis		Y															1
	Glossocardia bidens	Native Cobblers Pegs	Y															
	Gnaphalium pensylvanicum	(a) Cudweed	Y															
	Helichrysum collinum		Y															
	Ozothamnus diosmifolius	Sago Flower	Y										2					
	Ozothamnus diotophyllus		Y				1							2				
	Peripleura hispidula		Y							1	2		2	1				
	Senecio lautus s. str		Y												1			1
	Senecio tuberculatus		Y															
	Sigesbeckia orientalis	Indian Head	N			2												
	Solvia anthemifolia	Soft Bindy-eye	N												1			
	Sonchus oleraceus	Milk Thistle	N			2												1
	Vesbenia encelioides	Crownbeard	Y												1			1
	Vittadinia cuneata		Y						1						2	1		
	Vittadinia dissecta		Y		2	2		1			2			2				2
	Vittadinia pustulata		Y		2	1		1						1				
	Zygophyllum apiculatum	Gall Weed	Y												2			1 to 3
AZOLLACEAE	*Azolla pinnata*	Azolla Fern	Y															2 (dam)
BORAGINACEAE	*Heliotropium aplexicaule*	Blue Heliotrope	N						2									
	Cardamine paucijuga		Y												2			
	Lepedium bonariense		Y		1	2												1
	Sisymbrium irio	London Rocket	Y												1			
CACTACEAE	*Opuntia stricta*	Common Prickly Pear	N(2)			2			2						1			
	Opuntia tomentosa	Velvet Prickly Pear	N(2)		2	1	1	1	2		1			1	2	1	1	1
CAESALPINIACEAE	*Senna artemisioides ssp. coriacea*		Y								2				2			1
	Senna sophera sp. 'Forty Mile Scrub'		Y												1			
CALLITRICHACEAE	*Callitriche muelleri*		Y															
CAMPANULACEAE	*Wahlenbergia communis*		Y															
	Wahlenbergia gracilis		Y													1	1	
CAPPARACEAE	*Apophyllum anomalum*	Warrior Bush	Y												2			
	Capparis canescens	Wild Orange	Y															
	Capparis lasiantha	Nipan	Y		2	1									2	2		1 to 2
	Capparis loranthifolia	Narrow-leaved Bumble Tree	Y												2			
	Capparis mitchellii	Native Orange	Y												2			
CASUARINACEAE	*Allocasuarina inophloia*	Thready-barked She-Oak	Y									2						
	Allocasuarina leuhmanii	Bull Oak	Y		2	1	4			3			2	1		2	2	2
	Casuarina cristata	Belah	Y					2							4			1
CELASTRACEAE	*Elaeodendron australe var. integrifolium*	Narrow-leaved Red Olive Plum	Y		2	1									1			1
	Maytenus cunninghamii		Y								2						2	
	Maytenus dispema		Y												1			
CHENOPODIACEAE	*Atriplex muelleri*	Mueller's Saltbush	Y															3
	Atriplex semibaccatum	Creeping Saltbush	Y												1			1
	Chenopodium carinatum	Small Crumbweed	N											2	1			1
	Chenopodium desertortum	Desert Goosefoot	N			2					2							
	Chenopodium melanocarpum		Y															
	Chenopodium pumilo		N								1				1			
	Dysphania myriocephala		Y															
	Einadia hastata	Saloop	Y		1	1					2				2			1
	Einadia nutans	Climbing Saltbush	Y		1	2		1	2						2			1
	Enchylaena tomentosa	Ruby Saltbush	Y					2							1	1		2
	Maireana decalvans	Black Cottonbush	Y												1			
	Maireana microphylla	Small-leaved Cottonbush	Y				2				2					1		1
	Rhagodia gaudichaudiana		Y												1			
	Rhagodia parabolica		Y												2			
	Salsola kali	Soft Roly Poly	Y		1	2		1			2				2	1		2
	Sclerolaena bicornis var. horrida	Goathead Burr	Y		2	1												
	Sclerolaena birchii	Galvanised Burr	Y			2									2			1
	Sclerolaena muricatus	Black Roly Poly	Y												1			2
	Sclerolaena tetracuspis	Brigalow Burr	Y															
	Sclerolaena tricuspis		Y															
COMMELINACEAE	*Commelina ensifolia*		Y															
CONVOLVULACEAE	*Evoluvus alsinoides*	Tropical Speedwell	Y		1	2					1							
CRASSULACEAE	*Bryophyllum delagoense*	Mother-of-Millions	N(2)						4									
	Calandrinia ptychosperma		Y				1								2			
	Crassula sieberiana		Y				1					2			1			
CUPRESSACEAE	*Callitris glaucophylla*	White Cypress Pine	Y		2	1	6	1	5 6	5		3	4	3	1	3	4	1
CYPERACEAE	*Carex inversa*		Y		2	1												
	Cyperus betchei		Y		2	1												
	Cyperus difformis	Dirty Dora	Y															
	Cyperus gracilis	Whisker Grass	Y		2	1					2				2		1	
	Fimbristylis dichotoma		Y				1		1	1			2				2	1
	Gahnia aspera	Saw Sedge	Y				2		1			2	3	2	1			
	Schoenus kennyi		Y				1				2			1				
	Scleria sphacelata		N		1	2					2			2				1
DILLENIACEAE	*Hibbertia cistoidea*		Y				2											
DROSERACEAE	*Drosera peltata*	Pale Sundew	Y									2						
EBENACEAE	*Diospyros humilis*	Small-leaved Ebony	Y												1			
EHRETIACEAE	*Ehretia membranifolia*	Peach Bush	Y								2				1			
EPACRIDACEAE	*Leucopogon biflorus*		Y											1				
	Leucopogon pleiosospermus		Y				2					5		1				
EUPHORBIACEAE	*Acaclypha erenorum*	Soft Acalypha	Y												2			
	Breynia oblongifolia	Coffee Bush	Y										2		1			
	Bridelia leichhardtii	Samll-leaved Scrub Ironbark	Y										1		1			
	Chamaesyce drummondii	Caustic Weed	Y													1		1
	Euphorbia tannensis ssp. eremophila		Y								2			1			1	
	Petalostigma pubescens	Quinine Bush	Y						1	4			1	2				
	Phyllanthus gunnii		Y				1			1								
	Phyllanthus maderaspatensis		Y								2							
	Phyllanthus virgatus		Y								2		2					
FABACEAE	*Daviesia ulicifolia*	Native Gorse	Y							1								
	Desmodium varians	Variable Tre-foil	Y													2		
	Glycine microphylla		Y						1									
	Glycine tabacina	Glycine Pea	Y															
	Glycine tomentella	Hairy Glycine	Y							1								
	Hovea ramularis		Y															
	Jacksonia scoparia	Dogwood	Y							2								1
	Medicago polymorpha	Burr Medic	N			2									1			2
	Mirbelia pungens		Y				1											
	Stylostanhes humilis	Shrubby Stylo	N															
GERANIACEAE	*Erodium crinitum*	Crowsfoot	Y															
GOODENIACEAE	*Dampiera adpressa*		Y				2							1				

FAMILY	Scientific Name	Common Name	Native	BBS Sig.	Surveyed Regional Ecosystems												
					11.3.2	11.3.25	11.5.1	11.5.1a	11.5.4	11.5.21	11.7.2	11.7.4	11.7.6	11.7.7	11.9.5	11.9.7	11.11.1	Cleared Areas
	Goodenia fascicularis	Silky Goodenia	Y										2	1		2		
	Goodenia glabra	Smooth Goodenia	Y						1					1				
	Goodenia rotundifolia		Y								2							
	Scaevola spinescens	Prickly Fan Flower	Y					1										
HALORAGACEAE	*Gonocarpus micranthus ssp. ramosissimus*		Y									2						
HEMEROCALLIDACEAE	*Dianella caerulea*	Blue Flax Lily	Y										2					
	Dianella longifolia	Smooth Flax Lily	Y				1											
	Dianella revoluta var. revoluta	Spreading Flax Lily	Y							2			2	1				
JUNCACEAE	*Juncus ariticola*		Y															
	Juncus remotiflorus		Y															
	Juncus subsecundus		Y		2	1			1									
LAXMANNIACEAE	*Laxmannia gracilis*	Wire Lily	Y				2			1				1				
	Lomandra confertifolia ssp. pallida		Y				1		2	2			2		2			
	Lomandra filiformis		Y									2		2				
	Lomandra leucocephala var. leucocephala	Woolly-headed Mat Rush	Y				2			2	2	1		1				
	Lomandra longifolia	Spiny-headed Mat Rush	Y		1	2	1		2	2		2						
	Lomandra multiflora	Many-flowered Mat Rush	Y		1	2	1			2		1	2	2				
LILIACEAE	*Bulbine barbata*		Y												1			
	Crinum flaccidum	Murray Lily	Y									1						
LORANTHACEAE	*Amyema bifurcata*	Bloodwood Mistletoe	Y															
	Amyema congener ssp. congener	Variable Mistletoe	Y															
	Amyema linophylla ssp. orientalis	Bull Oak Mistletoe	Y															
	Amyema maidenii ssp.angustifolia		Y												2			
	Amyema miquelii	Box Mistletoe	Y															
	Amyema quandang var. bancroftii	Grey Mistletoe	Y									2		2	1			1
	Amyema quandang var. quandang	Grey Mistletoe	Y											2				1
	Lysiana exocarpi ssp. tenuis	Harlequin Mistletoe	Y				2											
	Lysiana subfalcata	Yellow Mistletoe	Y															1
MALVACEAE	*Abutilon malviflorum*	Bastard Marshmallow	Y					1						1	2			
	Abutilon oxycarpum var. oxycarpum	Flannel Weed	Y												1			
	Hibiscus sturtii	Hill Hibiscus	Y								3	1		1				
	Malvastrum americanum	Spiked Malvastrum	N		2	1									1			2
	Modiela caroliana	Red-fruited Mallow	N			2												1
	Sida cordifolia	Flannel Weed	Y											1				
	Sida corrugata	Corrugated Sida	Y															
	Sida cunninghamii	Ridge Sida	Y								2					2		
	Sida fibulifera	Pin Sida	Y					1										
	Sida rhombifolia	Paddy's Lucerne	N			1												1
	Sida rohlenae	Shrub Sida	Y								1	1	1	2		2	2	1
	Sida subspicata	Spiked Sida	Y		3	1												1
	Sida trichopoda	High Sida	Y															
MELIACEAE	*Owenia acidula*	Emu Apple	Y								2				1	2		
MIMOSACEAE	*Acacia aprepta*	Miles Mulga	Y	**Yes**								3						1
	Acacia blakei ssp. blakei	Blake's Wattle	Y			2				1		2	2	3				3
	Acacia burrowi	Currawong	Y															
	Acacia buxifolia	Box-lef Wattle	Y											1				
	Acacia carolae	Carole's Wattle	Y				2											
	Acacia conferta	Crowded-leaf Wattle	Y							4		2		1				1
	Acacia crassa ssp. crassa	Black Wattle	Y						4				2				2 3	1
	Acacia deblis		Y															
	Acacia decora	Pretty Wattle	Y													1	3	2
	Acacia excelsa	Ironwood	Y		3	2			1						1	2		2
	Acacia harpophylla	Brigalow	Y												5			2 to 4
	Acacia ixiophylla	Umbrella Wattle	Y				1											2 to 4
	Acacia julifera ssp. julifera		Y			2				1								1
	Acacia juncifolia ssp. juncifolia	Rush-leaf Wattle	Y											1				
	Acacia leicalyx ssp. leiocalyx	Black Wattle	Y										2					1
	Acacia leptostchya	Townsville Wattle	Y									2						
	Acacia longispicata ssp. velutina		Y															
	Acacia loroloba		Y									2						1
	Acacia macradenia	Zig-zag Wattle	Y															1
	Acacia melville	Yaran		**Yes**							2	2						
	Acacia neriifolia		Y															
	Acacia omalophylla	Yarran	Y	**Yes**							1	2						
	Acacia salicina	Sally Wattle	Y		2	1									2			1
	Acacia semilunata		Y			2	1					2		1				2
	Acacia semirigidula	Stony-Ridge Wattle	Y				1		2					2				1
	Acacia shirleyi	Lancewood	Y	**Yes**							6			1				2 to 4
	Acacia spectabilis	Glory Wattle	Y				1			2				2				2
	Acacia triptera	Spur-wing Wattle	Y				1											1
MYOPORACEAE	*Eremophila debile*	Winter Apple	Y		2	1										1		
	Eremophila deserti	Ellangowan Poison Bush	Y										2	1	2			1
	Eremophila mitchellii	False Sandalwood	Y		2	2		3							2	2		2
	Myoporum acuminatum	Mountain Boobialla	Y		2	1												
MYRTACEAE	*Angophora floribunda*	Rough-barked Apple	Y			2			3									1
	Angophora leiocarpa	Smooth-bark Apple	Y				2			5				2				1
	Corymbia citriodia ssp. variegata	Spotted Gum	Y										6					1
	Corymbia clarksoniana	Long-fruited Bloodwood	Y							2							1	
	Corymbia tessellaris	Carbeen	Y			1			1						1			
	Corymbia trachyphloia ssp. trachyphloia	Brown Bloodwood	Y									1						
	Eucalyptus chloroclada	Baradine Red Gum	Y				1		4	2				1				
	Eucalyptus crebra	Narrow-leaved Red Ironbark	Y				5		1		1	1		1	2		6	1
	Eucalyptus exserta	Queensland Peppermint	Y				1					4		1				
	Eucalyptus fibrosa ssp. nubila	Blue-leaved Ironbark	Y								2			5				1
	Eucalyptus longirostrata	Grey Gum	Y						5									
	Eucalyptus melanophloia	Silver-leaved Ironbark	Y		2	1												
	Eucalyptus piligaensis	Narrow-leaved Grey Box	Y								1							1
	Eucalyptus populnea	Poplar Box	Y		6	4	2	6			2				1	6	2	1
	Eucalyptus tenuipes	Narrow-leaved White Mahogany	Y									2		1				
	Eucalyptus tereticornis	Queensland Blue Gum	Y			3												
	Leptospermum polygalifolium	Wild May	Y									2						
	Lysicarpus angustifolius	Budgeroo	Y									1		1				
	Melaleuca viminalis	Weeping Bottlebrush	Y															
OLEACEAE	*Jasminum didymum ssp. racemosum*		Y		1	2		1							1			1
	Jasminum lineare	Desert Jasmine	Y			1									1			
	Jasminum volubile		Y												1			
	Notelaea microcarpa	Narrow-leaved Mock Olive	Y												1			
ORCHIDACEAE	*Cyanicula caerulea var. caerulea*		Y				1					1						
OXALIDACEAE	*Oxalis corniculata ssp. corniculata*	Creeping Oxalis	N		2	1												2
	Oxalis exilis		Y											1				
	Oxalis sp. (n-r)		Y		2	1			1		2	3		2	2			
PITTOSPORACEAE	*Auranticarpa rhombifolia*	Diamond-leaved Pittosporum	Y												2			
	Pittosporum angustifolium	Weeping Pittosporum	Y		1	2		2					2			1	1	
	Pittosporum spinescens	Wallaby Apple	Y												1			
PLANTAGINACEAE	*Plantago cunninghamii*		Y												1			
POACEAE	*Alloteropsis semialata*	Cockatoo Grass	Y															1
	Ancistrachne uncinulata	Hooky Grass	Y								2		2		1			
	Aristida calycina var. praealta	Dark Wiregrass	Y					2	1			1				2		2
	Aristida caput-medusae	Many-headed Wiregrass	Y		1	2			2	3	4	3	3	4			2	3
	Aristida curvala	African Lovegrass	N															2
	Aristida holanthera var. holanthera	Erect Kerosene Grass	Y										2	1				1
	Aristida jerichoensis var. jerichoensis	Jericho Wiregrass	Y		1	2							1					2
	Aristida latifolia	Feathertop Wiregrass	Y												1			1
	Aristida ramosa	Purple Wiregrass	Y				5					2		2				3
	Arundinella nepalensis	Reedgrass	Y						1			2						
	Austrostipa ramosissimum	Stout Bamboo Grass	Y			2									1			
	Austrostipa scaber	Rough Speargrass	Y												1			
	Austrostipa verticillata	Slender Bamboo Grass	Y												1			
	Bothriochloa decipiens var. decipiens	Pitted Bluegrass	Y													1		1
	Cenchrus ciliaris	Buffel Grass	Y					2							2	1	1	4
	Chloris divaricata	Slender Chloris	Y		2	2									4	2		1
	Chloris gayana	Rhodes Grass	N			2												2
	Chloris truncata	Windmill Grass	Y		1	2		4	1						1	2	2	
	Chrysopogon sylvaticus		Y														2	
	Cymbopogon refractus	Barbed Wire Grass	Y		1	2		1	2	1			2			1	2	
	Cynodon dactylon	Couch	N		2	1			2									
	Dichanthium sericeum	Queensland Blue Grass	Y		1	2		1								3	2	
	Dichelachne crinita	Shorthair Plume Grass	Y					1										
	Digitaria divaricatissima		Y								2	2		2				
	Echinopogon ovatus	Hedgehog Grass	Y															
	Eleusine indica	Crow's Foot Grass	N												1			1

FAMILY	Scientific Name	Common Name	Native	BBS Sig.	Surveyed Regional Ecosystems													
					11.3.2	11.3.25	11.5.1	11.5.1a	11.5.4	11.5.21	11.7.2	11.7.4	11.7.6	11.7.7	11.9.5	11.9.7	11.11.1	Cleared Areas
	Elymus scarbus	Common Wheat Grass	Y		2	1												
	Enneapogon gracilis	Nine Awn Grass	Y													1	2	
	Enneapogon nigricans	Niggerheads	Y						1									
	Enteropogon acicularis	Curly Widmill Grass	Y													1		
	Enteropogon racemosus	Twirly Windmill Grass	Y					2							2			
	Entolasia stricta	Wiry Panic	Y				2				1		3	2				
	Eragrostis elongatus	Clustered Lovegrass	Y		2	1	2		3				2	2				1
	Eragrostis lacunaria	Purple Lovegrass	Y										2		2	1		
	Eragrostis leptostachya	Paddock Lovegrass	Y		2	1					2							
	Eragrostis longipedicellata		Y								2							
	Eragrostis megalosperma		Y					2			2			1	1			
	Eragrostis sororia	Woodland Lovegrass	Y					3		1	2						2	
	Eragrostis tenellula		Y		2	1			1									1
	Eriachne mucronata	Mountain Wanderrie Grass	Y				4					1		2				
	Eriochloa crebra	Early Spring Cup Grass	Y		2	2										1		1
	Heteropogon contortus	Bunched Speargrass	Y		3	1		1	2							2	4	
	Hyparrhenia rufa	Thatch Grass	Y															
	Imperata cylindrica	Blady Grass	Y															
	Leptochloa decipiens ssp. peacockii		Y								2				2			
	Leptochloa digitata	Umbrella Canegrass	Y			2												
	Megathyrsus maximus var. maximus	Guinea Grass	N		2	3		2	4					2	2			1 to 4
	Microlaena stipoides	Weeping Meadow Grass	Y								2							
	Neurachne munroi		Y								3		3	1				
	Panicum buncei		Y							1			1					
	Panicum decompositum	Native Millet	Y													2		
	Panicum effusum	Hairy Panic	Y				1		2				2	2		1	1	
	Paspalidium caespitosum	Brigalow Grass	Y												1			
	Paspalidium constrictum		Y								1				2	2		
	Paspalidium distans	Shot Grass	Y										2		2			
	Paspalidium sp. (n-r)		Y					2			2		2					
	Paspalum distichum	Water Couch	Y															
	Phragmies australis	Common Reed	Y			2												
	Rhynchelytrum repens	Red Natal Grass	Y						2	3				2			1 2	1
	Setaria surgens	Annual Pigeon Grass	Y															1
	Sporobolus actinocladus		Y													1		
	Sporobolus caroli	Fairy Grass	Y		1	2		2							2	1		1
	Sporobolus continuous		Y													6		
	Sporobolus creber	Slender Rat's Tail Grass	Y		1	2												
	Themeda triandra	Kangaroo Grass	Y						1					2				
	Tragus australianus	Small Burrgrass	Y		2	1												
	Urochloa mosambicensis	Sabi Grass	N											1				
POLYGONACEAE	*Rumex brownii*	Swamp Dock	Y			2												
PORTULACCACEAE	*Portulacca australis*		Y												1			
	Portulacca pilosa	Hairy Pigweed	N															1
PROTEACEAE	*Grevillea striata*	Beefwood	Y												1			
	Hakea fraseri	Corkwood Oak	Y								2				1			
	Hakea purpurea	Needlewood	Y				1											
RANUNCULACEAE	*Ranunculus pentandrus var. platycarpus*	(a) Buttercup	Y															
RHAMNACEAE	*Alphitonia excelsa*	Red Ash	Y					1					1	1				1
	Cryptandra armata		Y									2	1	1				
	Pomaderris queenslandica		Y						1									
RUBIACEAE	*Asperula conferta ssp. conferta*	Common Woodruff	Y													1		
	Asperula geminifolia	Twin-leaf Bedstraw	Y								2			1				
	Pomax umbellata	Pomax	Y															
	Psydrax johnsonii	Brigalow Canthium	Y												2			
	Psydrax odorata var. buxifolia	Shiny Canthium	Y															
	Psydrax odorata var. odorata	Stiff Canthium	Y										1					
	Psydrax oleiofolium		Y					3	1		1		2			1	1	
	Richardia brasiliensis	White Eye	N															
RUTACEAE	*Boronia bipinnata*	Rock Boronia	Y				2							1				
	Boronia glabrata	Sandstone Boronia	Y										2	2				
	Citrus glauca	Wild Lime	Y												1			
	Flindersia collina	Leopard Wood	Y												1			
	Geijera parviflora	Narrow-leaved Wilga	Y		2	1		3			1		1		3	2		2
SANTALACEAE	*Santalum lanceolatum*	Sandalwood	Y				1							1	2			1 to 3
SAPINDACEAE	*Alectryon diversifolius*	Scrub Boonaree	Y		2	1									2			
	Alectryon oleiofolius	Western Rosewood	Y		2	2									2			
	Atalaya hemiglauca	Whitewood	Y					1							2	1		1 to 3
	Dodonaea macrossanii		Y	**Yes**										1				
	Dodonaea triangularis		Y										1	2				
	Dodonaea truncatiales		Y															
	Dodonaea vestita		Y				1											
	Dodonaea viscosa var. angustifolium	Sticky Hop Bush	Y														2	
SOLANCEAE	*Solanum ellipticum*	Potato Bush	Y			2				1		1		2				1
	Solanum esuriale	Potato Weed	Y								1						1	1
	Solanum mitchellianum	Western Prickly Nightshade	Y		2	1									2			
	Solanum nemophilum		Y					1			3	1	2	2		1		1
	Solanum parvifolium ssp. parvifolium	Small-leaved Nightshade	Y								2	2			2			
	Stackhousia viminea		Y															
STERCULIACEAE	*Brachychiton australis*	Broad-leaved Bottle Tree	Y												1			
	Brachychiton populneus	Kurrajong	Y													1		
	Brachychiton rupestris	Queensland Bottle Tree	Y												1			1
THYMELAEACEAE	*Pimelea microcephala*	Poison Pimelea	Y				1											
VERBENACEAE	*Clerodendrum floribundum*	Lolly Bush	Y															
	Phyla nodiflora	Condamine Couch	N															
	Verbena aristega	Mayne's Pest	Y		3	3		2	2					2	1	1	1	1 to 4
	Verbena bonariensis	Purple-top	Y			2												
VISICACEAE	*Visicum whitei ssp. whitei*		Y															
VITACEAE	*Cayratia clematidea*	Slender Grape	Y												1			
XANTHORRHOEACEAE	*Xanthorrhoea johnsonii*	Grass Tree	Y									1		1				
RE Summary																		
Total number of species			350		61	88	46	39	42	30	54	46	45	83	113	53	33	95
Number of native speceis			321		54	72	45	36	36	30	50	46	45	78	104	52	32	81
Number of exotic species			29		7	16	1	3	6	0	4	0	0	5	9	1	1	14

LEGEND

"Native"	**Y**	taxon indigenous to Australia
	N	introduced and/or naturalised taxon not indigenous to Australia
	N(2)	Class 2 pest as defined under *Lands Protection (Stock Route and Pest Management) Act 2002* and *Regulation 2003*

"BBS Sig"	Individual taxa which are regarded as regionally significant within the Southern Brigalow Belt and/or require further investigation, as described within Table 3: Biodiversity Planning Assessment Brigalow Belt South Flora Expert Panel Report (EPA, 2002)

"Surveyed Regional Ecosystems" Vegetation communities identified on site which are representative of a described regional ecosytem (either remnant or non-remnant). Relative abundance was prescribed using the Braun-Blanquet technique
[NOTE: where multiple populations or site specific surveys of one regional ecosytem have been performed the relative abundance of an individual taxon was averaged across all sites]

1	Few individuals contributing less than 5% cover
2	Many individuals contributing less than 5% cover
3	5-25% cover
4	25-50% cover
5	50-75% cover
6	75-100% cover

WANDOAN

Proposed Sewer & Portable Water

Mine Access Road

Proposed Rail Options

Indicative Airport

Jackson Wandoan Rd

Fosters Road

SIX MILE CREEK

SANDY FLAT CREEK

11.4.3/11.4.7

11.3.1

11.3.1/11.9.6

11.12.21

11.9.3

11.9.3a

11.3.21

11.9.7/11.5.5

11.9.9

11.9.9/11.7.6/11.3.26

11.12.21/11.12.21

Little Pied Bat

Homopholis belsonii

0 1 2 Kilometres

Road
Pipeline
Watercourse
MLA
Creek diversion
Coal transport
Mining pits
Infrastructure
Proposed rail option

Significant Fauna
Little Pied Bat
Homopholis belsonii

Regional Ecosystem*
11.4.3/11.4.7
11.12.21
11.9.3
11.3.1
11.9.3a
11.3.1/11.9.6
11.9.7/11.5.5
11.3.21
11.9.9/11.7.6/11.3.26

* RE polygons with black outlinle represent remnant vegetation

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PARSONS BRINCKERHOFF

Map A

1:40,000 Regional Ecosystems, non-remnant vegetation map and other significant biodiversity

Road
Pipeline
Watercourse
MLA

Significant Fauna
Golden-tailed Gecko
Brigalow Scaly-foot
Little Pied Bat

Regional Ecosystem*
11.10.1/11.7.6
11.10.7
11.10.7/11.7.6
11.3.2
11.3.2/11.3.25
11.3.25
11.3.25/11.3.19
11.3.25/11.3.2
11.3.25/11.3.2/11.3.18
11.3.25/11.3.2/11.9.7
11.3.25/11.3.27b
11.3.25/11.3.39/11.3.2
11.3.25/11.3.4
11.3.25/11.3.4/11.3.2
11.3.4
11.5.1
11.5.1/11.5.1a/11.7.7
11.5.1a
11.5.21
11.5.4
11.7.6
11.7.7
11.9.5
11.9.5/11.9.10
11.9.5/11.9.10/11.9.5
11.9.5/11.9.5
11.9.5/11.9.5/11.9.4a
11.9.7
11.9.7/11.3.25
11.9.7/11.3.4
11.9.9

* RE polygons with black outlinle represent remnant vegetation

Giligulgul
Golden-tailed Gecko
Gurulmundi
Brigalow Scaly-foot
Golden-tailed Gecko
Little Pied Bat

0 1 2
Kilometres

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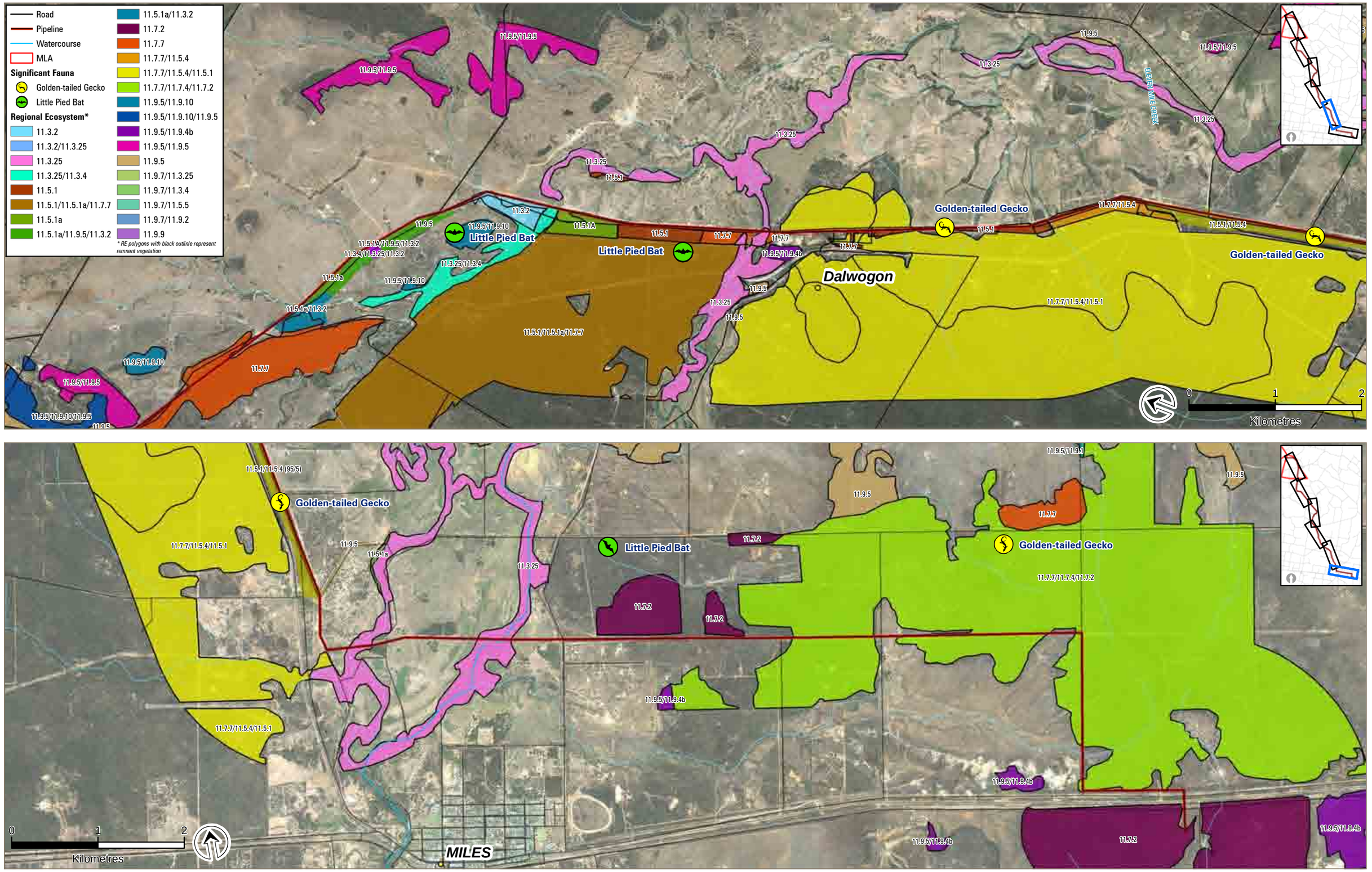
Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

PARSONS BRINCKERHOFF

Map B

1:40,000 Regional Ecosystems, non-remnant vegetation map and other significant biodiversity



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Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

PARSONS BRINCKERHOFF

Map C

1:40,000 Regional Ecosystems, non-remnant vegetation map and other significant biodiversity

Attachment F

Fauna habitat results

Table F-1: Fauna habitat types within the Study Area

Habitat Characteristic	Acacia-Belah Scrub (Brigalow)	Dry Sclerophyll Forest	Ironbark Woodland	Box Woodland	QLD Blue Gum Riparian	Acacia Scrub	Cleared Land	Aquatic/Wetland
Standard Trapping Site	3	1,2	-	4	-	5	-	-
Supplementary Sites	yes	yes	yes	yes	yes	yes	yes	yes
Topography	Lower slopes and ridges	Undulated sand plain	Undulated sand plain	Broad alluvial plain	Alluvial Flats and Riparian Zones of Major Drainages	Gently undulated sand plains derived from deeply weathered sandstone and atop laterised duricrust	Variable	Alluvial and variable (farm dams)
Landuse	Private and Roadside Reserve	Private, State Forest and Roadside Reserve	Private and Roadside Reserve	Private and Roadside Reserve	Private and Roadside Reserve	Private	Private and Roadside Reserve	Private
Age Class	Remnant & Non Remnant	Predominantly Remnant	Predominantly Remnant	Remnant & Non Remnant	Remnant	Remnant and Non Remnant	Not applicable	Not applicable
Dominant Vegetation								
Overstorey	Brigalow (*Acacia harpophylla*) 50% Belah (*Casuarina cristata*) 50% – (10-13m height, FPC 25%)	Spotted Gum (*Corymbia citriodora ssp. variegata*) 70%, Smooth-barked Apple (*Angophora leiocarpa*) 20% (25 m, FPC 35%)	Blue-leaved Ironbark (*Eucalyptus fibrosa*) 70% Peppermint (*Eucalyptus exertaa*) 5% - (14 m height, FPC 20%)	Poplar Box (*Eucalyptus populnea*) 90%, Queensland Blue Gum (*E. tereticornis*) 10% - (16 m, FPC 20%)	Queensland Blue Gum (*Eucalyptus tereticornis*) 95%, Rough-barked Apple (*Angophora floribunda*) 5% - (22m, FPC 30-35%)	Miles Mulga (*Acacia aprepta*), 85%, Queensland Peppermint (*Eucalyptus exsertq*) 5%, Brown Bloodwood (*C.trachyphloia ssp. trachyphloia*) 5% - (8.5 m , FPC – 35 %)	Generally scatted trees of remnant vegetation	absent
Mid Storey	Belah (*Casuarina*	White Cypress (*C.glaucophylla*)	White Cypress (*C.glaucophylla*)	Bullock Bush (*Alectryon*	Rough-barked Apple	Miles Mulga (*Acacia*	Generally scatted trees of	absent

Habitat Characteristic	Acacia-Belah Scrub (Brigalow)	Dry Sclerophyll Forest	Ironbark Woodland	Box Woodland	QLD Blue Gum Riparian	Acacia Scrub	Cleared Land	Aquatic/Wetland
	cristata) 30% Brigalow (*Acacia harpophylla*) 30% Wilga (*Geijera parviflora*) 20% , False Sandelwood (*Eremophila mitchellii*) 10%, Northern Velvet Prickly Pear (**Opuntia tomentose)* 5% – (Height 6, FPC 10-15%)	20%, Spotted Gum (*C.citriodora ssp. variegata*) 35%, Buloke (*Allocasuarina leuhmanii*) 25% - (10 m , FPC 10%)	30%, Acacia sp. 35% Blue-leaved Ironbark (*Eucalyptus fibrosa*) 20% Peppermint (*Eucalyptus exertaa*) 5% (Height 9 m, FPC 10%)	*oleifolius*) 20%, White Cypress (*C.glaucophylla*) 35% Wilga (*Geijera parviflora*) 35%. Poplar Box (*E.populnea*) 15%, - (5 m , FPC 10%)	(*Angophora floribunda*) 40% Queensland Blue Gum (*Eucalyptus tereticornis*) 40%, White Cypress (*C.glaucophylla*) 15% - (14m, FPC 10-15%)	*aprepta*), 90% Queensland Peppermint (*Eucalyptus exsertq*) 5% , Grey Mistletoe (*Amyema quandang var. bancrofti*) - (5 m , FPC – 20%)	remnant vegetation	
Understorey	Scrub Boonaree (*Alectryon diversifolius*) 10%, Kunkerberry (*Carissa ovata*) 10%, Narrow-leaved Red Olive Plum (*Elaeodendron australe var. integrifolium)* 10%, Wilga (*Geijera parviflora*) 20%, Brigalow (*A. harpophylla*) 30%, Belah (*C. cristata*) 20% - (Height 1.5	Black Wattle (*Acacia crassa ssp. crassa*) 30%, White Cypress (*C.glaucophylla*) 25%, Spotted Gum (*C.citriodora ssp. variegata*) 10%, Buloke (*Allocasuarina leuhmanii*) 15% - (5m, FPC 5-10%)	White Cypress (*C.glaucophylla*) 35%, Acacia sp. 40% - (Height 1.5-3.5 m, FPC 15%)	Bullock Bush (*Alectryon oleifolius*) 20%, White Cypress (*C.glaucophylla*) 35% Wilga (*Geijera parviflora*) 35%. Poplar Box (*E.populnea*) 15%,, Velvety Tree Pear (*Olearia tomentose*) - (1.5 m, FPC <5%)	Weeping Bottlebrush (*Melaleuca viminalis*) 30% , Tea-tree (*Leptospernum sp.*) 35%, White Cypress (*C.glaucophylla*) 15%, Velvety Tree Pear (*Olearia tomentose*) 10% - (4m, FPC 10%)	Miles Mulga (*Acacia aprepta*), 70% Queensland Peppermint (*Eucalyptus exsertq*) 5%, Beard Heath (*Leucopogon pleisospermus*) 25% - (0.7-1.0 m – FPC <5%)	Generally scatted shrubs of remnant vegetation	absent

Habitat Characteristic	Acacia-Belah Scrub (Brigalow)	Dry Sclerophyll Forest	Ironbark Woodland	Box Woodland	QLD Blue Gum Riparian	Acacia Scrub	Cleared Land	Aquatic/Wetland
	m, FPC 5-10%)							
Groundcover	Slender Windmill Grass (*Chloris divaricata*) 20%, Hooky Grass (*Ancistrachne uncinulata)* 25%, Ruby Saltbush (*Enchylaena tomentose*) 5%, Brigalow Grass (*Paspalidium caespitosum*) 15%, Guinea Grass (**Megathyrsus maximus var. maximu)* 15%, Potato Weed (*Solanum spp.*) 10%- (Height 0.1-0.7 m, FPC – 20%)	Many-headed Wire Grass (*Aristida caput-medusae*) 40% , Wiregrass (*Aristida holanthera*) 40%, Matrushes (*Lomandra spp.*) 10% – (<1.0m, FPC 5%)	Many-headed Wire Grass (*Aristida caput-medusae*) 40% *Paraneurachne sp*. 25%- (Height 0.7 m, FPC – 10%)	Bunched Speargrass (*Heteropogon contortus*) 20%, Mayne's Pest (*Verbena aristgea*) 15%, Queensland Blue Grass (*Dichanthium sericeum*) 10%, Wire Grass (*Aristida spp.*) 10%, Love Grass (*Eragrostis spp.*) 10%, Windmill Grass (*Chloris spp.*) 10%, *Scleria sphacelata* 5%– (<1.0m, FPC 40%)	Many-headed Wire Grass (*Aristida caput-medusae*) 50%, Matrush (*Lomandra sp.*) 10%, Blady Grass (*Imperata cyclindrica*) 20% - (0.5-1.0m, FPC 35%)	Jericho Wiregrass (*Aristida jerichoensis*) 35%, Wild Parsnip (*Trachymene incisa*) 30%, Mulga Fern (*Cheilanthes sieberi ssp. seeberi*) 15% - (<1.0m, FPC <5%)	Predominantly Wire Grasses (*Aristida sp*) and Windmill Grasses (*Chloris sp*) interspersed with Queensland Blue Grass (*Dicanthium sericum*)	absent
Soil Type	Clay and clay loam with deep underlying clays	Sand with underlying clays	Sandy Loam with underlying clays	Grey clay	Light brown sandy and silty clays	Sandy to light brown loam	Highly variable from cracking clays in north to sand plans in central study area and sandy loams in the south	Generally heavy clays
Fire History	>20 yrs	> 20 yrs	>20 yrs	> 20 yrs	>20 yrs	>20 yrs	Unknown and variable	Unknown and variable
Waterbodies	Generally absent	Absent	Absent	Artificial Constructed	Yes	Absent	Yes	Yes

Habitat Characteristic	Acacia-Belah Scrub (Brigalow)	Dry Sclerophyll Forest	Ironbark Woodland	Box Woodland	QLD Blue Gum Riparian	Acacia Scrub	Cleared Land	Aquatic/Wetland
				Dam				
Waterbody type	na	na	na	Stock Dam	Semi Permanent Dogwood Creek	na	Stock Dams	Ephemeral Wetlands
Stream Substrate	na	na	na	Clay	Clay	na	Clay	Clay
Fringing Ground Vegetation	na	na	na	Azolla Fern (*Azolla pinnata*), Water Couch (*Paspalum distichum*), *Epaltes australis* and isolated clumps of Rushes (*Juncus spp.*).	Occasional *Cyperus, Juncus* and *Sporobolous* species	na	Nil	Mainly sedges (*Cyperus*) rushes (*Juncus sp*) and occasionally tussock grasses (*Sporobolous*) and reeds (*Phragmites australis*)
Riparian Vegetation	na	na	na	Poplar Box Woodland	Queensland Blue Gum	na	Nil	Eucalyptus tereticornis
Water Quality	na	na	na	Turbid	Turbid	na	Turbid	Turbid
Approximate Depth	na	na	na	2.5 m	Up to 1.5m	na	Up to 2-3 m	<0.5m
Terrestrial Component								
Litter Depth	5-15 cm	2-5 cm	<5 cm	0-2 cm	2-5 cm	<5 cm	<5 cm	nil
Humus	5-10 cm	0-5 cm	<5 cm	0-2 cm	0-5 cm	<5 cm	<2 cm	nil
Groundcover Composition	20% vegetation (grasses) 60% litter 9% log 5% bare soil 4% rock 2% rubbish-rubbish Comments – extensive litter and log cover	15-40% vegetation 25-60% litter 5-15% log 5-20% bare soil 0-10% rock 0% rubbish Comments – habitat quality highly variable through study area. Generally	10% vegetation 40% litter 10% log 40% bare soil 5% rock 0% rubbish Comments – abundant ground cover attributes for fauna	40% vegetation 20% litter 15% log 25% bare soil 0% rock 0% rubbish Comments – highly variable through study area	35% vegetation 20% litter 5% log 30% bare soil 10 % rock 0% rubbish Comments – habitat quality highly variable throughout this habitat type.	<5% vegetation 15% litter 20% log 40% bare soil 20% rock 0% rubbish Comments – abundant small diameter log cover	20-85% vegetation 0-10% litter 0-20% log (in recently cleared areas) 5-25% bare soil 0-10 % rock <5% rubbish-rubbish Comments – provides limited	10% vegetation 5% litter 15% log 70% bare soil 0% rock 0%-rubbish Comments – provides habitat for nomadic and migratory wetland species including Great Egret

Habitat Characteristic	Acacia-Belah Scrub (Brigalow)	Dry Sclerophyll Forest	Ironbark Woodland	Box Woodland	QLD Blue Gum Riparian	Acacia Scrub	Cleared Land	Aquatic/Wetland
	make this habitat suitable for fossorial reptiles including Brigalow Scaly-foot	supports abundant log and litter cover suitable for dunnarts and cover dependant reptiles such as Brigalow Scaly-foot and litter skinks.					habitat to fauna	
Tree Hollow Density (tree per ha)	0-3 per ha	1-6 per ha	3 per ha	2-10 per ha	~12 per ha	~1-2 per ha in *Eucalyptus* and *Corymbia* species	Variable depending on density and type of retained paddock trees 0-2 per ha	Nil
Hollow Characteristics	Trunk – small to medium crevices and fissures restricted to Belah Limb – small and medium crevices. Also fissures. Restricted to Belah Suitability – bats, arboreal herpetofauna	Trunk – small, medium and large Limb – small, medium and large Suitability – bats, gliders, possum, large birds, arboreal herpetofauna	Trunk – small Limb – small, medium and large Suitability – bats, gliders, possum, large birds, arboreal herpetofauna	Trunk – small, medium and large Limb – small, medium and large Suitability – bats, gliders, possum, large birds, arboreal herpetofauna	Trunk – small, medium and large Limb – small, medium and large Suitability – bats, gliders, possum, large birds, arboreal herpetofauna	Trunk – small Limb – small, medium and large Suitability – bats, gliders, possum, large birds, arboreal herpetofauna	Trunk – small, medium and large Limb – small, medium and large Suitability – bats, some birds and occasionally possums	Not applicable
Flowering & Fruiting Trees	Belah (20% cones)	Mistletoe (5%) Spotted Gum (25%) Baradene Red Gum (20%) Isolated QLD Blue Gum (30%)	Mistletoe (5%) *Acacia sp* (30%)	Mistletoe (10%) Queensland Blue Gum (20%)	Queensland Blue Gum (20%)	Mistletoe (5%)	Nil	Nil

Habitat Characteristic	Acacia-Belah Scrub (Brigalow)	Dry Sclerophyll Forest	Ironbark Woodland	Box Woodland	QLD Blue Gum Riparian	Acacia Scrub	Cleared Land	Aquatic/Wetland
Landscape/Corridor Value	Moderate. Often provides one of the few vegetated links in otherwise cleared landscape. Links other communities along Baileys Road and also near Nine Mile Creek	High as represents one of few large tracts of vegetation in the Wandoan-Miles region capable of supporting ecologically demanding species.	High as represents one of few large tracts of vegetation in the Wandoan-Miles region capable of supporting ecologically demanding species.	Moderate. Generally provides habitat linkage in north south direction associated with Leichart Highway	High as its generally associated with uncleared drainage lines and provides important late winter spring foraging resource and abundant tree hollows	Moderate as represents east west linkage to riparian habitat associated with Dogwood Creek.	Nil	Limited from a migratory perspective (no RAMSAR sites nearby)
Disturbance History	Clearing – high Logging – low Roads – high Fire – nil Weeds – moderate Refuse – low Recreation – nil Grazing - moderate	Clearing – low Logging – moderate Roads – low Fire – low Weeds – low Refuse – low Recreation – low Grazing - low	Clearing – low Logging – low Roads – low Fire – low Weeds – low Refuse – low Recreation – low Grazing - nil	Clearing – low Logging – low Roads – low Fire – nil Weeds – low Refuse – nil Recreation – low Grazing - low	Clearing – low Logging – low Roads – low Fire – nil Weeds – moderate Refuse – moderate Recreation – low Grazing - moderate	Clearing – moderate Logging – nil Roads – low Fire – nil Weeds – low Refuse – nil Recreation – nil Grazing - nil	Clearing – high Logging – nil Roads – high Fire – unknown Weeds – high Refuse – low Recreation – nil Grazing - high	Clearing – high Logging – nil Roads – nil Fire – nil Weeds – low Refuse – nil Recreation – nil Grazing - high
Other Notes	Suitable habitat for reptiles particularly fossorial species including Brigalow Scaly-foot and other Brigalow Belt endemics such as Golden-tailed	Appears to provide important habitat for hollow dependant fauna and those species which generally inhabit large tracts of forest	Appears to provide important habitat for hollow dependant fauna and those species which generally inhabit large tracts of forest	Appears to provide important habitat for hollow dependant fauna	Appears to provide important habitat for hollow dependant fauna particularly those species which also have nectivorous and/or folivorous habits	Appears to provide a discrete habitat for ground dwelling cover dependant fauna. Lancewood associated communities probably have higher ecological	Used by some open country specialists such as the Bustard. Some microchiropteran bats of conservation value may use isolated paddock trees for roosting	Provide habitat for waterfowl, egrets, frogs and some species of snake. Also used as watering points by macropods

Habitat Characteristic	Acacia-Belah Scrub (Brigalow)	Dry Sclerophyll Forest	Ironbark Woodland	Box Woodland	QLD Blue Gum Riparian	Acacia Scrub	Cleared Land	Aquatic/Wetland
	Gecko.					value than Miles Mulga communities.		

Family	Scientific Name	Common name	Conservation Status			Abundance	Winter 2008 survey							Habitat type associations								
			NCR	EPBC	RSF		Winter Detection Method	Standard sites 1	2	3	4	5	Supple-mentary sites / opportu-nistic	Non-Eucalypt woodland - Brigalow (Acacia harp +- Cas cristata)	Dry Sclerophyll Forest (Corymbia citriodora ssp. variegata + Angophora leiocarpa) Occasionally Redgum (Eucalyptus	Buloke (Allocasuari	Ironbark (Eucalyptus fibrosa ssp. nubila or E. crebra) +- Callitris glaucophylla and or Lancewood Acacia shirleyi Woodland	Poplar Box (Eucalyptus populnea) Woodland	Riparian (E. tereticornis dominated)	Acacia Scrub (Miles	Cleared	Wetland/ Dam
Bufonidae	*Rhinellus marinus*	Cane Toad	I	-	-	R	HS, Re						•	•				•	•		•	•
Hylidae	*Litoria caerulea*	Common Green Tree Frog	C	-	-	R	HS						•	•			•	•	•		•	•
Hylidae	*Litoria latopalmata*	Broad Palmed Rocket Frog	C	-	-	U	HS, S				•		•		•			•			•	
Hylidae	*Litoria rubella*	Desert Tree Frog	C	-	-	R	HS						•								•	
Myobatrachidae	*Limnodynastes salmani*	Salmon Sided Frog	C	-	SigSBB	R	HS						•	•								
Myobatrachidae	*Limnodynastes tasmaniensis*	Spotted Grassfrog	C	-	-	R	HS				•		•						•		•	•
Myobatrachidae	*Uperoleia rugosa*	Dusky Toadlet	C	-	-	R	HS						•					•			•	•
						Site Totals		**0**	**0**	**0**	**2**	**0**	**7**	**3**	**1**	**0**	**2**	**3**	**3**	**0**	**6**	**4**
Agamidae	*Amphibolurus burnsi*	Burn's Dragon	C	-	-	R	HS						•			•	•					
Agamidae	*Pogona barbata*	Bearded Dragon	C	-	-	U	HS, O			•			•	•	•		•		•		•	
Cheluidae	*Chelodina longicollis*	Eastern Snake-necked Turtle	C	-	-	R	Re						•								•	•
Elapidae	*Cryptophis nigrescens*	Eastern Small-eyed Snake	C	-	-	R	HS					•					•			•		
Gekkonidae	*Gehyra dubia*	Tree Dtella	C	-	-	A	HA			•	•	•	•	•	•	•	•	•	•	•		
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko	C	-	-	A	HS, P, FT	•	•	•		•	•	•	•	•	•	•	•	•		
Gekkonidae	***Strophurus taenicauda***	**Golden-tailed Gecko**	**R**	-	**SigSBB**	**U**	HS			•			•	•	•	•	•					
Pygopodidae	***Paradelma orientalis***	**Brigalow Scaly-foot**	**V**	**V**	**SigSBB**	**R**	**HS**	•							•							
Pythonidae	*Antaresia maculosa*	Spotted Python	C	-	-	R	HS			•				•							•	
Scincidae	*Carlia foliorum*	Rainbow Skink	C	-	-	C	HS, O, P, FT	•	•	•		•	•	•	•		•	•	•	•		
Scincidae	*Carlia pectoralis pectoralis*	Rainbow Skink	C	-	-	U	HS, O, P	•		•		•	•	•					•	•		
Scincidae	*Cryptoblepharus carnabyii*	Tree Skink	C	-	-	R	HS						•	•				•				
Scincidae	*Cryptoblepharus virgatus*	Wall Skink	C	-	-	A	HS	•	•	•	•	•	•	•	•	•	•	•	•	•		
Scincidae	*Ctenotus robusta*	Eastern Striped Skink	C	-	-	R	HS						•				•		•		•	
Scincidae	*Ctenotus taenulotus*	Fire-tail Skink	C	-	-	R	HS							•				•				
Scincidae	*Lerista fragilis*	Sand Sliding Skink	C	-	-	A	HS	•	•	•	•	•	•	•	•	•	•	•		•	•	
Scincidae	*Morethia boulengeri*	A skink	C	-	-	C	HS, P		•	•		•	•	•	•	•	•	•	•	•	•	
Varanidae	*Varanus tristis*	Freckled Monitor	C	-	-	R	HS						•						•			
						Site Totals		**6**	**5**	**10**	**3**	**8**	**14**	**12**	**9**	**7**	**11**	**8**	**9**	**8**	**6**	**1**
Canidae	*Canis lupus dingo*	Dingo/Wild Dog	I	-	-	R	Sc															
Canidae	*Vulpes vulpes*	Red Fox	I	-	-	R	Sc		•				•		•	•						
Dasyuridae	*Sminthopsis murina*	Common Dunnart	C	-	-	R	T	•														
Felidae	*Felis catus*	Feral Cat	I	-	-	R	Tk						•	•							•	
Leporidae	*Lepus capensis*	Brown Hare	I	-	-	U	O, S			•				•			•		•		•	
Leporidae	*Oryctolagus cuniculus*	Rabbit	I	-	-	U	Sc, O, S			•	•		•	•	•		•	•			•	
Macropodidae	*Macropus dorsalis*	Black-striped Wallaby	C	-	-	R	O, S			•			•	•							•	
Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo	C	-	-	C	O, Re			•	•		•	•			•	•	•		•	
Macropodidae	*Macropus rufogriseus*	Red-necked Wallaby	C	-	-	R	O			•		•	•	•				•		•	•	
Macropodidae	*Wallabia bicolor*	Swamp Wallaby	C	-	-	U	O, Re, S			•	•	•	•	•	•		•	•	•	•	•	
Molossidae	*Mormopterus* species 2/3	Eastern/Inland Free-tail Bat	C	-	-	R	A	•	•		•		•		•	•			•	•		•
Molossidae	*Tadarida australis*	White-striped Freetail Bat	C	-	-	R	W			•				•					•			
Muridae	*Mus musculus*	House Mouse	I	-	-	C	T, O, HS	•	•	•			•	•	•	•	•		•		•	
Peramelidae	*Isoodon or Permales*	Bandicoot (Probably Long-nos	C	-	SigSBB	R	Tk						•		•							
Petauroidea	*Petauroides volans*	Greater Glider	C		WRL + SigSBB	R	S, Sc		•		•		•		•				•	•		
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum	C	-	SigSBB	A	S, Sc	•	•	•	•	•	•	•	•	•	•	•	•	•		
Potoroidae	*Aepyprymnus rufescens*	Rufous Bettong	C	-	SigSBB	R	O								•				•		•	
Suidae	*Sus scrofa*	Feral Pig	I	-	-	U	Tk, O, D						•	•					•	•	•	•
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	C	-	-	A	HS, Sc, O, Re	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Vespertilionidae	*Miniopterus schreibersii oceanens*	Eastern Bent-wing Bat	C	-	SigSBB	R	A				•			•	•	•	•	•	•	•		

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Vespertilionidae	*Nyctophilus gouldi*	Gould's Long-eared Bat	C	-	-	R	H				•							•	•			
Vespertilionidae	*Chalinolobus gouldii*	Goulds Wattled Bat	C	-	-	R	A		•		•		•	•		•	•	•				
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat	C	-	-	R	H					•	•				•	•		•		
Vespertilionidae	*Scotorepens greyii*	Little Broad-nosed Bat	C	-	-	R	A				•		•	•			•	•				
Vespertilionidae	*Vespadelus vulturnus*	Little Forest Bat	C	-	NRL	R	A, H				•		•	•			•	•	•			•
Vespertilionidae	***Chalinolobus picatus***	**Little Pied Bat**	**R**	**-**	**SigSBB**	U	A, H				•	•	•	•				•	•	•		•
						Site Totals		**5**	**7**	**10**	**12**	**6**	**19**	**16**	**10**	**6**	**11**	**17**	**12**	**6**	**11**	**4**
Accipitridae	*Milvus migrans*	Black Kite	C	-	-	R	O														•	
Accipitridae	*Accipiter fasciatus*	Brown Goshawk	C	-	-	R	O		•						•	•	•					
Accipitridae	*Circus assimilis*	Spotted Harrier	C	-	-	R	O														•	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle	C	-	-	A	O		•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Accipitridae	*Haliastur sphenurus*	Whistling Kite	C	-	-	R	O														•	
Aegothelidae	*Aegotheles cristatus*	Australian Owlet Nightjar	C	-	-	R	W			•				•				•				
Anatidae	*Chenonetta jubata*	Australian Wood Duck	C	-	-	R	O															•
Anatidae	*Anas gracilis*	Grey Teal	C	-	-	R	O															•
Anatidae	*Aythya australis*	Hardhead	C	-	-	R	O															•
Anatidae	*Anas superciliosa*	Pacific Black Duck	C	-	-	R	O											•				•
Ardeidae	*Ardea alba*	Great Egret	C	M	-	R	O											•				•
Ardeidae	*Egretta novaehollandiae*	White-faced Heron	C	-	-	U	O						•					•	•		•	•
Ardeidae	*Ardea pacifica*	White-necked Heron	C	-	-	R	O															•
Artamidae	*Gymnorhina tibicen*	Australian Magpie	C	-	-	C	O			•	•	•	•	•			•	•	•	•	•	•
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow	C	-	-	R	O						•				•		•			
Artamidae	*Cracticus torquatus*	Grey Butcherbird	C	-	-	U	O	•	•				•		•	•	•					
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird	C	-	-	A	O		•	•	•	•	•	•	•	•	•	•	•	•	•	
Artamidae	*Strepera graculina graculina*	Pied Currawong	C	-	-	U	O				•	•	•					•	•	•	•	
Cacatuidae	*Nymphicus hollandicus*	Cockatiel	C	-	-	R	O						•	•							•	
Cacatuidae	*Cacatua roseicapilla*	Galah	C	-	-	C	O			•		•	•	•			•	•	•	•	•	
Cacatuidae	*Cacatua sanguinea*	Little Corella	C	-	-	R	O												•			
Cacatuidae	*Cacatua galerita*	Sulphur Crested Cockatoo	C	-	-	C	O				•	•						•	•	•	•	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo Shrike	C	-	-	C	O			•	•		•	•				•	•		•	
Campephagidae	*Coracina papuensis*	White-bellied Cuckoo Shrike	C	-	-	R	W										•		•			
Casuariidae	*Dromaius novaehollandiae*	Emu	C	-	-	R	O														•	
Centropodidae	*Centropus phasianinus*	Pheasant Coucal	C	-	-	R	O			•				•					•		•	
Charadriidae	*Vanellus miles miles*	Masked Lapwing	C	-	-	U	O														•	•
Columbidae	*Phaps chalcoptera*	Common Bronzewing	C	-	-	R	O						•				•					
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	C	-	-	C	O			•	•		•	•			•	•		•	•	•
Columbidae	*Geopelia striata*	Peaceful Dove	C	-	-	R	O				•		•				•	•	•			
Columbidae	*Columba livia*	Rock Dove	I	-	-	R	O												•		•	
Columbidae	*Streptopelia chinensis*	Spotted Turtle Dove	I	-	-	R	O												•		•	
Corcoracidae	*Struthidea cinerea*	Apostlebird	C	-	-	A	O		•	•			•	•	•	•	•	•	•		•	
Corcoracidae	*Corcorax melanorhamphos*	White-winged Chough	C	-	-	R	O		•				•		•	•	•					
Corvidae	*Corvus coronoides*	Australian Raven	C	-	-	R	W	•					•	•	•						•	
Corvidae	*Corvus orru*	Torresian Crow	C	-	-	A	O, W	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cuculidae	*Chrysococcyx lucidus*	Shining Bronze Cuckoo	C	-	-	R	O					•								•		
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	C	-	-	A	O, W	•	•	•	•	•	•	•	•	•	•	•	•	•		
Dicruridae	*Rhipidura fuliginosa*	Grey Fantail	C	-	-	A	O	•	•		•	•	•	•	•	•	•	•	•	•		
Dicruridae	*Grallina cyanoleuca*	Magpielark	C	-	-	U	O			•	•		•	•				•		•	•	•

Family	Scientific Name	Common name	Conservation Status			Abundance	Winter 2008 survey							Habitat type associations								
			NCR	EPBC	RSF		Winter Detection Method	Standard sites 1	2	3	4	5	Supplementary sites / opportunistic	Non-Eucalypt woodland - Brigalow (Acacia harp +- Cas cristata)	Dry Sclerophyll Forest (Corymbia citriodora ssp. variegata + Angophora leiocarpa) Occasionally Redgum (Eucalyptus	Buloke (Allocasuari	Ironbark (Eucalyptus fibrosa ssp. nubila or E. crebra) +- Callitris glaucophylla and or Lancewood Acacia shirleyi Woodland	Poplar Box (Eucalyptus populnea) Woodland	Riparian (E. tereticornis dominated)	Acacia Scrub (Miles	Cleared	Wetland/ Dam
Dicruridae	*Myiagra inquieta*	Restless Flycatcher	C	-	-	R	O						•						•			
Dicruridae	*Dicrurus bracteatus*	Spangled Drongo	C	-	-	R	O						•						•			
Dicruridae	*Rhipidura leucophrys leucophrys*	Willie Wagtail	C	-	-	C	O		•	•	•	•	•	•	•	•	•	•	•	•	•	•
Falconidae	*Falco longipennis*	Australian Hobby	C	-	-	R	O		•				•		•	•	•				•	
Falconidae	*Elanus axillaris*	Black Shouldered Kite	C	-	-	R	O														•	
Falconidae	*Falco berigora*	Brown Falcon	C	-	-	R	O			•		•	•	•						•	•	
Falconidae	*Falco cenchroides*	Nankeen Kestrel	C	-	-	U	O					•	•	•							•	
Gruidae	*Grus rubicundus*	Brolga	C	-	-	R	O														•	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	C	-	-	U	O	•			•	•	•	•	•	•				•	•	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	C	-	-	U	O						•				•	•		•	•	
Maluridae	*Malurus leucopterus*	Red-backed Wren	C	-	-	R	O						•	•		•					•	
Maluridae	*Malurus cyaneus*	Superb Fairywren	C	-	-	U	O	•		•		•	•	•	•	•				•	•	
Maluridae	*Malurus lamberti*	Variegated Fairy Wren	C	-	-	R	O						•	•								
Meliphagidae	*Entomyzon cyanotis*	Blue-faced Honeyeater	C	-	-	C	O			•	•		•	•	•			•	•		•	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater	C	-	-	C	O		•	•	•	•	•	•	•	•	•	•	•	•		
Meliphagidae	*Melithreptus brevirostris*	Brown-headed Honeyeater	C	-	-	R	O		•				•		•	•						
Meliphagidae	*Philemon citreogularis*	Little Friarbird	C	-	-	A	O	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Meliphagidae	*Philemon corniculatus*	Noisy Friarbird	C	-	-	R	O		•	•				•	•	•						
Meliphagidae	*Manorina melanocephala*	Noisy Miner	C	-	-	C	O	•	•		•	•	•	•	•	•	•	•	•	•	•	
Meliphagidae	*Myzomela sanguinolenta*	Scarlet Honeyeater	C	-	-	C	O	•			•		•		•		•	•	•			
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater	C	-	-	R	O			•				•								
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater	C	-	-	R	O		•	•				•	•	•						
Meliphagidae	*Plectorhyncha lanceolata*	Striped Honeyeater	C	-	-	A	O	•	•	•	•		•	•	•	•	•	•	•	•		
Meliphagidae	*Lichenostomus leucotis*	White-eared Honeyeater	C	-	-	U	O, W					•	•		•	•	•	•		•		
Meliphagidae	*Lichenostomus penicillatus*	White-plumed Honeyeater	C	-	-	R	O												•			
Meliphagidae	*Lichenostomus chrysops*	Yellow-faced Honeyeater	C	-	-	A	O, W	•	•	•	•	•	•	•	•	•	•	•	•	•		
Meliphagidae	*Manorina melanotis*	Yellow- throated Miner	C	-	-	A	O							•	•		•	•	•	•	•	
Motocillidae	*Anthus novaeseelandiae*	Richards Pipit	C	-	-	R	O														•	
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	C	-	-	U	O	•	•		•				•	•	•	•	•			
Otididae	*Ardeotis australis*	Australian Bustard	C	-	-	R	O						•								•	
Pachycephalidae	*Pachycephala pectoralis pectoralis*	Golden Whistler	C	-	-	R	O		•				•		•	•	•		•			
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike Thrush	C	-	-	U	O	•	•		•	•	•	•	•	•	•	•	•	•		
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler	C	-	-	C	O	•	•	•	•	•	•	•	•	•	•	•	•	•		
Pardalotidae	*Acanthiza reguloides*	Buff-rumped Thornbill	C	-	-	R	O		•				•		•	•		•				
Pardalotidae	*Acanthiza uropygialis*	Chestnut-rumped Thornbill	C	-	-	A	O		•	•	•	•	•	•	•	•	•			•		
Pardalotidae	*Acanthiza apicalis*	Inland Thornbill	C	-	-	R	O		•						•	•						
Pardalotidae	*Chthonicola sagittata*	Speckled Warbler	C	-	SigSBB	R	O						•				•			•		
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	C	-	-	A	O, W	•		•	•	•	•	•	•	•	•	•	•	•		
Pardalotidae	*Smicrornis brevirostris*	Weebill	C	-	-	A	O, W	•	•	•	•	•	•	•	•	•	•	•	•	•		
Pardalotidae	*Gerygone olivacea*	White Throated Gerygone	C	-	-	C	O		•		•		•		•	•	•	•	•			
Pardalotidae	*Acanthiza nana*	Yellow Thornbill	C	-	-	R	O						•				•					
Pardalotidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	C	-	-	C	O		•	•			•	•		•	•				•	
Passeridae	*Taeniopygia bichenovii*	Double Barred Finch	C	-	-	C	O			•	•		•	•	•		•	•	•		•	
Passeridae	*Passer domesticus*	House Sparrow	I	-	-	R	O														•	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican	C	-	-	R	O															•
Petroicidae	*Eopsaltria australis*	Eastern Yellow Robin	C	-	-	R	O		•							•	•					
Petroicidae	*Microeca flavigaster*	Jacky Winter	C		-	U	O				•		•	•			•	•			•	

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Petroicidae	*Petroica goodenovii*	Red-capped Robin	C	-	-	R	O					•								•		
Phasianidae	*Coturnix ypsilophora*	Brown Quail	C	-	-	R	O															
Phasianidae	*Coturnix pectoralis*	Stubble Quail	C	-	-	R	O					•							•	•		
Podargidae	*Podargus strigoides*	Tawny Frogmouth	C	-	-	R	O, W	•		•				•	•							
Pomatostomidae	*Pomatostomus temporalis tempor*	Grey-crowned Babbler (easter	C	-	SigSBB	R	O							•		•	•					
Psittacidae	*Alisterus scapularis*	Australian King Parrot	C	-	-	R	O				•		•						•	•	•	
Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	C	-	-	C	O	•			•		•		•			•	•	•		
Psittacidae	*Platycercus adscitus palliceps*	Pale-headed Rosella	C	-	-	A	O		•	•	•	•	•	•	•	•	•	•	•	•	•	
Psittacidae	*Trichoglossus haematodus haema*	Rainbow Lorikeet	C	-	-	R	O												•	•	•	
Psittacidae	*Psephotus haematonotus*	Red Rumped Parrot	C	-	-	U	O															
Psittacidae	*Aprosmictus erythropterus*	Red Winged Parrot	C	-	-	A	O	•		•	•	•	•	•	•		•	•	•		•	
Psittacidae	*Trichoglossus chlorolepidotus*	Scaly-breasted Lorikeet	C	-	-	A	O	•	•	•	•	•	•	•	•	•	•	•	•	•		
Ptilonorhynchidae	*Chlamydera maculata*	Spotted Bowerbird	C	-	-	R	O							•								
Strigidae	*Ninox novaeseelandiae*	Southern Boobook	C	-	-	R	O	•	•	•		•		•	•	•	•		•		•	
Sturnidae	*Sturnus vulgaris*	Common Starling	I	-	-	R	O														•	
Sylviidae	*Cinclorhamphus cruralis*	Brown Songlark	C	-	-	R	O							•							•	
Sylviidae	*Cinclorhamphus mathewsi*	Rufous Songlark	C	-	-	R	O														•	
Threskiornithidae	*Threskiornis spinicollis*	Australian White Ibis	C	-	-	R	O						•							•	•	•
Threskiornithidae	*Platalea regia*	Royal Spoonbill	C	-	-	R	O												•			•
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis	C	-	-	R	O															
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill	C	-	-	R	O															•
Tytonidae	*Tyto javanica*	Pacific Barn Owl	C	-	-	R	Re														•	
						Site Totals		**22**	**33**	**34**	**35**	**31**	**60**	**48**	**44**	**35**	**49**	**45**	**47**	**35**	**50**	**18**

Appendix G

Likelihood of occurrence assessment for Rare, Threatened species of plant

Figure G-1 Likelihood of occurrence assessment for Rare, Threatened species of plant identified from the desk base assessment

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Aponogetonaceae	*Aponogeton queenslandicus*		R		Yd	Rooted, submerged and floating, perennial aquatic (Royal Botanic Gardens 2008, personal observations of C.Hansen). Occurs in Darling Downs district in temporary waters 30-60 cm deep, in sunny positions on clay substrates (Stanley & Ross 1983). Potential habitat in the study area corresponds with RE 11.3.25 and other aquatic habitats.	Moderate: habitat encountered in the investigation area
Asteraceae	*Rutidosis glandulosa*		R		Yd	Herb in *Corymbia citriodora ssp. variegata, Eucalyptus crebra* and *Allocasuarina leuhmanii* open forest on deeply weathered sandstone in Barakula SF (Queensland Herbarium 2008b). Potential habitat in the study area corresponds with RE 11.7.6.	Moderate: habitat encountered in the investigation area
Asteraceae	*Rutidosis lanata*		E		Yd	Herb in *Eucalyptus populnea* and *E.coolibah* woodland or *A.harpophylla* open forest on alluvium and immediately associated low rises. Known populations potentially extinct (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002; Queensland Herbarium 2008b).	Low: habitat is marginally present within the investigation area

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Asteraceae	*Stemmacantha australis*	Austral Cornflower, Native thistle	V	V		Woodland and grassland on heavy black or red-brown clay or clay loams derived from basalt. Often found on road sides and road verges. Associated with *Eucalyptus crebra, E. orgadophila, E. populnea, E. tereticornis, E. melanophloia, Angophora subvelutina, A. floribunda, *Cirsium vulgare, Dichanthium sericeum and Themeda triandra*. Does not compete well with exotic grasses e.g. **Chloris gayana* (QPWS 2001).	Low: habitat is not present within the investigation area
Caesalpiniaceae	*Senna acclinis*		R		Yd	Erect shrub on margins of sub tropical rainforest, littoral rainforest, dry rainforest and vine thickets; north from Gloucester to Gladstone and west to Taroom district (Expedition NP) (Harden *et al.* 2006).	Low: habitat is not present within the investigation area
Celastraceae	*Apatophyllum teretifolium*		R		Yd	Grows on skeletal soils on rocky ridges of lateritic duricrust in low woodland of *Eucalyptus tenuipes, E.exserta* and *Lysicarpus angustifolius* in the Barakula SF. The shrub layer is generally dense and diverse (Queensland Herbarium 2008b). Potential habitat in the study area corresponds with RE 11.7.2, and RE 11.7.4.	Moderate: habitat encountered in the investigation area

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Celastraceae	*Denhamia parvifolia*	small-leaved denhamia	V	V	Yd	Mainly restricted to SEVT, vine scrubs and brigalow -softwood scrub communities at 160-560 m. (Also occasionally in *E. crebra* forest), in fertile, red brown, sandy, clay loams on hill slopes and crests of variable aspect. Burnett and Darling Downs districts (Stanley & Ross 1983).	Low: good quality intact habitat not encountered within the investigation area
Cupressaceae	*Callitris baileyi*		R		Yd	Hilly or mountainous areas of the Moreton, Darling Downs and Burnett districts generally on fertile soils (Stanley & Ross 1989)	Low: habitat unlikely to occur in investigation area
Cyperaceae	*Eleocharis blakeana*		R		Yd	In moist areas including roadside drains, dam edges, shallow waterways/drainage corridors and/or swamps on floodplains, often growing with other sedges, rushes and grasses (Queensland Herbarium 2008b). Potential habitat in the study area corresponds with RE 11.3.25 and other aquatic habitats.	Moderate: habitat encountered in the investigation area
Cyperaceae	*Fimbristylis vagans*		R		Yd	Occurs at lagoon edges, often growing with other sedges, rushes and grasses (Queensland Herbarium 2008b). Potential habitat in the study area corresponds with RE 11.3.25 and other aquatic habitats.	Moderate: habitat encountered in the investigation area

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Haloragaceae	*Gonocarpus urceolatus*		V		Yd	Decumbent herb growing in skeletal soils in association with low woodland of *Eucalyptus exserta, Acacia spp*. (including *A.shirleyi, A.burrowi, A.sparsiflora*) and/or *Callitris glaucophylla* near Chinchilla (Chinchilla Field Naturalist's Club Inc 1997; Queensland Herbarium 2008b).	Low: habitat is present within the investigation area but outside known range for taxon.
Lamiaceae	*Westringia cheelii* (syn. *W.parvifolia*)		V	V		Widespread in the Western Darling Downs and Barakula SF, usually on sandy or stony soils (Stanley & Ross 1989). Potential habitat in the study area corresponds with RE 11.5.1, RE 11.7.4, RE 11.7.6, RE 11.7.7.	Moderate: habitat encountered in the investigation area.
Mimosaceae	*Acacia barakulensis*	Waaji wattle	V		Yd	Restricted to the Waaji wildflower area in the north-western extent of Barakula SF and occurs on shallow soils over lateritic duricrust in association with *Melaleuca* shrubland with stunted *Corymbia trachyphloia* emergents (Lithgow 1997; ABRS 2001). Potential habitat in the study area corresponds with RE 11.7.5.	Moderate: scalds were not encountered in the investigation area but are known in the Study Area surrounds
Mimosaceae	*Acacia chinchillensis*	Chinchilla wattle	V	V	Yd	Confined to an area of sandy soils north of Chinchila near Tara (Stanley & Ross 1989). Woodland to open forest dominated by *E.crebra, A.leiocarpa, C.glaucophylla, C.enderlicheri* and *Allocasuarina leuhmanii* (Queensland Herbarium 2008b).	Low: habitat is present within the investigation area but outside known range for taxon

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Mimosaceae	*Acacia curranii*	curly-bark wattle	V	V	Yd	Tall shrub in shrub/heathland with occasional emergent *Eucalyptus* spp. on shallow soils or natural "scalds" on deeply weathered coarse-grained sedimentary rock (lateristic duricrusts) (Chinchilla Field Naturalist's Club Inc 1997; Lithgow 1997; Maslin 2002) Known to occur in the Gurulmundi Special Area comprising Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway. Most likely to occur in RE 11.7.5 which does not occur in the Study Area, however potential to also occur in RE 11.7.1.	Moderate: No Re 11.7.5 or scalds were not encountered in the investigation area but are known in the Study Area surrounds.
Mimosaceae	*Acacia gittinsii*		R		Yd	Confined to Blackdown Tableland occurring in Eucalypt woodland on sandstone, particularly in wetter areas (Maslin 2002).	Low: habitat is present within the investigation area but outside known range for taxon
Mimosaceae	*Acacia handonis*	Hando's wattle	V	V	Yd	Known primarily from the Barakula area, north of Chinchilla, growing in lateritic soil with grey sand or clayey silt with ironstone gravel, in gently undulating country, often on stony ridges, in eucalypt woodland and open forest dominated by *E.fibrosa ssp. nubila, Corymbia watsoniana* and *Lysicarpus angustifolius*. (Maslin 2002; Queensland Herbarium 2008b; Stanley & Ross 1989) Potential habitat in the study area corresponds with RE 11.7.7.	Moderate: habitat encountered in the investigation area

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Mimosaceae	*Acacia lauta*		V	V		Occurs in open forest to low woodland with *Callitris glaucophylla* (White Cypress Pine) and *Allocasuarina luehmannii* present at all known sites. Restricted to a small region of the Darling Downs in south-eastern Qld, from Tara to Inglewood.	Low: The Study Area is located to the north of the known distribution of the species (Tara to Inglewood).
Mimosaceae	*Acacia tenuinervis*	scrub wattle	R		Yd	Grows on red loamy soils atop deeply weathered sandstone in association with *Corymbia citriodora ssp. variegata* and/or *E.crebra* open forest and occasionally in Brigalow or at the edge of SEVT (Lithgow 1997; Maslin 2002) Potential habitat in the study area corresponds with RE 11.7.6	Moderate: habitat encountered in the investigation area
Mimosaceae	*Acacia wardellii*		V	V	Yd	Grows on laterised sandstone ridges in the Condamine SF in association with *Eucalyptus fibrosa ssp. nubila, E.crebra, Acacia spp*. and *C.glaucophylla* (Chinchilla Field Naturalist's Club Inc 1997; Queensland Herbarium 2008b)	Low: habitat is present within the investigation area but outside known range for taxon. Local record is a planted specimen (EPA 2002)

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Myrtaceae	*Calytrix gurulmundensis*	yellow calytrix	V	V	Yd	Low shrub in shrub/heathland with occasional emergent *Eucalyptus/Corymbia* spp. on shallow soils or natural "scalds" on deeply weathered coarse-grained sedimentary rock (lateristic duricrusts) in the Gurulmundi area (Chinchilla Field Naturalist's Club Inc 1997; Lithgow 1997) Known to occur in the Gurulmundi Special Area comprising Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway. Most likely to occur in RE 11.7.5 which does not occur in the Study Area, however potential to also occur in RE 11.7.1.	Moderate: No RE 11.7.5 or scalds were encountered in the investigation area but are known in occur in Study Area surrounds.
Myrtaceae	*Eucalyptus argophloia*	Queensland western white gum	V	V	Yd	Tall slender tree growing on heavy cracking-clay soils in the south-eastern extent of Barakula SF near Chinchilla. Associated with fertile Brigalow forest (Brooker & Kleinig 2004; Chinchilla Field Naturalist's Club Inc 1997; Environmental Protection Agency and Environmental Planning Southwest Queensland 2002)	Low: habitat is not present within the investigation area and outside known range for taxon.

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Myrtaceae	*Eucalyptus curtisii*	Plunkett mallee	R		Yd	Sandy or stony soils, often in sandstone areas (Stanley and Ross, 1986). Wet sclerophyll forests of SEQ (personal observations). SEQ from Robinson Gorge and Isla Gorge National Parks through Barakula State Forest and Plunkett south of Brisbane (Brooker & Kleinig 2004). Potential habitat in the study area corresponds with RE 11.7.5.	Moderate: scalds were not encountered in the investigation area but are known in the Study Area surrounds
Myrtaceae	*Eucalyptus pachycalyx subsp. waajensis*	pumpkin gum	E		Yd	Small tree with a restricted though disjunct distribution with small populations in North Quensland, Cracow, Eidsvold and the Waaji wildflower area near Gurulmundi. At a regional context specific to the current investigation area, the taxon is associated with skeletal soils in natural scald areas on laterised duricrust (Brooker & Kleinig 2004; Chinchilla Field Naturalist's Club Inc 1997; Environmental Protection Agency and Environmental Planning Southwest Queensland 2002) Potential habitat in the study area corresponds with RE 11.7.5.	Moderate: scalds were not encountered in the investigation area but are known in the Study Area surrounds

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Myrtaceae	*Eucalyptus rubiginosa*		R		Yd	Small tree with a restricted distribution with small populations in Isla Gorge NP near Robison Gorge and Barakula SF in association with *Corymbia watsoniana, Corybia citriodora ssp. variegata, Eucalyptus tenuipes* and *Lysicarpus angustifolius* on rocky ridges of laterised sandstone (Brooker & Kleinig 2004; Queensland Herbarium 2008b) Potential habitat in the study area corresponds with RE 11.7.4	Moderate: habitat encountered in the investigation area
Myrtaceae	*Eucalyptus virens*		V	V		Small to medium sized ironbark in four disjunct populations near Inglewood, Tara, north-east of Eidsvold and the scarp on approach to the Maranoa River near Mt. Moffat (Brooker & Kleinig 2004).	Low: habitat is present within the investigation area but outside known range for taxon
Myrtaceae	*Homoranthus decumbens*		V	V	Yd	Low shrub in shrub/heathland with occasional emergent *Eucalyptus/Corymbia spp*. on shallow soils or natural "scalds" on deeply weathered coarse-grained sedimentary rock (lateristic duricrusts) in the Gurulmundi area (Chinchilla Field Naturalist's Club Inc 1997; Lithgow 1997). Potential habitat in the study area corresponds with RE 11.7.5.	Moderate: scalds were not encountered in the investigation area but are known in the Study Area surrounds

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Myrtaceae	*Melaleuca groveana*		R		Yd	Occurs on ridges, high mountain slopes and the summits of mountains, at 340 – 600 m elevation. It generally occurs in heaths and eucalypt woodlands and forests with heath understoreys, open forests with a grassy understorey and in microphyll vine forests (QPWS 2001) and on sandstone ridges in Barakula SF (Chinchilla Field Naturalist's Club Inc 1997). Potential habitat in the study area corresponds with RE 11.7.5.	Moderate: scalds were not encountered in the investigation area but are known in the Study Area surrounds
Myrtaceae	*Micromyrtus carinata*	Gurulmundi heath-myrtle	E		Yd	Restricted to the Waaji, Gurulmundi and Coolmundi wildflower areas in the north-western extent of Barakula SF and occurs on shallow soils over lateritic duricrust in association with *Melaleuca* shrubland with stunted *Corymbia trachyphloia* emergents (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002) Potential habitat in the study area corresponds with RE 11.7.5.	Moderate: scalds were not encountered in the investigation area but are known in the Study Area surrounds. Known to occur in the Gurulmundi Special Area comprising Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway.

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Myrtaceae	*Micromyrtus patula*	Waaji micromyrtus	E		Yd	Restricted to the Waaji, Gurulmundi and Coolmundi wildflower areas in the north-western extent of Barakula SF and occurs on shallow soils over lateritic duricrust in association with *Melaleuca* shrubland with stunted *Corymbia trachyphloia* emergents (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002) Potential habitat in the study area corresponds with RE 11.7.5.	Moderate: scalds were not encountered in the investigation area but are known in the Study Area surrounds
Oleaceae	*Notelaea pungens*		R		Yd	Low shrub growing on laterised sandstone in open forest to woodland of *Corymbia watsoniana, Eucalyptus fibrosa ssp. nubila, Eucalytus panda* and *Acacia spp*. in Barakula SF (Chinchilla Field Naturalist's Club Inc 1997; Queensland Herbarium 2008b) Potential habitat in the study area corresponds with RE 11.7.2, RE 11.7.4 and RE 11.7.7.	Moderate: habitat encountered in the investigation area
Orchidaceae	*Diuris tricolor*	Tricolor Diuris	-	V		Although disturbance regimes are not known, the species is usually recorded from disturbed habitats. Associated species include *Callitris glaucophylla*, *Eucalyptus populnea*, *Eucalyptus intertexta*, Ironbark and Acacia shrubland (Department of Environment and Climate Change 2007).	Low: predicted habitat only. The species occurs sporadically through southern central Queensland and the western slopes of NSW. No records identified from data base searches over a large geographic region done for the Wandoan MLA and infrastructure and associated CMS water pipelines (Parsons Brinckerhoff 2008a, 2008b)

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Orchidaceae	*Pterostylis cobarensis*		-	V		Grows among rocks on low hills and on slopes above streams; chiefly from Nyngan to Bourke district (Royal Botanic Gardens 2008).	Low: predicted habitat only.
Poaceae	*Bothriochloa biloba*	Lobed Bluegrass	-	V		Has a widespread distribution and grows in woodland on poorer soils (Harden 1993). Occurs on basaltic hills and grassland on drainage slopes on a variety of soils in association with *Eucalypus punctata*, *E. albens*, *E.camaldulensis E. tereticornis*, *E. populnea* ssp *bimbil and Angophora floribunda* (DLWC, 2001).	Low: predicted habitat only.
Poaceae	*Digitaria porrecta*		R	E		Heavy black soils in Darling Downs district. Tropical and sub-tropical rainforests and sub-humid woodlands (Sharp & Simon 2002)	Low: suitable habitat not present
Poaceae	*Homopholis belsonii*	Belson's panic	E	V	Yd	Occurs across a wide range in isolated disjunct populations in regrowth to remnant *A.harpophylla* and *Casuarina cristata* open forest/scrub on clay loams, *E.populnea/A.harpophylla* open forest in the Oakey area, in *Eucalyptus piligaensis* open forest in the Jackson area and in open forest in the Gurulmundi area (Queensland Herbarium 2008b; Stanley & Ross 1989, personal observations of C.Hansen; Tothill & Hacker 1996) Potential habitat in the study area corresponds with RE 11.9.5, RE 11.9.10 and RE 11.7.7.	Moderate: habitat encountered in the investigation area

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Proteaceae	*Grevillea singuliflora*		R		Yd	Low shrub on sand sheets (deeply weathered sandstone) in association with *Callitris glaucophylla* and *Allocasuarina leuhmanii* low open forest with emergent *Corymbia watsoniana, Angophora leiocarpa* and *Lysicarpus angustifolius* (Chinchilla Field Naturalist's Club Inc 1997; Queensland Herbarium 2008b). Potential habitat in the study area corresponds with RE 11.5.1 and RE 11.7.4.	Moderate: habitat encountered in the investigation area
Rhamnaceae	*Cryptandra ciliata*		R		Yd	Little information available but recorded in the Cracow area on lower snady slopes of undulated sandstone country in association with *Angophora leiocarpa* and *Corymbia watsoniana* (Queensland Herbarium 2008b).	Low: habitat is present within the investigation area but outside known range for taxon. Local record is a planted specimen (EPA 2002)
Rutaceae	*Philotheca sporadica*		V	V		Dense low shrub generally on stony ridges of laterised sandstone amongst *Acacia* scrubs (montypic stands of *A.shirleyi* or *A.burrowii*) with occasional emergent Eucalypts and dense low shrub layer or *Eucalyptus crebra* and *Callitris glaucophylla* woodland on stony rises in the Kogan and Condamine districts (Chinchilla Field Naturalist's Club Inc 1997; Queensland Herbarium 2008b).	Low: habitat is present within the investigation area but outside known range for taxon.
Sterculiaceae	*Commersonia* sp. *Cadarga*			V		Recorded from north of Chinchilla on stony ridges in eucalypt forest (Stanley & Ross 1986).	Low : stony ridges not present in study area.

Family	Botanical name	Common name	Conservation status[1]		Records from desktop assessment study area[2]	Description	Likelihood of occurrence
			State	National			
Surianaceae	*Cadellia pentastylis*	ooline	V	V	Yd	Emergent in Semi-evergreen Vine Thicket (SEVT); pure stands on residual sandstone ranges and scarps associated with *Acacia harpophylla, A. sparsiflora, Casuarina cristata*; in localised clumps among brigalow-belah communities on undulating clay plains and low hills; in *E. populnea* or *A. catenulata* communities (QPWS 2001). Known from Moonie Range, north of Goodiwindi and Gurulmundi Reserve (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002).	Low: good quality intact habitat not encountered within the investigation area, though present within the local area

1. Conservation status - State as listed under the NC Act: E = Endangered, V = Vulnerable, R = Rare. National as listed under the EPBC Act: E = Endangered, V = Vulnerable.
2. Yd= record from desktop assessment.

Attachment G References

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Appendix H

Likelihood-of-occurrence assessments for conservation significant fauna

Table H-1 Likelihood of occurrence assessment for Rare, Threatened and Priority taxa of animal identified from the desk base assessment

Class name	Scientific name	Common name	EPBC Act Status	NC Act Status	Brigalow Belt Priority Species	Distribution and habitat	Records from desktop assessment study area	Likelihood of occurrence within Study Area
Frog	*Adelotus brevis*	Tusked frog	—	V	Y	Known from coast and ranges of eastern Australia including western slopes of the Great Dividing Range (Barker et al., 1995; Meyer et al., 2001). Commonest in lowland coastal areas and near-coastal ranges (Meyer et al., 2001). Associated mainly with streams and seepages in wet forest areas (Meyer et al., 2001; Robinson, 2002). Also found along well-vegetated creeks and drainage lines in more open habitat (e.g., paddocks and playing fields) (Anstis, 2002; Barker et al., 1995; Robinson, 2002). Shelters under logs, stones or leaf litter near puddles, creeks and ponds (Barker et al., 1995 and Robinson, 2002).	—	Low The study area is outside the known distribution of this species. There is no suitable habitat for this species within the Study area. There are also no known records of this species from the desktop assessment study area.
Frog	*Cyclorana verrucosa*	Rough Frog	—	R	Y	Known from inland parts of southern Queensland and northern New South Wales (Barker et al., 1995; Cogger, 2000). Associated with low-lying woodland and open forest areas on heavy clay soli and sandy loams (Environmental Protection Agency, 2002; E. Meyer, unpub. data). Breeds in flooded depressions (Cogger, 2000; Anstis, 2002; E. Meyer, unpub. data).	Yd	Moderate Suitable habitat exists in flooded depressions and drainages throughout study area. There are also records of this species from the desktop assessment study area.
Frog	*Limnodynastes salmini*	Salmon-striped frog	—	-	Y	Known from inland and coastal parts of southern Queensland and northern New South Wales (Barker et al., 1995; Cogger, 2000). Associated with ephemeral wetlands in areas of woodland and open forest (Environmental Protection Agency, 2002; Barker et al., 1995). Brigalow Belt considered the stronghold for this	Yd	Recorded This species was recorded from remnant Brigalow on corner of Peakes Road and Hansens Lane. Likely to occur throughout the study area on heavier soils.

Class name	Scientific name	Common name	EPBC Act Status	NC Act Status	Brigalow Belt Priority Species	Distribution and habitat	Records from desktop assessment study area	Likelihood of occurrence within Study Area
						species in Queensland (Environmental Protection Agency, 2002).		
Frog	*Uperoleia fusca*	Dusky Toadlet	—	—	Y	Known from coastal and sub-coastal parts of eastern Australia (Barker et al., 1995). Associated with areas of open forest, shrubland, tussock grassland and woodland (Robinson, 2002). Breeds in ephemeral wetlands and dams (Barker et al., 1995; E. Meyer, unpub. Data). Largely absent from Brigalow Belt bioregion (Environmental Protection Agency, 2002).	—	Low. No suitable habitat identified within study area for this species. There are also no known records of this species from the desktop assessment study area.
Reptile	*Chelodina expansa*	Broad-shelled river Turtle	—	—	Y	Associated with streams, rivers, lakes and swamps of inland south-east Australia and coastal Queensland (Cogger, 2000; Wilson, 2005). More commonly associated with larger water courses and billabongs (Environmental Protection Agency, 2002).	—	Moderate Potential habitat includes vegetated dams and creeks within study area. However, there are no known records of this species from the desktop assessment study area.
Reptile	*Emydura macquarii/ krefftti*	Macquarii/ Krefft's turtle	-	-	Y	Associated with rivers, creeks, billabongs and lagoons of coastal and inland south-eastern (*E. macquarii*) and central eastern (*E. krefftti*) Australia (Wilson, 2005a and 2005b).	Ys	High Potential habitat exists in well vegetated dams and riparian zones. This species was recorded in the MLA 50229 during previous surveys.
Reptile	*Rheodytes leukops*	Fitzroy tortoise	V	V	Y	Associated with clear fast-flowing waters of the Fitzroy River and associated tributaries, central east Queensland (Wilson, 2005).	—	Low There is no suitable habitat within the study area for this species. There are also no known records of this species from the desktop assessment study area.
Reptile	*Diplodactylus stenodactylus*	Crowned Gecko	—	—	Y	Associated with a range of habitats across central and north-western	—	Low The study area lies outside the

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						Australia (Cogger, 2000). Known from shrublands on sandy and stony soils in far western Queensland. Apparent outlying population on sand plains in far west of Brigalow Belt bioregion, near Altonvale (Environmental Protection Agency, 2002; Wilson, 2005).		known distribution of this species. There is no suitable habitat identified within the Study area for this species. There are also no known records of this species from the desktop assessment study area.
Reptile	*Strophurus taenicauda*	Golden-tailed Gecko	—	R	Y	Known from eastern interior of southern Queensland (Wilson, 2005). The golden-tailed gecko is an arboreal species associated with dry open woodland and forest featuring ironbark eucalypts, cypress pine and brigalow (Wilson, 2003 and 2005; Environmental Protection Agency, 2008d)	—	Present This species was recorded in the study area during field surveys. Likely to occur in other stands of Brigalow, Poplar Box and Ironbark associations found in study area.
Reptile	*Delma inornata*	Legless Lizard	—	—	Y	Known from dry temperate southern grasslands and grassy woodlands in inland parts of south-east Australia (Wilson, 2008). In Queensland, the species is associated with native grasslands of the Darling Downs (Wilson, 2005).	—	Low Habitat in study area unsuitable as this species is usually found in association with native grasslands. There are also no known records of this species from the desktop assessment study area.
Reptile	*Delma plebeia*	Leaden delma	-	-	Y	Known from south-eastern and north-eastern New South Wales (Wilson, 2008). Associated mainly with dry sclerophyll forests and woodland, usually with a grassy understorey (Wilson, 2008; Cogger, 2000). In Queensland, the leaden delma is found in coastal heath and dry forest (including brigalow communities) in the far south-east of the state (Wilson, 2005).	-	High Suitable habitat for this species occurs within dry sclerophyll forest and associated habitats near Gurulmundi south to Miles.
Reptile	*Delma torquata*	Collared Delma	V	V	Y	Known from south-east Queensland, from Brisbane, north to Blackdown	—	Low The study area contains only

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						Tableland, west to Millmerran and the Bunya Mountains (Wilson, 2005). Associated mainly with eucalypt and acacia dominated woodland on rocky terrain, though it has also been recorded from *E. tereticornis* woodland and brigalow communities on alluvial soils with no significant rock cover (Department of Environment, Water, Heritage and Arts, 2008e; Environmental Protection Agency, 2008e; Wilson, 2005).		marginal habitat at best. The study area does not occur within documented distribution. There are also no known records of this species from the desktop assessment study area.
Reptile	*Paradelma orientalis*	Brigalow Scaly-foot	V	V	Y	Known from south-east Queensland (Wilson, 2008). Recorded from a variety of habitats including open woodland, open forest and vine thicket (Department of the Environment Water and Arts, 2008a; Environmental Protection Agency, 2008a; Wilson, 2003 and 2005). Known habitat for this species includes areas with sandy clay, deep cracking clay soil and shallow skeletal soils (Department of the Environment Water and Arts, 2008a; Environmental Protection Agency, 2008a; Wilson, 2003 and 2005). Most published records of this species are from remnant native vegetation; however it has been recorded from cultivated and grazed land suggesting some resilience to disturbance (Department of the Environment Water and Arts, 2008a)	Yds	Present This species was recorded in the study area during field surveys. Likely to be found in other stands of remnant Brigalow and quite possibly non remnant stands that support abundant log and litter cover. Less likely to occur in Poplar Box and Riparian communities.
Reptile	*Anomalopus brevicollis*	Slider Skink	—	R	Y	Endemic to Queensland (Wilson, 2005). Known from a variety of habitats including rainforest, vine thickets and dry sclerophylly forest, from Cracow district north to MacKay and inland to Clermont (Wilson, 2005a).	—	Low There is no suitable habitat within the study area for this species. There are also no known records of this species from the desktop assessment

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								study area.
Reptile	*Anomalopus mackayi*	Five-clawed Worm-skink	V	E	Y	Known from south-eastern Queensland and north-eastern New South Wales (Wilson, 2008). Known mainly from the Darling Downs with specimens recorded from Oakey and Dalby districts (Wilson, 2003). It inhabits burrows in cleared paddocks and grassland on black soil plains (Department of Environment, Water and Heritage, 2007).	—	Low The study area contains largely unsuitable habitat for this species. There are also no known records of this species from the desktop assessment study area.
Reptile	*Ctenotus ingrami*	Striped Skink	—	—	Y	Associated with dry woodlands of inland central and southern Queensland as well as inland parts of northern New South Wales (Wilson, 2005 and 2008). Found on a range of soils, from heavy clay to stony soils (Wilson, 2005).	—	Moderate Habitat within the study area is largely unsuitable habitat for this species, but there is a low-moderate likelihood that the species may occur within woodland habitats.
Reptile	*Cyclodomorphus gerrardii*	Pink-tongued Lizard	—	—	Y	Known from humid coastal and near-coastal environs along Australia's eastern seaboard (Wilson, 2008). Prefers moist timbered habitats (Wilson, 2005).	—	Low There is no suitable habitat within the study area for this species. There are also no known records of this species from the desktop assessment study area.
Reptile	*Egernia rugosa*	Yakka Skink	V	V	Y	The yakka skink is endemic to Queensland. Its known range extends from St George north to Coen on Cape York Peninsula (Department of the Environment Water and Arts, 2008b; Environmental Protection Agency, 2008b; Wilson, 2003 and 2005). While occurring across a broad latitudinal range, the yakka skink is patchily distributed, with most populations known from the Brigalow Belt bioregion (Department of the Environment Water	Yd	Moderate This species has a moderate likelihood of occurrence within dry eucalypt forest and woodland habitats from Gurulmundi, south to Miles. There are known records of this species from the desktop assessment.

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						and Arts, 2008b; Environmental Protection Agency, 2008b). The species has been recorded mainly from sub-humid and arid areas in habitat ranging from rocky outcrops, to open dry sclerophyll forest, brigalow scrub and open shrubland (Department of the Environment Water and Arts, 2008b; Environmental Protection Agency, 2008b; Wilson, 2005). Known habitat for the yakka skink includes lancewood forest on coarse soils associated with low ranges and areas of undulating terrain (Environmental Protection Agency, 2008b).		
Reptile	*Trachydosaurus rugosus asper*	Shingleback lizard	—	—	Y	Associated with dry woodlands, shrublands and dunefields of south-eastern Australia. (Wilson, 2008).	Yd	High This species has a high likelihood of occurring throughout the study area from Peakes Road south to Miles. There are known records of this species from the desktop assessment study area.
Reptile	*Amphibolurus muricatus*	Jacky Lizard	—	—	Y	Associated with dry sclerophyll forests, heaths and woodlands in coastal and near-coastal parts of south-east Australia (Wilson, 2005 and 2008).	—	High This species has a low-moderate likelihood of occurring within in roadside remnants particularly Brigalow, Poplar Box associations.
Reptile	*Chlamydosaurus kingii*	Frilled Lizard	—	—	Y	Found in tropical and subtropical woodlands of northern Australia, south as far as Brisbane, south-east Queensland (Wilson, 2008). Confined to coastal and near-coastal areas in south of range (Wilson, 2008). Absent from heavily cleared areas	—	Low There is no suitable habitat within the study area for this species. The study area is beyond the known distribution for this species and it is

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						(Environmental Protection Agency, 2002).		generally unlikely to occur in small fragmented woodland. There are also no known records of this species from the desktop assessment study area.
Reptile	*Physignathus lesueurii*	Eastern Water Dragon	—	—	Y	Associated with coastal and near-coastal waterways of eastern Australia (Wilson, 2008).	—	Moderate Potential habitat exists in riparian zones and small creeks; however there are no known records of this species from the desktop assessment study area.
Reptile	*Tympanocryptis pinguicolla*	Grassland Earless Dragon	E	E	Y	Known from a handful of localities in Victoria, southern New South Wales and south-east Queensland (Wilson, 2008). In Queensland, this species is known from highly modified agricultural areas of the Darling Downs. Its preferred habitat is associated with mixed crops, such as cotton, sorghum, maize and sunflower interspersed with fallow land. Large areas of native and introduced grasses existing as headlands, and along drainage lines are also a feature of the farmlands where the dragon exists (Environmental Protection Agency, 2007). Soils are essentially black, cracking clays of the Condamine River flood plain (Environmental Protection Agency, 2007). This species has been recorded from near Bongeen, Mount Tyson and Brookstead on the eastern Darling Downs (Pittsworth and Jondaryan Shires) in the Brigalow Belt South bioregion. A single specimen has also been recorded from near Dalby on the	—	Low There is no suitable habitat within the study area for this species. The study area is beyond the known distribution for this species and it is generally unlikely to occur in small woodland remnants. There are also no known records of this species from the desktop assessment study area.

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						Cecil Plains Road (Environmental Protection Agency, 2007).		
Reptile	*Aspidites ramsayi*	Woma	—	R	Y	Associated with dry open habitats across central and south-western Australia, east to the Condamine district, south-east Queensland (Wilson, 2008). Known from a variety of habitats: from spinifex deserts to brigalow (Wilson, 2005).	—	Low This species is spatially limited within Southern Brigalow Belt and no suitable habitat exists within the study area. There are also no known records of this species from the desktop assessment study area.
Reptile	*Acanthophis antarcticus*	Common death adder	—	R	Y	Known from eastern and far southern Australia (Wilson, 2008). The common death adder is found in a variety of habitats ranging from rainforest to heathland (Wilson, 2008). In Queensland, it is more commonly associated with wet and dry eucalypt forests/woodlands and coastal heaths (Wilson, 2005).	—	Moderate There is some limited potential habitat within the study area for this species. However, there are no known records of this species from the desktop assessment study area.
Reptile	*Denisonia maculata*	Ornamental Snake	—	V	Y	Associated with low-lying seasonally flooded areas in coastal and near-coastal parts of central Queensland, from Collinsville area, south to Rockhampton and inland to Blackwater (Wilson, 2005).	—	Low There is no suitable habitat within the study area for this species. The study area is beyond the known distribution of this species. There are also no known records of this species from the desktop assessment study area.
Reptile	*Furina dunmalli*	Dunmall's Snake	V	V	Y	Known from inland south-east Queensland (Wilson, 2008). Inhabits dry forest and woodland habitats (Wilson, 2003 and 2005). Known mainly from brigalow forest and woodland on cracking clay and clay loam soils (Environmental Protection Agency, 2008c)	Yd	Moderate There is limited potential habitat within the study area for this species. However, there are records for this species within the desktop assessment study area.

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Reptile	*Hemiaspis damelii*	Grey Snake	—	E	Y	Known from south-east Queensland and north-eastern New South Wales (Wilson, 2008). Within Queensland, records are known from near Goondiwindi and the adjacent Darling–Riverine Plain from the Darling Downs and from the Lockyer Valley (Environmental Protection Agency, 2007b and Wilson, 2005). Prefers woodlands, usually on heavier, cracking clay soils, particularly in association with water bodies (Environmental Protection Agency, 2008b and Wilson, 2005).	—	Low There is some potential habitat within the study area for this species. However, there are no known records of this species from the desktop assessment study area.
Reptile	*Hoplocephalus bitorquatus*	Pale-headed Snake	—	—	Y	Known from coast and eastern interior of central and northern Australia (Wilson, 2008). Associated with dry sclerophyll forests and woodland, usually near watercourses or flood-prone areas (Wilson, 2005).	Yd	High Potential habitat for this species exists around major watercourses within the study area. There are records for this species within the desktop assessment study area
Reptile	*Pseudechis guttatus*	Spotted Black-snake	—	—	Y	Known from interior of south-east Queensland and northern New South Wales (Wilson, 2008). Associated mainly with river floodplains, dry sclerophyll forest and woodlands. Often associated with temporary wetlands (Wilson, 2005 and 2008).	—	Moderate There is some potential habitat within the study area for this species. However, There are no known records of this species from the desktop assessment study area.
Reptile	*Rhinoplocephalus (Cryptophis) boschmai*	Carpentarian snake	—	—	Y	Known from coast and eastern interior of Queensland (Wilson, 2005). Associated with dry woodlands, mostly west of coastal ranges. (Wilson, 2005).	—	High This species was recorded in the greater MLA study area during previous surveys. It was found in association with riparian zones and cleared areas.
Birds	*Stictonetta naevosa*	Freckled Duck	—	R	Y	Known from south-eastern and far	—	Low

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						south-west Australia (Marchant and Higgins, 1990). Prefers well-vegetated freshwater wetlands. Also associated with rivers, river pools, billabongs, farm dams, sewage ponds and shallow freshwater swamps with short emergent vegetation (Marchant and Higgins, 1990).		There is limited potential habitat within the study area for this species and its occurrence would be influenced by seasonal conditions. There are no known records of this species from the desktop assessment study area.
Birds	*Anseranas semipalmata*	Magpie Goose	M	—	—	Known from coastal and near-coastal south-eastern and northern Australia (Pizzey and Knight, 2008). Associated with large seasonal wetlands, inundated grassland areas, flood plains and well-vegetated dams (Pizzey and Knight, 2008).	Yd	Low There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal conditions. It may occasionally fly over the study area or utilise aquatic resources. There are records of this species from the desktop assessment study area.
Birds	*Nettapus coromandelianus*	Cotton Pygmy-goose	M	R	Y	Known from coastal and near-coastal areas of Queensland, from Cape York south to around Brisbane (Pizzey and Knight, 2008). Associated with freshwater lakes, swamps and larger impoundments, preferring wetlands with abundant floating and submerged vegetation (Garnett and Crowley, 2000; Marchant and Higgins, 1990).	Yd	Low There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal conditions. It may occasionally fly over the study area or utilise aquatic resources, where there are drier conditions elsewhere in its range. There are records for this species from the desktop assessment study area.
Birds	*Ardea alba*	Great Egret	M	—	—	Found across much of Australia, except for arid parts of Western Australia (Pizzey and Knight, 2008). Associated with rivers, wetlands, estuaries, intertidal mudflats, saltmarshes,	Yds	Present This species was recorded in the study area in association with wetlands and farm dams.

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						sewerage ponds, irrigation areas and farm dams (Pizzey and Knight, 2008)		
Birds	*Ardea ibis*	Cattle Egret	M	—	—	Known from eastern, northern and south-western Australia (Pizzey and Knight, 2008). Found in various open habitats including paddocks, croplands, refuse tips, wetlands, intertidal mudflats and drainage ditches (Pizzey and Knight, 2008)	Yds	High This species has a high likelihood of occurring within cleared and cropping lands, wetlands and dams on a seasonal basis. There are known records for this species from the desktop assessment study area.
Birds	*Hieraaetus morphnoides*	Little eagle	M	—	—	Found across much of Australia (Pizzey and Knight, 2008). Associated with plains and foothills, open forests, woodlands and scrublands and riparian forest (Pizzey and Knight, 2008).	Yd	Low There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal conditions. It may occasionally fly over the study area or utilise aquatic resources, where there are drier conditions elsewhere in its range. There are known records for this species from the desktop assessment study area.
Birds	*Haliaeetus leucogaster*	White-bellied Sea-eagle	M	—	—	Coasts, estuaries, creeks, reservoirs, major river systems and lakes including inland Australia (Pizzey and Knight,2008).	Yd	High There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal conditions. It may occasionally fly over the study area or utilise aquatic resources, where there are drier conditions elsewhere in its range. There are records for this species from the desktop

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Birds	*Erythrotriorchis radiatus*	Red Goshawk	V	E	—	Inhabits wooded and forested lands of tropical and warm temperate Australia; coastal and sub coastal areas (Marchant and Higgins, 1993). Prefers forest and woodland habitat with a mosaic of vegetation types, large populations of birds and permanent water (Marchant and Higgins, 1993). Known to nest in tall trees beside permanent water, in fairly open and bird-rich forest areas (Higgins and Marchant, 1993). Records of the Red Goshawk from the southern Brigalow Belt bioregion are likely to be mis-identifications or incidental records (Environmental Protection Agency, 2002).	—	Low The study area contains mainly unsuitable habitat for this species largely due to the cleared landscape. The study area is at the distributional limit for this species. There are no known records of this species from the desktop assessment study area.
Birds	*Accipiter novaehollandiae*	Grey Goshawk	—	R	Y	Known from northern and eastern Australia (Pizzey and Knight, 2008). Inhabits wooded and forested lands of coastal and sub coastal eastern Australia where the mean annual rainfall exceeds >760 mm, preferring forest or woodland with cover for hunting (Higgins and Marchant 1993).	—	Low There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal movement patterns. There are no known records of this species from the desktop assessment study area.
Birds	*Falco hypoleucos*	Grey Falcon	—	R	Y	The grey falcon inhabits open country and wooded areas in arid and semi-arid parts of Australia (where rainfall is < 500 mm per annum) (Garnett and Crowley, 2000). It is associated primarily with lightly wooded plains of inland drainage systems (Marchant and Higgins, 1993).	—	Low There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal movement patterns and prey availability.
Birds	*Lophoictinia isura*	Square-tailed Kite	—	R	Y	Found throughout most of Australia except for western arid interior (Pizzey and Knight, 2008). The square-tailed	—	Moderate There is limited habitat within the study area for this species

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						kite is associated mainly with open forest, woodland and mallee in coastal and near-coastal areas (Marchant and Higgins, 1993). The species shows a preference for eucalypt woodland on fertile soils bordering grassland areas, particularly mature eucalypt forest or woodland near water, where small passerine birds are abundant (Marchant and Higgins, 1993).		and its occurrence would be influenced by seasonal conditions. It may occasionally fly over or forage over parts of the study area such as Woleebee Creek.
Birds	*Ephippiorhynchus asiaticus*	Black-necked Stork	—	R	Y	Known from eastern and northern Australia, (Pizzey and Knight, 2008). Associated with freshwater and estuarine habitats including wetlands, lagoons, farm dam, mudflats and flooded pastures (Pizzey and Knight, 2008).	Yd	Moderate There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal rains. It may occasionally fly over the study area or utilise aquatic resources, where there are drier conditions elsewhere in its range. There are records for this species within the desktop assessment study area.
Birds	*Rostratula australis*	Australian Painted Snipe	V & M	V	Y	Known from coastal and inland eastern and northern Australia (Pizzey and Knight, 2008). Associated with ephemeral and permanent shallow freshwater wetlands and, occasionally, brackish water wetlands (Geering et al., 2007; Marchant and Higgins, 1993. This includes natural wetlands as well as sewage farms, bore drains with rank emergent vegetation, dams and rice crops (Marchant and Higgins, 1993).	—	Low There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal conditions. It may occasionally fly over the study area or utilise aquatic resources in response to rainfall events. There are no records for this species within the desktop assessment study area.
Birds	*Burhinus grallarius*	Bush Stone-curlew	—	—	Y	Found across much of Australia, except for arid western and southern parts (Pizzey and Knight, 2008). Associated	—	High There is some potential

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						with a variety of habitats including open woodland, sandplains with spinifex and mallee; coastal scrubs, mangrove fringes and golf-courses (Pizzey and Knight, 2008).		habitat within the study area for this species especially dry sclerophyll and woodland habitats south from Guluguba to Miles. However, there are no records for this species within the desktop assessment study area.
Birds	*Turnix melanogaster*	Black-breasted Button-quail	V	V	Y	Known from far south-eastern Queensland and north-eastern New South Wales (Pizzey and Knight, 2008). Black-breasted button-quail appear to prefer vine thickets and rainforest vegetation types that are periodically water-stressed, including semi-evergreen vine thicket, low microphyll vine forest, Araucarian microphyll vine forest, Araucarian notophyll vine forest scrubs that may incorporate bottle trees, brigalow and belah (Mathieson and & Smith, 2006).	Yd	Low The study area contains no suitable habitat for this species largely due to the cleared landscape. The study area is at the distributional limit for this species.
Birds	*Pedionomus torquatus*	Plains Wanderer	V	V	—	Formerly broadly distributed across inland south-eastern Australia's (Geering et al., 2007). In Queensland, range has contracted westwards to far south-west of state (Geering et al., 2007). Associated with dry open, treeless habitats (open grasslands and herbfields) (Pizzey and Knight, 2008). Past records from southern Brigalow Belt of vagrant animals (Environmental Protection Agency, 2002). Considered extinct in eastern parts of former range (Geering et al., 2007).	—	Low There is no suitable habitat within the study area for this species. The study area is beyond the known distribution of this species. There are also no known records of this species from the desktop assessment study area.
Birds	*Gallinago hardwickii*	Latham's Snipe	M	—	—	Known from eastern and western parts of Australia, including Tasmania (Pizzey and Knight, 2008). Associated with littoral zone and fringing grasses of wetlands, intertidal areas, saltmarshes,	—	High There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal

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						open woodland from sea level to upland areas of Great Dividing Range (Pizzey and Knight, 2008)		conditions. It may occasionally fly over the study area or utilise aquatic resources in response to rainfall events.
Birds	*Numenius minutus*	Little Curlew	M	—	—	Known mainly from coastal eastern and northern Australia, with scattered records from northern and south-east interior (Geering et al., 2007). Favours short, dry grasslands including lawns, racecourses and airfields (Geering et al., 2007). Found in numbers near water (Geering et al., 2007).	—	Low There is limited potential habitat within the study area for this species and its occurrence would be influenced by seasonal conditions. There are also no known records of this species from the desktop assessment study area.
Birds	*Geophaps scripta scripta*	Squatter Pigeon (southern race)	V	V	Y	The squatter pigeon (southern race) is known from dry inland and coastal parts of central and southern east Australia, from central New South Wales north to the Burdekin River, central eastern Queensland (Garnett and Crowley, 2000; Higgins and Davies, 1997; Royal Australian Ornithologists Union, 2003). The species may already be extinct in New South Wales and is rarely encountered in south-east Queensland with most recent records species from central Queensland (Garnett and Crowley, 2000; Higgins and Davies, 1997; Royal Australian Ornithologists Union, 2003).	Yd	Moderate There is limited potential habitat within the study area for this species. This species has been recorded 30 km to the north of the study area and there are older records from approximately 70 years ago in areas adjoining the study area.
Birds	*Cacatua leadbeateri*	Pink Cockatoo	—	V	Y	Known from inland parts of southern, northern and western Australia (Pizzey and Knight, 2008). Typically found near water, along timbered watercourses; surrounding grasslands, gibber plains, and areas of saltbush (Pizzey and Knight, 2008). Also found in association with mulga woodland, stands of native cypress, casuarinas and tall mallee	—	Low This species may occasionally move through the study area in response to dry seasonal conditions further to the west. During these times, favourable conditions may provide potential breeding

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						associated with riverine woodlands (Pizzey and Knight, 2008).		opportunities within riparian habitats that support senescent *E. tereticornis.* However, there are no known records of this species from the desktop assessment study area.
Birds	*Calyptorhynchus lathami*	Glossy black-cockatoo	—	V	Y	Known from coastal and inland parts of south-east Australia, from eastern Victoria north to central eastern Queensland (Higgins and Davies, 1997; Royal Australian Ornithologists Union, 2003). It also occurs on Kangaroo Island, off the coast of South Australia (Higgins and Davies, 1997). Throughout its range, the glossy black cockatoo is associated mainly with eucalypt forest and woodland featuring casuarinas (Higgins and Davies, 1997; Garnett and Crowley, 2000).	—	Moderate This species has been recorded during previous surveys within the greater MLA area in association with Brigalow patches and Ironbark and/or Callitris woodlands (Parsons Brinckerhoff 2008). It has a moderate likelihood of occurring in association with *Casuarina cristata.*
Birds	*Lathamus discolor*	Swift Parrot	E & M	E	—	Occurs along eastern seaboard, from Tasmania north to Bowen, central Queensland (Pizzey and Knight, 2008). Breeds in Tasmania, migrating to mainland areas in Autumn (Higgins, 1999). Inhabits dry open eucalypt forests and woodlands, usually box/ironbark communities, especially with red ironbark, mugga ironbark, grey box, white box or yellow gum (Higgins, 1999). Considered unlikely to occur within the southern Brigalow Belt (Environmental Protection Agency, 2002).	—	Low There is no suitable habitat within the study area for this species. The study area is beyond the species known distribution. There are also no known records of this species from the desktop assessment study area.
Birds	*Neophema pulchella*	Turquoise Parrot	—	R	Y	Known from coast and eastern interior of southern Queensland, News South Wales and Victoria (Pizzey and Knight, 2008). Associated with open grassy woodland areas, near permanent water	—	Low There is no suitable habitat within the study area due to the heavily modified state of native grassland and

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						and forested hills (Pizzey and Knight, 2008).		herbaceous communities. The study area is beyond the species known distribution. There are also no known records of this species from the desktop assessment study area.
Birds	*Ninox strenua*	Powerful Owl	—	V	Y	Known from coast and ranges of south-east Australia (Pizzey and Knight, 2008). Prefers open sclerophyll forests and woodlands, open and tall open wet sclerophyll forests, box/ironbark and riparian river red gum along with open casuarina and cypress pine forests, mature pine plantations and sometimes fragmented landscapes (Higgins, 1999).	—	Moderate There is generally no suitable habitat for this species within the study area. The study area is beyond the species known distribution. There are also no known records of this species from the desktop assessment study area.
Birds	*Ninox connivens*	Barking Owl	—	—	Y	Known form inland and coastal parts of eastern and northern Australia; also, far south-western Australia (Pizzey and Knight, 2008). Associated with a variety of habitats ranging from open forest to dense scrubs, and woodland (Pizzey and Knight, 2008). Riparian areas of the Brigalow Belt region serve as the stronghold for this species (Environmental Protection Agency, 2002).	—	Moderate There is limited habitat within the study area for this species and its occurrence would be influenced by seasonal conditions and prey availability. It may occasionally fly over or forage over parts of the study area such as Woleebee Creek. However, there are no known records of this species from the desktop assessment study area.
Birds	*Tyto capensis*	Grass owl	—	—	Y	Known from coastal and near-coastal parts of eastern Australia; range extending further west and north after succession of years with good rainfall (Pizzey and Knight, 2008). Associated with areas of dense grass including grassland and woodland areas with a grassy understorey (Pizzey and Knight, 2008). Also recorded from stands of	—	High This species was recorded during surveys for the Western CSM pipeline. Its occurrence would be influenced by seasonal conditions and prey availability. It may occasionally fly over or forage over cleared

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						cultivated sorghum, sugar cane and grain stubble, as well as coastal heath (Pizzey and Knight, 2008).		parts of the study area.
Birds	*Tyto novaehollandiae*	Masked Owl	—	—	Y	Known form coastal and near-coastal parts of northern and eastern Australia (Pizzey and Knight, 2008). Associated with forest, open woodland, areas of farmland with large remnant trees, timbered watercourses and paperbark woodlands (Pizzey and Knight, 2008). Found only in extensive sandstone areas and north of Brigalow Belt bioregion; absent from all other areas of the Brigalow Belt (Environmental Protection Agency, 2002).	—	Low The study area contains little or no suitable habitat for this species. There are no known records of this species from the desktop assessment study area.
Birds	*Apus pacificus*	Fork-tailed Swift	M	—	—	Recorded throughout Australia (Pizzey and Knight, 2008). Forages aerially over all manner of habitats (Pizzey and Knight, 2008).	Yd	High This species is likely to forage over the entire study area on a seasonal basis. There are known records for this species within the desktop assessment study area.
Birds	*Hirundapus caudacutus*	White-throated Needletail	M	—	—	Occurs along entire eastern seaboard including Tasmania (Pizzey and Knight, 2008). Forages aerially over all manner of habitats (Pizzey and Knight, 2008).	Yd	Moderate This species has a moderate likelihood of utilising the air space over the entire study area on a seasonal basis. There are known records for this species within the desktop assessment study area.
Birds	*Merops ornatus*	Rainbow bee-eater	M	—	—	Found throughout Australia except for arid western interior and Tasmania (Pizzey and Knight, 2008). Associated with open woodlands normally with sandy, loam soils. Breeds along open riparian habitats with exposed riverbanks, exposed road cuttings,	Yd	High Likely to inhabit much of the study area on a seasonal basis. Potential breeding habitat located in banks of Dogwood Creek, Wallan Creek, 11 Mile Creek and

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						beach dunes, cliffs and sand ridges across a range of vegetation types from mangroves to rainforests, sclerophyll forest and woodlands (Pizzey and Knight, 2008)		cuttings associated with vehicle tracks and roads. There are known records of this species from the desktop assessment study area.
Birds	*Climacteris picumnus*	Brown Treecreeper	—	—	Y	Known from coastal and inland eastern Australia (Pizzey and Knight, 2008). Associated with drier forest, woodland and scrubs (Pizzey and Knight, 2008). In inland areas, often associated with forest red gums on water courses and lake shores (Pizzey and Knight, 2008). Few records from southern Brigalow Belt bioregion (Environmental Protection Agency, 2002).	—	Low The study area contains little or no suitable habitat for this species. There are also no known records of this species from the desktop assessment study area.
Birds	*Monarcha melanopsis*	Black-faced monarch	M	—	—	Known from coastal eastern Australia (Pizzey and Knight, 2008). Associated with rainforest, eucalyptus woodlands, coastal scrubs (Pizzey and Knight, 2008). May use more open woodland habitat when migrating (Pizzey and Knight, 2008).	Yd	Low There is limited habitat within the study area for this species and its occurrence would only be influenced by seasonal migrations.
Birds	*Pyrrholaemus brunneus*	Redthroat	—	R	—	Known from dry inland parts of southern, western and central Australia (Pizzey and Knight, 2008). Associated with dry inland scrubs, areas of saltbush and eucalypt regrowth (Pizzey and Knight, 2008).	—	Low The study area is outside the known range of this species. There is limited habitat within the study area. There are no known records of this species from the desktop assessment study area.
Birds	*Chthonicola sagittata*	Speckled warbler	—	—	Y	Known from eastern interior of south-eastern Australia (Pizzey and Knight, 2008). Associated mainly with dry woodlands including mulga and brigalow communities (Pizzey and Knight, 2008). Also known from areas of vine scrub (Pizzey and Knight, 2008).	Yd	Present This species was recorded within the study area in association with Ironbark and Acacia habitat to the east of Miles near Gearys Lane. There are known records of

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								this species from the desktop assessment study area.
Birds	*Pomatostomus superciliosus*	White-browed Babbler	—	—	Y	Known mainly from drier parts of southern and western Australia (Pizzey and Knight, 2008). Associated with dry scrub/woodland including areas of mallee, *Acacia* and cypress pine scrub (Pizzey and Knight, 2008). Also known from timbered watercourses and areas of saltbush (Pizzey and Knight, 2008).	—	Moderate There is some suitable habitat within the study area but no records of this species from the desktop assessment study area. It may occasionally move into study area in response to drier seasonal conditions further inland.
Birds	*Pomatostomus temporalis*	Grey-crowned babbler	—	—	Y	Known from coastal and inland parts of eastern northern and western Australia (Pizzey and Knight, 2008). Frequents open forests, woodland, scrublands and area of farmland (Pizzey and Knight, 2008). Scarce or absent where Noisy Miner and Indian Minors abundant (Environmental Protection Agency, 2002).	Yds	Present This species was recorded within the study area in association with roadside Brigalow remnants, Poplar Box woodland, Ironbark and/or Callitris woodlands and Riparian areas.
Birds	*Amytornis striatus*	Striated Grasswren	—	R	—	Patchily distributed across inland parts of central, southern and western Australia (Pizzey and Knight, 2008). Associated with areas of spinifex grassland and shrubland with spinifex understorey (Pizzey and Knight, 2008).	—	Low There is limited habitat within the study area for this species which is normally associated with Spinifex and *Acacia* scrubs. There are also no known records of this species from the desktop assessment study area.
Birds	*Xanthomyza phrygia*	Regent Honeyeater	E	E	Y	Known from eastern Victoria, eastern New South Wales as well as south-east Queensland (Pizzey and Knight, 2008). This species prefers dry eucalypt woodlands and forest dominated by box and ironbark eucalypts which occur on inland slopes of the Great Divide, heavily associated with moister more	—	Low There is generally no suitable habitat for this species within the study area. The study area is beyond the species known distribution. There are also no known records of this species from the desktop assessment

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						fertile soil areas such as river valleys, creeks and lower slopes of foothills (Higgins et al., 2001). Vegetation types must produce copious and reliable amounts of nectar such as yellow box, white box, yellow gum, grey box, Blakely's red gum and river red gum. SEQ is at the northern limit of this species range with only small numbers having been previously recorded in SEQ (Higgins et al., 2001)		study area.
Birds	*Melithreptus gularis*	Black-chinned Honeyeater	—	R	Y	Known from south-east and northern Australia (Pizzey and Knight, 2008). The black-chinned honeyeater is associated with dry eucalypt woodland, particularly ironbark and box communities (Garnett and Crowley, 2000; Higgins et al., 2001).	Yd	High There is limited habitat within the study area but it may occasionally move into study area particularly along riparian habitats. There are records of this species form the desktop assessment study area.
Birds	*Grantiella picta*	Painted Honeyeater	—	R	Y	Sparsely distributed across south-eastern and northern central Australia (Higgins et al., 2001; Royal Australian Ornithologists Union, 2003).The painted honeyeater inhabits dry sclerophyll forest and woodlands supporting mistletoes (Garnett and Crowley, 2000; Higgins et al., 2001).	—	Moderate There is limited habitat within the study area but it may occasionally move into study area particularly through *Acacia* dominated communities. However, there are no known records of this species from the desktop assessment study area.
Birds	*Melanodryas cucullata*	Hooded Robin	—	—	Y	Found across much of inland Australia as well as drier southern coastal areas (Pizzey and Knight, 2008). Associated with drier eucalypt forests, woodland and scrubs with woody debris (Pizzey and Knight, 2008). Also known from areas supporting mulga, casuarina and cypress pine (Pizzey and Knight, 2008).	—	Moderate There is some suitable habitat within the study area for this species. However, there are no known records of this species from the desktop assessment study area.

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Birds	*Myiagra cyanoleuca*	Satin Flycatcher	M	—	—	Found along eastern seaboard, from Cape York south to Tasmania (Pizzey and Knight, 2008). Associated with densely vegetated gullies of wet forests, tall woodlands and dry sclerophyll forests. May also inhabit coastal forests, woodlands, mangroves and open habitats (Pizzey and Knight, 2008).	Yd	Moderate There is limited habitat within the study area for this species, but it may occasionally move along riparian habitats. The study area falls within the western range limit for this species. There are known records for this species from the desktop assessment study area.
Birds	*Epthianura crocea crocea*	Yellow Chat	—	V	—	Known from central and northern Australia (Pizzey and Knight, 2008). Associated with vegetation fringing seasonal wetlands, artesian bores and springs as well as saltbush plains (Pizzey and Knight, 2008).	—	Low There is little suitable habitat within the study area for this species There are also no known records of this species from the desktop assessment study area.
Birds	*Stagonopleura guttata*	Diamond Firetail	—	—	Y	Known from inland and coastal parts of south-eastern Australia (Pizzey and Knight, 2008). Associated with open eucalypt forest/woodland as well as cypress pine and *Acacia* scrubs (Pizzey and Knight, 2008). Patchily distributed within southern Brigalow Belt bioregion; no recent records from Dawson River catchment (Environmental Protection Agency, 2002).	Yd	Moderate There is limited habitat within the study area for this species, but it may occasionally move along riparian habitats. There are known records of this species from the desktop assessment study area.
Birds	*Poephila cincta cincta*	Black-throated Finch	V	V	Y	Known from north-eastern Australia and north-eastern New South Wales (Pizzey and Knight, 2008). The black-throated finch prefers dry open grassy woodlands, forests and grasslands of the tropics and sub tropics that have seeding grasses and free water (Higgins et al., 2006).	—	Low The study area is beyond the known distribution for this species. Any potential habitat within the study area is greatly modified through cropping and pastures and is generally unsuitable for this species. There are no known records of

Class name	Scientific name	Common name	EPBC Act Status	NC Act Status	Brigalow Belt Priority Species	Distribution and habitat	Records from desktop assessment study area	Likelihood of occurrence within Study Area
								this species from the desktop assessment study area.
Birds	*Neochimia ruficauda ruficauda*	Star Finch	E	E	—	Known from eastern, northern and western Australia (Pizzey and Knight, 2008).This species inhabits low dense, damp grasslands and sedgelands bordering watercourses, swamps and other wetlands. It is also known to occupy grassy open sclerophyll woodlands (Higgins et al., 2006). The species has disappeared from much of its former range and is considered extinct within the southern Brigalow Belt bioregion (Environmental Protection Agency, 2002).	—	Low Thought to be extinct from Southern Brigalow Belt. Any potential habitat within the study area is greatly modified through cropping and pastures and is generally unsuitable for this species. There are also no known records of this species from the desktop assessment study area.
Mammal	*Dasyurus maculatus maculatus*	Spotted-tailed Quoll	E	V	Y	Known from temperate and tropical parts of eastern Australia (Van Dyck and Strahan, 2008). Queensland records from south-east of state and Wet Tropics bioregion (Van Dyck and Strahan, 2008). Recorded from a range of habitats, including rainforest, open forest, woodland, coastal heath land and inland riparian forest from lowland and montane areas (Van Dyck and Strahan, 2008). Reliant on large tracts of remnant vegetation (Environmental Protection Agency, 2002).	—	Low The study area is beyond the known distribution limit for this species. Habitat within the study area is generally too fragmented and modified to support a viable population of this species. There are also no known records of this species from the desktop assessment study area.
Mammal	*Dasyurus hallucatus*	Northern Quoll	—	—	Y	Patchily distributed across northern Australia: from the Pilbarra to south-east Queensland (Van Dyck and Strahan, 2008). Range has declined significantly since European settlement (Van Dyck and Strahan, 2008). Patchily distributed in Queensland, particularly in south of range (Van Dyck and Strahan, 2008). Prefers rocky scarps, but also found in eucalypt woodland, and forest, generally within 200 km	—	Low The study area is beyond the known distribution limit for this species. Habitat within the study area is generally too fragmented and modified to support a viable population of this species. There are also no known records of this species from the desktop

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						from coast (Menkhorst and Knight 2004; Van Dyck and Strahan, 2008). In southern parts of range, the northern quoll is associated mainly with dissected sandstone scarps and tablelands (e.g., Cania Gorge, Carnarvon Range) (Environmental Protection Agency, 2002).		assessment study area.
Mammal	*Isoodon macrourus*	Northern brown bandicoot	—	—	Y	Known from coast and interior of eastern Australia (Van Dyck and Strahan, 2008). Associated with mesic habitats, favouring heath and forest habitats (Van Dyck and Strahan, 2008).	—	Moderate This species was recorded along Kangaroo Creek during surveys for the Western CSM Pipeline. There is some potential habitat along riparian habitats such as Dogwood Creek, 11 Mile Creek and Wallan Creek where dense grass cover may provide some degree of suitable habitat.
Mammal	*Perameles nasuta*	Long-nosed bandicoot	—	—	Y	Known from coast and interior of eastern Australia (Van Dyck and Strahan, 2008). Associated mainly with mesic areas (> 750 mm rainfall per annum), favouring closed forest and dense scrubs (Van Dyck and Strahan, 2008).	—	High There is limited potential habitat for this species, but tracks fitting the description of this species were recorded from Tree Creek near Gurulmundi. Likely to occur in this area south to Dalwogon. However, there are no known records of this species from the desktop assessment study area.
Mammal	*Aepyprymnus rufescens*	Rufous bettong	—	—	Y	Known from coastal areas and interior of eastern Australia (Van Dyck and Strahan, 2008). Associated with dry open grassy eucalypt woodland and forest (Van Dyck and Strahan, 2008). Generally absent from areas subject to heavy grazing (Environmental	—	Present This species was recorded within the study area from north of Guluguba in association with Poplar Box, Queensland Blue Gum

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						Protection Agency, 2002). Common north of Warrego Highway; no records south of Warrego Highway (Environmental Protection Agency, 2002).		habitat. Likely to occur further to the south including the Gurulmundi, Kowguran and Dalwogon areas.
Mammal	*Macropus dorsalis*	Black-striped wallaby	—	—	Y	Known from coastal and eastern interior of southern and central Queensland (Menkhorst and Knight, 2004). Also occurs on western slopes of the Great Dividing Range in New South Wales (Menkhorst and Knight, 2004). Associated with dry sclerophyll forest and brigalow scrub with dense shrubby understorey (Menkhorst and Knight, 2004). Generally scarce in eastern part of southern Brigalow Belt (Environmental Protection Agency, 2002).	Yd	Present This species was recorded during the field survey from Brigalow habitat and cleared lands adjacent to Baileys Lane. May occur sporadically at other locations in the study area.
Mammal	*Ornithorhynchus anatinus*	Platypus	—	—	Y	Known from coastal and near-coastal parts of eastern Queensland (Van Dyck and Strahan, 2008). Associated mainly with permanent creeks and rivers, though also found in larger shallow impoundments (Van Dyck and Strahan, 2008).	—	Low There is only limited habitat within the study area for this species as the creeks are ephemeral and don't appear to support any permanent pools. There are no known records of this species from the desktop assessment study area.
Mammal	*Phascolarctos cinereus*	Koala	—	—	Y	Known from coastal and inland eastern Australia (Van Dyck and Strahan, 2008). Prefers eucalypt woodland and forest. Favoured feed trees in north of range include forest red gums and narrow-leaved iron bark (Van Dyck and Strahan, 2008). In more arid areas koalas prefer habitat along watercourses and on adjacent floodplains (Van Dyck and Strahan, 2008). Declining in eastern parts of southern Brigalow Belt bioregion	Yd	High This species was recorded during previous surveys within the greater MLA area in association with Poplar Box woodland, Ironbark and/or Callitris woodlands and Riparian habitats. This species has a high likelihood of occurring along riparian zones such as Dogwood, 11

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						(Environmental Protection Agency, 2002).		Mile and Wallan Creeks, where *E. tereticornis* is the dominant upper canopy species. There are known records of this species from the desktop assessment study area.
Mammal	*Petauroides volans*	Greater glider	—	—	Y	Known from coastal areas and eastern interior of eastern states (Menkhorst and Knight, 2004). Found in eucalypt-dominated forest and woodlands; reliant on large hollow-bearing trees (Van Dyck and Strahan, 2008).	Yd	Present This species was recorded within the study area in association with Poplar Box and Queensland Blue Gum habitat bordering 11 Mile Creek and Dogwood Creek. Likely to occur at other locations between these points.
Mammal	*Petaurus petaurus australis*	Yellow-bellied glider (southern subspecies)	—	—	Y	Known from coastal areas and near-coastal ranges of south-east Australia (Van Dyck and Strahan, 2008). Associated with open forest areas supporting large hollow-bearing eucalypts (Van Dyck and Strahan, 2008; Menkhorst and Knight, 2004).	—	High This species was recorded during previous surveys within the greater MLA area in association with Poplar Box woodland, Ironbark and/or Callitris woodlands and Riparian habitats. This species has a high likelihood of occurring along riparian zones such as Dogwood, 11 Mile and Wallan Creeks, where *E. tereticornis* is the dominant upper canopy species. There are no known records of this species from the desktop assessment study area.
Mammal	*Petaurus norfolcensis*	Squirrel Glider	—	—	Y	Known from coastal areas and eastern interior of Queensland and New South Wales; also known from parts of	—	Moderate There is suitable habitat

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						Victoria and far east South Australia (Menkhorst and Knight, 2004). Found in eucalypt-dominated forest and woodlands; reliant on large hollow-bearing trees (Van Dyck and Strahan, 2008).		across the study area particularly within riparian habitats and this species has a moderate likelihood of occurring. There are no known records of this species from the desktop assessment study area.
Mammal	*Phascogale tapoatafa tapotafata*	Brush-tailed Phascogale	—	—	Y	Known from coastal and sub-coastal eastern Australia (Van Dyck and Strahan, 2008). Associated with dry sclerophyll forest and woodland as well as monsoonal forest (Menkhorst ands Knight, 2004). Forages predominantly on rough-barked eucalypts (Van Dyck and Strahan, 2008).	—	Low The study area is beyond the known distribution limit for this species. Habitat within the study area is generally too fragmented and modified to support a viable population of this species. There are also no known records of this species from the desktop assessment study area.
Mammal	*Planigale tenuirostris*	Narrow-nosed planigale	—	—	Y	Sparsely distributed across inland central eastern Australia (Menkhorst and Knight, 2004). Found in a range of habitats with cracking clay soils including open grassland, mallee scrubs and densely vegetated creek flats (Van Dyck and Strahan, 2008).	—	Low There is no suitable habitat within the study area for this species which usually favours more naturally occurring open habitats. There are no known records of this species from the desktop assessment study area.
Mammal	*Pseudocheirus peregrinus*	Common ringtail possum	—	—	Y	Known from coastal and sub-coastal east Australia (Menkhorst and Knight, 2008). Associated with open and closed forest, coastal scrubs and gardens (Menkhorst and Knight, 2008).	—	Moderate There is suitable habitat across the study area particularly within riparian habitats along Dogwood, 11 Mile and Wallan Creeks. This species has a moderate likelihood of occurring within these areas. There are no

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								known records of this species from the desktop assessment study area.
Mammal	*Trichosurus vulpecula*	Common brushtail possum	—	—	Y	Formerly widespread, occurring across much of Australia. Has declined in arid areas (Van Dyck and Strahan, 2008). Currently known from coastal and inland parts of eastern Australia, far northern Australia and far south-western Australia (Van Dyck and Strahan, 2008). Known from a wide range of habitats. Prefers dry eucalypt forests and woodlands (Van Dyck and Strahan, 2008). Common in eastern parts of southern Brigalow Belt bioregion; scarce in west (Environmental Protection Agency, 2002).	—	Present This species was recorded within the study area during survey at numerous locations from Miles north to Baileys Lane. Has widespread distribution in the study area and is found in association dry sclerophyll woodland, Poplar Box, Bulloke, Ironbark and/or Callitris woodlands and Riparian habitats.
Mammal	*Pseudomys patrius*	Eastern Pebble-mound Mouse	—	—	Y	Known from coast and eastern interior of Queensland (Van Dyck and Strahan, 2008). Predominantly associated with dry open eucalypt forest on rolling hills, usually with a grassy understorey (Van Dyck and Strahan, 2008). Rarely recorded from alluvial flats (Environmental Protection Agency, 2008).	—	Low The study area is beyond the known distribution limit for this species. Habitat within the study area is generally too fragmented and modified to support a viable population of this species.
Mammal	*Pteropus poliocephalus*	Grey-headed Flying Fox	V	—	Y	The grey headed flying-fox ranges from about Townsville in the tropical north, south along the east coast, and into southern Victoria (Van Dyck and Strahan, 2008). The species roosts communally, often in hundreds of thousands, in gullies with dense vegetation canopy, and feeds on rainforest fruits, blossom from eucalypts, angophoras, banksias and tea-trees (Van Dyck and Strahan, 2008). Potential habitat in Brigalow Belt	—	Low There is limited habitat within the study area for this highly mobile species and its occurrence would be influenced by seasonal conditions such as response to mass flowering events (if foraging resources within the species normal distribution were scarce). There are also no known records of this

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						bioregion limited largely to riparian eucalypt forest/ woodland (Environmental Protection Agency, 2002).		species from the desktop assessment study area.
Mammal	*Chalinolobus dwyeri*	Large-eared pied bat	V	R	Y	The large-eared pied bat is associated mainly with areas of dry sclerophyll forest and woodland (including cypress pine woodland) (Duncan et al., 1999; Van Dyck and Strahan, 2008). Other habitats in which the species has been recorded include tall open eucalypt forest with wet forest elements, subalpine woodland and riparian vegetation in farmland (Duncan et al., 1999; Van Dyck and Strahan, 2008). In Queensland, the large-eared pied bat is known mainly from tall open forest adjacent to rain forest (Duncan et al., 1999). In the southern Brigalow Belt, it is likely to occur only in sandstone country (Environmental Protection Agency, 2002).	—	Low Potential foraging resources are present within the study area, but no roosting resources were identified in study area though. It would be more likely to roost in sandstone escarpments and gorges 100km to the north and east of the study area. There are no known records of this species from the desktop assessment study area.
Mammal	*Chalinolobus picatus*	Little-pied bat	—	R	Y	The little pied bat is primarily associated with dry sclerophyll forest, woodland and mallee, though it has also been recorded from wet sclerophyll and notophyll vine forests (Churchill, 1998; Duncan et al., 1999; Van Dyck and Strahan, 2008). In south-east Queensland, it is found mainly in association with dry forest featuring spotted gums, gum-topped box, ironbark eucalypts and forest red gums (Duncan et al., 1999). In sub-humid parts of Queensland, the species has been recorded mainly from cypress pine and casuarina-dominated forest (Duncan et al., 1999).	Yds	Present This species was recorded from numerous locations within the study area in association with Brigalow remnants, Poplar Box woodland, Ironbark and/or Callitris woodlands and Riparian habitats. Considered locally common.
Mammal	*Chalinolobus*	Hoary wattled Bat	—	—	Y	Known from coastal and inland northern	—	Low

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	nigrogriseus					and eastern Australia (Van Dyck and Strahan, 2008). Associated mainly with dry open habitats including open forest woodland, and grasslands (Van Dyck and Strahan, 2008). Roosts in tree hollows, rock crevices and buildings (Van Dyck and Strahan, 2008).		The study area is beyond the known distribution limit for this species. There are also no known records of this species from the desktop assessment study area.
Mammal	*Kerivoula papuensis*	Golden-tipped Bat	—	—	Y	Found principally in rainforest habitats and adjoining vegetation including hardwood plantations, dry sclerophyll forests and riparian rainforests (Menkhorst and Knight 2001). Known to have unusual roosting habits including use of scrubwren nests (Van Dyck and Strahan, 2008).	—	Low The study area is beyond the known distribution limit for this species. There are also no known records of this species from the desktop assessment study area.
Mammal	*Miniopterus australis*	Little bent-wing bat	—	—	Y	Known from coastal eastern Australia (Van Dyck and Strahan, 2008). Associated with well-timbered habitats including rainforest, paperbark swamps, wet forest and dry sclerophyll forest (Van Dyck and Strahan, 2008). Mainly a coastal cave-dwelling species; moves inland during summer months, returning to coast in winter (Environmental Protection Agency, 2002).	—	Moderate This species may only occasionally forage over the study area or occur as part of broader seasonal movements. However, there are also no known records of this species from the desktop assessment study area.
Mammal	*Miniopterus schreibersii oceanenis*	Eastern bent-wing bat	—	—	Y	Known from coastal and near-coastal parts of eastern Australia (Van Dyck and Strahan, 2008). Generally found near caves, mines and tunnels in coastal areas (Menkhorst and Knight, 2004).	—	Present This species was recorded from numerous locations within the study area in association with Poplar Box woodland, adjacent to 11 Mile Creek. However, no obvious breeding or roosting habitat was identified during survey.
Mammal	*Nyctophilus timoriensis*	Greater long-eared Bat	V	V	Y	The Eastern long-eared bat is known from a variety of habitats including river	—	Moderate This species has a moderate

Class name	Scientific name	Common name	EPBC Act Status	NC Act Status	Brigalow Belt Priority Species	Distribution and habitat	Records from desktop assessment study area	Likelihood of occurrence within Study Area
						red gum, mallee, bulloke, box and brigalow/belah-dominated communities (Duncan et al., 1999; Van Dyck and Strahan, 2008). In inland southern Queensland, the species is most abundant in open box/ ironbark/ cypress pine woodland (Duncan et al., 1999; Van Dyck and Strahan, 2008). Records from southern Brigalow Belt from brigalow scrub, smooth-barked apple and narrow-leaved ironbark forest as well as bulloak/ cypress woodland/ forest on sandy soil. Also recorded from poplar box woodland on alluvial flats (Environmental Protection Agency, 2002).		likelihood of occurring along main drainage lines associated with Dogwood, 11 Mile and Wallan Creeks. It may also use peripheral habitats bordering the area. There are no known records of this species from the desktop assessment study area.
Mammal	*Scotorepens sp.*	Central Eastern Broad-nosed bat	—	—	Y	Known from far south-east Queensland and north-eastern New South Wales (Van Dyck and Strahan, 2008). Associated with eucalypt and brigalow-belah forests and woodlands (Van Dyck and Strahan, 2008). Roosts in tree-hollows (Van Dyck and Strahan, 2008).	—	Moderate This species has a moderate likelihood of occurring in association with remnant vegetation communities supporting senescent trees. There are no known records of this species from the desktop assessment study area.
Mammal	*Vespadelus baverstocki*	Inland forest bat	—	—	Y	Known from central southern and eastern Australia (Van Dyck and Strahan, 2008). Inhabits grassland, chenopod shrublands, stony deserts, mallee, creeklines and woodlands (Van Dyck and Strahan, 2008).	—	Moderate This species has a moderate likelihood of occurring within the study area. However, there are no known records of this species from the desktop assessment study area.
Mammal	*Vespadelus regulus*	Southern Forest Bat	—	—	Y	Known from south-eastern, far southern and south-western Australia (Van Dyck and Strahan, 2008). Associated with a wide range of habitats including dry sclerophyll forest, shrubland, low shrub woodland, mixed temperate woodland	—	Low This species has a low likelihood of occurring within the study area. There are also no known records of this

Class name	Scientific name	Common name	EPBC Act Status	NC Act Status	Brigalow Belt Priority Species	Distribution and habitat	Records from desktop assessment study area	Likelihood of occurrence within Study Area
						and mallee (Van Dyck and Strahan, 2008).		species from the desktop assessment study area.

Notes: NC Act = *Nature Conservation Act 1992*: V = Vulnerable, E = Endangered, R = Rare, CS = Culturally Significant, LC = Least Concern, EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*: E = Endangered, V = Vulnerable. Brigalow Belt Priority Species: Y= Listed as priority taxa by the Brigalow Belt South fauna Expert Panel in the Brigalow Belt South Biodiversity Planning Assessment (EPA, 2002). Yd= record from desktop assessment, Ys= recorded during field survey, Yds= record from desktop assessment *and* recorded during field survey

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Attachment I

Impact assessments

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I1. Introduction

One Threatened plant, seven Threatened animals, one Migratory bird and one endangered ecological communities listed under state or Commonwealth legislation were either recorded in the Study Area or identified as having a moderate to high likelihood-of-occurrence. Assessment of the significance of impacts for these species and communities has been completed (refer Table I-1).

Table I-1: Threatened species and communities for which impact assessments have been completed

Name	Conservation status[1]		Outcome of assessment	
	State	National	State	National
RE 11.9.5 *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks (sub-unit of Brigalow dominant and co-dominant)	E	E	No significant impact	No significant impact
Westringia cheelii	V	V	No significant impact	No significant impact
Acacia barakulensis		V	No significant impact	No significant impact
Acacia curranii	V	V	No significant impact	No significant impact
Acacia handonis	V	V	No significant impact	No significant impact
Calytrix gurulmundensis	V	V	No significant impact	No significant impact
Eucalyptus pachycalyx subsp. waigensis		E	No significant impact	No significant impact
Homoranthus decumbens	V	V	No significant impact	No significant impact
Micromyrtus carinata		E	No significant impact	No significant impact
Micromyrtus patula		E	No significant impact	No significant impact
Homopholis belsonii	V	E	No significant impact	No significant impact
Brigalow Scaly-foot (*Paradelma orientalis*)	V	V	No significant impact	No significant impact
Dunmall's Snake *(Furina dunmalli)*	V	V	No significant impact	No significant impact

Name	Conservation status[1]		Outcome of assessment	
	State	National	State	National
Yakka Skink *(Egernia rugosa)*	V	V	No significant impact	No significant impact
Squatter Pigeon (southern race) *(Geohaps scripta scripta)*	V	V	No significant impact	No significant impact
Powerful Owl (*Ninox strenua*)	V	-	No significant impact	n/a
Glossy Black-cockatoo (*Calyptorhynchus lathami)*	V	-	No significant impact	n/a
Eastern Long-eared Bat *(Nyctophilus sp cf timoriensis) (eastern form)*	V	V	No significant impact	No significant impact
Satin Flycatcher *(Myiagra cyanoleuca)*	-	M	n/a	No significant impact

1. State conservation status. E = Endangered, V = Vulnerable,
National E = Endangered, V = Vulnerable for plants, animals and ecological communities (EPBC Act), M = Migratory.

For species and communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) the significance of impacts are assessed in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment and Heritage 2006a).

The *Vegetation Management Act 1999* (VM Act) and *Nature Conservation Act 1992* (NC Act) do not outline factors for consideration in impact assessments. As such, the following factors were considered:

- will areas of high conservation value for the species or community be affected?
- do individual animals and/or plants and/or subpopulations that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community?
- do habitat features that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community?
- are the duration of impacts for the species or community long-term?
- are the impacts for the species or community permanent and irreversible?

If species or communities are listed under the EPBC Act and NC Act or EPBC Act and VM Act, then the significance of impacts has been assessed under both the EPBC Act *Policy Statement 1.1 Significant Impact Guidelines* and the general significance assessment explained above.

It is acknowledged that field surveys were undertaken at a sub-optimal time of year (late winter) for detection of many species of plant and animal and that some sections of the study area were not accessed during this survey period. As such, seasonal surveys are proposed to increase the likelihood of detecting Threatened species if they are present in the Study

Area, and define the size of the local population and extent of their habitat in the Study Area. The conclusions of the impact assessments will therefore be reviewed and revised if necessary following the seasonal survey.

I2. Vegetation communities

I2.1 Commonwealth impact assessment

I2.1.1 Brigalow (*Acacia harpophylla* dominant and co-dominant) (RE 11.9.5)

Description

RE 11.9.5 is characterised by an open-forest dominated by *Acacia harpophylla* (Brigalow) and/or *Casuarina cristata* (Belah) (10-20 m) with *C. cristata* becoming more common in southern parts of the Brigalow Belt bioregion. A prominent low tree or tall shrub layer dominated by species such as *Geijera parviflora* and *Eremophila mitchellii*, and often with semi-evergreen vine thicket species is often present.

In Queensland, the Brigalow ecological community that has been listed under the EPBC Act is defined by reference to 16 regional ecosystems (REs), all of which are listed as 'endangered' under the Queensland *Vegetation Management Act 1999* (VM Act). Vegetation analogous with one of these REs was recorded in the Study Area, RE 11.9.5.

Status under state (Qld) and Commonwealth legislation

Remnant RE 11.9.5 is listed as Endangered under the VM Act. This status only applies to vegetation identified as remnant by the EPA.

RE 11.9.5 is a RE used to define the 'Brigalow (*Acacia harpophylla* dominant and co-dominant)' ecological community under the EPBC Act (Environment Australia 2003). Brigalow regrowth (non-remnant vegetation) may form part of the Brigalow ecological community listed under the EPBC Act if it retains species composition and structural elements typical of that found in undisturbed areas of the listed Brigalow ecological community. Brigalow regrowth is not considered part of the Brigalow ecological community that is listed under the EPBC Act if it is of poor quality. In general, areas that have been cleared within the past 15 years will not have regained the structure and species composition typical of remnant Brigalow and, therefore, will not qualify as the listed Brigalow ecological community (Anon 2003).

All remnant RE 11.9.5 in the Study Area possessed the species composition and structural elements consistent with the Brigalow (*Acacia harpophylla* dominant and co-dominant) determination. No Brigalow regrowth (non-remnant vegetation) was in the Study Area that was consistent with the ecological community under the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community under the EPBC Act.

Brigalow regrowth between Giligulgul and Fosters Road that could not be accessed for this assessment will require assessment during the further surveys of the site to determine if it is consistent with the definition of Brigalow (*Acacia harpophylla* dominant and co-dominant)' ecological community under the EPBC Act.

Distribution

Brigalow (*Acacia harpophylla* dominant and co-dominant) occurs in scattered remnants in the Brigalow Belt, Mulga Lands, South East Queensland and New England Tableland

bioregions in Queensland (Environmental Protection Agency 2007) and the North West Slopes and Plains and Darling River Plains in NSW (Department of Environment and Climate Change 2008).

Within the Study Area remnant patches of this RE 11.9.5 occur between Giligulgul and Miles including a significant patch on the southern side of Giligulgul Road that was mapped by the EPA as RE 11.3.2. Several small areas of non-remnant 11.9.5 were also defined during the field verification along the in the Leichhardt Highway and between Giligulgul and Fosters Road that were occurring primarily as sparse to mid-dense, mid-mature regrowth and low fragmented regrowth within respective road reserves. RE 11.9.5 also occurred in private landholdings in small fragmented patches of regrowth consisting of retained woodlots, cattle camps or stunted shrubby regrowth in ploughed paddocks. Access to some properties between Fosters Road and Giligulgul was not possible during the winter survey period and have therefore been inferred from EPA mapping (2005) and aerial photograph interpretation. These areas will be verified during subsequent seasonal surveys.

Habitat

Brigalow (*Acacia harpophylla* dominant and co-dominant) usually occurs on heavy clay soils.

RE 11.9.5 occurs on undulating plains and rises formed mainly on shale's. The soils are predominantly cracking clay soils or dark brown and grey-brown gradational soils (Environmental Protection Agency 2007).

Threats

Heavy clay soils that Brigalow (*Acacia harpophylla* dominant and co-dominant) occurs on are of high agricultural value and have been extensively cleared historically for agricultural purposes including grazing livestock and cropping (Environmental Protection Agency 2007).

Historical clearing of Brigalow (*Acacia harpophylla* dominant and co-dominant) has significantly decreased the extent of the community. Of an estimated original extent of 7,325,000 ha, only 800,000 ha remain. Thus nationally, Brigalow (*Acacia harpophylla* dominant and co-dominant) has declined to approximately 10% of its former area. In September 2003, <10% of the pre-clearing area of RE 11.9.5 remained.

Specific Project impacts

The Project will result in loss of 0.6 ha of remnant RE 11.9.5 consistent with the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community as defined under the EPBC Act. Additional areas Brigalow regrowth on private property not accessed for this assessment may also be consistent with this ecological community.

Significance assessment

Under the EPBC Act, an action is likely to have a significant impact on a critically endangered or endangered community if there is a real chance or possibility that it will result in one or more of the following.

Reduce the extent of an ecological community

The Project will result in a small reduction of the extent of Brigalow (*Acacia harpophylla* dominant and co-dominant) of 0.6 ha.

Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area is already fragmented by clearing of the surrounding landscape and is already subject to effects of fragmentation such as edge effects. As such, the Project will not increase fragmentation within the ecological community in the Study Area or surrounds.

Adversely affect habitat critical to the survival of an ecological community

Critical habitat under the EPBC Act is habitat critical to the survival of a species or ecological community. It may include areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development
- for the reintroduction of populations or recovery of the species or ecological community (Department of the Environment and Heritage 2006b).

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act.

No critical habitat has been listed for Brigalow (*Acacia harpophylla* dominant and co-dominant) under the EPBC Act. The habitat within the Study Area is not considered to be critical to the survival of Brigalow (*Acacia harpophylla* dominant and co-dominant) in accordance with EPBC Act.

Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.

The Project will adversely modify the soil profile in the areas of Brigalow (*Acacia harpophylla* dominant and co-dominant) that require clearing of vegetation such as within the construction footprint and associated ancillary areas (0.6 ha across the Study Area). The construction and operation of the water pipeline is unlikely to otherwise change abiotic factors necessary for the survival of this community in the Study Area.

Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The Project is unlikely to substantial change in the species composition of Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area or surrounds. Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area is already subject to a modified disturbance regime as a result of extensive landscape scale vegetation clearing. As a result of these pressures, Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area and surrounds has a modified species composition that would generally have a lower native diversity and higher abundances of weeds by comparison to an undisturbed site.

The Project is unlikely to result in any a change to the existing disturbance regime including changing the grazing pressure and change to the surface and ground water regime that would in turn modify species composition.

Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to assisting invasive species, that are harmful to the listed ecological community, to become established; or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community

Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area is already subject to a modified disturbance regime as a result of extensive landscape scale vegetation clearing. As a result, Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area and surrounds has is generally in poor to moderate condition and the Project is unlikely substantial reduction in the quality or integrity of an Brigalow (*Acacia harpophylla* dominant and co-dominant) that is not directly affected by the Project.

Interfere with the recovery of an ecological community

A recovery plan has not been prepared for Brigalow (*Acacia harpophylla* dominant and co-dominant). The removal of 0.6 ha is unlikely to interfere with the recovery of this community.

Conclusion

The Project will result in the loss of 0.6 ha of Brigalow (*Acacia harpophylla* dominant and co-dominant). The patches of this ecological community that will be affected by the Project were small, fragmented and subject a modified disturbance regime as a result of landscape scale vegetation clearing.

Given the condition of the ecological community that will be affected by the Project, and that it is not playing an important role in maintaining connectivity or retaining important species, the Project is not considered likely to result in a significant impact to Brigalow (*Acacia harpophylla* dominant and co-dominant). Nonetheless, the Offsets Strategy that will be developed for the Project should ensure that the residual impacts to the ecological community are adequately offset. This may include active management of the Brigalow (*Acacia harpophylla* dominant and co-dominant) and Brigalow regrowth in the Study Area.

I2.2 State impact assessment

Will areas of high conservation value for the community be affected?

The patches of remnant RE 11.9.5 have been identified as being of State biodiversity significance under the Biodiversity Planning Assessment (Environmental Protection Agency 2003) due to their status as and Endangered RE under the VM Act (Environmental Protection Agency 2002). These patches are not however considered as being of high value to the conservation of RE 11.9.5 regionally as it is occurs in small, fragmented patches that are and of moderate species diversity only.

Do individual animals and/or plants and/or subpopulations that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community?

The remnant RE 11.9.5 in the Study Area does not play an important role in maintaining long term viability of the ecological community as it is occurs in small, fragmented patches that are and of moderate species diversity only.

Do habitat features that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community?

The remnant RE 11.9.5 does not provide important habitat features that are important for the long term long-term viability of the RE of other species.

RE 11.9.5 (remnant and non-remnant) may provide suitable habitat for numerous Threatened species including *Homopholis belsonii* (a grass) and Brigalow Scaly-foot (*Paradelma orientalis*) which were both recorded in non-remnant vegetation analogous with this RE 11.9.5 in the in Study Area. Non-remnant RE 11.9.5 (Brigalow regrowth) is relatively common in the Study Area and locality including in the road corridors (the percentage can not be calculated as non-remnant vegetation is not mapped by the Environmental Protection Agency (2007)).

Are the duration of impacts for this community long-term?

The impact of the pipeline construction activates will be long-term.

Are the impacts permanent and irreversible?

The impact the pipeline will be permanent. Areas within the Study Area will be rehabilitated and revegetated following mining activities which will replace some of the habitat elements provided by the RE, however the patches of RE 11.9.5 affected by the Project will be permanently removed.

Conclusion

Given the relatively small extent of remnant RE 11.9.5 that will be affected, and the generally modified and fragmented condition of the RE in the Study Area, the Project is not considered likely to have a significant impact to this RE. Actions should however be taken to maintain the current extent of the RE in accordance with the definition of ‘maintain the current extent’ used in the regional vegetation management code (Department of Natural Resources and Water 2006). As impacts to the extent of the community can not be avoided, offsets will be required to maintain the current extent.

I3. Plants

I3.1 Significance assessments for Commonwealth-listed species

I3.1.1 *Westringia cheelii* (syn. *W. parvifolia*)

Description

Westringia cheelii is a spreading shrub 0.3 – 1.5 m high that usually occurs on sandy or stony soils (Stanley & Ross 1989). This species was not recorded in the study area, however was considered to have a moderate likelihood of occurrence in RE 11.5.1, RE 11.7.4, RE 11.7.6 and/or RE 11.7.7 in the Study Area.

Westringia cheelii flowers in spring at which time the abundance of white flowers make it highly conspicuous.

Status under state (Qld) and Commonwealth legislation

Westringia cheelii is listed as Vulnerable under the NC Act and the EPBC Act.

Distribution

Westringia cheelii is a widespread species in the Western Darling Downs. The species also occurs in NSW and as far south as Goonoo Forest in the Central Tablelands bioregion and is relatively common in Pilliga Scrub (Royal Botanic Gardens 2008).

Habitat

Westringia cheelii occurs in mallee, woodland and dry sclerophyll forest, on sandy soils or in deep gravel-rich sands (Royal Botanic Gardens 2008). Within the Study Area, RE 11.5.1, RE 11.7.4, RE 11.7.6 and RE 11.7.7 were considered likely habitat for the species.

Ecology

The ecology of this species is poorly known. The species flowers in spring between August and November.

Threats

No specific threats to *Westringia cheelii* were identified for this assessment. As with most Threatened species however, *Westringia cheelii* is likely to be threatened by loss of habitat (land clearance) and changes to disturbance regime (such as changes to fire regime).

Recovery Actions

A recovery plan has not been prepared for *Westringia cheelii* by the EPA or DEWHA.

Specific Project impacts

The Project will also result in loss of 28.8 ha of potential habitat for *Westringia cheelii* consisting of 16.6 ha of remnant vegetation and 12.2 ha of non-remnant vegetation. This will include vegetation in RE11.5.1, RE 11.7.6 and RE 11.7.7. No RE 11.7.4.

Significance assessment

Under the EPBC Act, an action is likely to have a significant impact on a Vulnerable species if it affects an important population of the species. Under the Principle Significant Impact Guidelines an important population is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity
- populations that are near the limit of the species range.

Westringia cheelii that may occur in the Study Area would not be important as defined above.

Lead to a long-term decrease in the size of an important population of a species

Westringia cheelii that may occur in the Study Area would not be defined as an important population.

If present within the Footprint, the Project will result in a decrease in the size of the local population. Further survey will be required however to determine if the species is present and if so, what the extent of the population is within the study area.

Reduce the area of occupancy of an important population

Westringia cheelii that may occur in the Study Area would not be defined as an important population.

If present within the Footprint, the Project will result in a decrease in the area of occupancy of the local population. Further survey will be required however to determine if the species is present and if so, what the area of occupancy of the population is within the study area.

Fragment an existing important population into two or more populations

Westringia cheelii that may occur in the Study Area would not be defined as an important population.

The proposed route of the Project has been selected to follow existing roads and easements to minimise clearing and further fragmentation. If present, the loss of *Westringia cheelii* individuals in the study area is unlikely to result in further fragmentation as the project is unlikely to create a barrier to pollinators or otherwise fragment the local population.

Adversely affect habitat critical to the survival of a species

Critical habitat under the EPBC Act is habitat critical to the survival of a species or ecological community. It may include areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development

- for the reintroduction of populations or recovery of the species or ecological community (Department of the Environment and Heritage 2006b).

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act.

No critical habitat has been listed for *Westringia cheelii* under the EPBC Act. The habitat within the Study Area is not considered to be critical to the survival of *Westringia cheelii* in accordance with EPBC Act.

Disrupt the breeding cycle of an important population

Westringia cheelii that may occur in the Study Area would not be defined as an important population.

The ecology and breeding cycle of the *Westringia cheelii* is poorly known. The Project will not involve actions that are likely to disturb the ecology and breeding cycle of the species surrounding the Project such as routine clearing of vegetation, changes to the fire regime, changes to hydrology of control of insect pests.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Westringia cheelii was not recorded in the study area however suitable habitat was recorded in four REs. The project will impact 28.8 ha of suitable habitat for the species. This loss of habitat is unlikely to result in the decline of the species if present.

Result in invasive species that are harmful to a vulnerable species becoming established in the Vulnerable species' habitat

The Project is has potential to result in changes to the species composition in remnant and regrowth (non-remnant) vegetation that may result in the proliferation of existing weeds. The Project is however unlikely to result in the establishment of new weed species in the Study Area.

Monitoring and active management of weeds and would be required to prevent invasive species affecting *Westringia cheelii* habitat in the Study Area.

Introduce disease that may cause the species to decline

The Project is unlikely to introduce disease that may cause the species to decline.

Interfere substantially with the recovery of the species

A recovery plan has not been prepared to *Westringia cheelii.* It is unlikely that the Project will interfere with the recovery of this species.

Conclusion

Westringia cheelii was not recorded in the Study Area, however was considered to have a moderate likelihood of occurrence in RE 11.5.1, RE 11.7.4, RE 11.7.6 and/or RE 11.7.7 in the Study Area. Targeted survey should however be undertaken for *Westringia cheelii* within

areas of suitable habitat to determine if present and if so, what the size and extent of a local population would be impacted.

Based on the nature of the impacts of the Project and the extent of the suitable habitat affected alone, *Westringia cheelii* is unlikely to be significantly impacted by the Project. If the species is identified in the study area however, the conclusion of this impact assessment should be reviewed. Furthermore, the Offsets Strategy that will be developed for the Project should ensure that the residual impacts to *Westringia cheelii* (if identified in the Study Area) are adequately offset. This may include seed collection, propagation and use in revegetation, translocation of individuals to be affected and active management of known *Westringia cheelii* sites if identified during seasonal surveys.

I3.1.2 *Acacia curranii, Acacia handonis, Calytrix gurulmundensis* and *Homoranthus decumbens*

Acacia curranii, Acacia handonis, Calytrix gurulmundensis and *Homoranthus decumbens* each occur in association with scalds on deeply weathered soil profiles. Due to the similarity in habitat and likely impacts, these species have been assessed collectively.

Description

Acacia curranii is a shrub to around 3m tall with long narrow phyllodes (13-18 cm long and 0.5 – 1 mm wide) and bright yellow inflorescences in the axil or phyllodes and distinctive reddish brown bark which curls off in narrow strips.

Acacia handonis is a small slender shrub growing 1-2 m high and 1-2 m wide with sticky bright yellow globular flower heads (Department of the Environment Water Heritage and the Arts 2008e).

Calytrix gurulmundensis is a small to medium shrub between 0.5 and 1.5 m high with star-shaped flowers, 15 - 20 mm in diameter, with cream petals with a bright yellow centre.

Homoranthus decumbens (syn. *Darwinia decumbens*) is a decumbent habitat with short narrow leaves (less than 3 mm thick) (Craven & Jones 1991).

Status under state (Qld) and Commonwealth legislation

Acacia curranii, Acacia handonis, Calytrix gurulmundensis and *Homoranthus decumbens* are all listed as Vulnerable under the NC Act and the EPBC Act.

Distribution

Acacia curranii has a disjunct distribution in western NSW and south-eastern Queensland, occurring in three areas each separated by several hundred kilometres (Department of the Environment Water Heritage and the Arts 2008e). The Queensland population occurs in the Gurulmundi area where it occurs on deeply weathered sandstone forming red sandy soils.

Acacia handonis is only known from one population in Barakula State Forest (Department of the Environment Water Heritage and the Arts 2008e). Barakula State Forest is located within approximately 20 km to the east of the Study Area from approximately Wandoan to Gurulmundi.

Calytrix gurulmundensis also occurs on shallow soils or natural "scalds" on deeply weathered coarse-grained sedimentary rock (lateristic duricrusts) in the Gurulmundi area (Chinchilla Field Naturalist's Club Inc 1997; Lithgow 1997)

Acacia curranii and *Calytrix gurulmundensis* are both know to occur in the Gurulmundi Special Area comprising Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002).

Homoranthus decumbens is known from the Waaje area of Barakula State Forest to the east of the Study Area and also on deeply weathered coarse-grained sedimentary rock in the Gurulmundi area (Chinchilla Field Naturalist's Club Inc 1997; Lithgow 1997).

Habitat

Acacia curranii, Calytrix gurulmundensis and *Homoranthus decumbens* all occurs on shallow soils or natural "scalds" on deeply weathered coarse-grained sedimentary rock (lateristic duricrusts) in the Gurulmundi area (Chinchilla Field Naturalist's Club Inc 1997; Lithgow 1997).

Acacia handonis also occurs on lateritic soil with grey sand or clayey silt with ironstone gravel, in gently undulating country, often on stony ridges, in eucalypt woodland and open forest dominated by *Eucalyptus fibrosa* ssp*. nubila, Corymbia watsoniana* and *Lysicarpus angustifolius* (Department of the Environment Water Heritage and the Arts 2008e; Maslin 2002; Queensland Herbarium 2008b; Stanley & Ross 1989).

Ecology

Acacia curranii flowers in spring (Department of the Environment Water Heritage and the Arts 2008e). *Acacia handonis* flowers in winter to early spring between June and September (Department of the Environment Water Heritage and the Arts 2008e). *Calytrix gurulmundensis* flowers in later winter or spring (ASGAP 2008). *Homoranthus decumbens* flowers in spring to early summer (September to December) (Craven & Jones 1991).

Threats

No specific threats to *Acacia curranii, Acacia handonis, Calytrix gurulmundensis* or *Homoranthus decumbens* were identified for this assessment. As with most Threatened species however, *Westringia cheelii* is likely to be threatened by loss of habitat (land clearance) and changes to disturbance regime (such as changes to fire regime).

Recovery actions

A recovery plan has not been prepared for *Acacia curranii, Acacia handonis, Calytrix gurulmundensis* or *Homoranthus decumbens* by the EPA or DEWHA.

Specific Project impacts

Acacia curranii, Calytrix gurulmundensis and *Homoranthus decumbens* are most likely to occur in RE 11.7.1 (which does not occur in the Study Area). These species are however considered as having potential to occur in other REs on deeply weather soils including RE 11.7.7 in the Study Area.

Acacia handonis is also likely to occur in RE 11.7.7.

The Project will result in the loss of 3.8 ha of this habitat type.

Significance assessment

Under the EPBC Act, an action is likely to have a significant impact on a Vulnerable species if it affects an important population of the species. Under the Principle Significant Impact Guidelines an important population is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity
- populations that are near the limit of the species range.

Acacia curranii and *Calytrix gurulmundensis* in the Gurulmundi Special Area is considered an important population in as defined above. *Homoranthus decumbens* in the Study Area would form part of the Barakula State Forest population which would also be considered an important population. *Acacia handonis* is extremely rare and currently only known from one location in the Barakula State Forest, as such any occurrence of the species would be considered important.

Lead to a long-term decrease in the size of an important population of a species

Acacia curranii, Acacia handonis, Calytrix gurulmundensis and *Homoranthus decumbens* in the Study Area and surrounds each form part of important populations.

If *Acacia curranii, Acacia handonis, Calytrix gurulmundensis* and/or *Homoranthus decumbens* are present within the Footprint, the Project will result in a decrease in the size of the local population. Further survey will be required however to determine if the species is present and if so, what the extent of the population is within the study area.

Reduce the area of occupancy of an important population

Acacia curranii, Acacia handonis, Calytrix gurulmundensis and *Homoranthus decumbens* in the Study Area and surrounds each form part of important populations.

If *Acacia curranii, Acacia handonis, Calytrix gurulmundensis* and/or *Homoranthus decumbens* are present within the Footprint, the Project will result in a decrease in the area of occupancy of the local population. Further survey will be required however to determine if the species is present and if so, what the area of occupancy of the population is within the study area.

Fragment an existing important population into two or more populations

Acacia curranii, Acacia handonis, Calytrix gurulmundensis and *Homoranthus decumbens* in the Study Area and surrounds each form part of important populations.

The proposed route of the Project has been selected to follow existing roads and easements to minimise clearing and further fragmentation. If present, the loss of *Acacia curranii, Acacia handonis, Calytrix gurulmundensis* and *Homoranthus decumbens* individuals in the study area is unlikely to result in further fragmentation as the project is unlikely to create a barrier to pollinators or otherwise fragment the local population.

Adversely affect habitat critical to the survival of a species

Critical habitat under the EPBC Act is habitat critical to the survival of a species or ecological community. It may include areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development
- for the reintroduction of populations or recovery of the species or ecological community (Department of the Environment and Heritage 2006b).

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act.

No critical habitat has been listed for *Acacia curranii, Acacia handonis, Calytrix gurulmundensis* and *Homoranthus decumbens* under the EPBC Act. The habitat within the Study Area is not considered to be critical to the survival of these species unless the species are recorded within it. If any of these species were recorded, the habitat may be considered as Critical Habitat.

Disrupt the breeding cycle of an important population

Acacia curranii, Acacia handonis, Calytrix gurulmundensis and *Homoranthus decumbens* in the Study Area surrounds are each part of important populations.

The Project will not involve actions that are likely to disturb the ecology and breeding cycle of the species surrounding the Project such as routine clearing of vegetation, changes to the fire regime, changes to hydrology of control of insect pests.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Acacia curranii, Acacia handonis, Calytrix gurulmundensis and *Homoranthus decumbens* were not recorded in the study area, however RE 11.7.7 was considered as potential habitat for these species. The project will impact 3.8 ha of suitable habitat for these species. This loss of habitat is unlikely to result in the decline of any of these species if present.

Result in invasive species that are harmful to a vulnerable species becoming established in the Vulnerable species' habitat

The Project is has potential to result in changes to the species composition in remnant and regrowth (non-remnant) vegetation that may result in the proliferation of existing weeds. The Project is however unlikely to result in the establishment of new weed species in the Study Area.

Monitoring and active management of weeds and would be required to prevent invasive species affecting *Acacia curranii, Calytrix gurulmundensis* and *Homoranthus decumbens* habitat in the Study Area.

Introduce disease that may cause the species to decline

The Project is unlikely to introduce disease that may cause the species to decline.

Interfere substantially with the recovery of the species

A recovery plan has not been prepared to *Acacia curranii, Calytrix gurulmundensis* or *Homoranthus decumbens.*

Conclusion

Acacia curranii, Acacia handonis, Calytrix gurulmundensis or *Homoranthus decumbens* were not recorded in the Study Area. These species are however known to occur in habitats similar to the RE 11.7.7 and therefore were considered as having a moderate likelihood of occurrence in the study area.

Each of these species has a limited species or population distribution in the Study Area and surrounds. *Acacia curranii* and *Calytrix gurulmundensis* are both known from the Gurulmundi Special Area comprising Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002). *Acacia handonis* is only known from one population in Barakula State Forest (Department of the Environment Water Heritage and the Arts 2008e) and *Homoranthus decumbens* is also only known locally from the Barakula State Forest. As such, the local populations of these species in the Study Area and surrounds would be considered important populations.

The impact of the proposal to the habitat of these species is unlikely to result in a significant impact. However, further targeted survey will however be undertaken for these species within areas of suitable habitat to determine if present and if so, what the size and extent of a local population would be affected. If any of these species are recorded, conclusion of this impact assessment will be reviewed.

Furthermore, the Offsets Strategy that will be developed for the Project should ensure that the residual impacts to *Acacia curranii, Acacia handonis, Calytrix gurulmundensis* or *Homoranthus decumbens* (if identified in the Study Area) are adequately offset. This may include seed collection, propagation and use in revegetation, translocation of individuals to be affected and active management of known sites if identified during seasonal surveys.

I3.1.3 *Homopholis belsonii* (Belson's panic)

Description

Homopholis belsonii is a rhizomatous and/or stoloniferous perennial to 0.5 m high (although generally to 0.2 m high in the Study Area) with leaves 2–4.5 mm wide. The species flowers in summer with forming an inflorescence 8–15 cm long with primary branches 8–15 cm long coming from a common axis (Royal Botanic Gardens 2008). The inflorescence is important for field identification.

Status under state (Qld) and Commonwealth legislation

Homopholis belsonii is listed as Endangered under the NC Act and Vulnerable under the EPBC Act.

Distribution

Homopholis belsonii grows in dry woodland on poor soils north from the Warialda district (north-west plains, NSW) to the Gurulmundi district (north-west Darling Downs, Queensland).

Habitat

Homopholis belsonii is known to occur in association with woodlands dominated by *Eucalyptus populnea* and *Acacia harpophylla* in the Brigalow Belt south including RE 11.3.2, RE 11.4.3, RE 11.9.6 (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002).

No *Homopholis belsonii* was identified in the study area, however remnant and non-remnant RE 11.9.5 is suitable habitat for this species based on observations of the species in this RE in the MLA areas (Parsons Brinckerhoff 2008). Within these communities, *Homopholis belsonii* appears to prefer shade or sheltered sites such as under logs (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002).

Ecology

The ecology of this species is poorly known. The species flowers in summer.

Threats

Homopholis belsonii is threatened by inappropriate fire regimes and ongoing grazing pressure (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002).

Recovery Actions

A recovery plan has not been prepared for *Homopholis belsonii* by the EPA or DEWHA.

Specific Project impacts

The Project will result in direct impacts to the *Homopholis belsonii* identified in the Study Area.

The Project will also result in loss of 16.8 ha of remnant RE 11.9.5 in the Study Area. Non-remnant RE 11.9.5 (Brigalow regrowth) is also likely to be present (and provide potential habitat) in the freehold properties between Giligulgul and Fosters road south of the MLA areas which could not be accessed during the winter surveys.

Significance assessment

Under the EPBC Act, an action is likely to have a significant impact on a Vulnerable species if it affects an important population of the species. Under the Principle Significant Impact Guidelines an important population is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity
- populations that are near the limit of the species range.

Homopholis belsonii in the Study Area would not be considered an important population.

Lead to a long-term decrease in the size of an important population of a species

Homopholis belsonii in the Study Area would not be considered an important population.

If present within the Footprint, the Project will result in a decrease in the size of the local population. Further surveys are required however to determine if the species is present and if so, what the extent of the population is within the study area.

Reduce the area of occupancy of an important population

Homopholis belsonii in the Study Area would not be considered an important population.

If present within the Footprint, the Project will result in a decrease in the area of occupancy of the local population. Further surveys are required however to determine if the species is present and if so, what the area of occupancy of the population is within the study area.

Fragment an existing important population into two or more populations

Homopholis belsonii in the Study Area would not be considered an important population.

Similar to other species of Panic grass (e.g. *Panicum* spp., *Walwhalleya* spp., and other closely related genera of grasses), the inflorescence of *Homopholis belsonii* is an exerted open panicle that has appears to detach at maturity (personal observations Peter Monsted) and is dispersed by wind (as per *Panicum effusum* for example). It is considered likely that the rare occurrences of *Homopholis belsonii* in the Study Area are therefore a result of the being established from wind blown seed sourced from populations at some distance (possibly kilometres) from the Study Area. Given this dispersal strategy of the species, the Project is unlikely to create a barrier to the dispersal of the *Homopholis belsonii* or otherwise fragment the local population.

Adversely affect habitat critical to the survival of a species

Critical habitat under the EPBC Act is habitat critical to the survival of a species or ecological community. It may include areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development
- for the reintroduction of populations or recovery of the species or ecological community (Department of the Environment and Heritage 2006b).

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act.

No critical habitat has been listed for *Homopholis belsonii* under the EPBC Act. The habitat within the Study Area is not considered to be critical to the survival of *Homopholis belsonii* in accordance with EPBC Act.

Disrupt the breeding cycle of an important population

Homopholis belsonii in the Study Area would not be considered an important population.

The ecology and breeding cycle of the *Homopholis belsonii* is poorly known (Department of Environment and Climate Change 2008). Given the likely wind dispersal strategy of the species (similar to *Panicum* spp. and *Walwhalleya* spp.) the Project is unlikely to disrupt the breeding cycle of the species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Homopholis belsonii was not recorded in the study area, however RE 11.9.5 is suitable habitat for the species. The project will impact 16.8 ha of suitable habitat for these species. Based on the surveys completed for MLA areas and surrounds, the species was rare throughout this habitat type (Parsons Brinckerhoff 2008). This loss of habitat is therefore unlikely to result in the decline of any of these species if present.

Result in invasive species that are harmful to a vulnerable species becoming established in the Vulnerable species' habitat

The Project is has potential to result in changes to the species composition in remnant and regrowth (non-remnant) vegetation that may result in the proliferation of existing weeds. The Project is however unlikely to result in the establishment of new weed species in the Study Area.

Monitoring and active management of weeds and would be required to prevent invasive species affecting *Homopholis belsonii* habitat in the Study Area.

Introduce disease that may cause the species to decline

The Project is unlikely to introduce disease that may cause the species to decline.

Interfere substantially with the recovery of the species

A recovery plan has not been prepared to *Homopholis belsonii.*

Conclusion

Homopholis belsonii was not recorded in the Study Area, however was considered likely to occur in remnant and non-remnant RE 11.9.5. Targeted survey should therefore be undertaken for *Homopholis belsonii* within areas of suitable habitat to determine if present and if so, what the size and extent of a local population would be impacted.

Based on the nature of the impacts of the Project and the extent of the suitable habitat affected alone, *Homopholis belsonii* is unlikely to be significantly impacted by the Project. If the species is identified in the study area however, the conclusion of this impact assessment will be reviewed. Furthermore, the Offsets Strategy that will be developed for the Project will ensure that the residual impacts to *Homopholis belsonii* (if identified in the Study Area) are adequately offset.

I3.2 Significance assessments for State-listed threatened flora

While there is no standard methodology for assessing the significance of impacts on Threatened species and communities in Queensland listed under the NC Act or VM Act, for this assessment the significance of likely impacts were assessed using the criteria outlined below:

- will areas of high conservation value for the species or community be affected?
- do individual animals and/or plants and/or subpopulations that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community?
- do habitat features that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community?
- are the duration of impacts for the species or community long-term?
- are the impacts for the species or community permanent and irreversible?

These factors for consideration are addressed in Table I-1.

Surveys for this assessment were done in later winter which is suboptimal for detection of most of the Threatened species considered likely to occur. As such, the conclusions of these impact assessments should be reviewed should any of these species be recorded in the Study Area.

Table I-2: Assessment of significance for state-listed Threatened flora likely to occur in the Study Area

Family	Botanical name	Significance assessment question				
		a)	b)	c)	d)	e)
Lamiaceae	*Westringia cheelii*	-if present the, habitat within the Study Area would form part of the Gurulmundi Special Area for this species and be considered high conservation value	-no	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent
Mimosaceae	*Acacia barakulensis*	-this species occurs locally in the Barakula State Forest only and if present the habitat would be considered high conservation value	-yes if present	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent
Mimosaceae	*Acacia curranii*	-if present the, habitat within the Study Area would form part of the Gurulmundi Special Area for this species and be considered high conservation value	-no	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent

Family	Botanical name	Significance assessment question				
		a)	b)	c)	d)	e)
Mimosaceae	*Acacia handonis*	-this species occurs in the Barakula State Forest only and if present the habitat would be considered high conservation value	-yes if present	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent
Myrtaceae	*Calytrix gurulmundensis*	-if present the, habitat within the Study Area would form part of the Gurulmundi Special Area for this species and be considered high conservation value	-no	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent
Myrtaceae	*Eucalyptus pachycalyx* subsp. *waigensis*	-species with disjunct population with local occurrence at locally in the Barakula State Forest. Study area is not considered high for this species	-no	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent

Family	Botanical name	Significance assessment question				
		a)	b)	c)	d)	e)
Myrtaceae	*Homoranthus decumbens*	-this species occurs locally in the Barakula State Forest only and if present the habitat would be considered high conservation value	-no	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent
Myrtaceae	*Micromyrtus carinata*	-if present the, habitat within the Study Area would form part of the Gurulmundi Special Area for this species and be considered high conservation value	-no	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent
Myrtaceae	*Micromyrtus patula*	-this species is locally endemic, however potential habitat is not considered high conservation value	-no	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent

Family	Botanical name	Significance assessment question				
		a)	b)	c)	d)	e)
Poaceae	*Homopholis belsonii*	-RE 11.9.5 in the Study Area is not considered high conservation value as habitat for this species	-no	-no	-areas will be rehabilitated following construction, however the impact to individuals within the footprint (if present, including in the seed bank) would be long term	- areas will be rehabilitated following construction however the impact to individuals within the footprint (if present, including in the seed bank) would be long permanent

1. Conservation status - State as listed under the NC Act: E = Endangered, V = Vulnerable, R = Rare. National as listed under the EPBC Act: E = Endangered, V = Vulnerable.
2. Source – HERBRECS (Queensland Herbarium 2008b), CORVEG(Queensland Herbarium 2008a), WO = Wildlife Online (Queensland Environmental Protection Agency 2008c), EPBC Tool = Protected Matters Search Tool (Department of the Environment Water Heritage and the Arts 2008d).

I4. Animals

For the assessment of impact on animals, the assessments under the EPBC Act are considered first and then the impacts on state-listed threatened species are considered.

I4.1 Significance assessments for Commonwealth-listed species

I4.1.1 Brigalow Scaly-foot (*Paradelma orientalis*)

Description

The Brigalow Scaly-foot is a snake-like pygopodid lizard of moderate size (snout-to-vent length up to 160 mm) endemic to the Brigalow Belt bioregion (Wilson 2003, 2005)

Status under state (Qld) and Commonwealth legislation

The Brigalow Scaly-foot is listed as Vulnerable under both the EPBC Act and NC Act.

Distribution

The Brigalow Scaly-foot's known range extends roughly from Miles north to the Bowen Basin in central Queensland (Wilson 2005).

Habitat

The species has been recorded from a variety of habitats including open woodland, open forest and vine thicket (Department of the Environment Water Heritage and the Arts 2008c; Queensland Environmental Protection Agency 2008a; Wilson 2003, 2005). Known habitat for this species includes areas with sandy clay, deep cracking clay soil and shallow skeletal soils (Department of the Environment Water Heritage and the Arts 2008c; Queensland Environmental Protection Agency 2008a; Wilson 2003, 2005). Most published records of this species are from remnant native vegetation; however it has been recorded from cultivated and grazed land suggesting some resilience to disturbance (Department of the Environment Water Heritage and the Arts 2008c).

Ecology

Specimens are usually found sheltering by day under woody debris, rocks, amidst grass tussocks and/or in deep leaf litter (Department of the Environment Water Heritage and the Arts 2008c; Wilson 2005). On suitably warm nights (> 19º C) the Brigalow Scaly-foot emerges from cover to feed on arthropods and sap from *Acacia* trees. Though largely terrestrial, Brigalow scaly-foot will climb trees and shrubs in search of sap (Department of the Environment Water Heritage and the Arts 2008c; Queensland Environmental Protection Agency 2008a). Data on reproduction are scant. Available information suggests egg-laying and hatching are likely to occur in late Spring and Summer (Department of the Environment Water Heritage and the Arts 2008c; Queensland Environmental Protection Agency 2008a).

Threats

The Brigalow scaly-foot is threatened by habitat loss due to clearing and thinning of native vegetation, inappropriate management of roadside remnant vegetation and predation by

feral animals, particularly cats (Department of the Environment Water Heritage and the Arts 2008c; Queensland Environmental Protection Agency 2008a).

Habitat degradation due to grazing and road traffic is also a likely threat. Persecution of this species, as a consequence of its snake-like appearance, may also pose a threat (Queensland Environmental Protection Agency 2008a).

Recovery actions

Recovery actions as outlined by the Queensland Environmental Protection Agency (2008a) for the Brigalow scaly-foot include:

- identification of key habitat and priority areas for conservation
- development of management guidelines to protect important habitat areas on private and state-controlled land
- implementation of monitoring programs in key habitat and priority conservation areas
- protection of habitat on the stock route network and shire roadsides and reserves
- a collaborative approach to reptile conservation with government and non-government organisations, industry groups, indigenous groups and landholders
- increased community awareness of this species in Queensland.

Occurrence within the Study Area

The Study Area and adjoining lands support extensive areas of dry open forest and woodland on rocky soil and /or sandy loam, much of which appears suitable for the Brigalow Scaly-foot. Despite this, database searches returned few records and the Brigalow Scaly-foot was only detected once during winter surveys within the Study Area. One adult was captured during active diurnal herpetofauna searches residing under refuse in mixed *Corymbia citriodora /Eucalyptus crebra* open forest (RE 11.7.6) on the eastern side of Baileys Road south of Gurulmundi.

The Brigalow Scaly-foot appears to have a patchy distribution in the Study Area and whilst it has been recorded in a range of vegetation types all sites tend to contain abundant log (15%) and/or deep litter cover (5-20cm). This species is likely to occur sporadically within most of the remnant *Corymbia citriodora /Eucalyptus crebra* and *Acacia harpophylla/Casuarina cristata* habitat types, provided microhabitat features such as deep litter and abundant log cover are present.

Species specific Project impacts

Potential impacts on the Brigalow Scaly-foot include, but are not limited to:

- removal of 1 hectare of remnant and non-remnant *Acacia harpophylla/Casuarina cristata* (RE 11.9.5) and 9 hectares of remnant and 4 hectares of non-remnant *Corymbia citriodora /Eucalyptus crebra* (RE 11.7.6) vegetation within the Study Area, which is considered to be potential Brigalow Scaly-foot habitat
- potential trapping of animals in deep steep-walled trenches which makes them vulnerable to predation, heat stress, dehydration, and/or drowning
- displacement of animals in response to temporary increased noise and vibration

- creation of open areas devoid of cover within areas of contiguous habitat may inhibit the movement/ dispersal of Brigalow Scaly-foot
- fragmentation of *Acacia harpophylla/Casuarina cristata* scrub and *Corymbia citriodora /Eucalyptus crebra* forest may also increase edge effects and the risk of predation (in particular predation by feral cats and foxes)
- establishment of feral animals and weeds.

Species specific Project mitigation

Mitigation measures for the Brigalow Scaly-foot include:

- clearing of remnant and non-remnant (REs 11.9.5 and 11.7.6) vegetation within the Study Area should be minimised during design in areas of known habitat for the Brigalow Scaly-foot (i.e. road reserves) to minimise the extent of potential habitat cleared and minimise fragmentation of habitat
- undertaking seasonal surveys to clarify the distribution and abundance of the Brigalow Scaly-foot along the proposed southern CSM water pipeline route, so that any important areas of habitat for the species can be refined during the design phase
- A flora and fauna management plan will be implemented for construction and operational phases of the Project and ensure the following:
  - a pre-clearing survey and fauna rescue program is put in place where sensitive areas of habitat are the be cleared. A trained ecologist should be present during all clearing of sensitive environmental areas
  - regular backfilling of trenches so as minimise the amount of time trenches are left open
  - grading the open ends of pipeline trenches to allow trapped animals to climb out
  - placement of habitat components such as logs/woody debris and rock from areas to be cleared, in adjacent retained areas to allow the continuation of their function as potential refuge sites suitable for Brigalow Scaly-foot
  - completion of contractor/staff inductions on site by qualified ecologist/fauna spotter-catcher or environmental advisor to indicate sensitive habitats and species
  - implementation of a weed and feral animal management program as part of the overall Wandoan Coal Project
  - development of an adaptive monitoring program for the entire Wandoan Coal Project ensuring the effectiveness of mitigation measures employed.

Commonwealth significance assessment

The Brigalow Scaly-foot that occurs within the Study Area is not considered an ‘important population’ because:

- the species was recorded in very low densities (1 individual) within the Study Area, despite targeted searches
- the species is not restricted to habitat within the Study Area
- the Study Area occurs within the centre of the distributional range for this species, and therefore the species is not at the limit of its range

- habitat within the Study Area is highly fragmented and the species was recorded as isolated individuals.

Potential impacts of the construction of the Project within the Study Area on the Brigalow Scaly-foot are evaluated using EPBC Act criteria for assessing significant impacts on listed Vulnerable species below.

Will the action lead to a long-term decrease in the size of an important population of a species?

While the population of Brigalow Scaly-foot is not considered to be an important population, the Project will require the proposed clearing of 14 hectares of remnant vegetation which is considered to be potential habitat for the Brigalow Scaly-foot within the Study Area. Clearing of this habitat may result in mortality of some individuals, and reduce numbers of Brigalow Scaly-foot within the Study Area. While this is a large amount of habitat, it is relatively small in terms of the extent of similar habitat available in the local area. Given the highly fragmented habitat and low density of individuals recorded within the Study Area, the Project is unlikely to lead to a long-term decrease in the size of any important population of this species.

Will the action reduce the area of occupancy of an important population of a species?

While the population of Brigalow Scaly-foot is not considered to be an important population, the clearing of woodland and/or open forest will reduce the extent of potential habitat available to the Brigalow Scaly-foot within the Study Area. This is likely to reduce the area of occupancy of the species; however, revegetation and restoration of ground cover after construction will ensure the reduction in area of occupancy for the species is mostly short-term. Additionally, similar suitable woodland and open forest habitats are widespread within the Study Area and surrounding landscape.

Will the action fragment an existing important population into two or more populations?

The Project will not fragment an important population of the Brigalow Scaly-foot. The indicative habitat for the Brigalow Scaly-foot within the Study Area is already fragmented and some of it is highly modified as a result of anthropogenic disturbance arising from agriculture, road infrastructure and residences. These open, cleared areas already serve as barriers to the species, and so the clearing of 14 hectares of potential habitat within the Study Area may merely serve to reinforce this barrier (as opposed to creating a new barrier). Moreover, with mitigation measures such as revegetating cleared areas and placement of habitat components into retained areas, any reinforcement of existing barriers to dispersal is likely to be short-term.

Will the action adversely affect habitat critical to the survival of a species?

Habitat along within the Study Area is not considered critical to the survival of the Brigalow Scaly-foot, as similar suitable woodland and open forest habitat are widespread within the Study Area and surrounding landscape. Effects on adjoining habitat areas are likely to be limited to short-term edge effects. These effects are considered unlikely to affect extensive areas of habitat suitable for the species. As such, the Project is unlikely to adversely affect habitat critical to the survival of the species.

Furthermore, the Project will not adversely affect habitat critical to the survival of the Brigalow Scaly-foot as no habitat within the Study Area is listed as critical habitat in any recovery plans for the species or under the Department of the Environment, Water Heritage and the Arts critical habitat register.

Will the action disrupt the breeding cycle of an important population?

While the population of Brigalow Scaly-foot is not considered to be an important population, construction within the Study Area in spring or summer may disrupt breeding for some individuals (as this is time when Brigalow Scaly-foot are most likely to be reproducing and/or dispersing). However this is most likely to only be in areas where vegetation/habitat will be cleared/removed.

Will the action modify, destroy or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Clearing for construction within the Study Area will result in the loss of potential Brigalow Scaly-foot habitat. Clearing may also result in edge effects which may affect habitat quality in areas of woodland and open forest adjoining the Study Area. This may lead to a decline of the species within the Study Area, but is unlikely to result in an overall decline of the species.

Will the action result in establishment of harmful invasive species becoming established in the species' habitat?

A number of invasive flora species and feral animals were recorded in the Study Area during field surveys for this assessment. A flora and fauna management plan will ensure the management of these species from within and immediately adjacent to the pipeline easement both during construction and operational phases of the project.

Will the action result in the introduction of disease(s) that may cause the species to decline?

There are no known transmissible diseases, or vectors of disease, likely to be introduced to the Study Area that would significantly affect the Brigalow Scaly-foot.

Will the action interfere substantially with the recovery of the species?

Actions for recovery of the Brigalow Scaly-foot include identification of key habitat and priority areas for conservation, and protection of habitat within road reserves. This is particularly important in areas where roadside remnant vegetation is the only remaining suitable habitat for the species. In this case, roadside remnant vegetation is not the only suitable habitat available to the species within the Study Area. Additionally, the majority of the existing landscape within the Study Area has been subject to anthropogenic disturbance and ongoing habitat clearance and is highly modified and fragmented. Therefore, the Project is not considered to interfere substantially with the recovery of the species.

Conclusion

Although the Project will remove approximately 14 hectares of potential habitat for the Brigalow Scaly-foot, similar suitable habitat is widespread throughout the Study Area and region. With the implementation of the aforementioned impact mitigation/avoidance measures, it is unlikely that Project will have a significant impact on the Brigalow Scaly-foot.

I4.1.2 Dunmall's Snake (*Furina dunmalli)*

Description

Dunmall's Snake is a dark-coloured elapid snake of moderate size (snout-to-vent length up to 600 mm) endemic to the Brigalow Belt bioregion (Wilson 2005).

Status under state (Qld) and Commonwealth legislation

Dunmall's Snake is listed as Vulnerable under both the EPBC Act and NC Act.

Distribution

Dunmall's Snake is known only from a few localities in the south-eastern interior of Queensland. Most records of this species are from the southern Brigalow Belt bioregion (Queensland Environmental Protection Agency 2008b; Wilson 2005).

Habitat

Dunmall's Snake inhabits dry forest and woodland habitats (Wilson 2003, 2005). It is known mainly from Brigalow (*Acacia harpophylla*) forest and woodland on cracking clay and clay loam soils (Queensland Environmental Protection Agency 2008b).

Ecology

Very little is known of the ecology of Dunmall's Snake. The species is active by night and appears to feed on small skinks and geckoes (Department of the Environment Water Heritage and the Arts 2008b; Queensland Environmental Protection Agency 2008b). It is known to shelter under fallen timber and is also likely to shelter down rock crevices and amongst leaf litter (Queensland Environmental Protection Agency 2008b).

Threats

Dunmall's Snake is threatened by habitat loss due to land clearing and thinning, inappropriate management of roadside reserves and predation by feral animals. Much of the habitat of this species has been heavily modified for agricultural use (Department of the Environment Water Heritage and the Arts 2008b; Queensland Environmental Protection Agency 2008b).

Recovery actions

Recovery actions for Dunmall's Snake include:

- identification of key habitat and priority areas for conservation
- development of management guidelines to protect important habitat areas on private and state-controlled land
- implementation of monitoring programs in key habitat and priority conservation areas
- protection of habitat on the stock route network and shire roadsides and reserves
- investigation of the species biology, ecology and population dynamics to inform management
- a collaborative approach to reptile conservation with government and non-government organisations, industry groups, indigenous groups and landholders

- increased community awareness of this species in Queensland (Department of the Environment Water Heritage and the Arts 2008b).

Occurrence within the Study Area

The Study Area and adjoining lands support areas of dry forest and woodland which may provide habitat for Dunmall's Snake. Preferred habitat (woodland/open forest on cracking clay soils) is, however, limited within the Study Area. Potential habitat for Dunmall's Snake within the Study Area is limited to intact remnants of *Acacia harpophylla* scrub, dry forest and woodland. This species has a moderate chance of occurring within stands of *Acacia harpophylla* and/or *Callitris glaucophylla* (RE 11.9.5), dry forest (REs 11.10.1, 11.10.7 and 11.7.6) and woodland (REs 11.3.2, 11.3.4 and 11.7.7) associations found in the Study Area. However, database searches returned few records and despite 18 person hours of targeted survey techniques, Dunmall's Snake was not recorded during field surveys undertaken for this assessment.

Species specific Project impacts

Potential impacts on Dunmall's Snake include, but are not limited to:

- removal of 1 hectare of remnant and non-remnant *Acacia harpophylla/Casuarina cristata* (RE 11.9.5), 23 hectares of dry forest and 18 hectares of woodland vegetation within the Study Area which is considered to be potential Dunmall's Snake habitat
- potential trapping of animals in deep steep-walled trenches which makes them vulnerable to predation, heat stress, dehydration, and/or drowning
- displacement of animals in response to temporary increased noise and vibration
- creation of open areas devoid of cover within areas of contiguous habitat may inhibit the movement/ dispersal of Dunmall's Snake
- fragmentation of *Acacia harpophylla/Casuarina cristata* scrub, dry forest and woodland habitats may also increase edge effects and the risk of predation (in particular predation by feral cats and foxes)
- further establishment of feral animals and weeds.

Species specific Project mitigation

Mitigation measures for Dunmall's Snake include:

- clearing of remnant and non-remnant (REs 11.9.5, 11.7.6, 11.10.1, 11.10.7, 11.3.2, 11.3.4 and 11.7.7) vegetation within the Study Area should be minimised during design in areas of potential habitat for the Dunmall's Snake (i.e. road reserves) to minimise the extent of potential habitat cleared and minimise fragmentation of habitat
- undertaking seasonal surveys to clarify the distribution and abundance of the Dunmall's Snake along the southern CSM water pipeline route, so that any important areas of habitat for the species can be refined during the design phase
- a flora and fauna management plan will be implemented for construction and operational phases of the Project and ensure the following:
    - a pre-clearing survey and fauna rescue program is put in place where sensitive areas of habitat are the be cleared. A trained ecologist should be present during all clearing of sensitive environmental areas

- regular backfilling of trenches so as minimise the amount of time trenches are left open
- grading the open ends of pipeline trenches to allow trapped animals to climb out
- placement of habitat components such as logs/woody debris and rock from areas to be cleared, in adjacent retained areas to allow the continuation of their function as potential refuge sites suitable for Dunmall's Snake
- completion of contractor/staff inductions on site by qualified ecologist/fauna spotter-catcher or environmental advisor to indicate sensitive habitats and species
- implementation of a weed and feral animal management program
- development of an adaptive monitoring program ensuring the effectiveness of mitigation measures employed.

Commonwealth significance assessment

If present, the population of Dunmall's Snake would not be considered an 'important population' because:

- the species was not recorded within the Study Area, despite targeted searches and is therefore clearly not abundant in the Study Area
- the species is not restricted to habitat within the Study Area
- the species is not at the limit of its range.

Potential impacts of the construction of the Project within the Study Area on Dunmall's Snake are evaluated using EPBC Act criteria for assessing significant impacts on listed Vulnerable species below.

Will the action lead to a long-term decrease in the size of an important population of a species?

Analogous habitat to that known to the species (described above) was identified throughout Study Area. Despite field surveys incorporating a multidisciplinary approach comprising pitfalls (100 pit nights), 18 hours of active search and numerous other opportunistic surveys this species was not recorded. The Project will require the proposed clearing of 42 hectares of remnant and non-remnant vegetation which is considered to be potential habitat for Dunmall's Snake within the Study Area. Clearing of this habitat may result in mortality of Dunmall's Snake, consequently reducing numbers of this species within the Study Area. While this is a large amount of potential habitat, it is relatively small in terms of the extent of similar habitat available in the local and regional areas. The paucity of database records and lack of detection of this species within the Study Area suggests Dunmall's Snake may not occur or if present it is not abundant. Given this situation, the Project is unlikely to lead to a decrease in the size of any important population of this species.

Will the action reduce the area of occupancy of an important population of a species?

Dunmall's Snake was not recorded within the Study Area during the field surveys and if present it is likely to be in very low numbers. Therefore, any habitat clearing would not reduce the area of occupancy of an important population. The clearing of woodland and/or dry forest will reduce the extent of potential habitat available to Dunmall's Snake within the Study Area and surrounds. This is likely to reduce the area of potential occupancy of the

species in the Study Area, but this is not likely to be significant, as there is similar habitat widely available in the local area and region.

Will the action fragment an existing important population into two or more populations?

The Project will not fragment an important population of Dunmall's Snake. The indicative habitat for Dunmall's Snake within the Study Area is already fragmented and some of it is highly modified as a result of anthropogenic disturbance arising from agriculture, road infrastructure and residences. These open, cleared areas already serve as barriers to the species, and so the clearing of 42 hectares of potential habitat within the Study Area may merely serve to reinforce this barrier (as opposed to creating a new barrier). Moreover, with mitigation measures such as revegetating cleared areas and placement of habitat components into retained areas, any reinforcement of existing barriers to dispersal is likely to be short-term.

Will the action adversely affect habitat critical to the survival of a species

The Project will not affect habitat critical to the survival of Dunmall's Snake because it was not recorded during the field survey, despite targeted surveys. Habitat along within the Study Area is not considered critical to the survival of Dunmall's Snake as similar suitable woodland and dry forest habitat are widespread within the Study Area and surrounding landscape. Effects on adjoining habitat areas are likely to be limited to short-term edge effects. These effects are considered unlikely to affect extensive areas of habitat suitable for the species. Furthermore, the Project will not adversely affect habitat critical to the survival of Dunmall's Snake as no habitat within the Study Area is listed as critical habitat in any recovery plans for the species or under the Department of the Environment, Water Heritage and the Arts critical habitat register.

Disrupt the breeding cycle of an important population

Considering that Dunmall's Snake was not recorded in the Study area despite extensive targeted surveys, the Project is unlikely to disrupt the breeding cycle of an important population.

Modify, destroy or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Clearing for construction within the Study Area will result in the loss of potential Dunmall's Snake habitat. Clearing may also result in edge effects which may affect habitat quality in areas of woodland and open forest adjoining the Study Area.

Establishment of harmful invasive species becoming established in the species' habitat

A number of invasive flora species and feral animals were recorded in the Study Area during field surveys for this assessment. The flora and fauna management plan will ensure the management of these species during construction and operational phases of the Project.

Introduction of disease(s) that may cause the species to decline

There are no known transmissible diseases, or vectors of disease, likely to be introduced to the Study Area that would significantly affect Dunmall's Snake.

Substantial interference with the recovery of the species

Actions for recovery of Dunmall's Snake include identification of key habitat and priority areas for conservation, and protection of habitat within road reserves (Department of the Environment Water Heritage and the Arts 2008b). This is particularly important in areas where roadside remnant vegetation is the only remaining suitable habitat for the species. In this case, roadside remnant vegetation is not the only suitable habitat available to the species within the Study Area. Additionally, the majority of the existing landscape within the Study Area has been subject to anthropogenic disturbance and ongoing habitat clearance and is highly modified and fragmented. Therefore, the Project is not considered to interfere substantially with the recovery of the species.

Conclusion

Although the Project will remove approximately 42 hectares of potential habitat for Dunmall's Snake, similar habitat is widely available within the Study Area and surrounds. With the implementation of the aforementioned impact mitigation/avoidance measures, it is unlikely that Project will have a significant impact on Dunmall's Snake.

I4.1.3 Yakka Skink (*Egernia rugosa)*

Description

The Yakka Skink is a large, robust scincid lizard reaching 200 mm in length (measured snout-to-vent). It is distinguished from sympatric congeneric species by the arrangement of scales on its head and its large flat ear lobules (Wilson 2003, 2005).

Status under State (Qld) and Commonwealth legislation

The Yakka Skink is listed as Vulnerable under both the EPBC Act and NC Act.

Distribution

The Yakka Skink is endemic to Queensland. Its known range extends from St George north to Coen on Cape York Peninsula (Department of the Environment Water Heritage and the Arts 2008a; Queensland Environmental Protection Agency 2008d) (Wilson 2003, 2005). While occurring across a broad latitudinal range, the Yakka Skink is patchily distributed, with most populations known from the Brigalow Belt bioregion (Department of the Environment Water Heritage and the Arts 2008a; Queensland Environmental Protection Agency 2008d).

Habitat

The species has been recorded mainly from sub-humid and arid areas in habitat ranging from rocky outcrops, to open dry sclerophyll forest, brigalow scrub and open shrubland (Department of the Environment Water Heritage and the Arts 2008a; Queensland Environmental Protection Agency 2008d; Wilson 2005). Known habitat for the Yakka Skink includes Lancewood forest on coarse soils associated with low ranges and areas of undulating terrain (Queensland Environmental Protection Agency 2008d).

Ecology

The Yakka Skink is an essentially terrestrial species which seldom ventures far from cover (Department of the Environment Water Heritage and the Arts 2008a; Queensland Environmental Protection Agency 2008d; Wilson 2005). It lives in communal dens amidst

fallen timber, deep rock crevices and burrows excavated under rocks and logs (Department of the Environment Water Heritage and the Arts 2008a; Queensland Environmental Protection Agency 2008d; Wilson 2005). Disused rabbit burrows may also be used as den sites, as well as old sheds and the eroded foundations of rural buildings (Wilson 2005). The diet of the Yakka Skink comprises plant and animal matter including arthropods, small vertebrates and fruit (Queensland Environmental Protection Agency 2008d).

Threats

The Yakka Skink is threatened by habitat loss due to land clearing, thinning of tree/shrub cover, inappropriate management of roadside reserves, and removal of woody debris and rocks that provide shelter from predators (which include feral animals such as cats and foxes) (Queensland Environmental Protection Agency 2008d).

Recovery actions

Recovery actions for the species include:

- identification of key habitat and priority areas for conservation
- development of management guidelines to protect important habitat areas on private and state-controlled land
- implementation of monitoring programs in key habitat and priority conservation areas
- protection of habitat on the stock route network and shire roadsides and reserves
- investigation of the species biology, ecology and population dynamics to inform management
- a collaborative approach to reptile conservation with government and non-government organisations, industry groups, indigenous groups and landholders
- increased community awareness of this species in Queensland (Queensland Environmental Protection Agency 2008d).

Occurrence within the Study Area

The Study Area and adjoining lands support areas of dry forest and woodland which may provide habitat for the Yakka Skink. Preferred habitat (open dry sclerophyll forest and *Acacia harpophylla* scrub) is, however, limited within the Study Area. This species has a moderate chance of occurring within stands of *Acacia harpophylla* and/or *Callitris glaucophylla* (RE 11.9.5) and dry forest (REs 11.10.1, 11.10.7 and 11.7.6) associations found in the Study Area. However, database searches returned few records and despite 18 person hours of targeted survey techniques, the Yakka Skink was not recorded during field surveys undertaken for this assessment.

Species specific Project impacts

Potential impacts on the Yakka Skink include, but are not limited to:

- removal of 1 hectare of remnant and non-remnant *Acacia harpophylla/Casuarina cristata* (RE 11.9.5), and 23 hectares of dry forest vegetation within the Study Area which is considered to be potential habitat for the Yakka Skink
- direct mortality during construction

- potential trapping of animals in deep steep-walled trenches which makes them vulnerable to predation, heat stress, dehydration, and/or drowning
- creation of open areas devoid of cover within areas of contiguous habitat may inhibit the movement/ dispersal of the Yakka Skink
- fragmentation of *Acacia harpophylla* scrub and dry forest may also increase edge effects and the risk of predation (in particular predation by feral cats and foxes)
- establishment of feral animals and weeds

Species specific project mitigation

Mitigation measures for the Yakka Skink include:

- clearing of remnant and non-remnant (REs 11.9.5, 11.7.6, 11.10.1 and 11.10.7) vegetation within the Study Area should be avoided in areas of potential habitat for the Yakka Skink (i.e. road reserves) to minimise the extent of potential habitat cleared and minimise fragmentation of habitat
- undertaking seasonal surveys to clarify the distribution and abundance of the Yakka Skink along the proposed southern CSM water pipeline route, so that any important areas of habitat for the species can be refined during the design phase
- a flora and fauna management plan will be implemented for construction and operational phases of the Project and ensure the following:
  - a pre-clearing survey and fauna rescue program is put in place where sensitive areas of habitat are the be cleared. A trained ecologist should be present during all clearing of sensitive environmental areas
  - regular backfilling of trenches so as minimise the amount of time trenches are left open
  - grading the open ends of pipeline trenches to allow trapped animals to climb out
  - placement of habitat components such as logs/woody debris and rock from areas to be cleared, in adjacent retained areas to allow the continuation of their function as potential refuge sites suitable for Yakka Skink
  - completion of contractor/staff inductions on site by qualified ecologist/fauna spotter-catcher or environmental advisor to indicate sensitive habitats and species
  - implementation of a weed and feral animal management program
  - development of an adaptive monitoring program ensuring the effectiveness of mitigation measures employed.

Significance assessment

If present, the population of the Yakka Skink would not be considered an ‘important population’ because:

- the species was not recorded within the Study Area, despite targeted searches
- the species is not restricted to habitat within the Study Area
- the Study Area is not at the limit of the species’ range.

Potential impacts of the construction of the Project within the Study Area on the Yakka Skink are evaluated using EPBC Act criteria for assessing significant impacts on listed Vulnerable species below.

Will the action lead to a long-term decrease in the size of an important population of a species?

Analogous habitat to that known to the species (described above) was identified throughout Study Area. Despite field surveys incorporating a multidisciplinary approach comprising pitfalls (100 pit nights), 18 hours of active search and numerous other opportunistic surveys this species was not recorded. The Project will require the proposed clearing of 24 hectares of remnant and non-remnant vegetation that is considered to be potential habitat for the Yakka Skink. Clearing of this habitat may result in mortality of the Yakka Skink, consequently reducing numbers of this species within the Study Area. While this is a relatively large amount of habitat, it is relatively small in terms of the extent of similar habitat available in the local area. The paucity of database records and lack of detection of this species within the Study Area suggests the Yakka Skink either does not occur or is present at very low densities. The Project is unlikely to result in the decrease in size of an important population.

Will the action reduce the area of occupancy of an important population of a species?

The Yakka Skink was not recorded within the Study Area during the field surveys and if present would not be considered an important population. Therefore, any habitat clearing would not reduce the area of occupancy of an important population. The clearing of rock piles and woody debris within *Acacia harpophylla* scrub and/or dry forest will reduce the extent of potential habitat available to the Yakka Skink. This is likely to reduce the area of occupancy of the species, but this is not likely to be significant, as there is similar habitat widely available in the local area and region.

Will the action fragment an existing important population into two or more populations?

The Project will not fragment an important population of the Yakka Skink. The indicative habitat for the Yakka Skink within the Study Area is already fragmented and some is highly modified as a result of anthropogenic disturbance arising from agriculture and road infrastructure. These open, cleared areas already serve as barriers to the species, and so the clearing of 24 hectares of potential habitat within the Study Area may merely serve to reinforce this barrier (as opposed to creating a new barrier).

Will the action adversely affect habitat critical to the survival of a species

The Project will not affect habitat critical to the survival of the Yakka Skink. This species was not recorded during the field survey, despite targeted surveys. Habitat within the Study Area is not considered critical to the survival of the Yakka Skink as similar suitable *Acacia harpophylla* scrub and dry forest habitat are widespread within the Study Area and surrounding landscape. No habitat within the Study Area is listed as critical habitat in any recovery plans for the species or under the Department of the Environment, Water, Heritage and the Arts critical habitat register.

Disrupt the breeding cycle of an important population

Considering that the Yakka Skink was not recorded in the Study area despite targeted surveys, the Project is unlikely to disrupt the breeding cycle of an important population.

Modify, destroy or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Clearing for construction within the Study Area will result in the loss of potential Yakka Skink habitat. Clearing may also result in edge effects which may affect habitat quality in areas of woodland and open forest adjoining the Study Area. This may lead to a decline of the species within the Study Area. However, these impacts are unlikely to result in a significant or irreversible decline in numbers.

Establishment of harmful invasive species becoming established in the species' habitat

A number of invasive flora species and feral animals were recorded in the Study Area during field surveys for this assessment. The flora and fauna management plan will ensure the management of these species during construction and operational phases of the Project.

Introduction of disease(s) that may cause the species to decline

There are no known transmissible diseases, or vectors of disease, likely to be introduced to the Study Area that would significantly affect the Yakka Skink.

Substantial interference with the recovery of the species

Actions for recovery of the Yakka Skink include identification of key habitat and priority areas for conservation. This is particularly important in areas where roadside remnant vegetation is the only remaining suitable habitat for the species. In this case, roadside remnant vegetation is not the only suitable habitat available to the species within the Study Area. Additionally, the majority of the existing landscape within the Study Area has been subject to anthropogenic disturbance and ongoing habitat clearance and is highly modified and fragmented. Therefore, the Project is not considered to interfere substantially with the recovery of the species.

Conclusion

Although the Project will remove approximately 24 hectares of potential habitat for the Yakka Skink, there is similar suitable habitat available within the local area and region. With the implementation of the aforementioned impact mitigation/avoidance measures, it is unlikely that Project will have a significant impact on the Yakka Skink.

I4.1.4 Squatter Pigeon (southern race) (*Geophaps scripta scripta)*

Description

This is a moderate-sized pigeon with prominent black and white facial markings and bare blue skin surrounding the eyes (Higgins & Davies 1997).

Status under state (Qld) and Commonwealth legislation

The southern race of the Squatter Pigeon is listed as Vulnerable under the EPBC Act and NC Act.

Distribution

The Squatter Pigeon (southern race) is known from dry inland and coastal parts of central and southern east Australia, from central New South Wales north to the Burdekin River, central eastern Queensland (Garnett & Crowley 2000; Higgins & Davies 1997; Royal Australian Ornithologists Union 2003). The species may already be extinct in New South Wales and is rarely encountered in south-east Queensland with most recent records species from central Queensland (Garnett & Crowley 2000; Higgins & Davies 1997; Royal Australian Ornithologists Union 2003).

Habitat

The Squatter Pigeon (southern race) favours dry open woodland areas with sparse grass cover near permanent water (Garnett & Crowley 2000; Higgins & Davies 1997). Sown pastures and dense grass cover on heavier fertile soils appear generally unsuitable for this species (Higgins & Davies 1997). Treeless areas with sparse shrub / grass cover are also unlikely to provide habitat suitable for this species (Higgins & Davies 1997).

Ecology

Squatter pigeons spend most of their time foraging on the ground and are often observed beside roads and tracks (Higgins & Davies 1997). At night, Squatter Pigeons ascend trees to roost (Higgins & Davies 1997).

The movements of this species are poorly known. Available evidence suggests this species is only locally dispersive, with little evidence for long-distance seasonal movements. There is, however, evidence to suggest that the species may disperse more widely from drought affected areas (Higgins & Davies 1997).

The diet of Squatter Pigeons comprises mainly seeds. This includes seeds from a wide range of grasses, legumes, dicot herbs and shrubs (Higgins & Davies 1997).The breeding biology of this species is poorly known. Available information suggests breeding may occur throughout the year, peaking May to June. Birds are known to nest on the ground, amidst short grass and bushes (Garnett & Crowley 2000; Higgins & Davies 1997). Due to its ground-nesting behaviour, birds may be vulnerable to predation by feral cats and foxes.

Threats

Much of this species' habitat has been modified for grazing and cropping. In NSW, over-grazing by sheep and rabbits combined with drought has resulted in the decline and apparent extinction of this species (Garnett & Crowley 2000; Higgins & Davies 1997). Improvement of pastures for grazing of cattle *per se* does not appear to have affected this species as strongly as pasture improvement for sheep (Garnett & Crowley 2000; Higgins & Davies 1997).

Fox predation may be of particular concern with declines in New South Wales occurring in areas of high fox abundance (Higgins & Davies 1997). Given the species' apparent affinity for roadsides, fast-moving vehicular traffic may also pose a threat.

Recovery actions

Recommended actions for the recovery of this species outlined in 'The Action Plan for Australia Birds 2000' (Garnett & Crowley 2000) include:

- defining population size and distribution of the southern race in Queensland and New South Wales
- ecological research investigating the relationship between pigeon abundance, tree density and sticking rate
- monitoring of the race
- establishment of a public education and habitat/tree planting scheme.

Occurrence within the Study Area

The Study Area and adjoining lands support small areas of dry forest and woodland that may provide potential habitat for the Squatter Pigeon. Preferred habitat (dry open woodland areas with sparse grass cover near permanent water) is extremely limited within the Study Area. Potential habitat for the Squatter Pigeon within the Study Area is limited to intact remnants of *Eucalyptus populnea* woodland close to stock dams and *Eucalyptus tereticornis* woodland fringing drainage lines. This species has a moderate chance of occurring nomadically within stands of *Eucalyptus populnea* and *Eucalyptus tereticornis* woodland associations found in the Study Area. Database searches returned few recent records and despite targeted surveys for this species, the Squatter Pigeon was not recorded during field surveys undertaken for this assessment.

Species specific Project impacts

Potential impacts on the Squatter Pigeon include, but are not limited to:

- removal of 4 hectares of remnant and non-remnant *Eucalyptus populnea* woodland (RE 11.3.2) and 5 hectares of remnant and non-remnant *Eucalyptus tereticornis* vegetation (REs 11.3.4 and 11.3.25) within the Study Area which is considered to be potential Squatter Pigeon habitat
- displacement of animals (particularly nesting birds) in response to temporary increased noise and vibration
- fragmentation of *Eucalyptus populnea* woodland may also increase edge effects and the risk of predation (in particular predation on chicks by feral cats and foxes)
- further establishment of feral animals which could result in mortality of chicks and/or abandonment of nests
- establishment of weeds which may result in loss of foraging and nesting habitat.

Species specific Project mitigation

Mitigation measures for the Squatter Pigeon include:

- clearing of remnant and non-remnant vegetation (REs 11.3.2, 11.3.25 and 11.3.4) within the Study Area should be minimised during design in areas of potential habitat for the Squatter Pigeon, especially sparsely grassed remnants close to permanent water sources. This will minimise the extent of potential woodland/ forest habitat cleared and minimise fragmentation of habitat

- a flora and fauna management plan will be implemented for construction and operational phases of the project and ensure the following:
  - a comprehensive clearing program is put in place that includes pre-clearing survey and fauna rescue. A trained ecologist should be present during all clearing of sensitive environmental areas
  - contractor/staff inductions on site by qualified ecologist/fauna spotter-catcher or environmental advisor are completed
  - a weed and feral animal management program is prepared for the Project
  - a monitoring program is developed and implemented to ensure the effectiveness of mitigation measures and to all adaptive changes to be made to measures should they be needed.

Commonwealth significance assessment

If present, the population of the Squatter Pigeon would not be considered an 'important population' because:

- the species was not recorded within the Study Area, despite targeted searches
- the species is partly-nomadic (Pizzey & Knight 1997) and is therefore not restricted to habitat within the Study Area
- the Study Area is not at the limit of the species' range.

Potential impacts of the construction of the Project within the Study Area on the Squatter Pigeon are evaluated using EPBC Act criteria for assessing significant impacts on listed Vulnerable species below.

Will the action lead to a long-term decrease in the size of an important population of a species?

If present within the study Area, the population of Squatter Pigeon would not be considered an important population. Although analogous habitat to that known to the species (described above) was identified throughout Study Area and targeted searches were undertaken, the Squatter Pigeon was not detected within the Study Area. The Project will require the proposed clearing of 9 hectares of remnant and non-remnant vegetation which is considered to be potential habitat for the Squatter Pigeon. This is a relatively small amount compared to the extent of similar suitable habitat available elsewhere within the Study Area and surrounds, it is unlikely this will lead to a decrease in the size of any important population of this species.

Will the action reduce the area of occupancy of an important population of a species?

If present within the study Area, the population of Squatter Pigeon would not be considered an important population. The Squatter Pigeon was not recorded within the Study Area during the field surveys and if present it is likely to be present in very low numbers. Therefore, any habitat clearing would not reduce the area of occupancy of an important population.

Will the action fragment an existing important population into two or more populations?

The Project will not fragment an important population of the Squatter Pigeon. The indicative habitat for Squatter Pigeon within the Study Area is already fragmented and some of it is highly modified as a result of anthropogenic disturbance arising from agriculture, road infrastructure and residences. These open, cleared areas already serve as barriers to the species, and so the clearing of 9 hectares of potential habitat within the Study Area may merely serve to reinforce this barrier (as opposed to creating a new barrier). Moreover, with mitigation measures such as revegetating cleared areas and weed control, any reinforcement of existing barriers to dispersal is likely to be short-term.

Will the action adversely affect habitat critical to the survival of a species

The Project will not affect habitat critical to the survival of the Squatter Pigeon. This species was not recorded during the field survey, despite targeted surveys. Habitat within the Study Area is not considered critical to the survival of the Squatter Pigeon as similar suitable woodland and open forest habitat are widespread within the Study Area and surrounding landscape.

Disrupt the breeding cycle of an important population

Considering that the Squatter Pigeon was not recorded within the Study area the Project is unlikely to disrupt the breeding cycle of an important population.

Modify, destroy or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Clearing for construction within the Study Area will result in the loss of potential foraging, nesting and roosting habitat for the Squatter Pigeon. Clearing may also result in edge effects which may affect habitat quality in areas of woodland and open forest adjoining the Study Area. This may lead to a decline of the species within the Study Area. However, given the species is partly-nomadic these impacts are unlikely to result in a significant or irreversible decline in numbers.

Establishment of harmful invasive species becoming established in the species' habitat

A number of invasive flora species and feral animals were recorded in the Study Area during field surveys for this assessment. The flora and fauna management plan will ensure the management of these species during construction and operational phases of the project.

Introduction of disease(s) that may cause the species to decline

There are no known transmissible diseases, or vectors of disease, likely to be introduced to the Study Area that would significantly affect the Squatter Pigeon.

Substantial interference with the recovery of the species

Actions for recovery of the Squatter Pigeon include defining population size and distribution of the southern race in Queensland and New South Wales, monitoring and research investigating relationship between pigeon abundance, tree density and sticking rate.

The Project is not considered to interfere substantially with the recovery of the species.

Conclusion

Although the Project will remove approximately 9 hectares of potential habitat for the Squatter Pigeon, similar habitat is widely available within the Study Area and surrounds. With the implementation of the aforementioned impact mitigation/avoidance measures, it is unlikely that Project will have a significant impact on the Squatter Pigeon.

I4.1.5 Eastern long-eared bat (*Nyctophilus sp cf timoriensis)* (eastern form)

Description

This is a moderate-sized insectivorous bat with large prominent ears, distinguished from sympatric congeners by its larger size, proportionately larger head and broad snout (Churchill 1998; Van Dyck & Strahan 2008).

Status under state (Qld) and Commonwealth legislation

The Eastern long-eared bat is listed as vulnerable under both the EPBC Act and NC Act.

Distribution

The Eastern long-eared bat's range extends across the Murray-Darling Basin, from eastern South Australia north-east to central Queensland (Van Dyck & Strahan 2008).

Habitat

The Eastern long-eared bat is known from a variety of habitats including River Red gum, Mallee, Bulloke, Box and Brigalow/Belah-dominated communities (Duncan *et al.* 1999; Van Dyck & Strahan 2008). In inland southern Queensland, the species is most abundant in open box/ ironbark/ Cypress pine *Callitris* woodland (Duncan *et al.* 1999; Van Dyck & Strahan 2008).

Ecology

Little is known of the biology of the Eastern long-eared bat. Like other long-eared bats, the species is likely to roost in tree hollows, fissures in branches or under exfoliating bark (Van Dyck & Strahan 2008).

The Eastern long-eared bat forages aerially amidst low (understorey) vegetation and may forage at ground level as well (Duncan *et al.* 1999; Van Dyck & Strahan 2008). The diet of this species comprises mainly arthropods (Van Dyck & Strahan 2008).

Mating is likely to occur in autumn with young born in late Spring and Summer (Duncan *et al.* 1999; Van Dyck & Strahan 2008). Females with young are likely to roost communally in large tree hollows during Spring and Summer (Van Dyck & Strahan 2008).

Threats

The Eastern long-eared bat is threatened by habitat loss, degradation and fragmentation (Duncan *et al.* 1999). Unlike other common sympatric *Nyctophilus* species, the Eastern long-eared bat occurs at high densities only in larger areas of intact woodland/forest habitat. Habitat fragmentation may therefore be of particular concern for this species (Duncan *et al.* 1999; Van Dyck & Strahan 2008).

Recovery actions

Recovery actions for the species identified in 'The Action Plan for Australian Bats' (Duncan *et al.* 1999) include:

- investigation of habitat requirements, roost and maternity site selection, foraging behaviour, population dynamics and threatening processes
- targeted surveys in areas where clearing is imminent
- assessing the impact of timber harvesting and related activities such as grazing on the viability of populations.

Occurrence within the Study Area

The Study Area and adjoining lands support a limited amount of potential habitat for the Eastern Long-eared Bat including *Eucalyptus tereticornis* forest, *Acacia harpophylla/Casuarina cristata* woodland and *Eucalyptus populnea* woodland. This species has a moderate likelihood of occurring in association with remnant vegetation communities supporting senescent trees. However, there were no known records of this species from the desktop assessment and despite 16 nights of harp-trapping and 9 nights of Anabat surveys; the Eastern Long-eared Bat was not recorded during field surveys undertaken for this assessment. Further the habitat within the study area is highly fragmented, which may reduce the likelihood of this species occurring.

Species specific Project impacts

Potential impacts on the Eastern Long-eared Bat include, but are not limited to:

- removal of 4 hectares of remnant and non-remnant *Eucalyptus populnea* woodland (RE 11.3.2), 5 hectares of remnant and non-remnant *Eucalyptus tereticornis* woodland (RE 11.3.25 and 11.3.4) and 1 hectares of remnant and non-remnant *Acacia harpophylla/Casuarina cristata* woodland (RE 11.9.5) within the Study Area which is considered to be potential Eastern Long-eared Bat habitat
- direct mortality through felling of trees supporting large hollows which may be used as maternity sites by the Eastern Long-eared Bat
- displacement of roosting animals in response to increased noise and vibration, especially in vicinity of construction and mining areas
- fragmentation of woodland and open forest.

Species specific Project mitigation

Mitigation measures for the Eastern Long-eared Bat include:

- clearing of remnant and non-remnant vegetation (REs 11.3.2, 11.3.25, 11.9.5 and 11.3.4) within the Study Area should be minimised during design in areas of potential habitat for the Eastern Long-eared Bat, especially those remnants supporting senescent trees. This will minimise the extent of potential woodland/ forest habitat cleared and minimise fragmentation of habitat
- revegetation/rehabilitation of cleared areas not necessary for operation of the pipeline (including the provision of bat roost boxes)

- A flora and fauna management plan will be implemented for construction and operational phases of the Project and ensure the following:
  - a comprehensive clearing program is put in place that includes pre-clearing survey and fauna rescue in sensitive ecological areas. A trained ecologist to be present during all clearing of sensitive environmental areas
  - contractor/staff inductions on site by qualified ecologist/fauna spotter-catcher or environmental advisor relating to ecologically sensitive areas are completed
  - a weed and feral animal management program is prepared for the Project
  - a monitoring program is developed and implemented to ensure the effectiveness of mitigation measures and to all adaptive changes to be made to measures should they be needed.

Significance assessment

If present, the population of the Eastern Long-eared Bat would not be considered an 'important population' because:

- the species was not recorded within the Study Area, despite targeted searches
- there is no established breeding population that relies on maternity resources within the site for breeding or dispersal
- the populations of the species that may potentially forage in the area are not restricted to the habitat within the site due to the species large home range. Therefore the genetic diversity of the species can still be maintained by interbreeding with other populations throughout the wider area.

Potential impacts of the construction and operations of the Project within the Study Area on the Eastern Long-eared Bat are evaluated using EPBC Act criteria for assessing significant impacts on listed Vulnerable species below.

Will the action lead to a long-term decrease in the size of an important population of a species?

If present within the Study Area, a population of the Eastern Long-eared Bat would not be considered an important population. Although analogous habitat to that known to the species (described above) was identified throughout Study Area and targeted surveys were undertaken, the Eastern Long-eared Bat was not detected within the Study Area and no known records of this species were identified from the desktop assessment. The Project will require the proposed clearing of 10 hectares of remnant and non-remnant vegetation which is considered to be potential habitat for the Eastern Long-eared Bat. However most of this habitat is highly fragmented and does not represent core habitat for the species.

Will the action reduce the area of occupancy of an important population of a species?

If present within the Study Area, a population of the Eastern Long-eared Bat would not be considered an important population. The Eastern Long-eared Bat was not recorded within the Study Area. Therefore, any habitat clearing would not reduce the area of occupancy of an important population. The clearing of woodland containing hollow bearing trees will reduce the extent of potential roosting habitat available to the Eastern Long-eared Bat but this is unlikely to cause the species to decline.

Will the action fragment an existing important population into two or more populations?

The Project will not fragment an important population of the Eastern Long-eared Bat. The indicative habitat for Eastern Long-eared Bat within the Study Area is already fragmented and some of it is highly modified as a result of anthropogenic disturbance arising from agriculture and road infrastructure. Additionally, proposed vegetation clearing for the pipeline easement is a 20 metre wide corridor and given the species is highly mobile, the Project is unlikely to further create a barrier for this species. The Eastern Long-eared Bat which may potentially occur within the Study Area would not be considered an important population.

Will the action adversely affect habitat critical to the survival of a species

The Project will not affect habitat critical to the survival of the Eastern Long-eared Bat. There is a paucity of database records and this species was not recorded during the field surveys completed for this assessment, despite targeted surveys. Habitat within the Study Area is not considered critical to the survival of the Eastern Long-eared Bat as similar suitable woodland and open forest habitat are widespread within the Study Area and surrounding landscape. Not critical habitat has been listed for this species.

Disrupt the breeding cycle of an important population

Considering that the Eastern Long-eared Bat was not recorded within the Study area, the Project is unlikely to disrupt the breeding cycle of an important population.

Modify, destroy or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Clearing for construction within the Study Area will result in the short-term loss of potential foraging and roosting habitat for the Eastern Long-eared Bat. Clearing may also result in edge effects which may affect habitat quality in areas of woodland and open forest adjoining the Study Area. In the short-term, this may lead to a decline of the species within the Study Area. However, given the species is mobile these impacts are unlikely to result in a significant or irreversible decline in numbers.

Establishment of harmful invasive species becoming established in the species' habitat

A number of invasive flora species and feral animals were recorded in the Study Area during field surveys for this assessment. The flora and fauna management plan will ensure the management of these species during construction and operational phases of the Project.

Introduction of disease(s) that may cause the species to decline

There are no known transmissible diseases, or vectors of disease, likely to be introduced to the Study Area that would significantly affect the Eastern Long-eared Bat.

Substantial interference with the recovery of the species

The Project is unlikely to interfere with the recovery of the Eastern Long-eared Bat.

Conclusion

Although the Project will remove approximately 10 hectares of potential habitat for the Eastern Long-eared Bat, similar habitat is widely available within the Study Area and

surrounds. With the implementation of the aforementioned impact mitigation/avoidance measures, it is unlikely that Project will have a significant impact on the Eastern Long-eared Bat.

I4.1.6 Satin Flycatcher (*Myiagra cyanoleuca*)

Description

This is a small flycatcher with dark upper- and light underparts. The common name alludes to the glossy blue-black head plumage of male birds.

Status under State (Qld) and Commonwealth legislation

The Satin Flycatcher is listed as a Migratory species under the EPBC Act. It is not listed under State (QLD) legislation.

Distribution

The Satin Flycatcher occurs along Australia's eastern seaboard, from Tasmania north to Torres Strait (Higgins *et al.* 2006). It is also known from scattered sites in Papua New Guinea and nearby offshore islands. It is generally restricted to coastal and near-coastal areas.

Habitat

The Satin Flycatcher is most commonly associated with eucalypt forest, particularly wet sclerophyll forest (Higgins *et al.* 2006). The species is also known to occur in open grassy eucalypt woodland and is often associated with gullies and watercourses ((Higgins *et al.* 2006). It is largely absent from regrowth vegetation (Higgins *et al.* 2006).

Ecology

The Satin Flycatcher breeds mainly in south-east Australia during spring and summer, migrating north in autumn; though there are some breeding records from northern and central Eastern Queensland (Higgins *et al.* 2006). The species forages mainly in trees, feeding on arthropods (Higgins *et al.* 2006). It breeds in summer and spring and nests in the outer branches of tall eucalypt trees (Higgins *et al.* 2006).

Threats

Populations in south-east Australia have been reduced by clearing and logging of eucalypt forests (Higgins *et al.* 2006).

Recovery actions

No actions have been identified for the recovery of this species nationally or in Queensland.

Occurrence within the Study Area

The Study Area supports large areas of *Eucalyptus populnea* woodland and *Eucalyptus tereticornis* woodland fringing drainage lines which may provide habitat suitable for the Satin Flycatcher. Though not recorded during surveys undertaken for this assessment, the Satin Flycatcher has previously been recorded from the Study Area. The Study Area falls within the western range limit for this species and hence can be considered important habitat as defined under the EPBC Act Policy Statement 1.1 Significant Impact Guidelines.

Species specific Project impacts

Potential impacts on the Satin Flycatcher include, but are not limited to:

- removal of 4 hectares of remnant and non-remnant *Eucalyptus populnea* woodland (RE 11.3.2) and 3 hectares of remnant *Eucalyptus tereticornis* (RE 11.3.25) vegetation within the Study Area which is considered to be potential Satin Flycatcher habitat
- displacement of animals (particularly nesting birds) in response to increased noise and vibration
- fragmentation of *Eucalyptus tereticornis* and *Eucalyptus populnea* woodland may also increase edge effects and the risk of predation
- establishment of weeds.

Species specific Project mitigation

Mitigation measures for the Satin Flycatcher include:

- clearing of remnant and non-remnant vegetation (REs 11.3.2 and 11.3.25) within the Study Area should be minimised during design in areas of potential habitat for the Satin Flycatcher.

Assessment of impacts (Migratory species)

Impacts of the Project on the Satin Flycatcher are evaluated using EPBC Act criteria for assessing significant impacts on listed Migratory species below.

Will the action substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?

The Project will not substantially modify, destroy or isolate an area of important habitat for the Satin Flycatcher. While the Project may remove 7 hectares of potential habitat for the Satin Flycatcher within the Study Area, there is extensive suitable habitat available elsewhere throughout the region. Given the mobility of the species it is unlikely that areas of potential habitat will be isolated as a result of the Project.

Will the action result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?

The Project will not result in any invasive species that is harmful to the Migratory species becoming established in an area of important habitat for the species. The Study Area already contains invasive weeds and pest animals.

Will the action seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?

The Project will not seriously disrupt the breeding, feeding, migration or resting behaviour of an ecologically significant proportion of the population of the Satin Flycatcher as this species is widespread across Eastern Australia (Pizzey & Knight 1997). Suitable habitat for breeding, feeding or resting exists extensively in the region.

Outcome

The Project is unlikely to have a significant impact on the Migratory Satin Flycatcher as suitable habitat for this species is highly abundant in the region.

I4.2 Significance assessments for State-listed threatened fauna

While there is no standard methodology for assessing the significance of impacts on Threatened species and communities in Queensland listed under the NC Act or VM Act, for this assessment the significance of likely impacts were assessed using the criteria outlined below:

- will areas of high conservation value for the species or community be affected? (Question a)
- do individual animals and/or plants and/or subpopulations that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community? (Question b)
- do habitat features that are likely to be affected by the Project play an important role in maintaining the long-term viability of the species, population or ecological community? (Question c)
- are the duration of impacts for the species or community long-term? (Question d)
- are the impacts for the species or community permanent and irreversible? (Question e)

These factors for consideration are addressed in Table I-2.

Table I-2: Assessment of significance for state-listed Threatened fauna likely to occur in the Study Area

Species	Significance assessment question				
	a)	**b)**	**c)**	**d)**	**e)**
Dunmall's Snake (*Furina dunmalli*)	-species not recorded during survey -no important habitat present	-species not recorded during survey	-species not recorded during survey -species would not be restricted to habitat found within the Study Area	Potential impacts from loss of habitat are not long-term. The extent of habitat removal is small and the habitat is of poor quality in relation to habitat available in the local area and region. Cleared areas for the southern CSM pipeline will be revegetated and rehabilitated following construction.	Potential impacts resulting from loss of habitat during construction of the pipeline are not permanent and irreversible, and are therefore not considered to be significant.

Species	Significance assessment question				
	a)	b)	c)	d)	e)
Yakka skink (*Egernia rugosa*)	-species not recorded during survey -no important habitat present	-species not recorded during survey	-species not recorded during survey -species would not be restricted to habitat found within the Study Area	Potential impacts from loss of habitat are not long-term. The extent of habitat removal is small and the habitat is of poor quality in relation to habitat available in the local area and region. Cleared areas for the southern CSM pipeline will be revegetated and rehabilitated following construction.	Potential impacts resulting from loss of habitat during construction of the pipeline are not permanent and irreversible, and are therefore not considered to be significant.
Brigalow Scaly-foot (*Paradelma orientalis*)	-species recorded during survey -no important habitat present -suitable habitat is widespread within the Study Area and surrounds	-species recorded in low density (2 isolated individuals) and is not considered an 'important' population	-the Study Area contains important habitat features but these are commonly available in the surrounding landscape	Potential impacts from loss of habitat are not long-term. The extent of habitat removal is small and the habitat is of poor quality in relation to habitat available in the local area and region. Cleared areas for the southern CSM pipeline will be revegetated and rehabilitated following construction.	Potential impacts resulting from loss of habitat during construction of the pipeline are not permanent and irreversible, and are therefore not considered to be significant.

Species	Significance assessment question				
	a)	b)	c)	d)	e)
Squatter Pigeon (southern race) (*Geophaps scripta scripta*)	-species not recorded during survey -no important habitat present	-species not recorded during survey	-species not recorded during survey -species would not be restricted to habitat found within the Study Area	Potential impacts from loss of habitat are not long-term. The extent of habitat removal is small and the habitat is of poor quality in relation to habitat available in the local area and region. Cleared areas for the southern CSM pipeline will be revegetated and rehabilitated following construction.	Potential impacts resulting from loss of habitat during construction of the pipeline are not permanent and irreversible, and are therefore not considered to be significant.
Powerful Owl (*Ninox strenua*)	-species not recorded during survey -no important habitat present	-species not recorded during survey	-species not recorded during survey -nesting sites not detected during survey -species would not be restricted to habitat found within the Study Area	Potential impacts from loss of habitat are not long-term. The extent of habitat removal is small and the habitat is of poor quality in relation to habitat available in the local area and region. Cleared areas for the southern CSM pipeline will be revegetated and rehabilitated following construction.	Potential impacts resulting from loss of habitat during construction of the pipeline are not permanent and irreversible, and are therefore not considered to be significant.

Species	Significance assessment question				
	a)	b)	c)	d)	e)
Glossy Black-cockatoo (*Calyptorhynchus lathami)*	-species recorded during survey, however were not recorded using tree hollows for breeding -no important habitat present and *Casuarina/ Allocasuarina* feed trees are distributed throughout the Study Area and surrounds	-species recorded in low density (2 foraging individuals) and is not considered a viable population - a highly mobile species that is not at its distributional limit	-species is not restricted to habitat found within the Study Area	Potential impacts from loss of habitat are not long-term. The extent of habitat removal is small and the habitat is of poor quality in relation to habitat available in the local area and region. Cleared areas for the southern CSM pipeline will be revegetated and rehabilitated following construction.	Potential impacts resulting from loss of habitat during construction of the pipeline are not permanent and irreversible, and are therefore not considered to be significant.
Eastern Long-eared Bat (*Nyctophilus timoriensis*)	-species not recorded during survey -no important habitat present	-species not recorded during survey -no established breeding population identified within Study Area	-species not recorded during survey -no established breeding population that relies on maternity resources identified within Study Area -species would not be restricted to habitat found within the Study Area	Potential impacts from loss of habitat are not long-term. The extent of habitat removal is small and the habitat is of poor quality in relation to habitat available in the local area and region. Cleared areas for the southern CSM pipeline will be revegetated and rehabilitated following construction.	Potential impacts resulting from loss of habitat during construction of the pipeline are permanent and irreversible, but are not considered to be significant.

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Attachment J

Matters of National Environmental Significance – Summary

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J1. Introduction

Matters of National Environmental Significance (MNES) are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Details of MNES and the potential impact of the proposed pipeline are covered in detail in Volume 2 Chapter 17(a) and the Technical Report (in particular sections 5.1 and Appendix I).

However for ease of reference, this attachment summarises the information relevant to MNES, exclusively addresses the matters of NES in the proposed pipeline study area and the relevant controlling provisions, describes how the proposed pipeline is likely to impact on those matters of NES and proposes relevant mitigation measures to manage those impacts.

In June 2008, the WJV referred the Project to the Australian Government Minister for the Environment, Water, Heritage and the Arts under the EPBC Act as four inter-related EPBC Referrals addressing:

- the mine and infrastructure (EPBC 2008/4284)
- CSM (South) water supply pipeline (EPBC 2008/4287)
- CSM (West) water supply pipeline (EPBC 2008/4283)
- Glebe Weir raising and pipeline. (EPBC 2008/4285).

On 21 July 2008, the Minister determined that all four referrals were controlled actions.

This attachment covers the potential impact of the CSM (South) water supply pipeline on relevant matters of NES (EPBC 2008/4287). The controlling provisions relevant to the mine and infrastructure, CSM (West) Option and Glebe Option are covered in Volumes 1, 3 and 4 of the EIS respectively.

J1.1 Relevant controlling provisions

The controlling provisions of the EPBC Act that were determined to be relevant to the proposed pipeline are:

- Sections 18 and 18A (listed threatened species and ecological communities).

In particular, the decision letter indicated that the project was likely to have a significant impact because it involves habitat fragmentation and habitat degradation through weed invasion and clearing of threatened ecological communities.

Section 18 of the EPBC Act prohibits actions that have or will have, or are likely to have a significant impact on listed threatened species, critically endangered species, endangered species, vulnerable species, critically endangered communities or endangered communities unless an approval for the taking of the action is in operation under Part 9 of the EPBC Act. Section 18A provides that it is an offence to take an action that results, or will result, in a significant impact on a listed threatened species or ecological community.

J2. Matters of national environmental significance

This section addresses the MNES considered in the assessment and the likelihood of their occurrence in the study area. While all MNES are covered, a particular focus is threatened species and communities (the controlling provisions).

The EPBC Act identifies seven MNES:

- World Heritage properties
- National heritage places
- wetlands of international importance (Ramsar wetlands)
- threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- nuclear actions (including uranium mining).

Matters of National Environmental Significance relating to biodiversity are discussed below in relation to the proposed pipeline based on the results of the EPBC Protected Matters Search Tool (Department of the Environment Water Heritage and the Arts 2008), desktop review of databases and literature and the results of field surveys.

Details of the methods used to collect data are presented in Chapter 3 of this Technical Report, while the detailed description of the ecological environment is presented in Chapter 4. Reference to specific figures and chapters are made throughout this attachment.

J2.1 Threatened ecological communities

Three Threatened ecological communities listed under the EPBC Act are known or predicted to occur in the Study Area:

- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

No Regional Ecosystems (RE) or regrowth vegetation characteristic of Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions or White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland were identified in the Study Area (refer Section 4.4 of the Technical Report). However vegetation characteristic of Brigalow (*Acacia harpophylla* dominant and co-dominant) was recorded and is described below.

J2.1.1 Brigalow (*Acacia harpophylla* dominant and co-dominant)

Brigalow (*Acacia harpophylla* dominant and co-dominant) corresponded with remnant RE 11.9.5 in the Study Area. The listing of Brigalow (*Acacia harpophylla* dominant and co-dominant) under the EPBC Act does not automatically dismiss non-remnant vegetation, rather species composition and structural elements typical of that found in undisturbed areas of the listed Brigalow are determining factors. Four field-mapped polygons of RE 11.9.5 possessed were considered to be consistent with the definition of the Endangered ecological community. Additional Brigalow regrowth between Giligulgul and Fosters Road may also be consistent with the definition of the Endangered ecological community however this section of the proposed pipeline was not assessed during the winter field surveys (refer Section 4.4, Figure 5.1 and Attachment E of the Technical Report).

RE 11.9.5 *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks

RE 11.9.5 *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks (Land Zone 9) occurred infrequently as non-remnant vegetation within the Study Area. Remnant patches of this RE were recorded within the Study Area along Giligulgul Road and along the Leichhardt Highway. Several small areas of non-remnant 11.9.5 were also defined during the field verification within the central and northern extents of the Study Area, with these occurring primarily as sparse to mid-dense, mid-mature regrowth and low fragmented regrowth within respective road reserves. RE 11.9.5 also occurred in private landholdings in small fragmented patches of regrowth consisting of retained woodlots, cattle camps or stunted shrubby regrowth in ploughed paddocks. Access to some properties between Fosters Road and Giligulgul was not possible during the winter survey period and have therefore been inferred from EPA mapping (2005) and satellite imagery interpretation. These areas will be verified during subsequent seasonal surveys.

Canopy: *Acacia harpophylla* and *Casuarina cristata* dominated the canopy, with associated *Brachychiton rupestris* and *Eucalyptus populnea* occurring infrequently and generally restricted to the periphery of the community. The highly variable median height possessed a range of 8 to 16 m.

Mid-stratum: Due to the broad canopy height range of this RE, the mid- stratum was found to be dominated either by juvenile canopy species or comprised of *Alectryon diversifolius* and *Geijera parviflora*, with associated *Apophyllum anomalum* (Warrior Bush), *Psydrax oleifolium, Santalum lanceolatum, Capparis mitchellii*, *Lysiphyllum carronii* and/or *Elaeodendron australe* var*. integrifolium.* The low shrub layer, where present, was generally dominated by *G. parviflora, Capparis lasiantha* (Nipan)*, Jasminum didymium* ssp*. racemosum* (no common name) and/or *Carissa ovata.*

Ground layer: The sparse ground layer was limited by the presence of a mid-dense to dense leaf litter. It was dominated by *Chloris divaricata, Enteropogon acicularis* and **Cenchrus ciliaris,* with associated *Einadia* spp*., Paspalidium caespitosum* (Brigalow Shot Grass), *Rhagodia gaudichaudiana*, *Tetragonia tetragonoides, Salsola kali* and **Emex australis* (Spiny Emex).

Condition: This community consisted primarily of regrowth *A. harpophylla*, with evidence of thinning and use by cattle on private landholdings and in some cases within the road

reserve. Small patches showed evidence of degradation from edge effects and *Amyema spp.* (mistletoes) were occasionally prevalent within the upper strata. Mature **Opuntia tomentosa* were encountered commonly within this vegetation type.

Remnant status: Only four field-mapped polygons of RE 11.9.5 potentially possessed the height, cover and population size characteristics which were favourable for consideration of remnant status. The remainder of field-mapped RE 11.9.5 polygons consisted of regrowth vegetation (most likely of less than fifteen years of age) or fragmented/thinned populations in which the mid-stratum facilitates the ecological dominant layer.

J2.2 Threatened species

Details of all species recorded in the study area are presented in Chapter 4 of the Technical Report. Species lists and habitat information are presented in Attachments B-H.

Twenty Threatened species of plant and sixteen Threatened species of animal listed under the EPBC Act have the potential to occur within the Study Area and surrounds based on the Protected Matters Search Tool (Department of the Environment Water Heritage and the Arts 2008) (see Table J-1, Attachments G and H).

Table J-1: EPBC Act listed Threatened species predicted to occur in the Study Area

Name	Conservation status[1]	Likelihood of occurrence
Plants		
Acacia chinchillensis	V	Moderate
Acacia curranii	V	Moderate
Acacia handonis	V	Moderate
Acacia lauta	V	Moderate
Acacia wardellii	V	Low
Bothriochloa biloba	V	Low
Cadellia pentastylis	V	Low
Calytrix gurulmundensis	V	Moderate
Commersonia sp. *Cadarga*	V	Low
Denhamia parvifolia	V	Low
Digitaria porrecta	E	Low
Diuris tricolor	V	Low
Eucalyptus argophloia	V	Low
Eucalyptus virens	V	Low
Homopholis belsonii	V	Moderate
Homoranthus decumbens	V	Moderate

Name	Conservation status[1]	Likelihood of occurrence
Philotheca sporadica	V	Low
Pterostylis cobarensis	V	Low
Stemmacantha australis	V	Low
Westringia cheelii (syn. *W. parvifolia*)	V	Moderate
Mammals		
Grey-headed Flying-Fox	V	Low
Large-eared Pied Bat (*Chalinolobus dwyeri*)	V	Low
Eastern Long-eared Bat (*Nyctophilus timoriensis*)	V	Moderate
Birds		
Australian Painted Snipe (*Rostratula australis*)	V	Low
Black-breasted Button-quail (*Turnix melanogaster*)	V	Low
Squatter Pigeon (southern race) (*Geophaps scripta scripta*)	V	Moderate
Red Goshawk (*Erythotriorchis radiatus*)	V	Low
Swift Parrot (Lathamus discolour)	E	Low
Star Finch (*Neochmia ruficauda ruficauda*)	E	Low
Reptiles		
Fitzroy Tortoise (*Rheodytes leukops*)	V	Low
Collared Delma (*Delma torquata*)	V	Low
Grassland Earless Dragon (*Tympanocryptis pinguicolla*)	E	Low
Brigalow Scaly-foot (*Paradelma orientalis*)	V	Recorded
Five-clawed Worm Skink (*Anomalopus mackayi*)	V	Low
Yakka Skink (*Egernia rugosa*)	V	Moderate
Dunmall's Snake (*Furina dunmalli*)	V	Moderate

1. Conservation status. E = Endangered, V = Vulnerable (*EPBC Act*)

Eight Threatened species of plant were assessed to have a moderate likelihood-of-occurrence in the study area. Further targeted surveys are required to detect these species if present within the Study Area, but a precautionary approach has been taken.

The Vulnerable Brigalow Scaly-foot (*Paradelma orientalis*) was the only EPBC Act listed Threatened species of animal detected during the surveys undertaken for this assessment (see Figure 5-1). One adult of this species was captured at Site 1 residing under a rubber car tyre within a tract of Dry Eucalypt Forest on the southern side of Gurulmundi (see Figure 5-1 of the Technical Report). This species is likely to occur sporadically throughout

the Study Area where microhabitat features including but not limited to deep litter and abundant log cover occur.

The following Threatened species of animal listed under the EPBC Act were considered to have a moderate or high likelihood of occurring within the Study Area based on the presence of suitable roosting, foraging or breeding habitat:

- Dunmall's Snake (*Furina dunmalli*)
- Yakka Skink (*Egernia rugosa*)
- Squatter Pigeon (southern race) (*Geophaps scripta scripta*)
- Greater Long-eared Bat (*Nyctophilus timoriensis*).

J2.2.1 Migratory species

Migratory species listed under the EPBC Act are those protected under international agreements to which Australia is a signatory. These include the *Japan Australia Migratory Bird Agreement* (JAMBA), the *China Australia Migratory Bird Agreement* (CAMBA) and the *Bonn Convention on the Conservation of Migratory Species of Wild Animals*.

One species of bird, the Great Egret (*Ardea alba*) recorded within the Study Area is recognised under the migratory provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (see Attachment F). This species was recorded on two occasions from dams located near Nine Mile Creek and at a *Eucalyptus populnea* (Poplar Box) – *Eucalyptus tereticornis* (Queensland Blue Gum) depression north of Kowguran. No nests consistent with this species were recorded during the survey. This species displays nomadic habits with numbers probably fluctuating according to seasonal conditions. It would be expected to occur along Dogwood Creek where birds are likely to occasionally congregate.

A further 14 Migratory species were predicted to occur in the wider Study Area and surrounds based on the Department of the Environment, Water, Heritage and the Arts Protected Matters Search Tool (see Attachment C).

Although one Migratory species of bird was recorded and other Migratory species of bird may potentially utilise resources in the Study Area, the Study Area is not considered 'important habitat' as defined under the *EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines* (Department of the Environment and Heritage 2006), in that the Study Area does not contain:

- habitat used by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- habitat used by a migratory species that is at the limit of the species range
- habitat within an area where the species is declining.

It is therefore unlikely that the proposal would significantly affect Migratory species predicted to occur within the Study Area. As such, significant assessments for these species are considered unnecessary, with the exception of the Satin Flycatcher (*Myiagra cyanoleuca*). The Study Area occurs within the western limit of the distributional range for this species and, consequently, habitat for this species within the Study Area would be considered important habitat as defined under the EPBC Act. Though not recorded within the Study

Area during surveys, the species has been previously recorded within the Study Area and surrounds (see Attachment C). Subsequently an impact assessment was undertaken for this species (see Attachment I).

J2.3 World heritage properties

World heritage properties include sites of both cultural and/or environmental heritage that are either:

- an Australian property on the World Heritage List kept under the World Heritage Convention, or
- a property declared to be a World Heritage property by the Commonwealth Environment Minister.

No records of world heritage properties listed under the EPBC Act were identified from the Protected Matters Search Tool in the study area and surrounds.

Consideration has been given to the potential impacts of the proposed pipeline on The Great Barrier Reef, the world's largest World Heritage Area. While the proposed pipeline may affect water quality and/or flow along waterways within and immediately adjacent to the study area, it is unlikely these impacts would extend far enough to have any significant impacts on The Great Barrier Reef, either direct or indirect.

J2.4 Ramsar wetlands

The CSM Water Supply South Referral Area spans across two broad catchments that include wetlands of international significance. The northern extents are located in the same catchment as Shoalwater and Corio Bay Areas, a declared Ramsar site. However, this site is located over 400 km downstream and it is not envisioned that the project will impact on this wetland. The CSM Water Supply South Referral Area is located within the catchment of the Narran Lake Nature Reserve. This lake is over 600 km south-east of the project area

While the proposed pipeline may affect water quality and/or flow along waterways within and immediately adjacent the study area, it is unlikely these impacts would extend far enough downstream to affect the aforementioned Ramsar sites, either directly or indirectly.

J2.5 National Heritage Places

There are no national heritage places located near the Mine and Infrastructure Referral Area. The nearest national heritage places include the Gondwana rainforests of eastern Australia, the Great Barrier Reef and the wet tropics of Queensland.

Consideration has been given to the potential impacts of the proposed pipeline on The Great Barrier Reef, the world's largest World Heritage Area. While the proposed pipeline may affect water quality and/or flow along waterways within and immediately adjacent to the study area, it is unlikely these impacts would extend far enough to have any significant impacts on The Great Barrier Reef, either direct or indirect.

J2.6 Commonwealth marine areas

The proposed pipeline is not located near any Commonwealth marine area.

J2.7 Nuclear actions

The proposed pipeline does not include any nuclear actions.

J3. Likely impacts of the proposed pipeline on matters of national environmental significance

The relevant controlled action for the matters of NES under the EPBC Act is the construction and operation of the mine and related infrastructure, as described in Chapters 5 and 6 of this EIS (Volume 2). Details of the impacts of the project are described in Chapter 6 of this Technical Report. Given the nature of the MNES present in the study area, it is considered that the following impacts are likely to occur:

- loss of vegetation and habitats
- further habitat fragmentation
- new edge effects
- direct mortality of individuals
- increased noise and dust
- cumulative impacts.

By far the greatest impact will result from the loss of vegetation and habitat (refer Table J-2). Other impacts mentioned in the decision on referral letter were habitat fragmentation and weeds. These are discussed below.

J3.1 Vegetation and habitat clearing

The proposed pipeline will result in a total extent of vegetation clearing of 85.7 ha (Table J-2). This will include 0.6 ha of Brigalow (*Acacia harpophylla* dominant and co-dominant). Vegetation may also provide potential habitat for a range of threatened species.

The vegetation in the Study Area that will be affected by vegetation clearing has potential to provide habitat for 21 Rare or Threatened species of plant and. The majority of the Rare and Threatened species of plant are likely to occur in the vegetation referred to as the Gurulmundi Special Area under the Biodiversity Planning Assessment (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002) which comprises Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway.

Vegetation clearing will also directly affect habitat of the 15 Rare or Threatened species of animal known or likely to occur in the Study Area and surrounds. Three rare and Threatened species of animal were detected in the Study Area during the winter survey period. Impacts to fauna habitats are also likely to be most significance in the vicinity of the Gurulmundi Special Area which is identified as a State Wildlife Corridor and also consists of large areas of essential habitat for priority taxa.

The potential impact to these biodiversity values resulting from vegetation clearing has been reduced by following the existing clearing along roads and easements.

Table J-2: Extent of vegetation clearing relating to MNES

RE code	Remnant status		Total (ha)
	Remnant (ha)	Non-remnant (ha)	
11.3.2	2.1	1.4	3.5
11.3.4	1.3	0.7	2.0
11.3.25	2.7	0.0	2.8
11.5.1	6.9	10.6	17.5
11.5.1A	4.0	6.2	10.2
11.5.4	2.7	3.4	6.2
11.5.21	2.7	0.7	3.4
11.7.2	1.7	0.0	1.7
11.7.4	2.5	0.0	2.5
11.7.6	9.1	3.9	13.1
11.7.7	11.4	0.6	12.1
11.9.5*	**0.6**	0.4	1.0
11.10.7	8.0	1.8	9.9
Total	**55.8**	**30.0**	**85.7**

*in the study area only the remnant vegetation meets the condition definition of the Brigalow endangered ecological community under the EPBC Act

J3.2 Habitat fragmentation

Habitat fragmentation is the division of a single area of habitat into two or more smaller areas, with the occurrence of a new habitat type in the area between the fragments (Andren 1994; Ford *et al.* 2001). This new dividing habitat type is often artificial and inhospitable to the species remaining within the fragments. Although the newly created habitat is generally used by some species, those species are usually generalists and are often considered aggressive further decreasing population levels of the species remaining in the fragments. In addition to the loss of total habitat area, the process of fragmentation can impact on species within the newly created fragments in a number of ways, including barrier effects, genetic isolation and edge effects. The degree to which these potential impacts affect the flora and fauna within the newly created fragments depends on a number of variables, including distance between the fragments, local environmental conditions, the species present and mitigation measures. Some of the potential impacts are summarised below:

- **Barrier effects:** Barrier effects occur where particular species are either unable or unwilling to move between suitable areas of fragmented habitat. This could result in either a complete halt to movement or reduced level of movement between fragments.
- **Genetic Isolation:** Genetic isolation occurs where individuals form a population within one fragment are unable to interbreed with individuals from populations in adjoining fragments. Genetic isolation can lead to inbreeding and genetic drift problems for populations isolated within a fragment.

- **Edge effects:** Edge effects are where a zone of changed environmental conditions (i.e. altered light levels, wind speed and/or temperatures) occurs along the edges of habitat fragments.

Cleared areas present a barrier to the movement of some species that occur in woodland habitats (Bennett & Radford 2004; Radford & Bennett 2007). The alignment will however generally following existing clearings through larger patches of woodland and forest habitat such as roads and power line easement. As such, it will not result in new or increased fragmentation of habitats in most of the Study Area.

J3.3 Weeds and pest species

Twenty-nine species of weed were recorded in the Study Area (see Attachment E). Amongst these were three declared plants as listed under the *Land Protection (Pest and Stock Route Management) Act 2002* (see Table 4-3 of the Technical Report).

The construction and operation of the proposed pipeline has the potential to disperse weeds into areas of remnant vegetation where weed species are currently limited. The most likely causes of weed dispersal associated with the proposal would include earthworks, movement of soil and attachment of seed (and other propagules) to vehicles and machinery. This may, in turn, reduce the habitat quality of the sites for Threatened species.

Twelve species of introduced animals were recorded in the Study Area (see Table 6-2 of the Technical Report). Amongst these were five declared pest species listed under the *Land Protection (Pest and Stock Route Management) Act 2002*. These pest species are all listed under Class 2, which are pests that are established in Queensland and have, or could have, a substantial adverse economic, environmental or social impact. Management of these pests requires coordination and they are subject to programs led by local government, community or landowners. Landowners must take reasonable steps to keep land free of Class 2 pests.

It is likely that the pest species recorded in the Study Area already exist in vegetation and habitats surrounding the Study Area, as such the proposal is unlikely to result in the further establishment of pest species into areas where they are currently limited. However, the dispersion of these species may result on increase predation or competition pressures on native wildlife in area into which they re-establish during construction.

J3.4 The significance of the impacts

Impacts on threatened species and communities listed under the EPBC Act are required to be assessed following the *Significant Impact Guidelines*. Detailed significance assessments for these communities and species are included in Attachment I of this Technical Report.

It is acknowledge that field surveys were undertaken at a sub-optimal time of year (late winter) for detection of many species of plant and animal and that some sections of the Study Area were not accessed during this survey period. As such, seasonal surveys are proposed to increase the likelihood of detecting Threatened species if they are present in the Study Area, and define the size of the local population and extent of their habitat in the Study Area. The conclusions of the impact assessments will therefore be reviewed and revised if necessary following the seasonal surveys.

For many of the Threatened species considered likely to occur, a local population would be considered an important population in accordance with the definition under the EPBC Act if they were recorded in the Study Area. This would apply particularly to plants that occur in the Gurulmundi Special Area, the state wildlife corridors or areas mapped as essential habitat for priority taxa under the Biodiversity Planning Assessment (Environmental Protection Agency 2002). As such, if detected during further surveys, direct impacts to these species are likely to change the conclusions of the significant assessments.

A summary of significance assessments undertaken for threatened biodiversity is provided below in Table J-3. The impact assessments conclude that the proposed pipeline is not likely to have a significant impact on threatened species or communities, nor would it interfere with their recovery, assuming suitable mitigation measures are put in place.

Table J-3: Summary of threatened biodiversity for which significance assessments were undertaken and their likelihood of being significantly affected by the proposed pipeline

Name	EPBC Act Status	Likely to be significantly affected	Reason for the outcome
Ecological communities			
Brigalow (*Acacia harpophylla* dominant co-dominant)	E	No	Small extent to be affected in Study Area (<1 ha)
Plants			
Westringia cheelii	V	No	Not recorded therefore size and extent of population likely to be limited.
Acacia barakulensis	—	No	Not recorded therefore size and extent of population likely to be limited.
Acacia curranii	V	No	Not recorded therefore size and extent of population likely to be limited.
Acacia handonis	V	No	Not recorded therefore size and extent of population likely to be limited.
Calytrix gurulmundensis	V	No	Not recorded therefore size and extent of population likely to be limited.
Eucalyptus pachycalyx subsp. waajensis	—	No	Not recorded therefore size and extent of population likely to be limited.
Homoranthus decumbens	V	No	Not recorded therefore size and extent of population likely to be limited.
Micromyrtus carinata	—	No	Not recorded therefore size and extent of population likely to be limited.
Micromyrtus patula	—	No	Not recorded therefore size and extent of population likely to be limited.
Homopholis belsonii	V	No	Not recorded therefore size and extent of population likely to be limited.

Name	EPBC Act Status	Likely to be significantly affected	Reason for the outcome
Reptiles			
Brigalow Scaly-foot (*Paradelma orientalis*)	V	No	Low density of animals recorded (1) and similar suitable habitat available in the surrounding landscape
Yakka Skink (*Egernia rugosa*)	V	No	Not recorded within Study Area and no important habitat present
Dunmall's Snake (*Furina dunmalli*)	V	No	Not recorded within Study Area and no important habitat present
Birds			
Squatter Pigeon (southern race) (*Geophaps scripta scripta*)	V	No	Not recorded within Study Area and no important habitat present
Satin Flycatcher (*Myiagra cyanoleuca*)	M	No	Not recorded within Study Area and no important habitat present
Mammals			
Eastern Long-eared Bat (*Nyctophilus timoriensis*)	V	No	Not recorded within Study Area and no important habitat present

J4. Mitigation relating to matters of national environmental significance

Mitigation measures relating to biodiversity, and hence the controlling provisions, are presented in Chapter 7 of the Technical Report, and summarised below.

J4.1 Avoiding environmental impacts on MNES

Avoiding environmental impacts has been considered where possible throughout the route selection, planning and preliminary design phases. Following the field surveys for this assessment, sections of Gearys Lane were also found to be unformed and vegetated with remnant vegetation, as such the route was modified to follow an existing power line easement approximately 1 km south of Gearys Lane. There will also be ongoing opportunities to further avoid impacts at a local scale through the detailed design process.

At the route selection stage, four potential pipeline route alignments were identified and evaluated though a comparative assessment including assessment of Threatened species, remnant vegetation communities and watercourses from desk based resources. All southern CSM pipeline options were required to traverse extensive areas of remnant vegetation and associated significant habitats including over the Great Dividing Range. As such, the proposed route has followed existing roads and easements as far as possible to minimise impacts to biodiversity.

J4.2 Management of the mitigation process for MNES

The mitigation measures associated with the proposed pipeline are discussed below in general terms. As part of the detailed design, and prior to the start of construction, more detailed mitigation measures will be developed and presented in a biodiversity management plan relating to the construction and operation of the pipeline. The plan will include:

- detailed design of mitigation measures such as temporary fencing during construction (as required)
- general impact mitigation
- staff/contractor inductions and continuing education of staff
- pre-clearing surveys and fauna salvage/translocation
- rehabilitation and restitution of adjoining habitat
- weed control
- pest management
- rehabilitation protocols
- monitoring.

The plan will include clear objectives and actions for the pipeline including:

- minimise human interferences to flora and fauna
- minimisation of vegetation clearing/disturbance
- minimise impact to Threatened species and communities
- minimise impacts to aquatic habitats and species
- ongoing monitoring of impacts on flora and fauna.

The flora and fauna management plan will be prepared prior to construction and detail the mitigation measures and required actions. This flora and fauna management plan developed for the pipeline will be an important document for the fauna/spotter catcher and aid in enacting the 'avoid and mitigate' principles during the construction phase. The flora and fauna management plan would include detailed information such as feral animal and pest control, monitoring activities and further measures developed during detailed design measures Table J-4.

Table J-4: Summary of mitigation measures

Mitigation measure	Design	Construction	Operation
▪ Further survey is required to increase the likelihood of detecting Rare and Threatened species in the Study Area and surrounds and assess sections of the Study Area that could not be accessed during the winter surveys.	Y		
▪ Refine alignment of pipeline in light of biological knowledge and design constraints in accordance with this report.	Y		
▪ Utilise trenchless technology to cross drainage lines. Directional drilling launch and receiving pad areas should be carefully planned in order to avoid removal of mature trees. If this is not possible, the number of trees to be affected should be minimised. It is envisaged, however, that any directional drilling should take place from within the cleared easement.	Y	Y	
▪ Prepare and implement a flora and fauna management plan.	Y	Y	Y
▪ Provide for designated areas in cleared and degraded land for stockpiles and equipment lay-down to minimise the overall impact of construction and avoid unnecessary vegetation and habitat removal.	Y	Y	
▪ Conduct staff/contractor inductions on site by the ecologist/fauna spotter catcher or environmental advisor.		Y	
▪ Implement dust suppression during construction.		Y	
▪ Implement appropriate erosion and sediment control strategies.		Y	
▪ Utilise preferred seed mixes for revegetation works, ideally to be collected from the Study Area and surrounds.		Y	
▪ Develop procedure for specific targeted species searches for those Threatened species and Priority taxa considered to have potential to occur prior to any staged development. If located, consideration should be given to translocation of individuals according to guidelines from the Australian Network for Plant Conservation (Vallee *et al.* 2004) or fauna guidelines such as those in the Nature Conservation (Koala Conservation) Plan 2006 (Environmental Protection Agency & Queensland Parks and Wildlife Service 2005).		Y	Y

Mitigation measure	Design	Construction	Operation
▪ Prepare weed and feral animal management plans, including vehicle washdown procedures to limit edge effects such as the establishment of aggressive weeds, and the spread of annual and perennial exotic herbs.		Y	Y
▪ Pre-clear the disturbance areas prior to construction activities commencing in co-ordination with a trained ecologist or other qualified environmental specialist in order to: ‣ mark the limits of clearing in sensitive areas (e.g. Endangered and Of concern REs) to avoid unnecessary vegetation and habitat removal ‣ place transportable habitat features such as large logs and boulders in adjacent retained areas to allow their continuation as potential fauna refuge sites ‣ implement pre-clearing surveys for fauna. Pre-clearing involves removal of the understorey and smaller non-hollow bearing trees in order to disturb fauna and encourage them away from the clearing area.		Y	
▪ Except for trenching, vegetation clearing should involve only the removal of above-ground plant parts, with root systems and the soil profile left undisturbed.		Y	
▪ Areas not necessary for the operation of the pipeline should be rehabilitated in a progressive manner as construction proceeds. Revegetate areas to improve habitat value and visual amenity, including: ‣ planting of a range of locally occurring native shrubs, trees and groundcover plants, in keeping with the former vegetation types present. Choice of species would be in consultation with the Environmental Protection Agency (EPA) and should include Allocasuarina, Eucalyptus, Angophora and Corymbia species to compensate for any impacts to habitat of the Koala and other hollow dependant species ‣ increasing the overall vegetation cover within the proposed pipeline alignment area ‣ incorporating existing natural vegetation where possible ‣ linking vegetation remnants ‣ focusing on riparian vegetation to protect waterways ‣ excluding stock from rehabilitated areas.		Y	Y
▪ Soil that may contain seeds of exotic species should be stockpiled away from drainage lines, and vegetated areas and weed-free soil stockpiles. Weed infested stockpiles would be covered to eliminate the spread of the soil and seed during rainfall and high wind events.		Y	
▪ No materials, spoil or machinery should be stored or parked within the drip-line of any trees.		Y	
▪ The amount of open trenching should be generally limited to 100 m per crew at any one time.	Y	Y	
▪ Trenches should be backfilled so as to cover as much open trench as practicable by the end of each day's work. If this is not possible, the ends of the open trenches would be graded to allow escape for any animals that may venture into the trench. Open trenches should be inspected each morning		Y	

Mitigation measure	Design	Construction	Operation
and any trapped animal removed by someone experienced in handling animals.			
▪ Implement a flora and fauna monitoring program (as part of the greater Wandoan Coal Project flora and fauna monitoring program) aiming to better understand and manage impacts and rehabilitation actions to flora and fauna throughout the Study Area. Monitoring would also include exotic weeds and feral animals. The detailed monitoring plans would be incorporated into the flora and fauna management plan for the Wandoan Coal Project.		Y	Y

J4.2.1 Further survey

Surveys of the proposed southern CSM water supply pipeline were completed in later Winter 2008. Weather conditions during this survey period were generally cool and sub-optimal for detecting herpetofauna (reptiles and frogs). The cool dry weather and general season (late winter) is also a time of reduced vegetative growth and reproductive activity for many species of plant, particularly grasses and other herbaceous ground cover species. Further seasonal surveys should be undertaken in order to better detect threatened and rare species and inform detailed design.

J4.3 Residual impacts and offsets for MNES

Residual impacts are those that remain after implementation of the proposed pipeline and all associated mitigation and other environmental management measures have been undertaken. Residual impacts for the proposed pipeline include the removal vegetation and associated habitat. Where there is residual loss or degradation of vegetation and habitat after mine plan and infrastructure detailed design, and determination of mitigation measures, compensation in the form of compensatory habitat, land rehabilitation and/or contribution to research can be employed (i.e. offsets).

J4.3.1 Offsets

A Green Offsets Package for the proposed pipeline will be developed in consultation with EPA and DEWHA giving consideration to relevant state and Commonwealth policies relating to offsets, as outlined below.

Environmental offsets for impact on MNES

Environmental offsets for impacts on Matters of National Environmental Significance may be used to maintain or enhance the health, diversity and productivity of the environment as it relates to Matters of National Environmental Significance. Environmental offsets are not applicable to all approvals under the EPBC Act and their requirement is assessed on a case-by-case basis. Matters of National Environmental Significance recorded in the study area for which offsets may be required for the Wandoan Coal Project may include:

- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
- *Homopholis belsonii* habitat
- Brigalow Scaly-foot (*Paradelma orientalis*) habitat.

The Australian Government has identified eight principles for the use of environmental offsets under the EPBC Act. These eight principles will be used to assess any proposed environmental offsets to ensure consistency, transparency and equity under the EPBC Act. The Australian Government's position is that:

1. Environmental offsets should target the matter protected by the EPBC Act that is being impacted.
2. A flexible approach should be taken to the design and use of environmental offsets to achieve long-term and certain conservation outcomes which are cost effective for proponents.
3. Environmental offsets should deliver a real conservation outcome.
4. Environmental offsets should be developed as a package of actions — which may include both direct and indirect offsets.
5. Environmental offsets should, as a minimum, be commensurate with the magnitude of the impacts of the development and ideally deliver outcomes that are 'like for like'.
6. Environmental offsets should be located within the same general area as the development activity.
7. Environmental offsets should be delivered in a timely manner and be long lasting.
8. Environmental offsets should be enforceable, monitored and audited (Department of the Environment and Water Resources 2007).

The DEWHA define offsets as *'actions taken outside a development site that compensate for the impacts of that development — including direct, indirect or consequential impacts'* (Department of the Environment and Water Resources 2007). Actions that constitute a suitable offset will differ between projects and there is no prescriptive formula for what constitutes an adequate offset. As such, if required the DEWHA will be negotiated with through the development of the Green Offsets Package to ensure all relevant requirements are met.

Queensland Government Environmental Offsets Policy

The Queensland Government Environmental Offsets Policy aims to provide a supporting framework for environmental offsets in Queensland including principles and guidelines for using environmental offsets and guidance on when offsets should be uses. The Queensland Government Environmental Offsets Policy applies to decisions on development approvals under a range of approval processes including the IP Act, SDPWO Act and the EP Act.

The Queensland Government Environmental Offsets Policy outlines seven principles for seven policy principles that direct the way offsets must be used to contribute to environmental sustainable development (ESD) as follows:

1. Offsets will not replace or undermine existing environmental standards or regulatory requirements, or be used to allow development in areas otherwise prohibited through legislation or policy.
2. Environmental impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact.
3. Offsets must achieve an equivalent or better environmental outcome.
4. Offsets must provide environmental values as similar as possible to those being lost.
5. Offset provision should minimise the time-lag between the impact and delivery of the offset.
6. Offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values.
7. Offsets must be legally secured for the duration of the offset requirement.

The Green Offsets Package developed for the proposed pipeline will follow these principles and the guidelines of the Queensland Government Environmental Offsets Policy.

State policy for vegetation management offsetting

The requirements for offsets under state legislation fall under the subordinate policies of the VM Act and NC Act, specifically the:

- Regional Vegetation Management Code (Department of Natural Resources and Water 2006)
- Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007)
- Policy 2 of the Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006-2016 (The Koala Plan) (Environmental Protection Agency & Queensland Parks and Wildlife Service 2005).

The offsets strategy will be determined following detailed design of the proposed pipeline and based on the residual impacts once all reasonable alternatives to avoid impacts have been exhausted. This is also necessary in order to determine the minimum requirements for offsetting following the ‘maintain existing extent’ test for REs, essential habitat and conservation status thresholds under the Regional Vegetation Management Code for the Brigalow Belt and New England Tablelands Bioregions (Department of Natural Resources and Water 2006).

J5. Conclusion

The proposed southern CSM water supply pipeline will traverse a range of land uses and areas of different biodiversity value. Country in the Study Area north of Giligulgul has been largely cleared for grazing and dryland agriculture. Between Giligulgul and Miles however, the Study Area traverses the Great Dividing Range. Soils and geology associated with the Great Dividing Range are less arable and are dominated by shallow rocky or deeply weather soils. As such, country through this section of the Study Area has not been subject to as extensive broad scale and routine clearing as in the north. Vegetation associated with the Great Dividing Range forms part of a State Wildlife Corridor and also includes areas of Essential Habitat mapped under the Biodiversity Planning Assessment framework (Environmental Protection Agency 2002). Vegetation associated with the Great Dividing Range is also referred to as the Gurulmundi Special Area under the Biodiversity Planning Assessment which comprises Gurulmundi State Forest, Stones Country Resources Reserve and surrounding remnant vegetation on the escarpment west of the Leichhardt Highway. The Gurulmundi Special Area is known to provide habitat for numerous Rare and Threatened species.

Only one endangered ecological community was recorded in the study area: Brigalow (*Acacia harpophylla* dominant and co-dominant). However, only 0.6 ha of this community will be affected by the proposed pipeline. One Threatened species of animal was recorded in the Study Area: Brigalow Scaly-foot (*Paradelma orientalis*). No Threatened species of plant was recorded. However, surveys were not done in the optimum period to identify many of the Threatened species of plant that may occur in the Study Area, and eight species are considered likely to occur based on the presence of suitable habitat. An additional four Threatened species of animal were considered likely to occur in the Study Area and surrounds. Additional targeted seasonal surveys will be done to determine the location size and extent of Threatened species likely to be affected by the proposal.

Despite the efforts to avoid impacts to native vegetation and associated habitats, the proposed pipeline will result in clearing 85.8 ha of vegetation. This vegetation is primarily located along the road reserve or easement edge of large patches of vegetation and as such is generally subject to a range of edge effects. Only 0.6 ha of the vegetation is of an endangered ecological community.

Assessment of the significance of impacts associated with the proposed pipeline was done for: Threatened species that were recorded in the Study Area or considered likely to occur (moderate or high likelihood of occurrence); Migratory species (for which the Study Area is at their distributional range limit); and Endangered ecological communities. Based on the investigations undertaken to date, the proposed pipeline is considered unlikely to result in a significant impact to any Threatened species or communities. However, many of the Threatened species considered likely to occur, a local population should be considered an important population in accordance with the definition under the EPBC Act if they were recorded in the Study Area. As such, if detected during further surveys, direct impacts to these species are likely to change the conclusions of the significance assessments.

The impact assessments concluded that the proposed pipeline is unlikely to result in a significant impact to any Threatened species of plant or animal, RE or ecological community.

Nonetheless, the impacts of the proposed pipeline are acknowledged and should be reduced where possible during detailed design. Detailed mitigation measures should be developed and presented in a biodiversity management plan relating to the construction and operation of the pipeline. Furthermore, the residual impacts of the proposed pipeline should be accounted for in a Green Offsets Package.

J6. References

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